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Section 1
Load Centers

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QO Load Centers

Homeline Circuit Breakers

QO Circuit Breakers

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QO Load Center

QO™ and Homeline™ Load Center Selection Assistance

Load Center Selection Assistant

Steps to select a load center.

1. Select product type:
   - Homeline™ 1 inch format (HOM)
   - QO™ 3/4 inch format with plug-on neutral (QO) (P)
   - QO™ 3/4 inch format (QO)
2. Select enclosure type: indoor or outdoor (RB = rainproof)
3. Select single phase (1) or three phase (3)
4. Select type of main:
   - Main circuit Breaker (M)
   - Main lugs (L)
   - Generator panel (GP)
5. Select main ampacity rating
6. Select pole spaces and max. number of 1-pole, single-phase circuits
7. Select cover style:
   - Surface (box mounted on surface)
   - Surface (box mounted on surface, hinged cover included)
   - Flush (box recessed, cover is flush to wall)
8. Value pack (VP)
9. Select ground bar option:
   - Ground bar factory installed (T)
   - Ground bar included, field installation (G)
10. Select special application:
    - Riser panel with gutter
    - Mfg housing, single phase 3-wire, convertible mains
    - Manufactured housing, single phase, 3-wire
    - Manufactured housing, single phase, 2-wire

QO™ and Homeline™ Load Centers — Catalog Number Construction

QO 1 8 16 M 100 P C

Type
QO = QO
HOM = Homeline

Phase (only applies to QO)
Blank or 1 = Single-phase
3 = Three-phase

Spaces
Maximum number of full-size single-pole circuit breaker spaces.

Circuits
Maximum number of single-pole circuits when using tandem circuit breakers.
Note: Number of circuits minus number of spaces equals number of tandem circuit breakers accepted

Mains Type
M = Main circuit breaker
L = Main Lugs
MS = 300 A or 400 A main circuit breaker
MQ = Three-phase main circuit breaker
DM = Dual mains

Ampacity Mains Rating

Plug-on Neutral
P = Plug on Neutral Ready
Blank = Does not accept Plug on Neutral Circuit Breakers

Covers and Construction
C = Combination cover included
Blank = no cover, order cover separately
RB = Rainproof
T = Ground bar factory installed
G = Ground bar included, field installed
DF = Flush cover with door included
DS = Surface cover included
F = Flush cover included
FT = Feed-thru lugs factory installed
NM = Non-metallic
CU = Copper bus
GP = Generator panel
WG = Wide gutter
RBR = Rainproof accepts B-hubs with generator receptacle
EP = Service upgrade ready
VP = Value Pack with standard circuit breakers included
AF = (3) 15 A arc fault circuit breakers included
1A = (1) 15 A arc fault circuit breaker included

Additional Information

- Search "Load Centers" from our technical FAQs page: www.schneider-electric.us/en/faqs/home/
- Refer to catalog 1100CT0501.

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1Ø3W—120/240 Vac—UL Listed Main Lugs

QO120L125G

QO816L100F or S without cover

Table 1.1: Main Lugs (Accepts Only QO Plug-On Circuit Breakers)

	Mains Rating	Spaces	Max. 1P Circuits [1]	Max. Tandem Circuit Breakers	Load Center Box and Interior	Indoor Cover with Door (Order Separately)		Main Wire Size AWG/kcmil		Equipment Ground Bar Kit (Order Separately)	Box No. [2]
						Flush	Surface	Al	Cu		
INDOOR	Fixed Mains—Factory-Installed Main Lugs—10 kA Short Circuit Current Rating [3]										
	30 A	2	2	0	QO2L30S [4] [5]	Cover Included—Without Door		12–10	14–10	PK3GTA1	1
	70 A	2	4	2	QO24L70F/S [6] [7]	Cover Included—Without Door		12–3	14–4	PK4GTA	2
	100 A	6	12	6	QO612L100F/S [6] [8]	Cover Included—Without Door		8–1		PK7GTA	4
		6	12	6	QO612L100DF/S [6] [8]	Cover Included—With Door				PK7GTA	4
		8	16	8	QO816L100F/S [6] [8]	Cover Included—Without Door				PK7GTA	4
		8	16	8	QO816L100DF/S [6] [8]	Cover Included—With Door					
		6	12	6	QO612L100DFCU/SCU [6] [8] [9]	Cover Included—With Door				PK7GTA	4
		8	16	8	QO816L100DFCU/SCU [6] [8] [9]	Cover Included—With Door				PK7GTA	4
	125 A	4	8	4	QO148L125GF/S [6] [10]	Cover Included—Without Door		12–2/0	14–2/0	PK7GTA [11]	21
	Convertible Mains—Factory-Installed Main Lugs—65 kA Short Circuit Current Rating QOM1 Main Frame Size—Convertible to Main Circuit Breaker—Cu Bus [3] [12]										
	125 A	12	12	0	QO112L125G	QOC16UF	QOC16US	6–2/0		PK9GTA [11]	6
		12	24	12	QO11224L125G	QOC16UF	QOC16US			PK15GTA [11]	6
		16	16	0	QO116L125G	QOC24UF	QOC24US			PK12GTA [11]	7
		16	24	8	QO11624L125G	QOC24UF	QOC24US			PK15GTA [11]	7
		20	20	0	QO120L125G	QOC20U100F	QOC20U100S	6–2/0	6–1	PK15GTA [11]	6
		20	24	4	QO12024L125G	QOC20U100F	QOC20U100S	6–2/0	6–1	PK15GTA [11]	6
		24	24	0	QO124L125G	QOC24UF	QOC24US	6–2/0		PK15GTA [11]	7
		32	32	0	QO132L125G	QOC32UF	Use Flush			PK23GTA, LK100AN [11]	8
	Convertible Mains—Factory-Installed Main Lugs—65 kA Short Circuit Current Rating —Convertible To Main Circuit Breaker—Cu Bus [3] [12]										
	150 A	20	30	10	QO12030L150G	QOC30UF	QOC30US	6–250		PK23GTA, LK100AN [11]	9
		24	24	0	QO124L150G	QOC30UF	QOC30US			PK15GTA [11]	9
		30	30	0	QO130L150G	QOC30UF	QOC30US			PK23GTA, LK100AN [11]	9
	200 A	12	12	0	QO112L200G	QOC30UF	QOC30US	6–250		PK15GTA [11]	9
		24	36	12	QO12436L200TFT [13]	QOC40UF	QOC40US			PK23GTA, LK100AN [11]	10
		30	30	0	QO130L200G	QOC30UF	QOC30US			PK23GTA, LK100AN [11]	9
		30	40	10	QO13040L200G	QOC30UF	QOC30US			PK23GTA, LK100AN [11]	9
		40	40	0	QO140L200G	QOC40UF	QOC40US			PK23GTA, LK100AN [11]	10
		40	60	20	QO14060L200G	QOC40UF	QOC40US			(2) PK15GTA [11]	10
		42	52	10	QO14252L200G	QOC42UF	QOC42US			(2) PK15GTA [11]	11
	225 A	42	42	0	QO142L225G	QOC42UF	QOC42US	6–300		PK23GTA, LK100AN [11]	11
	Fixed Mains—Factory-Installed Main Lugs—65 kA Short Circuit Current Rating [3] [12]										
	400 A	30	30	0	QONQ30LS400 (Int) [14]	NC50NQVF	NC50NQVS	(1) 1/0–750 or (2) 1/0–300		PK27GTA [15] or PK15GTA6	15
					MH50 (box) [16]						
		42	42	0	QONQ42LS400 (Int) [14]	NC50NQVF	NC50NQVS				15
					MH50 (box) [16]						

Above listings through 200 A mains rating meet Federal Specification W-P-115C as Type 1, Class 2.

[1] Maximum single pole branch circuits utilizing QO and/or QOT circuit breakers.
[2] See Table 1.53 Knockout Information, page 1-23
[3] UL short circuit current rating depends on lowest interrupting rating of circuit breaker installed.
[4] Will not accept QO-EPD or Qwik-Gard™ QO-GFI or QO-AFI circuit breakers.
[5] Mains rated 25 A when Al wire is used.
[6] Order F for flush device or S for surface device.
[7] Use 10 AWG maximum size wire for GFI and AFI circuit breakers.
[8] 70 A Max. branch circuit breaker and 100 A max. back fed main circuit breaker.
[9] CU indicates copper bus.
[10] Copper bus.
[11] Factory-included.
[12] UL Listed 5000 A short circuit current rating for corner grounded Delta systems. Use QO-H circuit breakers only.
[13] Supplied with feed-thru lugs.
[14] Interior only, order box separately.
[15] PK27GTA includes a 6–2/0 AWG Al/Cu lug.
[16] PE1A Discount Schedule.

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QOM1 Frame Size
50–125 Amperes

QOM2 Frame Size
100–225 Amperes

1Ø, Field-Installed Main Circuit Breaker Kits

Table 1.2: QOM1 Frame Size—Use with Convertible Main Load Centers Only

Main Circuit Breaker Rating *[17]*	Convertible Load Center Mains Rating	22 k AIR *[18]* Main Circuit Breaker	Lug Wire Size *[19]* AWG/kcmil
50 A	100–125	QOM50VH	12–2/0 Al or Cu
60 A	100–125	QOM60VH	
70 A	100–125	QOM70VH	
80 A	100–125	QOM80VH	
90 A	100–125	QOM90VH	
100 A	100–125	QOM100VH	
110 A	125	QOM110VH	
125 A	125	QOM125VH	

Table 1.3: QOM2 Frame Size—Use with Convertible Main Load Centers Only

Main Circuit Breaker Rating *[17]*	Convertible Load Center Mains Rating	22 k AIR *[18]* Main Circuit Breaker *[20]*	Lug Wire Size *[19]* AWG/kcmil
100 A	150–225	QOM2100VH	4–300 Al or Cu
125 A	150–225	QOM2125VH	
150 A	150–225	QOM2150VH	
175 A	200–225	QOM2175VH	
200 A	200–225	QOM2200VH	
225 A	225	QOM2225VH	

1Ø3W—120/240 Vac—UL Listed Main Circuit Breaker

Table 1.4: Main Circuit Breaker (Accepts Only QO Plug-On Circuit Breakers.)

	Mains Rating	Spaces	Max. Single Pole Circuits *[21]*	Max. Tandem Circuit Breakers	Load Center Box and Interior	Indoor Cover with Door (Order Separately) Flush	Indoor Cover with Door (Order Separately) Surface	Main Wire Size AWG/kcmil Al or Cu	Equipment Ground Bar Kit (Order Separately)	Box No. See 1–17, page 1-22
	Convertible Mains—Factory-installed Main Circuit Breaker, 22 kA Short Circuit Current Rating, Convertible to Main Lugs (see below) or Lower Amperage Main Circuit Breaker. (See 1-5, page 1-3), *[18]* QOM1 Main Circuit Breaker Frame Size—Copper Bus									
	100 A	12	12	0	QO112M100	QOC12UF	QOC12US	6–1	PK9GTA	5
		16	16	0	QO116M100	QOC20U100F	QOC20U100S		PK12GTA	6
		20	20	0	QO120M100	QOC20U100F	QOC20U100S		PK15GTA	6
		24	24	0	QO124M100	QOC24UF	QOC24US	6–2/0	PK15GTA	7
		32	32	0	QO132M100	QOC32UF	Use Flush		PK18GTA	8
	125 A	24	24	0	QO124M125	QOC24UF	QOC24US	6–2/0	PK15GTA	7
		32	32	0	QO132M125	QOC32UF	Use Flush		PK18GTA	8
	Convertible Mains —Factory-Installed Main Circuit Breaker, 22 kA Short Circuit Current Rating Convertible to Main Lugs (see below) or Lower Amperage Main Circuit Breaker (See page 1–5, page 1-3), *[18]* QOM2 Main Circuit Breaker Frame Size—Copper Bus									
	150 A	20	30	10	QO12030M150	QOC30UF	QOC30US	4–250	PK18GTA	9
		24	24	0	QO124M150	QOC30UF	QOC30US		PK15GTA	9
		30	30	0	QO130M150	QOC30UF	QOC30US		PK18GTA	9
		32	32	0	QO132M150	QOC40UF	QOC40US		PK18GTA	10
	200 A	20	40	20	QO12040M200	QOC30UF	QOC30US	4–250	PK23GTA	9
		24	24	0	QO124M200	QOC30UF	QOC30US		PK15GTA	9
		24	36	12	QO12436M200TFT *[22]*	QOC40UF	QOC40US		PK23GTA and LK100AN *[23]*	10
		30	30	0	QO130M200	QOC30UF	QOC30US		PK18GTA	9
		30	40	10	QO13040M200	QOC30UF	QOC30US		PK23GTA	9
		40	40	0	QO140M200	QOC40UF	QOC40US		PK23GTA	10
		40	60	20	QO14060M200	QOC40UF	QOC40US		PK23GTA	10
		42	42	0	QO142M200	QOC42UF	QOC42US	4–300	PK23GTA	11
		42	52	10	QO14252M200	QOC42UF	QOC42US		PK23GTA	11
	225 A	40	40	0	QO140M225	QOC42UF	QOC42US		PK23GTA	11
		42	42	0	QO142M225	QOC42UF	QOC42US		PK23GTA	11
	Fixed Mains—Factory-installed LAL Main Circuit Breaker, 42 kA Short Circuit Current Rating *[24]*									
	300 A	42	42	0	QONQ42MS300 (int) *[25]* MH62 (box) *[27]*	NC62NQVF	NC62NQVS	(1) 4–500 or (2) 4–3/0	PK27GTA *[26]* or PK15GTA6	16
	400 A	42	42	0	QONQ42MS400 (int) *[25]* MH62 (box) *[27]*	NC62NQVF	NC62NQVS	(1) 4–500 or (2) 4–250	PK27GTA *[26]* or PK15GTA6	16

INDOOR

QO140M200

Above listings through 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.

[17] Do not exceed the load center mains rating.
[18] 22 k AIR main circuit breaker UL Listed for use ahead of QO, QOT and QO-PL 10 k AIR branch circuit breakers to permit their application on systems with up to 22 kA available fault current.
[19] Wire range listed for QOM circuit breaker kits is the wire range of that circuit breaker. To find out maximum wire size permitted in a particular load center per UL, see pages 1-5 through 1-11 under Main Wire Size.
[20] Add suffix 1021 for 120, 208 or 240 Vac shunt trip.
[21] Maximum single pole branch circuits utilizing QO and/or QOT circuit breakers.
[22] Supplied with feed-thru lugs.
[23] Factory included.
[24] UL short circuit current rating depends on lowest interrupting rating of circuit breakers installed. Also, UL Listed 5000 A short circuit current for corner grounded Delta systems. Use QO-H circuit breakers only.
[25] Interior only, order box separately.
[26] PK27GTA includes a 6–2/0 Al/Cu lug.
[27] PE1A Discount Schedule.

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QOL125

QOL225

1Ø, Field-Installed Main Lugs Kits

Table 1.5: Use with Convertible Main Load Centers Only

Main Lugs Rating *[28]*	Use on Convertible Load Center with Mains Rating	Cat. No.	Lug Wire Size *[29]* AWG/kcmil Al or Cu
125 A	100–125 A	QOL125 *[30]*	6–2/0
225 A	150–225 A	QOL225 *[30]*	6–300

Indoor, 1Ø, Main Lugs and Main Breaker

QO Plug-on Neutral Load Centers and CAFI Breakers connect are engineered for a quick Plug-on Neutral connection on every unit.

Table 1.6: QO Plug-on Neutral CAFI Load Center (accepts QO Circuit Breakers only)

		Mains Rating	Spaces	Max. 1P Circuits	Max. Tandem Breakers	Load Center Box and Interior	Indoor Cover with Door (Order Separately)		Main Wire Size AWG/kcmil	Equipment Ground Bar Kit *[31]* (Order Separately)	Box No. *[32]*
							Flush	Surface	Al/Cu		
QO154M200P	INDOOR	Convertible Mains — Factory-Installed Main Lugs — 65 kA Short Circuit Current Rating — Copper Bus QOM1 Main Frame Size, Convertible to Main Circuit Breaker									
		125 A	24	24	0	QO124L125PG	QOC24UF	QOC24US	6–2/0	PK15GTA	7
		Convertible Mains — Factory-Installed Main Lugs — 65 kA Short Circuit Current Rating — Copper Bus QOM2 Main Frame Size, Convertible to Main Circuit Breaker									
		200 A	30	30	0	QO130L200PG	QOC30UF	QOC30US	6–250	PK23GTA, LK100AN	9
		225 A	42	42	0	QO142L225PG	QOC42UF	QOC42US	6–300	(2) PK15GTA	11
			54	54	0	QO154L225PG	QOC54UF	—		PK23GTA, LK100AN	12
		Convertible Mains — Factory-Installed Main Circuit Breaker — 22 kA Short Circuit Current Rating — Copper Bus QOM1 Main Circuit Breaker Frame Size, Convertible to Main Lugs or Lower Amperage Main Circuit Breaker									
		100 A	24	24	0	QO124M100P	QOC24UF	QOC24US	6–2/0	PK15GTA	7
		Convertible Mains — Factory-Installed Main Circuit Breaker — 22 kA Short Circuit Current Rating — Copper Bus QOM2 Main Circuit Breaker Frame Size, Convertible to Main Lugs or Lower Amperage Main Circuit Breaker									
		200 A	30	30	0	QO130M200P	QOC30UF	QOC30US	4–250	PK18GTA	9
			42	42	0	QO142M200P	QOC42UF	QOC42US		PK23GTA	11
			54	54	0	QO154M200P	QOC54UF	—		PK23GTA	12
			60	60	0	QO160M200PC *[33]*	—	—		PK23GTA	24
	OUTDOOR	Convertible Mains — Factory-Installed Main Lugs — 65 kA Short Circuit Current Rating — Cu Bus QOM1 Main Circuit Breaker Frame Size, Convertible to Main Circuit Breaker — Equipment Ground Bar Included									
		125 A	24	24	0	QO124L125PGRB	—	—	6–2/0	PK15GTA	4R
		Convertible Mains — Factory-Installed Main Lugs — 65 kA Short Circuit Current Rating — Cu Bus QOM2 Main Circuit Breaker Frame Size, Convertible to Main Circuit Breaker — Equipment Ground Bar Included									
		200 A	30	30	0	QO130L200PGRB	—	—	6–250	PK23GTA, LK100AN	6R
		225 A	42	42	0	QO142L225PGRB	—	—	6–300	(2) PK15GTA	8R
		Convertible Mains — Factory-Installed Main Circuit Breaker — 22 kA Short Circuit Current Rating — Copper Bus Convertible to Main Lugs (see below) or Lower Amperage Main Circuit Breaker (See Indoor, 1Ø, Main Lugs, page 1-3), QOM1 Main Circuit Breaker Frame Size									
		100 A	24	24	0	QO124M100PRB	—	—	6–2/0	PK15GTA	4R
		Convertible Mains — Factory-Installed Main Circuit Breaker — 22 kA Short Circuit Current Rating — Copper Bus Convertible to Main Lugs (see below) or Lower Amperage Main Circuit Breaker (See Indoor, 1Ø, Main Lugs, page 1-3), QOM2 Main Circuit Breaker Frame Size									
		150 A	30	30	0	QO130M150PRB	—	—	4–250	PK18GTA	6R
		200 A	30	30	0	QO130M200PRB	—	—		PK18GTA	6R
			42	42	0	QO142M200PRB	—	—		PK23GTA	8R

[28] Do not exceed the load center mains rating.
[29] Wire range listed for QOL lug kits is the wire range of that lug. To find out maximum wire size permitted in a particular load center per UL, see Tables in QO™ Load Centers, page 1-7 and QO™ and Homeline™ Load Centers and Circuit Breakers, page 1-13 under main wire size.
[30] If main circuit breaker knockout has been removed from the load center's trim, order appropriate filler plate from Table 1.51, page 1-19
[31] Any catalog number containing the suffix 'G", ground bar factory is included. In addition to LK100AN where listed.
[32] See Indoor Knockout Information and Enclosure Dimensions, page 1-23
[33] Flush cover without a door is included. Door kit available separately, order QOCDK60.

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1Ø3W—120/240 Vac—UL Listed Main Lugs and Main Circuit Breakers

Table 1.7: Main Lugs (Accepts Only QO Plug-On Circuit Breakers.)

	Mains Rating	Spaces	Max. Single Pole Circuits *[34]*	Max. Tandem Circuit Breakers	Load Center Box and Interior	Main Wire Size AWG/kcmil Al	Main Wire Size AWG/kcmil Cu	Equipment Ground Bar Kit (Order Separately)	Box No. *[35]*
RAINPROOF	**Non-Metallic Enclosure** Fixed Mains—Factory-installed Main Lugs—10 kA Short Circuit Current Rating								
	60 A	2	4	2	QO24L60NRNM	14–4	14–4	Factory-installed	1NM
	Metallic Enclosure Fixed Mains—Factory-installed Main Lugs—10 kA Short Circuit Current Rating								
	40 A	2	2	0	QO2L40RB *[36]*	12–6	14–6	PK3GTA1	1R
	70 A	2	4	2	QO24L70RB *[36]*	12–3	14–4	PK4GTA	1R
	100 A	6	12	6	QO612L100RB*[37]*	8–1		PK7GTA	2R
		6	12	6	QO612L100TRB*[37]*			Factory-installed	2R
		8	16	8	QO816L100RB *[37]*			PK7GTA	2R
		6	12	6	QO612L100RBCU*[37] [38]*			PK7GTA	2R
		8	16	8	QO816L100RBCU*[37] [38]*			PK7GTA	2R
	125 A	4	8	4	QO148L125GRB *[38]*	12–2/0	14–2/0	PK7GTA Factory-included	15R
	Convertible Mains—Factory-installed Main Lugs—65 kA Short Circuit Current*[39][40][41]* **QOM1 Main Frame Size—Convertible to Main Circuit Breaker—Copper Bus**								
	125 A	12	12	0	QO112L125GRB	6–2/0		PK9GTA Factory-included	3R
		12	24	12	QO11224L125GRB			PK15GTA Factory-included	3R
		16	24	8	QO11624L125GRB			PK15GTA Factory-included	4R
		24	24	0	QO124L125GRB			PK15GTA Factory-included	4R
	Convertible Mains—Factory-installed Main Lugs—65 kA Short Circuit Current*[39][40][41]* **QOM2 Main Frame Size—Convertible to Main Circuit Breaker—Copper Bus**								
	150 A	30	30	0	QO130L150GRB	4–250		PK23GTA, LK100AN Factory-included	6R
	200 A	12	12	0	QO112L200GRB	4–250		PK9GTA Factory-included	5R
		30	30	0	QO130L200GRB			PK23GTA, LK100AN Factory-included	6R
		30	40	10	QO13040L200GRB			PK23GTA, LK100AN Factory-included	6R
		40	40	0	QO140L200GRB			PK23GTA, LK100AN Factory-included	7R
		40	60	20	QO14060L200GRB			(2) PK15GTA Factory-included	7R
		42	52	10	QO14252L200GRB			(2) PK15GTA Factory-included	8R
	225 A	42	42	0	QO142L225GRB	4–300		PK23GTA, LK100AN Factory-included	8R

Table 1.8: Main Circuit Breaker (Accepts Only QO Plug-On Circuit Breakers.)

	Mains Rating	Spaces	Max. Single Pole Circuits *[34]*	Max. Tandem Circuit Breakers	Load Center Box and Interior	Main Wire Size AWG/kcmil Al or Cu	Equipment Ground Bar Kit (Order Separately)	Box No. *[35]*
RAINPROOF	**Convertible Mains —Factory-installed Main Circuit Breaker, 22 kA Short Circuit Current Rating Convertible to Main Lugs (see 1Ø3W—120/240 Vac—UL Listed Main Circuit Breaker, page 1-4) or Lower Amperage Main Circuit Breaker (see 1Ø3W—120/240 Vac—UL Listed Main Lugs, page 1-3)***[41][42]* **QOM1 Main Circuit Breaker Frame Size—Copper Bus**							
	100 A	12	12	0	QO112M100RB	6–2/0	PK9GTA	3R
		16	16	0	QO116M100RB		PK12GTA	4R
		20	20	0	QO120M100RB		PK15GTA	4R
	125 A	24	24	0	QO124M125RB	6–2/0	PK15GTA	4R
	Convertible Mains —Factory-installed Main Circuit Breaker, 22 kA Short Circuit Current Rating Convertible to Main Lugs (see 1Ø3W—120/240 Vac—UL Listed Main Circuit Breaker, page 1-4) or Lower Amperage Main Circuit Breaker (see 1Ø3W—120/240 Vac—UL Listed Main Lugs, page 1-3) *[41][42]* **QOM2 Main Circuit Breaker Frame Size—Copper Bus**							
	150 A	20	30	10	QO12030M150RB	4–250	PK18GTA	5R
		30	30	0	QO130M150RB		PK18GTA	6R
	200 A	20	40	20	QO12040M200RB	4–250	PK23GTA	5R
		30	30	0	QO130M200RB		PK18GTA	6R
		30	40	10	QO13040M200GRB		PK23GTA	6R
		40	40	0	QO140M200RB		PK23GTA	7R
		40	60	20	QO14060M200RB		PK15GTA	7R
		42	42	0	QO142M200RB		PK23GTA	8R
		42	52	10	QO14252M200RB		PK15GTA	8R
	225 A	42	42	0	QO142M225RB	4–300	PK23GTA	8R
	Convertible Mains—Factory-installed Main Circuit Breaker, 22 kA Short Circuit Current Rating Convertible to Main Lugs (see 1Ø3W—120/240 Vac—UL Listed Main Circuit Breaker, page 1-4) or Lower Amperage Main Circuit Breaker (see 1Ø3W—120/240 Vac—UL Listed Main Lugs, page 1-3) *[41][42]* **QOM1 or QOM2 Main Circuit Breaker Frame Size—Copper Bus**							
	125 A	6	12	6	QO1612M125FTRB*[43]*	4–2/0	PK12GTA	3R
	150 A	8	16	8	QO1816M150FTRB*[43]*	4–250	PK15GTA-L	6R
	200 A	8	16	8	QO1816M200FTRB *[43]*	4–250	PK15GTA-L	6R

Above listings through 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.

[34] Maximum single pole branch circuits utilizing QO and/or QOT circuit breakers.
[35] See Table 1.54 Enclosure Dimensions, page 1-24Indoor Knockout Information and Enclosure Dimensions, page 1-23
[36] Use 10 AWG maximum size wire for GFI and AFI circuit breakers.
[37] 70 A Max. branch circuit breaker and 70 A max. back fed main circuit breaker.
[38] Copper bus.
[39] UL short circuit current rating depends on lowest interrupting rating of circuit breaker installed.
[40] UL Listed 5000 A short circuit current rating for corner grounded Delta systems. Use QO-H circuit breakers only.
[41] Side hinge door device; allow 1-1/4 in. on left side for door to open.
[42] 22 k AIR main circuit breaker UL Listed for use ahead of QO, QOT, QO-GFI, QO-AFI, QO-EPD and QOPL 10 k AIR branch circuit breakers to permit their application on systems up to 22 kA available fault current.
[43] QO1612M125FTRB provided with QOM1 frame main circuit breaker. QO1816M150FTRB and QO1816M200FTRB provided with QOM2 frame main circuit breaker.

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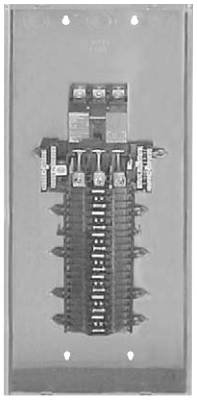
3Ø4W—208Y/120 Vac, 3Ø4W—240/120 Vac Delta and 3Ø3W—240 Vac Delta—UL Listed

Table 1.9: Main Lugs and Main Breakers (Accepts Only QO Plug-On Circuit Breakers)

	Mains Rating	Max. Number of 1P QO circuit breakers	Load Center Box and Interior	Indoor Cover with Door (Order Separately)		Main Wire Size AWG/kcmil		Equipment Ground Bar Kit (Order Separately)	Box No. See Pages 1-17, 1–18
			Cat. No.	Flush	Surface	Al	Cu		
INDOOR	**Fixed Mains—Factory-installed Main Lugs—Copper Bus—65 kA Short Circuit Current Rating** *[44]*								
	60 A	3	QO403L60NF/S	Cover Included With Load Center (No Door)		—	10–6	PK4GTA	13
	125 A	12	QO312L125G *[45]*	QOC16UF	QOC16US	6–2/0	6–2/0	Factory-incl. *[46]*	6
		20	QO320L125G *[45]*	QOC24UF	QOC24US			Factory-incl. *[46]*	7
		24	QO324L125G *[45]*	QOC24UF	QOC24US			Factory-incl. *[46]*	7
	200 A	18	QO318L200G *[45]*	QOC30UF	QOC30US	6–250	6–250	Factory-incl. *[47]*	9
		30	QO330L200G *[45]*	QOC30UF	QOC30US			Factory-incl. *[47]*	9
	225 A	42	QO342L225G *[45]*	QOC42UF	QOC42US	6–300	6–300	Factory-incl. *[47]*	11
	Convertible Mains—Factory-installed QDL Main Circuit Breaker—Copper Bus—25 kA Short Circuit Current Rating *[48]*								
	100 A	27	QO327M100 *[49]*	QOC30UF	QOC30US	4–2/0	4–2/0	PK15GTA	9
	125 A	30	QO330MQ125*[50]* *[45]*	QOC342MQF	QOC342MQS	4–300	4–300	PK18GTA	12
	150 A	30	QO330MQ150*[50]* *[45]*	QOC342MQF	QOC342MQS	4–300	4–300	PK18GTA	12
		42	QO342MQ150*[50]* *[45]*	QOC342MQF	QOC342MQS			PK23GTA	12
	200 A	30	QO330MQ200*[50]* *[45]*	QOC342MQF	QOC342MQS	4–300	4–300	PK18GTA	12
		42	QO342MQ200*[50]* *[45]*	QOC342MQF	QOC342MQS			PK23GTA	12
	225 A	42	QO342MQ225*[50]* *[45]*	QOC342MQF	QOC342MQS	4–300	4–300	PK23GTA	12
RAINPROOF	**Fixed Mains—Factory-installed Main Lugs—Copper Bus—65 kA Short Circuit Current Rating** *[44]* *[51]*								
	60 A	3	QO403L60NRB	Cover Included		—	10–6	PK4GTA	10R
	125 A	12	QO312L125GRB			6–2/0	6–2/0	Factory Incl. *[46]*	3R
		20	QO320L125GRB					Factory Incl. *[46]*	4R
	200 A	18	QO318L200GRB			6–250	6–250	Factory Incl. *[47]*	6R
		30	QO330L200GRB					Factory Incl. *[47]*	6R
	225 A	42	QO342L225GRB			6–300	6–300	Factory Incl. *[47]*	8R
	Convertible Mains—Factory-installed QDL Main Circuit Breaker—Copper Bus—25 kA Short Circuit Current Rating *[48]* *[51]*								
	100 A	27	QO327M100RB *[49]*	Cover Included		4–2/0	4–2/0	PK15GTA	6R
	125 A	30	QO330MQ125RB *[50]*			4–300	4–300	PK18GTA	14R
	150 A	30	QO330MQ150RB *[50]*			4–300	4–300	PK18GTA	14R
	200 A	30	QO330MQ200RB*[50]*			4–300	4–300	PK18GTA	14R
		42	QO342MQ200RB *[50]*					PK23GTA	14R
	225 A	42	QO342MQ225RB *[50]*			4–300	4–300	PK23GTA	14R

Above listings through 200 A mains rating meet Federal Specification W-P-115C as Type 1, Class 2.



QO342MQ200

QO312L125G

Table 1.10: 3Ø, Main Circuit Breakers

Amperage	25 k AIR	65 k AIR	100 k AIR *[52]*
Field-installed alternate main circuit breakers for QO 3Ø main circuit breaker load centers rated 70–225 A. Do not exceed the load center main rating.			
70 A	QDL32070	QGL32070	QJL32070
80 A	QDL32080	QGL32080	QJL32080
90 A	QDL32090	QGL32090	QJL32090
100 A	QDL32100	QGL32100	QJL32100
110 A	QDL32110	QGL32110	QJL32110
125 A	QDL32125	QGL32125	QJL32125
150 A	QDL32150	QGL32150	QJL32150
175 A	QDL32175	QGL32175	QJL32175
200 A	QDL32200	QGL32200	QJL32200
225 A	QDL32225	QGL32225	QJL32225

Table 1.11: 3Ø, Main Lugs Kits

Main Lugs Amperage Rating	Cat. No.	Lug Wire Size AWG/kcmil
Field-installed main lugs for convertible 3Ø main circuit breaker load centers		
125 A	QOL3125	6–2/0 Cu/Al
225 A	QOL3225	6–300 Cu/Al

[44] UL short circuit current rating depends on lowest interrupting rating of circuit breaker installed.
[45] For Certification to IEC 60439-1 contact the local Square D sales office; otherwise panels are **NOT** CE marked. (For use on 415Y/240 Vac 3-phase 4-wire, 3,000 Short Circuit Current Rating when QOXD...branch circuit breakers are used and 10,000 Short Circuit Current Rating when QO...VS branch circuit breakers are used).
[46] PK15GTA.
[47] PK23GTA and LK100AN.
[48] 25 kA short circuit current rating SSCR maximum with Square D Type QDL main circuit breaker, or 22 kA SCCR maximum with back-fed Type QO-VH main circuit breaker, feeding QO 10 k AIR branch circuit breakers.
[49] Includes factory-installed back fed QO3100VH main circuit breaker.
[50] 65 kA Short Circuit Current Rating maximum with field-installed Square D type QGL 65 k AIR minimum main circuit breaker feeding QO and Q1 10 k AIR minimum branch circuit breakers.
[51] Side hinge door device allow 1-1/4 in. on left side for door to open.
[52] When these 3P circuit breakers are used as the main circuit breaker of a 3Ø load center, the maximum AIR rating is 65 kA at 240 Vac and 100 kA at 208 Vac.

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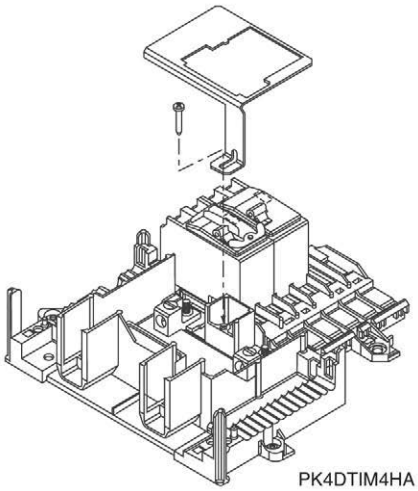
1Ø3W—120/240 Vac—UL Listed Backup Power Solutions

Table 1.12: Backup Power Solutions (Accept Only QO Plug-On Circuit Breakers.)

	Mains Rating (A)	Spaces	Max. Single Pole Circuits *[53]*	Max. Tandem Circuit Breakers	Load Center Box, Interior and Cover	Equipment Grounding Bar Kit (Order Separately)	Main Wire Size AWG/kcmil Al	Main Wire Size AWG/kcmil Cu	Box No. *[54]*
INDOOR	Generator Panels—Manual Transfer for Sub-Feed Applications NEMA 1 (Indoor)								
	Factory-Installed Main Circuit Breakers with Mechanical Interlock—10 kA Short Circuit Current Rating								
	30	4	8	4	QO48M30DSGP	PK7GTA	14–8	14–8	4
	60	4	8	4	QO48M60DSGP		8–2	8–2	4
RAINPROOF	Generator Panels—Manual Transfer with Generator Power Inlet Plug for Sub-Feed Applications NEMA 3R (Outdoor)								
	Factory-Installed Main Circuit Breakers with Mechanical Interlock—10 kA Short Circuit Current Rating								
	100	4	8	4	QO1DM10020TRBR	Factory-Installed	—	8–2	17R
		4	8	4	QO1DM10030TRBR		—		17R
		4	8	4	QO1DM10050TRBR		—		17R
INDOOR	**Generator Panel—Automatic Transfer Switch (Contact your local Square D Field Sales office for more information.)** *[55]*								
	Factory- or Field-Installed Main Circuit Breaker—22 kA Short Circuit Current Rating								
	150	38	42	42	QO13842MX150	PK23GTA	4–250	4–250	12
	200	38	42	42	QO13842MX200	PK23GTA	4–250	4–250	12
	225	38	42	42	QO13842MX225	PK23GTA	4–250	4–250	12
		38	42	42	QO13842UX225 *[56]*		4–250	4–250	12
					QOC38MXUF (Cover)	—			
3R	150	14	28	28	QO11428MX150FTRB *[57] [58]*	PK23GTA	4–250	4–250	7R
	200	14	28	28	QO11428MX200FTRB *[57] [58]*	PK23GTA	4–250	4–250	7R
		14	28	28	QO11428UX200FTRB *[56] [57] [58]*	PK23GTA	4–250	4–250	7R

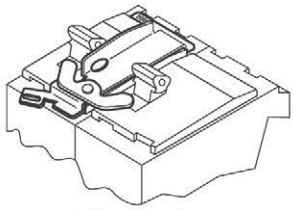
Table 1.13: QO Load Center Manual Power Transfer Accessories

	Description	Cat. No.	Schedule
Manual Transfer Equipment Kit	For interlocking the handles of two 2P or one 2P and one 1P QO and Q1 circuit breakers mounted side-by-side so that only one circuit breaker can be "ON" at a time.	QO2DTI	DE2E
	QO2DTI mechanical interlock attachment with retaining kits for securing two adjacent back-fed circuit breakers in dual power supply applications. Can be used with (2) 2P or (1) 2P and (1) 1P QO circuit breakers in QO816L100 load centers.	QO2DTIM	DE2E
	Secures two 2P circuit breakers to right side of interior when used as back-fed mains, a QO2DTI Kit included for back-up power supply applications. For 1Ø 100–125 ampere convertible main load centers. Series S01 and S02.	PK4DTIM4LA	DE3A
	Secures two 2P circuit breakers to right side of interior when used as back-fed mains, a QO2DTI Kit included for back-up power supply applications. For 1Ø 150–225 ampere convertible main load centers. Series S01 and S02.	PK4DTIM4HA	DE3A
	Secures two 2P circuit breakers to left side of interior when used as back-fed mains, a QO2DTI Kit included for back-up power supply applications. For 1Ø 100–125 ampere convertible main load centers. Series S01 and S02.	PK4DTIM4LAL	DE3A
Generator Circuit Breaker Interlock Kit	For use on "G" and "S" Series NEMA 1 and "G", "S1" and "S2" Series NEMA 3R load centers. Interlocks a QOM1 2P main circuit breaker of a load center (100–125 A) with a QO 2P (15–125 A) branch circuit breaker. Includes a retaining kit.	QOCRBGK1C	DE3A
	For use on "G" and "S" Series NEMA 1 and "G" and "S1" Series NEMA 3R load centers. Interlocks a QOM2 2P main circuit breaker of a load center (150–225 A) with a QO 2P (15–125 A) branch circuit breaker. Includes a retaining kit.	QOCGK2C	DE3A
	For use on "S2" Series NEMA 3R load centers. Interlocks a QOM2 2P main circuit breaker of a load center (150–225 A) with a QO 2P (15–125 A) branch circuit breaker. Includes a retaining kit.	QORBGK2C	DE3A



PK4DTIM4HA

QO2DTI



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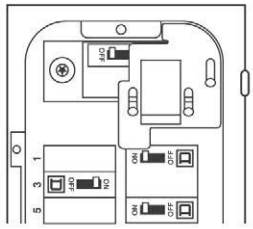

QOCGK2C Installed

[53] Maximum single pole branch circuits utilizing QO and/or QOT circuit breakers.
[54] See Indoor Knockout Information and Enclosure Dimensions, page 1-23 orRainproof, Dimensions, Knockouts and Bolt-on Hubs, page 1-24
[55] One main circuit breaker is included with panel. NEMA 1 indoor device requires cover ordered separately. Alternate source main circuit breaker (QO 125 A max.) ordered separately. Automatic Transfer Switch and Generator for secondary power source are ordered through a Kohler authorized dealer or contractor.
[56] Universal mains – No factory-installed main circuit breaker or main lugs. QOM2 frame size, field-install 22 k AIR. Main circuit breaker or main lugs (see Table 1.10 3Ø, Main Circuit Breakers, page 1-7 and Table 1.11 3Ø, Main Lugs Kits, page 1-7.
[57] Supplied with feed-thru lugs.
[58] Device is rated NEMA 3R and can be used for indoor or outdoor applications.

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1Ø2W—120Vac—1Ø3W—120/240 Vac—UL Listed

Table 1.14: QO Special Application (Accepts Only QO Plug-On Circuit Breakers.)

	Mains Rating	Short Circuit Current Rating	Spaces	Max. 1P Circuits *[59]*	Max. Tandem Circuit Breakers	Load Center *[60]* Box, Interior, and Cover	Equipment Ground Bar Kit (Order Separately)	Main Wire Size AWG/kcmil Al	Main Wire Size AWG/kcmil Cu	Box No. *[61]*
INDOOR	**Manufactured Housing:** 1Ø2W 120 Vac—Main Lugs Only—CSA Certified									
	30 A*[62]*	10 kA	2	2	0	QO2L30TTS*[63]*	Factory-installed	12–10	14–10	1
	50 A	10 kA	2	4	2	QO24L50TTS *[64]*		—	14–6	2
	1Ø2W 120 Vac—Main Circuit Breaker—CSA Certified									
	30 A	10 kA	3	5	2	QO35FM30TTF/S	Factory-installed	*[65]*		3
	1Ø3W 120/240 Vac—Main Lugs Only—CSA Certified									
	70 A	10 kA	2	4	2	QO24L70TS *[64]*		12–3	14–4	2
	100 A	10 kA	6	12	6	QO612L100TF/S *[66]*	Factory Installed	4–1		4
			6	12	6	QO612L100DTF/S *[66]*				4
			8	16	8	QO816L100TF/S *[66]*				4
			8	16	8	QO816L100DTF/S *[66]*				4
	Load Center with Cover: 1Ø3W 120/240 Vac—UL Listed Complete QO Load Center—Box, Interior and Combination Cover in One Package Convertible Mains—Factory-Installed Main Lugs *[67]*—QOM1 Main Frame Size—Convertible to Main Circuit Breaker **(See page 1-4)**—Copper Bus									
	125 A	65 kA	12	12	0	QO112L125GC	PK12GTA Incl.	6–2/0		6
		65 kA	12	24	12	QO11224L125GC	PK15GTA Incl.	6–2/0		6
		65 kA	20	20	0	QO120L125GC	PK15GTA Incl.	6–2/0	6–1	6
	Convertible Mains—Factory-Installed Main Lugs *[67]*—QOM2 Main Frame Size—Convertible to Main Circuit Breaker **(See page 1-4)**—Copper Bus									
	150 A	65 kA	30	30	0	QO130L150TC	PK23GTA, LK100AN Installed	6–250		9
	200 A	65 kA	30	40	10	QO13040L200GC	PK23GTA, LK100AN Incl.	6–250		9
	Convertible Mains—Factory-Installed Main Circuit Breaker— QOM1 Main Frame Size—Convertible to Main Lugs **(See page 1-5)** or Lower Amperage Main Circuit Breaker **(See page 1-4)**—Copper Bus *[68]*									
	100 A	22 kA	12	12	0	QO112M100C	PK9GTA	4–1/0		5
		22 kA	12	20	8	QO11220M100C	PK15GTA	4–1/0		5
		22 kA	16	16	0	QO116M100C	PK12GTA	4–1/0		6
		22 kA	20	20	0	QO120M100C	PK15GTA	4–1/0		6
	125 A	22 kA	32	32	0	QO132M125C	PK18GTA	6–2/0		8
	Convertible Mains—Factory-Installed Main Circuit Breaker— QOM2 Main Frame Size—Convertible to Main Lugs **(See page 1-5)** or Lower Amperage Main Circuit Breaker **(See page 1-4)**—Copper Bus *[68]*									
	150 A	22 kA	20	30	10	QO12030M150C	PK18GTA	4–250		9
		22 kA	30	30	0	QO130M150C	PK18GTA	4–250		9
	200 A	22 kA	20	40	20	QO12040M200C	PK23GTA	4–250		9
		22 kA	30	30	0	QO130M200C	PK18GTA	4–250		9
		22 kA	30	40	10	QO13040M200C	PK23GTA	4–250		9
		22 kA	40	40	0	QO140M200C	PK23GTA	4–250		10

Above listings through 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.

Table 1.15: Service Upgrade Load Centers: 1Ø3W 120/240Vac—UL Listed Load Center with Removable End Walls

Convertible Mains—Factory-Installed Main Breaker—22KA
QOM2 Main Frame Size—Convertible to Main Lugs or Lower Amperage Main Circuit Breaker (See page 1-8) *[68]*

	Mains Rating	Spaces	Max. 1P Circuits *[59]*	Max. Tandem Circuit Breakers	Load Center Box and Interior	Extra Long Cover with Door (Order Separately) Flush	Extra Long Cover with Door (Order Separately) Surface	Main Wire Size AWG / kcmil Al	Main Wire Size AWG / kcmil Cu	Equipment Ground Bar Kit (Order Separately)	Box No. *[61]*
INDOOR	200 A	30	60	30	HOM3060M200PCEP *[69]*	HOMC30UFL	—	4-250		PK23GTA	10
		40	40	0	QO140M200EP*[70]*	QOC40UFL	—			PK23GTA	10

Table 1.16: Auxiliary Gutter

Cat. No.	Cover	Conduit Riser Size	Width	Height	Depth
UL Listed for use with standard 1Ø and 3Ø load centers for riser applications *[71]*. For auxiliary gutter-load center compatibility, see catalog number **1100CT0501**					
SDAG26	Flush	1-3/4, 2, 2-1/2 or *[72]*3	13.50	26.12	3.75

Table 1.17: Tap Kits 120/240 Vac—UL Listed for use with Auxiliary Gutter SDAG26

Cat. N0.	Use with Auxiliary Gutter Cat. No.	Riser Wire Lug Type	Riser Wire Al/Cu Wire Size	Tap Off Wire Lug Type	Tap Off Wire Al/Cu Wire Size
SDGT30020	SDAG26	Mechanical (Included)	(2) 6 AWG–300 kcmil	Mechanical (Included)	(1) 6–2/0 AWG
SDGT300300	SDAG26	Mechanical (Included)	(2) 6 AWG–300 kcmil	Mechanical (Included)	(1) 6 AWG–300 kcmil
SDGT300C10C	SDAG26	Anderson VCEL030516H1 (Not included)	(2) 4 AWG–300 kcmil	Anderson VCEL02114S1 (Not Included)	(1) 8–1/0 AWG
SDGT300C300C	SDAG26	Anderson VCEL030516H1 (Not included)	(2) 4 AWG–300 kcmil	Anderson VCEL030516H1 (Not included)	(1) 4 AWG–300 kcmil
QOGL20Grounding Terminals	SDAG26	Mechanical (Included)	(2) 6–2/0 AWG	—	—

[59] Maximum single pole branch circuits utilizing QO and/or QOT circuit breakers.
[60] Order F for flush device or S for surface device.
[61] See Table 1.53 Knockout Information, page 1-23
[62] Mains rating 25 A when Al wire is used.
[63] Will not accept Qwik-Gard™ QO-GFI or QO-AFI circuit breaker.
[64] Use 10 AWG maximum size wire for GFI and AFI circuit breakers.
[65] Main circuit breaker is a field-installed standard QO single pole circuit breaker. Order separately from page 1-2, page 1-10.
[66] 70 A max. branch circuit breaker and 70 A max. back fed main circuit breaker.
[67] UL Listed 5000 A short circuit current rating for corner grounded Delta systems. Use QO-H circuit breakers only.
[68] 22 k AIR main circuit breaker UL Listed for use ahead of QO, QOT and QO-PL 10 k AIR branch circuit breakers to permit their application on systems with up to 22 kA available fault current.
[69] Ships with standard length cover.
[70] Copper Bus, order cover separately QOC40UF/S or QOC40UFL.
[71] One tap kit required for each riser wire.
[72] When used with B300 bolt-on hubs.

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QO 1P
1 Space Required

QO 2P
2 Spaces Required

QO 3P
3 Spaces Required

QO2200 2P 200 A
4 Spaces Required

QO Plug-On Circuit Breakers

Square D brand QO miniature circuit breakers are plug-on products for use in QO load centers, NQOD and NQ panelboards, NQOD and NQ OEM interiors or Speed-D™ switchboard distribution panels. Bolt-on QOB circuit breakers are for use in NQOD and NQ panelboards or interiors. *[1]*

The Square D exclusive Qwik-Open™ mechanism, with a trip reaction within 1/60th of a second, is standard on all 1P 15 A and 20 A QO circuit breakers.

Table 1.18: Plug-On Circuit Breakers

Amperes Rating *[2]*	1P—120/240 Vac	2P—120/240 Vac Common Trip	2P—240 Vac *[3]* Common Trip	3P—240 Vac Common Trip
10 k AIR				
10 A	QO110	QO210	—	QO310
15 A	QO115 *[4] [5]*	QO215 *[4]*	QO215H	QO315 *[4]*
20 A	QO120 *[4] [5]*	QO220 *[4]*	QO220H	QO320 *[4]*
25 A	QO125 *[4]*	QO225 *[4]*	QO225H	QO325 *[4]*
30 A	QO130 *[4]*	QO230 *[4]*	QO230H	QO330 *[4]*
35 A	QO135 *[4]*	QO235 *[4]*	—	QO335 *[4]*
40 A	QO140 *[4]*	QO240 *[4]*	QO240H	QO340 *[4]*
45 A	QO145 *[4]*	QO245 *[4]*	—	QO345 *[4]*
50 A	QO150 *[4]*	QO250 *[4]*	QO250H	QO350 *[4]*
60 A	QO160 *[4]*	QO260 *[4]*	QO260H	QO360 *[4]*
70 A	QO170 *[4]*	QO270 *[4]*	QO270H	QO370 *[4]*
80 A	—	QO280 *[4]*	QO280H	QO380 *[4]*
90 A	—	QO290 *[4]*	QO290H	QO390 *[4]*
100 A	—	QO2100 *[4]*	QO2100H	QO3100 *[4]*
110 A	—	QO2110 *[4]*	—	—
125 A	—	QO2125 *[4]*	—	—
150 A	—	QO2150 *[4] [6] [7]*	—	—
175 A	—	QO2175 *[4] [6] [7]*	—	—
200 A	—	QO2200 *[4] [6] [7]*	—	—
Molded Case Switch 60 A max.–240 Vac		—	QO200	QO300
Molded Case Switch 100 A max.–240 Vac		—	QO2000 *[8]*	QO3000 *[8]*
22 k AIR *[4]*				
15 A	QO115VH *[5]*	QO215VH *[9]*	—	QO315VH *[9]*
20 A	QO120VH *[5]*	QO220VH *[9]*	—	QO320VH *[9]*
25 A	QO125VH	QO225VH *[9]*	—	QO325VH *[9]*
30 A	QO130VH	QO230VH *[9]*	—	QO330VH *[9]*
40 A	QO140VH	QO240VH *[9]*	—	QO340VH *[9]*
50 A	QO150VH	QO250VH *[9]*	—	QO350VH *[9]*
60 A	QO160VH	QO260VH *[9]*	—	QO360VH *[9]*
70 A	QO170VH	QO270VH *[9]*	—	QO370VH *[9]*
80 A	—	QO280VH *[9]*	—	QO380VH *[9]*
90 A	—	QO290VH *[9]*	—	QO390VH *[9]*
100 A	—	QO2100VH *[9] [10]*	—	QO3100VH *[9]*
110 A	—	QO2110VH *[9] [10]*	—	—
125 A	—	QO2125VH *[9] [10]*	—	—
150 A	—	QO2150VH *[6] [9] [7]*	—	—
175 A	—	QO2175VH *[6] [9] [7]*	—	—
200 A	—	QO2200VH *[6] [9] [7]*	—	—
42 k AIR *[4]*				
40 A	—	QOH240 *[8]*	—	—
45 A	—	QOH245 *[8]*	—	—
50 A	—	QOH250 *[8]*	—	—
60 A	—	QOH26 *[8]*	—	—
70 A	—	QOH270	—	—
80 A	—	QOH280	—	—
90 A	—	QOH290	—	—
100 A	—	QOH2100	—	—
110 A	—	QOH2110 *[8]*	—	—
125 A	—	QOH2125	—	—
65 k AIR *[4]*				
15 A	QH115 *[5]*	QH215	—	QH315 *[4]*
20 A	QH120 *[5]*	QH220	—	QH320
25 A	QH125 *[8]*	QH225 *[8]*	—	QH325 *[8]*
30 A	QH130	QH230	—	QH330

Refer to page 7-2 for Interrupting Ratings, Accessories, and Dimensions.

[1] See Digest Section 1 for load centers, and Section 9 for panelboards and interiors.
[2] 10–30 A circuit breakers are suitable for use with 60ºC or 75ºC conductors. 35–125 A circuit breakers are suitable for use with 75ºC conductors.
[3] UL Listed 5 k AIR on corner grounded Delta systems.
[4] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[5] UL Listed as SWD (switching duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.
[6] Requires four spaces (1 AWG–300 kcmil Al/Cu.) Suitable for switching 120 Vac fluorescent lighting loads.
[7] Not suitable for use in 3Ø panels. Use only in 1Ø panel rated 150 A or greater.
[8] Order only. Contact your local Field Office.
[9] UL Listed for use ahead of QO, QO-GFI, QO-EPD, QOT, QO-AFI, and QO-PL 10 k AIR circuit breakers to permit their application at 22 kA fault level.
[10] 100 A maximum branch mounted opposite.

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QO/QOB Ring Terminal

Table 1.19: QO/QOB Ring Terminal—Factory-installed only

Ampere Rating	Poles	Suffix
10–30 A	1, 2, 3	5237
35–60 A	1,2	5238
35–50 A	3	
70–110 A	2	5273
60–100 A	3	

Wire Sizes for QO/QOB Circuit Breakers

Table 1.20: Wire Sizes

Circuit Breaker Type	Ampere Rating *[11]*	Wire Size (AWG/kcmil)
QO 1P	10–30 A	14–8 Al/Cu
	10–30 A	(2) 14–10 Cu
	35–70 A	8–2 Al/Cu
QO 2P	10–30 A	14–8 Al/Cu
	10–30 A	(2) 14–10 Cu
	35–70 A	8–2 Al/Cu
	80–125 A	4–2/0 Al/Cu
	150–200 A	4–300 Al/Cu
QO 3P	10–30 A	14–8 Al/Cu, (2) 14-10 Cu
	35–70 A	8–2 Al/Cu
	80–125 A	4–2/0 Al/Cu
QOB-VH	110–150 A	4–300 Al/Cu
QOT	15–20 A	12–8 Al 14–8 Cu
QO-AFI, QO-GFI or QO-EPD	15–30 A	12–8 Al 14–8 Cu
	40, 50, 60 A	12–4 Al 14–6 Cu
QO-PL	10–60 A	12–2 Al 14–2 Cu

QOT Tandem Circuit Breakers

Circuit limiting QOT tandem circuit breakers have a mounting cam as shown. Installation into a QO load center can only be made in those positions having a mounting pan rail slot. Meets Paragraph 408.54 of the NEC®. UL Listed as Class CTL

QOT 1P Tandem
1 Space Required

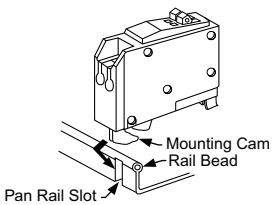

Table 1.21: QOT Tandem Circuit Breakers

Ampere Rating *[12]*	Cat. No. *[13]*
1P—120/240 Vac	
15 A and 15 A	QOT1515
15 A and 20 A	QOT1520
20 A and 20 A	QOT2020
2P—120/240 Vac Common Trip	
Order two QOT1515 or QOT2020 circuit breakers and handle tie QOTHT for common switching of center two poles.	

Replacement Tandem Circuit Breakers Includes two circuit breakers (one QO2030 and one QO3020) and handle tie QOTHT.

Table 1.22: Replacement Tandem Circuit Breakers

Ampere Rating *[12]*	Cat. No. *[13]*
1P—120/240 Vac—1 Space Required	
15 A and 15 A	QO1515
15 A and 20 A	QO1520
20 A and 20 A	QO2020
20 A and 30 A	QO2030
30 A and 20 A	QO3020
Two 1P Individual Trip—120/240 Vac—2 Spaces Required	
15 A and 15 A	Order Two QO1515 or QO2020 circuit breakers and handle tie QOTHT
15 A and 20 A	
20 A and 20 A	—
20 A and 30 A	QO20303020 *[14]*
30 A and 20 A	—

[11] 10–30 A circuit breakers are suitable for use with 60ºC or 75ºC conductors. 35–125 A circuit breakers are suitable for use with 75ºC conductors.
[12] 10–30 A circuit breakers are suitable for use with 60ºC or 75ºC conductors. 35–125 A circuit breakers are suitable for use with 75ºC conductors.
[13] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[14] Includes two circuit breakers (one QO2030 and one QO3020) and handle tie QOTHT.

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1P
QO-CAFI
Plug-On Neutral

1P
QO-CAFI
Pigtail

QO Arc-Fault Circuit Breaker

QO arc-fault circuit breakers provide protection for Series and Parallel Type Arcing as required by the NEC and local code adoption, and comply with UL1699.

Table 1.23: QO Arc Fault Circuit Breakers (One-Pole)

Circuit Breaker Type *[15]*	Ampere Rating	One–Pole 120 Vac		Two–Pole 120/240 Vac	
		10 k AIR 1 Space Required	22 k AIR 1 Space Required	10 k AIR 2 Space Required	22 k AIR 2 Space Required
Combination Arc-fault Interrupter (Pigtail Neutral)	15 20	QO115CAFI QO120CAFI	QO115VHCAFI QO120VHCAFI	QO215CAFI *[16]* QO220CAFI *[16]*	QO215VHCAFI *[16]* QO220VHCAFI *[16]*
Plug-On Neutral Combination Arc-fault Interrupter	15 20	QO115PCAFI QO120PCAFI	QO115VHPCAFI QO120VHPCAFI		

1P QO-DF
Plug-on Neutral

1P QO-DF
Pigtail

QO-Dual Function Circuit Breaker

QO Combination Arc Fault and Ground Fault Circuit Interrupters (Dual Function) provide overload and short circuit protection, plus arc fault and ground fault protection in accordance with the NEC, UL1699 and UL943.

Table 1.24: QO-Dual Function Arc Fault Circuit Breakers

Circuit Breaker Type *[17]*	Ampere Rating	1P 120 Vac 10 k AIR 1 Space Required	1P 120 Vac 22 k AIR 1 Space Required
Combination Arc-fault and Ground Fault Circuit Interrupter (Pigtail Neutral)	15 20	QO115DF QO120DF	QO115VHDF QO120VHDF
Plug-On Neutral Combination Arc-fault and Ground Fault Circuit Interrupter	15 20	QO115PDF QO120PDF	QO115VHPDF QO120VHPDF

1P
QO-GFI

2P
QO-GFI

QO-GFI

Qwik-Gard™ circuit breakers provide overload and short circuit protection, combined with Class A ground fault protection. Class A denotes a ground fault circuit interrupter that will trip when a fault current to ground is 6 mA or more, for people protection. Do not connect to more than 250 feet of load conductor for the total one-way run to prevent nuisance tripping.

Table 1.25: QO-GFI Circuit Breakers

Ampere Rating *[18]*	Qwik-Gard Circuit Breakers With Ground Fault Circuit Interrupter			
	1P 120 Vac		2P Common Trip 120/240 Vac	3P Common Trip 208Y/120 Vac
	10 k AIR 1 Space Required	22 k AIR 1 Space Required	10 k AIR 2 Spaces Required	10 k AIR 3 Spaces Required
15	QO115GFI	QO115VHGFI	QO215GFI	QO315GFI
20	QO120GFI	QO120VHGFI	QO220GFI	QO320GFI
25	QO125GFI	QO125VHGFI	QO225GFI	—
30	QO130GFI	QO130VHGFI	QO230GFI	QO330GFI
40	—	—	QO240GFI	QO340GFI
50	—	—	QO250GFI	QO350GFI
60	—	—	QO260GFI *[19]*	—

QO 1P
With Shunt Trip

QO-EPD/EPE

QO-EPD/EPE circuit breakers provide overload and short circuit protection combined with Class B ground fault protection. They are designed to provide ground fault protection of equipment at a 30 mA level (EPD) or 100 mA level (EPE). They are not designed to protect people from electrical shock.

Table 1.26: QO-EPD Circuit Breakers

Ampere Rating *[20]*	1P 120 Vac 10 k AIR 1 Space Required	2P Common Trip 120/240 Vac 10 k AIR 2 Spaces Required	3P Common Trip 240 Vac 10 k AIR 3 Spaces Required	
15	QO115EPD	QO215EPD	QO315EPD *[21]*	QO315EPE *[21]*
20	QO120EPD	QO220EPD	QO320EPD *[21]*	QO320EPE *[21]*
25	QO125EPD	QO225EPD	—	—
30	QO130EPD	QO230EPD	QO330EPD *[21]*	QO330EPE *[21]*
40	—	QO240EPD	QO340EPD *[21]*	QO340EPE *[21]*
50	—	QO250EPD	QO350EPD *[21]*	QO350EPE *[21]*
60	—	QO260EPD *[22]*	—	—

[15] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[16] For 120/240 V only, not for 208Y/120 V.
[17] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[18] 10–30 A circuit breakers are suitable for use with 60ºC or 75ºC conductors. 35–60 A circuit breakers are suitable for use with 75ºC conductors.
[19] Suitable only for feeding 240 Vac and 208 Vac two-wire loads. Does not contain load neutral connection.
[20] 10–30 A circuit breakers are suitable for use with 60ºC or 75ºC conductors. 35–60 A circuit breakers are suitable for use with 75ºC conductors.
[21] See note in Instruction Bulletin when using in an enclosure with a QO403 or QON prefix.
[22] Suitable only for feeding 240 Vac and 208 Vac two-wire loads. Does not contain load neutral connection.

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Two-wire
QO-SWN

Three-wire
QO-SWN

QO-SWN

Switch Neutral Common Trip 2008 NEC® 514.11

Table 1.27: QO-SWN Circuit Breakers

Ampere Rating *[23]*	2 Wire 120 Vac 10 k AIR 2 Spaces Required	3 Wire 120/240 Vac 10 k AIR 3 Spaces Required
10	QO210SWN	QO310SWN
15	QO215SWN	QO315SWN
20	QO220SWN	QO320SWN
25	QO225SWN	QO325SWN
30	QO230SWN	QO330SWN
40	QO240SWN	QO340SWN
50	QO250SWN	QO350SWN

QO-HID

HID circuit breakers are for use on circuits feeding fluorescent and high intensity discharge (HID) lighting systems such as mercury vapor, metal halide, or high pressure sodium. These circuit breakers are physically interchangeable with QO circuit breakers.

Table 1.28: QO-HID Circuit Breakers

Ampere Rating *[23]*	1P 120/240 Vac 10 k AIR 1 Space Required	2P Common Trip 120/240 Vac 10 k AIR 2 Spaces Required	3P Common Trip 240 Vac 10 k AIR 3 Spaces Required
15	QO115HID *[24]*	QO215HID	QO315HID
20		QO220HID	QO320HID
25	QO125HID	QO225HID	QO325HID
30	QO130HID	QO230HID	QO330HID
40	QO140HID	QO240HID	—
50	QO150HID	QO250HID	—

QO-K

Key operated QO circuit breakers are available in single-pole construction and can be mounted in any single-pole space which will accept a standard QO. These circuit breakers can be turned ON or OFF or to RESET with a special key (catalog number QOK10) included with the circuit breaker. These circuit breakers are UL Listed and available as shown in the table.

QO-K Key Operated

Table 1.29: QO-K Circuit Breakers

120 Vac—10 k AIR (1 Space Required)			
Ampere Rating *[23]*	Cat. No.	Ampere Rating *[23]*	Cat. No.
10 15 20	QO110K QO115K QO120K	25 30	QO125K QO130K

QO-HM

High magnetic trip circuit breakers are recommended for applications where high initial inrush may occur and for individual dimmer applications.

Table 1.30: QO-HM Circuit Breakers

120 Vac—10 k AIR	
Ampere Rating *[23]*	1P
15 A	QO115HM *[25] [26]*
20 A	QO120HM *[25] [26]*

Non-Automatic (Standard) Miniature Switches

Miniature non-automatic switches have the same physical packaging as miniature circuit breakers, but open only when the handle is switched to the OFF position.

Non-automatic switches provide no overcurrent protection or short circuit protection. They must not be used on systems that have an available fault current greater than the values listed in the table. Non-automatic switches are UL Listed per UL 1087 and are CSA certified.

Table 1.31: QO Non-Automatic Miniature Switches, 240 Vac 10 kA

Ampere Rating	2P	3P
60	QO200	QO300
100	QO2000	QO3000

[23] 10–30 A circuit breakers are suitable for use with 60oC or 75oC conductors. 35–60 A circuit breakers are suitable for use with 75oC conductors.
[24] UL Listed as SWD (switching duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.
[25] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[26] UL Listed as SWD (switching duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.

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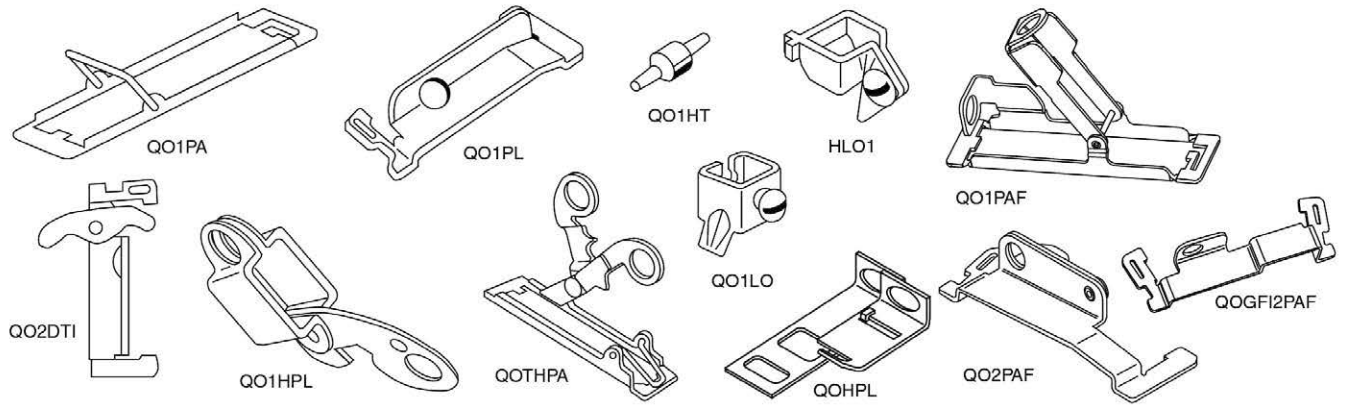
Accessories for QO/QOB Circuit Breakers

Table 1.32: Accessories for use with QO and QOB Miniature Circuit Breakers

Description		Cat. No.	Schedule
Handle Attachments			
Handle Tie	Converts any two adjacent 120/240 Vac 1P QO circuit breakers to independent trip 2P Converts any two adjacent 120/240 Vac1P side-by-side QOT circuit breakers to independent trip 2P	QO1HT QOTHT	DE2E DE2E
Handle Clamp	Clamp for holding QO 1P handle in ON or OFF position Clamp for holding QO or Q1 either 1P, 2P or 3P circuit breaker handles in ON or OFF position	QO1LO HLO1	DE2E DE2E
Handle Padlock Attachment for Padlocking in ON or OFF position	For padlocking 1P QO circuit breaker in ON or OFF position Loose attachment Fixed attachment	QOHPL QO1PA	DE2E DE2E
	For padlocking 1P side-by-side QOT circuit breaker in ON or OFF position	QOTHPA	DE2E
	For padlocking 2P QO-GFI circuit breakers in either ON or OFF position, fixed attachment.	GFI2PA	DE2A
	For 2P and 3P QO and Q1 standard circuit breakers which require padlocking in either ON or OFF position. Loose attachment Fixed attachment	QO1HPL QO1PL	DE2E DE2E
Handle Padlock Attachment for Padlocking in OFF position	For padlocking 1P QO circuit breaker in OFF position only, fixed attachment.	QO1PAF	DE2E
	For padlocking 2P and 3P QO circuit breakers in OFF position only, fixed attachment.	QO2PAF	DE2E
	For padlocking 1P QO-GFI, QO-CAFI, QO-DF and QO-EPD circuit breakers in OFF position only, fixed attachment.	QOGFI1PAF	DE2E
	For padlocking 2P QO-GFI, QO-CAFI and QO-EPD circuit breakers in OFF position only, fixed attachment.	QOGFI2PAF	DE2E
Ring Terminal	Ring terminals are available as a factory-installed option.	See page 7–10	DE2A
Sub-feed Lugs	60 A 2P plug-on – 2 spaces required (6–2 Al/Cu) 125 A 2P plug-on – 2 spaces required (12–2/0 Al/Cu) 225 A 2P plug-on – 4 spaces required (4–300 Al/Cu) 125 A 3P plug-on – 3 spaces required (12–2/0 Al/Cu)	QO60SL QO2125SL QO2225SL *[27]* QO3125SL	DE2A DE2A DE2A DE3
Mechanical Interlock Attachment	For interlocking the handles of two 2P or one 2P and one 1P QO and Q1 circuit breakers mounted side-by-side so that only one circuit breaker can be ON at a time (Not QOU)	QO2DTI	DE2E
With Retaining Kit	QO2DTI mechanical interlock attachment with retaining kits for securing two adjacent back-fed circuit breakers in dual power supply applications. Can be used with (2) 2Ps or (1) 2P and (1) 1P QO circuit breakers in QO816L100 load centers.	QO2DTIM	DE2E



Factory-Installed Accessories for use with QO and QOB Miniature Circuit Breakers

Factory-installed electrical accessories take up an additional pole space on QO, QO-GFI, QO-EPD, QO-SWN and QOU circuit breakers. All AC electrical accessories shown below are rated for 50/60 Hz. Accessories are not available for QOB-VH (2P 150 A and 3P 110–150 A) circuit breakers or QO, QOU molded case switches. QO circuit breakers will accept only one accessory per circuit breaker. Undervoltage trip is not available on miniature circuit breakers. Factory-installed accessories are not available for QO-AFI or QO-CAFI Arc Fault Circuit Breakers or on QO2150, QO2175, or QO2200 circuit breakers.

Table 1.33: Factory-Installed Accessories

Accessory	Description	Rated Voltage	Coil Burden	Cat. No. Suffix	Acces-sory	Description	Contact Comb.	Max. Voltage	Max.	Cat. No. Suffix
Shunt Trip	Trips the circuit breaker from a remote location by means of a trip coil energized from a separate circuit. A 120 Vac shunt trip will operate at 55% or more of rated voltage. All other shunt trips will operate at 75% or more of rated voltage. **Application** • For use with momentary or maintained push button. • Not available on QO-GFI, QO-EPD. • Shunt trip terminals accept (2) 0.14– 0.12 AWG Cu.	12 Vac/Vdc 24 Vac/Vdc	60 VA 168 VA	-1042	Auxiliary Switches	Monitors circuit breaker contact status and provides a remote signal indicating the circuit breaker contacts are OPEN or CLOSED. **Application** • Auxiliary switch terminals accept (2) 14–12 AWG Cu leads. • Leads (EH): Yellow for "A", Blue for "B", Striped common 18 AWG Cu.	1A 1B	120 Vac 120 Vac	5 A 5 A	-1200 -1201
		120 Vac 208 Vac 240 Vax	72 VA 228 VA 288 VA	-1021	Alarm Switches	Used with control circuits and is actuated only when the circuit breaker has tripped. Standard construction includes a normally-open contact. **Application** • Leads: Alarm switch terminals accept (2) 14–12 AWG Cu leads.	1A	120 Vac	5 A	-2100

[27] Not suitable for use in 3Ø panels. Use only in 1Ø panel rated 150 A or greater.

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1Ø3W—120/240 Vac—UL Listed

Table 1.34: Value Packs Contains Complete Load Center (Box, Interior and Cover) with Selected Branch Circuit Breaker

	Mains Rating	Spaces	Max. 1P Circuits *[1]*	Max. Tandem Circuit Breakers	Load Center Box, Interior, Cover and Branch Circuit Breakers		Equipment Ground Bar Kit (Order Separately)	Main Wire Size AWG/kcmil Al/Cu		Box No. *[2]*
					Cat. No.	Included Load Center/Circuit Breakers	Cat. No.			
INDOOR	QO (Accepts Only QO Plug-On Circuit Breakers) QO—Copper Bus Convertible Mains—Factory-Installed Main Circuit Breaker, 22 kA Short Circuit Current Rating Convertible appropriate to Main Lugs (See 1Ø, Field-Installed Main Lugs Kits, page 1-5) or QOM Main Circuit Breaker (See 1Ø, Field-Installed Main Circuit Breaker Kits, page 1-4)									
	125 A	24	24	0	QO124L125PGCVP	(1) QO124L125PGC, (3) QO120, (2) QO230	PK15GTA	6–2/0		7
	225 A	42	42	0	QO142L225PGCVP	(1) QO142L225PGC, (3) QO120, (2) QO230	(2) PK15GTA	6–300		12
	Convertible Mains—Factory-Installed Main Circuit Breaker, 22 kA Short Circuit Current Rating Convertible appropriate to Main Lugs or Main Circuit Breaker (See 1Ø3W—120/240 Vac—UL Listed, page 1-19)									
	125 A	24	24	0	QO124M100PCVP	(1) QO124M100PC, (3) QO120, (2) QO230	PK15GTA	6–2/0		7
		32	32	0	QO32M100VP	(1) QO132M100C, (3) QO120, (2) QO230	PK18GTA	4–2/0		8
	200 A	30	40	10	QO3040M200VP	(1) QO13040M200C, (3) QO120, (2) QO230	PK23GTA	4–250		9
		42	42	0	QO142M200PCVP	(1) QO142M200PC, (3) QO120, (2) QO230	PK23GTA			11
		42	42	0	QO142M200PCAFVP	(1) QO142M200PC, (3) QO120, (2) QO230, (3) QO115PCAFI	PK23GTA			11
	Homeline (Accepts Only HOM Plug-On Circuit Breakers) Convertible Mains—Factory-Installed Main Lugs, 10 kA Short Circuit Current Rating Convertible to appropriate QOM 22 kA Short Circuit Current Rating Main Circuit Breaker (See 1Ø3W—120/240 Vac—UL Listed, page 1-19)									
	125 A	12	24	12	HOM1224L125PGCVP	(1) HOM1224L125PGC, (2) HOM120	PK15GTAL	6–2/0	6–1	6
	225 A	30	60	30	HOM3060L225PGCVP	(1) HOM3060L225PGC, (3) HOM120, (2) HOM230	PK15GTAL PK15GTA	4–300	4–250	10
	Convertible Mains—Factory-Installed Main Circuit Breaker, 22 kA Short Circuit Current Rating Convertible appropriate to Main Lugs or Main Circuit Breaker (See 1Ø3W—120/240 Vac—UL Listed, page 1-19)									
	100 A	20	40	20	HOM2040M100PCVP	(1) HOM2040M100PC, (2) HOM120, (1) HOM230	PK18GTA	6–1	6–3	7
		20	40	20	HOM2040M100PC1AVP	(1) HOM2040M100PC, (2) HOM120, (1) HOM230, (1) HOM115PCAFI	PK18GTA	6–1	6–3	7
		24	48	24	HOM2448M100PCVP	(1) HOM2448M100PC, (3) HOM120, (2) HOM230	PK23GTA	6–2/0	6–1/0	8
	150 A	30	30	30	HOM3060M150PCVP	(1) HOM3060M150PC, (3) HOM120, (2) HOM230	PK23GTA	4–250		
	200 A	20	40	20	HOM2040M200PCVP	(1) HOM2040M200PC, (3) HOM120, (2) HOM230	PK18GTA	4–250		9
		30	60	30	HOM3060M200PCVP	(1) HOM3060M200PC, (3) HOM120, (2) HOM230	PK23GTA			10
		30	60	30	HOM3060M200PC1AVP	(1) HOM3060M200PC, (3) HOM120, (2) HOM230, (1) HOM115PCAFI	PK23GTA			10
		30	60	30	HOM3060M200PCAFVP	(1) HOM3060M200PC, (3) HOM120, (2) HOM230, (3) HOM115PCAFI	PK23GTA			10
		40	80	40	HOM4080M200PCVP	(1) HOM4080M200PC, (3) HOM120, (2) HOM230	PK27GTA			12
		40	80	40	HOM4080M200PC1AVP	(1) HOM4080M200PC, (3) HOM120, (2) HOM230, (1) HOM115PCAFI	PK27GTA			12
		40	80	40	HOM4080M200PCAFVP	(1) HOM4080M200PC, (3) HOM120, (2) HOM230, (3) HOM115PCAFI	PK27GTA			12
RAINPROOF	Homeline (Accepts Only HOM Plug-On Circuit Breakers) Convertible Mains—Factory-Installed Main Circuit Breaker, 22 kA Short Circuit Current Rating Convertible to Main Lugs or Lower Amperage QOM2 Main Circuit Breaker (See 1Ø3W—120/240 Vac—UL Listed, page 1-19)									
	125 A	12	24	12	HOM1224M125PRBVP	(1) HOM1224M125PRB, (3) HOM120, (2) HOM230	PK23GTA	6–2/0	6–1	3R
	200 A	30	60	30	HOM3060M200PRBVP	(1) HOM3060M200PRB, (3) HOM120, (2) HOM230	PK23GTA	4–250		7R

QO Riser Panels

Table 1.35: Offset Interior for Wide Gutter—30 A Maximum Branch Circuit Breaker on left side of interior *[3] [4]*
(Accepts Only QO Plug-On Circuit Breakers)

	Mains Rating	Spaces	Max. Single Pole Circuits *[5]*	Max. Tandem Circuit Breakers	Load Center Box and Interior	Load Center Cover	Equipment Ground Bar Kit (Order Separately)	Main Wire Size AWG/kcmil		Box No. *[6]*
								Al	Cu	
INDOOR	Convertible Mains—Factory-Installed Main Lugs, 65 kA Short Circuit Current Rating Convertible to QOM1 22 kA Short Circuit Current Rating Main Circuit Breaker (See Indoor, 1Ø, Main Lugs, page 1-3) when used with QOC cover below—Copper Bus									
	125 A	12	24	12	QO11224L125WG	QOC20UFWG	PK15GTA	6–2/0		14
		20	30	10	QO12030L125WG	QOC20UFWG	PK15GTA			14
	Convertible Mains-Factory—Installed Main Lugs, 65 kA Short Circuit Current Rating Convertible to QOM2 22 kA Short Circuit Current Rating Main Circuit Breaker (See Indoor, 1Ø, Main Lugs, page 1-3) when used with QOC cover below—Copper Bus									
	200 A	30	40	10	QO13040L200WG	QOC30UFWG	PK23GTA	4–250		23
	Convertible Mains—Factory-Installed Main Circuit Breaker, 22 kA Short Circuit Current Rating Convertible to Main Lugs (See Indoor, 1Ø, Main Circuit Breaker, page 1-4) or Lower Amperage QOM2 Main Circuit Breaker (See Indoor, 1Ø, Main Lugs, page 1-3) when used with QOC cover below—Copper Bus									
	200 A	24	24	0	QO124M200WG125 *[7]*	QOC30UFWG	PK23GTA	4–250		23

Above listings through 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.

Mains Rating of Load Center	Cat. No.
125 A	NQC20FWG
200 A	NQC30FWG

Panelboard-style Covers for Riser Panels

Mono-Flat™ Front available for riser panels as an alternative to standard load center cover listed above. Provides a low-profile, aesthetically pleasing solution for high-traffic areas in upscale multi-family applications. Deadfront included. Lock kit not provided. Cover NQC30FWG CANNOT be used when panel has been converted to a main circuit breaker panel. *[8]*

[1] Maximum single pole branch circuits utilizing QO and/or QOT circuit breakers.
[2] See Indoor, Dimensions and Knockouts, page 1-23 or Rainproof, Dimensions, Knockouts and Bolt-on Hubs, page 1-24
[3] UL short circuit current rating depends on lowest interrupting rating of circuit breaker installed.
[4] UL Listed 5000 A short circuit current rating for corner grounded Delta systems. Use QO-H circuit breakers only.
[5] Maximum single pole branch circuits utilizing QO and/or QOT circuit breakers.
[6] See Indoor Knockout Information and Enclosure Dimensions, page 1-23
[7] Comes with 125 A main circuit breaker factory installed.
[8] Order catalog number PK4FL for field-installed lock kit.

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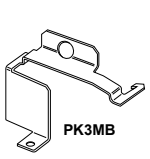
QO Load Center Accessories

Table 1.36: QO Load Center Accessories

Description		Cat. No.	Schedule
Retaining Kit for Breakers Used as Back-fed Mains	Secures circuit breaker to interior when used as a back-fed main. For QO612L100F/S, RB, QO612L100DF/S, QO816L100F/S, RB, QO816L100DF/S and QO148L125GF/S, GRB load centers	PK2MB	DE3A
	Secures 3P circuit breaker without accessories to left side of interior when used as a back-fed main. For 3Ø load centers	PK3MB	DE3A
	Secures circuit breaker to interior when used as a back-fed main for 2P QO 150–200 A circuit breakers	PK5RK	DE3A
	Secures ONE circuit breaker with or without electrical accessories to right side of interior when used as a back-fed main For 1Ø 100–125 ampere convertible main load centers. Series S01 and S02	PK4MB2LA	DE3A
	Secures ONE circuit breaker with or without electrical accessories to right side of interior when used as a back-fed main For 1Ø 150–225 ampere convertible main load centers. Series S01 and S02	PK4MB2HA	DE3A
Cover Sealing Strap	Provides means of sealing trim mounting screws on QO load center covers	QO1SE	DE3A
Replacement Cover Directory Label	1 through 42 numbered universal replacement directory label for load center covers	LSDL	DE5
Circuit Identification Stickers	Circuit identification stickers for use on cover directory labels to identify branch circuits	PSDS	DE5
Filler Plates	Fills opening in covers if twistout is removed in error	QOFP	DE3A
	Fills main circuit breaker opening in convertible load center covers 100–125 A	QOM1FP	DE3A
	Fills main circuit breaker opening in convertible load center covers 150–225 A	QOM2FP	DE3A
	Fills main circuit breaker opening in 3Ø load center covers (S01 and S02 Series)	KFP	DE3A
	Fills main circuit breaker opening in “Q” style 3Ø load center covers (S03 Series)	Q2FP	DE3A
Door Lock Kits	Use with QO612L100DF/S, QO612L100DFCU/SCU, QO612L100DTF/S, QO816L100DF/S, QO816L100DFCU/SCU, QO816L100DTF/S, QO48M30DSGP, or QO48M60DSGP	PK8FL *[1]*	DE3A
	Use with convertible mains, 1Ø and 3Ø 100–225 A, and fixed mains, 3Ø 125–225 A indoor load centers	PK6FL	DE3A
	Use with 300 and 400 ampere indoor load centers	PK4FL	PE1A
Neutral / Ground Lugs	Field-installed for 12– 2 Al or 14–4 Cu AWG wire	LK70AN	DE3A
	Field-installed for 6–2/0 Al/Cu AWG wire	LK100AN	DE3A
	Field-installed for 14–2/0 Al/Cu AWG wire	LK125AN	DE3A
	Field-installed for 2–3/0 Al/Cu AWG wire	LK150AN	DE3A
	Field-installed for 4 AWG to 300 kcmil Al/Cu wire. Use in Series S, 150-225A QO load center or S03 and below, 150-225A HOM load center	LK225AN LK225ANHOM	DE3A
Ground Bar Kits	Standard PK15GTA with a 1–4/0 Al/Cu Lug	PK15GTAL	DE3A
	Standard PK18GTA with a 1–4/0 Al/Cu Lug	PK18GTAL	DE3A
	Standard PK23GTA with a 1–4/0 Al/Cu Lug	PK23GTAL	DE3A
	Insulator Kit for PK7GTA through PK27GTA	PKGTAB	DE3A
Handle Padlock Attachment	For padlocking main circuit breakers in convertible load centers OFF	50–125 A QOM1PA	DE2E
		100–225 A QOM2PA	DE2E
Service Entrance Barriers	QO / Homeline 1Ø 100–125 A QOM1 convertible main load centers	PKSB1LA	DE3A
	QO / Homeline 1Ø 150–225 A QOM2 convertible main load centers	PKSB1HA	DE3A
	QO 3Ø convertible main load centers	PKSB3	DE3A
	QO 1Ø back-fed main breaker applications	PKSB1QOBF	DE3A
	QO 3Ø back-fed main breaker applications	PKSB3BF	DE3A
QO Load Center Manual Power Transfer Accessories			
Manual Transfer Equipment Kit	For interlocking the handles of two 2P or one 2P and one 1P QO and Q1 circuit breakers mounted side-by-side so that only one circuit breaker can be “ON” at a time.	QO2DTI	DE2E
	QO2DTI mechanical interlock attachment with retaining kits for securing two adjacent back-fed circuit breakers in dual power supply applications. Can be used with (2) 2P or (1) 2P and (1) 1P QO circuit breakers in QO816L100 load centers.	QO2DTIM	DE2E
	Secures two 2P circuit breakers to right side of interior when used as back-fed mains, a QO2DTI Kit included for back-up power supply applications. For 1Ø 100–125 ampere convertible main load centers. Series S01 and S02.	PK4DTIM4LA	DE3A
	Secures two 2P circuit breakers to right side of interior when used as back-fed mains, a QO2DTI Kit included for back-up power supply applications. For 1Ø 150–225 ampere convertible main load centers. Series S01 and S02.	PK4DTIM4HA	DE3A
	Secures two 2P circuit breakers to left side of interior when used as back-fed mains, a QO2DTI Kit included for back-up power supply applications. For 1Ø 100–125 ampere convertible main load centers. Series S01 and S02.	PK4DTIM4LAL	DE3A
Generator Circuit Breaker Interlock Kit	For use on “G” and “S” Series NEMA 1 and “G”, “S1” and “S2” Series NEMA 3R load centers. Interlocks a QOM1 2P main circuit breaker of a load center (100–125 A) with a QO 2P (15–125 A) branch circuit breaker. Includes a retaining kit.	QOCRBGK1C	DE3A
	For use on “G” and “S” Series NEMA 1 and “G” and “S1” Series NEMA 3R load centers. Interlocks a QOM2 2P main circuit breaker of a load center (150–225 A) with a QO 2P (15–125 A) branch circuit breaker. Includes a retaining kit.	QOCGK2C	DE3A
	For use on “S2” Series NEMA 3R load centers. Interlocks a QOM2 2P main circuit breaker of a load center (150–225 A) with a QO 2P (15–125 A) branch circuit breaker. Includes a retaining kit.	QORBGK2C	DE3A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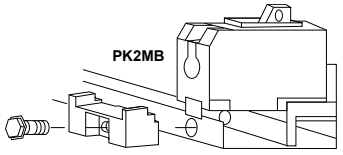
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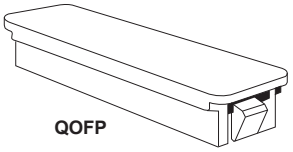
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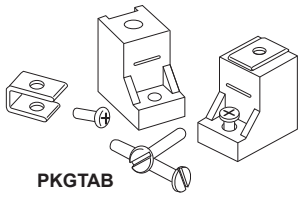
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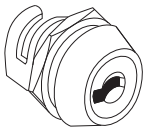
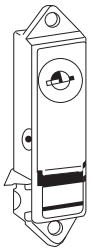

PK6FL and PK8FL


PK4FL

[1] QO403L60NF/S does not have provisions for a field-installed lock.

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Homeline Load Center Accessories

Table 1.37: Homeline Load Center Accessories

Description			Cat. No.	Schedule
Handle Padlock Attachment	For padlocking main circuit breakers in convertible load center, “OFF”	50–125 A	QOM1PA	DE2E
		100–225 A	QOM2PA	DE2E
Filler Plates	Fills opening in covers if twistout is removed in error		HOMFP	DE3C
	Fills main circuit breaker opening in convertible load centers	100–125 A	QOM1FP	DE3A
		150–225 A	QOM2FP	DE3A
Neutral / Ground Lugs	Field-installed for 14–2 AWG Al or 14–4 AWG Cu wire		LK70AN	DE3B
	Field-installed for 6–2/0 AWG Al/Cu wire		LK100AN	DE3B
	Field-installed for 14–2/0 AWG Al/Cu wire		LK125AN	DE3B
	Field-installed for 4 AWG to 300 kcmil Al/Cu wire. Use in Series S, 150-225A QO load center or S03 and below, 150-225A HOM load center		LK225AN	DE3A
	Field-installed for 4 AWG–300 kcmil Al/Cu wire. Use in Series S04, 150–225 A HOM load center		LK225ANHOM	DE3A
Retaining Kit for Breakers Used as Back-fed Mains	Secures circuit breaker to interior when used as a back-fed main. For HOM612L100F/S, RB and HOM48L125GC, GRB load centers		HOM1RK	DE3C
	Secures ONE circuit breaker right side of interior when used as a back-fed main For 100–125 A convertible main load centers, Series S01 and S02		HOM4RK2LA	DE3C
	Secures ONE circuit breaker right side of interior when used as a back-fed main For 150–225 A convertible main load centers, Series S01 and S02		HOM4RK2HA	DE3C
	Secures circuit breaker to interior when used as a back-fed main For 2P 150–200 A circuit breakers		HOM5RK	DE3C
Door Lock Kit	Use with convertible indoor load center covers (Series S-1)		PK6FL	DE3A
Replacement Cover Directory Label	1 through 42 numbered universal replacement directory label for load center covers		LSDL	DE5
Circuit Identification Stickers	Circuit identification stickers for use on cover directory labels to identify branch circuits		PSDS	DE5
Generator Circuit Breaker Interlock Kit	For use on “S” Series NEMA 1 and NEMA 3R load centers. Interlocks a QOM1 2P main circuit breaker of a load center (100–125 A) with a Homeline 2P (15–125 A) branch circuit breaker		HOMCRBGK1C	DE3D
	For use on “S” Series NEMA 1 and “S1” Series NEMA 3R load centers. Interlocks a QOM2 2P main circuit breaker of a load center (150–225 A) with a Homeline 2P (15–125 A) branch circuit breaker		HOMCGK2C	DE3D
	For use on “S2” and “S3” Series NEMA 3R QOM2 load centers. Interlocks a QOM2 2P main circuit breaker of a load center (150–225 A) with a Homeline 2P (15–125 A) branch circuit breaker		HOMRBGK2C	DE3D
Service Entrance Barriers	QO / Homeline 1Ø 100–125 A QOM1 convertible main load centers		PKSB1LA	DE3A
	QO / Homeline 1Ø 150–225 A QOM2 convertible main load centers		PKSB1HA	DE3A
	Homeline back-fed main breaker applications		PKSB1HOMBF	DE3A

QOSAMK

Surge Protective Devices

Table 1.38: Load Center and CSED Surge Protection Devices

Description		Cat. No.	Schedule
Surge Arresters	For use on 1Ø3W, 150 Vac maximum	SDSA1175	DE1B
	For use on 3Ø4W, 650 Vac maximum	SDSA3650	DE1B
	QO Surgebreaker $_{C}UL_{US}$ Listed Secondary Surge Arrester 150 Vac line-to-ground maximum	QO2175SB	DE1B
	Homeline Surgebreaker $_{C}UL_{US}$ Listed Secondary Surge Arrester 150 Vac line-to-ground maximum	HOM2175SB	DE1B
Surge Arrester Mounting Kit	UL Listed for mounting SDSA1175 surge arrester into ground bar mounting holes on 1Ø convertible main circuit breaker load centers	QOSAMK	DE3A

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Indoor, 1Ø, Main Lugs and Main Circuit Breaker

1Ø3W—120/240 Vac—UL Listed

Table 1.39: Convertible Main Load Centers (Accepts Only HOM Plug-On Circuit Breakers)

	Mains Rating	Spaces	Max. Single Pole Circuits *[1]*	Max. Tandem Circuit Breakers	Load Center Box, Interior and Cover *[2]*	Main Wire Size AWG/kcmil Al	Main Wire Size AWG/kcmil Cu	Equipment Ground Bar Kit (Order Separately)	Box No. *[3]*
INDOOR	**Main Lugs—10 kA Short Circuit Current Rating** Order HOM Circuit Breakers (See Homeline™ Circuit Breakers, page 1-20) Factory-installed Fixed Main Lugs								
	70 A	2	4	2	HOM24L70F/S *[4] [5]*	12–3	14–4	PK3GTA1	2
	100 A	6	12	6	HOM612L100F/S *[4] [6]*	8–1		PK7GTA	4
	125 A	4	8	4	HOM48L125GC	12–2/0	14–2/0	PK7GTA Included	21
	Convertible Mains—Factory-installed Main Lugs QOM1 Main Frame Size—Convertible to Main Circuit Breaker (See 1Ø3W—120/240 Vac—UL Listed, page 1-19)								
	125 A	8	16	8	HOM816L125PC		6–1	PK9GTA	6
		12	24	12	HOM1224L125PC		6–1	PK15GTA	6
		16	32	16	HOM1632L125PC	6–2/0	6–1/0	PK15GTA	8
		20	40	20	HOM2040L125PC		6–1/0	PK18GTA	8
		30	60	30	HOM3060L125PC		6–2/0	PK23GTA	10
	Convertible Mains—Factory-installed Main Lugs QOM2 Main Frame Size—Convertible to Main Circuit Breaker (See 1Ø3W—120/240 Vac—UL Listed, page 1-19)								
	225 A	30	60	30	HOM3060L225PC	4–300	4–250	PK23GTA	10
		40	80	40	HOM4080L225PC			PK27GTA	12
		42	84	42	HOM4284L225PC			PK27GTA	12
		60	120	60	HOM60120L225PC *[7]*			PK27GTA	25
	Convertible Mains—Factory-installed Main Lugs—Ground Bar Included QOM1 Main Frame Size—Convertible to Main Circuit Breaker (See 1Ø3W—120/240 Vac—UL Listed, page 1-19)								
	125 A	8	16	8	HOM816L125PGC	6–2/0	6–1	PK15GTAL Included	6
		12	24	12	HOM1224L125PGC		6–1	PK15GTAL Included	6
		20	40	20	HOM2040L125PGC		6–1/0	PK15GTAL Included	8
		24	80	24	HOM2448L125PGC		6–1/0	PK15GTAL Included	8
	Convertible Mains—Factory-installed Main Lugs—Ground Bar Included QOM2 Main Frame Size—Convertible to Main Circuit Breaker (See 1Ø3W—120/240 Vac—UL Listed, page 1-19)								
	225 A	30	60	30	HOM3060L225PGC	4–300	4–250	PK15GTAL & PK15GTA Included	10
		16	32	16	HOM1632L225PGC			PK15GTAL Included	9
		20	40	20	HOM2040L225PGC			PK15GTAL Included	9
		40	80	40	HOM4080L225PGC			PK15GTAL & PK15GTA Included	12
		42	84	42	HOM4284L225PGC			PK15GTAL & PK15GTA Included	12
	Main Circuit Breaker—22 kA Short Circuit Current Rating Convertible Mains—Factory-installed Main Circuit Breaker QOM1 Main Frame Size—Convertible to Main Lugs or Lower Amperage Main Circuit Breaker (See 1Ø3W—120/240 Vac—UL Listed, page 1-19)								
	100 A	8	16	8	HOM816M100PC	6–1		PK9GTA	5
		12	24	12	HOM1224M100PC	6–2/0		PK15GTA	6
		20	40	20	HOM2040M100PC	6–1		PK18GTA	7
		24	48	24	HOM2448M100PC	6–2/0		PK23GTA	8
		30	60	30	HOM3060M100PC	6–2/0		PK23GTA	10
	125 A	24	48	24	HOM2448M125PC		6–1/0	PK23GTA	8
		30	60	30	HOM3060M125PC	6–2/0	6–2/0	PK23GTA	10
	Convertible Mains—Factory-installed Main Circuit Breaker QOM2 Main Frame Size—Convertible to Main Lugs or Lower Amperage Main Circuit Breaker (See 1Ø3W—120/240 Vac—UL Listed, page 1-19)								
	150 A	30	60	30	HOM3060M150PC	4–250		PK23GTA	10
	200 A	20	40	20	HOM2040M200PC	4–250		PK18GTA	9
		30	60	30	HOM3060M200PC			PK23GTA	10
		40	80	40	HOM4080M200PC			PK27GTA	12
		42	84	42	HOM4284M200PC			PK27GTA	12
		60	120	60	HOM60120M200C *[7]*			PK27GTA	25
	225 A	42	84	42	HOM4284M225PC	4–300	4–250	PK27GTA	12
	Above listings through 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.								

[1] Maximum single pole branch circuits utilizing HOM and/or HOMT circuit breakers.
[2] C at end of catalog number indicates combination flush/surface cover included with device.
[3] See Indoor Knockout Information and Enclosure Dimensions, page 1-23
[4] F/S at end of catalog number indicates to order F for flush device or S for surface device. The cover does not have a door.
[5] HOM-GFI and HOM-AFI branch circuit breakers are limited to number 10 maximum wire.
[6] 70 A maximum branch circuit breaker, 100 A maximum back feed main circuit breaker.
[7] Door kit available separately. Order QOCDK60.

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Rainproof, 1Ø, Main Lugs and Main Circuit Breakers
1Ø3W—120/240 Vac—UL Listed

Table 1.40: Convertible Main Load Centers (Accepts Only HOM Plug-On Circuit Breakers.)

	Mains Rating	Spaces	Max. Single Pole Circuits *[8]*	Max. Tandem Circuit Breakers	Load Center Box, Interior and Cover Cat. No. (DE3C)	Main Wire Size AWG/kcmil Al	Main Wire Size AWG/kcmil Cu	Equipment Ground Bar Kit (Order Separately) Cat. No. (DE3A)	Box No. *[9]*
RAINPROOF	**Main Lugs**—10 kA Short Circuit Current Rating Factory-installed Fixed Main Lugs, 10 kA Short Circuit Current Rating								
	70 A	2	4	2	HOM24L70RB *[10]*	12–3	14–4	PK4GTA	1R
	100 A	6	12	6	HOM612L100RB *[11]*	8–1		PK7GTA	2R
	125 A	4	8	4	HOM48L125GRB	12–2/0	14–2/0	PK7GTA Included	15R
	Convertible Mains with Factory-installed Main Lugs *[12]*, QOM1 Main Frame Size—Convertible to Main Circuit Breaker (See Below)								
	125 A	8	16	8	HOM816L125PRB	6–2/0	6–1	PK9GTA	3R
		12	24	12	HOM1224L125PRB			PK15GTA	3R
		20	40	20	HOM2040L125PRB			PK18GTA	4R
		24	48	24	HOM2448L125PRB			PK23GTA	6R
	Convertible Mains with Factory-installed Main Lugs *[12]*, QOM2 Main Frame Size—Convertible to Main Circuit Breaker (See Below)								
	225 A	12	12	0	HOM12L225PRB	4–300	4–250	PK9GTA	5R
		16	32	16	HOM1632L225PRB			PK15GTA	6R
		20	40	20	HOM2040L225PRB			PK18GTA	6R
		30	60	30	HOM3060L225PRB			PK23GTA	7R
		40	80	40	HOM4080L225PRB			PK27GTA	14R
		42	84	42	HOM4284L225PRB			PK27GTA	14R
RAINPROOF	**Main Circuit Breaker—**22 kA Short Circuit Current Rating Convertible Mains with Factory-Installed Main Circuit Breaker, QOM1 Main Frame Size—Convertible to Main Lugs or Lower Amperage Main Circuit Breaker (See Below) *[13]*								
	100 A	8	16	8	HOM816M100PRB	6–2/0	6–1	PK9GTA	3R
		12	24	12	HOM1224M100PRB			PK15GTA	3R
		20	40	20	HOM2040M100PRB			PK18GTA	4R
	125 A	8	16	8	HOM816M125PRB	6–2/0	6–1	PK9GTA	3R
		24	48	24	HOM2448M125PRB			PK23GTA	6R
	Convertible Mains with Factory-installed Main Circuit Breaker , QOM2 Main Frame Size—Convertible to Main Lugs or Lower Amperage Main Circuit Breaker (See Below)								
	150 A	30	60	30	HOM3060M150PRB	4–250		PK23GTA	7R
	200 A	12	12	0	HOM12M200PRB	4–250		PK9GTA	5R
		20	40	20	HOM2040M200PRB			PK18GTA	6R
		30	60	30	HOM3060M200PRB			PK23GTA	7R
		40	80	40	HOM4080M200PRB			PK27GTA	14R
	Convertible Mains with Factory-installed Main Circuit Breaker with Feed-thru Lugs, QOM2 Main Frame Size—Convertible to Main Lugs or Lower Amperage Main Circuit Breaker (See Below) *[12]*								
	150 A	8	16	8	HOM816M150PFTRB	4–250		PK15GTA	6R
	200 A	8	16	8	HOM816M200PFTRB	4–250		PK15GTA	6R

Above listings through 200 A mains rating meet Federal Specification W-P-115c as Type 1, Class 2.

QOL125

QOL225

1Ø, Field-Installed Mains Kits

Table 1.41: For Convertible Load Centers Only

Field-Installed Main Type	Frame Size	Main *[14]* Ampere Rating	Use on Convertible Load Center with Mains Rating	Cat. No.	Lug Wire Size *[15]* AWG/kcmil
Main Lugs *[16]*	—	125 A	100–125 A	QOL125	6–2/0 Al or Cu
		225 A	150–225 A	QOL225	6–300 Al or Cu
Main Circuit Breaker *[13]*	QOM1	50 A	100–125 A	QOM50VH	12–2/0 Al or Cu
		60 A	100–125 A	QOM60VH	
		70 A	100–125 A	QOM70VH	
		80 A	100–125 A	QOM80VH	
		90 A	100–125 A	QOM90VH	
		100 A	100–125 A	QOM100VH	
		110 A	125 A	QOM110VH	
		125 A	125 A	QOM125VH	
	QOM2 *[17]*	100 A	150–225 A	QOM2100VH	4–300 Al or Cu
		125 A	150–225 A	QOM2125VH	
		150 A	150–225 A	QOM2150VH	
		175 A	200–225 A	QOM2175VH	
		200 A	200–225 A	QOM2200VH	
		225 A	225 A	QOM2225VH	

[8] Maximum single pole branch circuits utilizing HOM and/or HOMT circuit breakers.
[9] See Rainproof, Dimensions, Knockouts and Bolt-on Hubs, page 1-24
[10] HOM-GFI and HOM-AFI branch circuit breakers are limited to number 10 maximum wire.
[11] 70 A maximum branch circuit breaker, 100 A maximum back feed main circuit breaker.
[12] Side hinge door device allow 1-1/4 in. on left side for door to open.
[13] 22 k AIR main circuit breaker UL Listed for use ahead of HOM and HOMT 10 k AIR branch circuit breakers to permit their application on systems with up to 22 kA available fault current.
[14] Do not exceed the load center mains rating.
[15] Wire range listed for main device kits is the wire range of that device. To find out maximum wire size permitted in a particular load center per UL, see tables in QO™ Load Centers, page 1-3 and QO™ and Homeline™ Load Centers and Circuit Breakers, page 1-15 under Main Wire Size.
[16] If main circuit breaker knockout has been removed from the load center's trim, order appropriate filler plate from QO and Homeline Load Center Accessories, page 1-16.
[17] Add suffix 1021 for 120, 208, 240 Vac shunt trip.

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HOM 1P
1 Space Required

HOM 2P
2 Spaces Required

HOM2200BB
Branch Circuit Breaker
4 Spaces Required

Homeline Plug-On Circuit Breakers

The Square D Homeline circuit breakers are in a 1 in. wide format for 1-pole circuit breakers. They are designed to plug into Homeline load centers.

Table 1.42: HOM

Ampere Rating	AIR	1P—120/240 Vac Cat. No.	2P—120/240 Vac Common Trip Cat. No.
15 A	10 kA	HOM115 *[1][2]*	HOM215 *[2]*
20 A	10 kA	HOM120 *[1][2]*	HOM220 *[2]*
25 A	10 kA	HOM125 *[2]*	HOM225 *[2]*
30 A	10 kA	HOM130 *[2]*	HOM230 *[2]*
35 A	10 kA	—	HOM235 *[2]*
40 A	10 kA	HOM140 *[2]*	HOM240 *[2]*
45 A	10 kA	—	HOM245 *[2]*
50 A	10 kA	HOM150 *[2]*	HOM250 *[2]*
60 A	10 kA	—	HOM260 *[2]*
70 A	10 kA	—	HOM270 *[2]*
80 A	10 kA	—	HOM280 *[2]*
90 A	10 kA	—	HOM290 *[2]*
100 A	10 kA	—	HOM2100 *[2]*
110 A	10 kA	—	HOM2110 *[2]*
125 A	10 kA	—	HOM2125 *[2]*
150 A	10 kA	—	HOM2150BB *[2][3]*
175 A	10 kA	—	HOM2175BB *[2][3]*
200 A	10 kA	—	HOM2200BB *[2][3]*

Homeline High Magnetic (HM) Circuit Breakers

High magnetic trip circuit breakers are recommended for applications where high initial inrush current may occur.

Table 1.43: HOM-HM

Amperes	1P—120/240 Vac	2Ps
15 A	HOM115HM *[4]*	—
20 A	HOM120HM *[4]*	—

Homeline Combination Arc Fault Circuit Interruptors (HOM-CAFI)

Homeline Combination Arc Fault Circuit Interrupters—Provide overload and short circuit protection, plus arc fault protection in accordance with the NEC and UL1699.

HOM 1P CAFI
Plug-on Neutral

HOM 1P CAFI
Pigtail

Table 1.44: HOM-CAFI

Circuit Breaker Type	Ampere Rating	Poles 120 Vac	Cat. No.
One-Pole			
Combination Arc-Fault Circuit Interrupter with Pigtail Neutral	15 A	1	HOM115CAFI *[4]*
	20 A	1	HOM120CAFI *[4]*
Plug-On Neutral Combination Arc-Fault Interrupter	15 A	1	HOM115PCAFI *[4]*
	20 A	1	HOM120PCAFI *[4]*
Two-Pole			
Combination Arc-Fault Circuit Interrupter with Pigtail Neutral	15 A	2	HOM215CAFI *[4] [5]*
	20 A	2	HOM220CAFI *[4] [5]*

Homeline Dual Function Circuit Breaker (HOM-DF)

Homeline Combination Arc Fault and Ground Fault Circuit Interrupters (Dual Function)—Provide overload and short circuit protection, plus arc fault and ground fault protection in a single device in accordance with the NEC, UL1699 and UL943.

HOM 1P DF
Plug-on Neutral

HOM 1P DF
Pigtail

Table 1.45: HOM-DF

Circuit Breaker Type	Ampere Rating	Poles 120 Vac	Cat. No.
Combination Arc-Fault and Ground Fault Circuit Interrupter with Pigtail Neutral	15 A	1	HOM115DF *[4]*
	20 A	1	HOM120DF *[4]*
Plug-On Neutral Combination Arc-Fault and Ground Fault Circuit Interrupter	15 A	1	HOM115PDF *[4]*
	20 A	1	HOM120PDF *[4]*

[1] UL Listed as SWD (switching duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.
[2] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[3] Requires four spaces (1 AWG–300 kcmil Al/Cu). Use only in 1Ø panel rated 150 A or greater.
[4] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[5] For 120/240 V only, not for 208Y/120 V.

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HOM 1P GFI
(With Ground Fault Circuit Interrupter)
1 Space Required

HOM 2P GFI
(With Ground Fault Circuit Interrupter)
2 Spaces Required

Homeline GFI (HOM-GFI)

HOM-GFI circuit breakers provide overload and short circuit protection, combined with Class A ground fault protection. Class A denotes a ground fault circuit interrupter that will trip when a fault current to ground is 6 milliamperes or more.

Table 1.46: HOM-GFI

Ampere Rating	AIR	1P—120 Vac 1 Space Required	2P—120/240 Vac Common Trip 2 Spaces Required
15 A	10 kA	HOM115GFI	HOM215GFI
20 A	10 kA	HOM120GFI	HOM220GFI
30 A	10 kA	—	HOM230GFI
40 A	10 kA	—	HOM240GFI
50 A	10 kA	—	HOM250GFI

Homeline Equipment Protection Device (HOM-EPD)

Homeline Equipment Protection Device—Circuit Breakers with 30 mA Equipment Ground Fault Protection (UL Listed).

Table 1.47: HOM-EPD—10 k AIR

Amperes	1P—120 Vac	2P—120/240 Vac Common Trip
15 A	HOM115EPD	HOM215EPD
20 A	HOM120EPD	HOM220EPD
25 A	—	HOM225EPD
30 A	—	HOM230EPD
40 A	—	HOM240EPD
50 A	—	HOM250EPD

HOMT Tandem and HOMT Quad Tandem Circuit Breakers

Table 1.48: HOMT Tandem Circuit Breakers

Ampere Rating *[6]*	AIR	1P Tandem—120/240 Vac (One Space Required)
15 and 15 A	10 kA	HOMT1515 *[7]*
15 and 20 A	10 kA	HOMT1520 *[7]*
20 and 20 A	10 kA	HOMT2020 *[7]*
30 and 15 A	10 kA	HOMT3015 *[7]*
30 and 20 A	10 kA	HOMT3020 *[7]*

HOMT Quad
Circuit Breaker
2 Spaces Required

Table 1.49: HOMT Quad Tandem Circuit Breakers

Ampere Rating *[6]*		AIR	2P Tandem—120/240 Vac (Two Spaces Required)
1P	2P		
(2) 15 A	15 A	10 kA	HOMT1515215 *[7]*
(2) 15 A	20 A	10 kA	HOMT1515220 *[7]*
(2) 15 A	25 A	10 kA	HOMT1515225 *[7]*
(2) 15 A	30 A	10 kA	HOMT1515230 *[7]*
(2) 15 A	40 A	10 kA	HOMT1515240 *[7]*
(2) 15 A	50 A	10 kA	HOMT1515250 *[7]*
(2) 20 A	20 A	10 kA	HOMT2020220 *[7]*
(2) 20 A	25 A	10 kA	HOMT2020225 *[7]*
(2) 20 A	30 A	10 kA	HOMT2020230 *[7]*
(2) 20 A	40 A	10 kA	HOMT2020240 *[7]*
(2) 20 A	50 A	10 kA	HOMT2020250 *[7]*

NOTE: Typical catalog number (e.g. HOMT 1515230) represents two 1P, outer poles (two 15 A 1P CBs) and one 2P inner circuit breaker with common trip (one 30 A 2P CB).

Homeline Circuit Breaker Wire Sizes

Table 1.50: Circuit Breaker Wire Sizes

Breaker Type	Ampere Rating	Wire Size (AWG/kcmil) *[8]*	
		Aluminum	Copper
HOM 1P	15–30 A	14–8 AWG	14–8 AWG or (2) 14–10 AWG
	40–50 A	8–2 AWG	8–2 AWG
HOM 2P	15–30 A	14–8 AWG	14–8 AWG or (2) 14–10 AWG
	35–70 A	8–2 AWG	8–2 AWG
	80–125 A	4–2/0 AWG	4–2/0 AWG
	150–200 A	4 AWG–300 kcmil	4 AWG–300 kcmil
HOMT and Quad	15–30 A	14–8 AWG	14–8 AWG
Quad Only	40–50 A	6–12 AWG	6–14 AWG
HOM-GFI - 1P	15–20 A	14–10 AWG	14–10 AWG
HOM-GFI - 2P	15–50 A	12–4 AWG	14–6 AWG

[6] 15–20 A tandem or quad tandem circuit breakers are suitable for use with 60ºC or 75ºC conductors. 25–50 A tandem or quad tandem circuit breakers are suitable for use with 75ºC conductors only.
[7] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[8] 15–30 A circuit breakers are suitable for use with 60ºC or 75ºC conductors. 40–125 A circuit breakers are suitable for use with 75ºC conductors.

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Accessories for Homeline Circuit Breakers

Table 1.51: Accessories

Description		Cat. No.
Handle Attachments		
Handle Tie: Converts any two adjacent 120/240 Vac single HOM circuit breakers to independent trip 2P		HOM1HT
Handle Tie: Converts any two adjacent 120/240 Vac 1P side-by-side HOMT circuit breakers to independent trip 2P		HOMTHT
Handle Clamp: Clamp for holding HOM 1P handle in the ON or OFF position		QO1LO
Handle Blocking Device: Attaches to standard HOM 2P circuit breakers for holding the handle in the OFF position		HOM2HBD
Handle Padlock Attachment: For padlocking 1P Standard HOM breakers in the ON or OFF position		HOM1PA
Handle Padlock Attachment: For padlocking 2P Standard HOM circuit breakers in ON or OFF position	15–70 A	HOM2PALA
	80–125 A	HOM2PAHA
	150–200 A	HOM2PAVHA
Handle Padlock Attachment: For padlocking 1P CAFI, DF, GFI, and EPD HOM breakers in ON or OFF position		HOMELEC1PA
Handle Padlock Attachment: For padlocking 2P CAFI, GFI, and EPD HOM breakers in ON or OFF position		HOMELEC2PALA
Handle Padlock Attachment: For padlocking center poles of Homeline Quad breakers in the OFF position		HOMQPA
Handle Padlock Attachment: For padlocking main circuit breakers in convertible load center in OFF position	50–125 A	QOM1PA *[9]*
	100–225 A	QOM2PA *[9]*
Sub-Feed Lugs		
125 A 2P plug-on—2 spaces required		HOML2125
225 A 2P plug-on—4 spaces required		HOML2225 *[10]*

[9] 50–125 A QOM1 frame size; 100–225 A QOM2 frame size.
[10] Requires four spaces (1 AWG–300 kcmil Al/Cu). Use only in 1Ø panel rated 150 A or greater.

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Indoor Knockout Information and Enclosure Dimensions

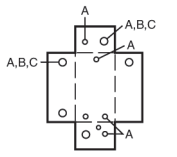
Table 1.52: Enclosure Dimensions

Box No.	Dimensions W in.	W mm	H in.	H mm	D in.	D mm
1	3.81	97	6.72	171	3.00	76
2	4.81	122	9.30	236	3.19	81
3	4.81	122	9.30	236	3.19	81
4	8.88	226	12.57	319	3.80	97
5	14.25	362	14.92	379	3.75	95
6	14.25	362	17.92	455	3.75	95
7	14.25	362	20.92	531	3.75	95
8	14.25	362	26.04	661	3.75	95
9	14.25	362	29.86	758	3.75	95
10	14.25	362	33.78	858	3.75	95
11	14.25	362	37.98	965	3.75	95
12	14.25	362	39.37	1000	3.75	95

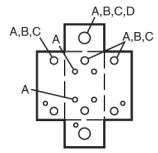
Box No.	Dimensions W in.	W mm	H in.	H mm	D in.	D mm
13	5.88	149	13.12	333	3.38	86
14	14.25	362	20.92	531	3.75	95
15	20.00	508	50.00	1270	5.75	146
16	20.00	508	62.00	1727	5.75	146
17	20.00	508	53.00	1346	5.75	146
18	5.88	149	16.12	409	3.38	86
19	7.56	192	23.12	587	4.25	108
20	9.62	244	26.12	663	4.75	121
21	8.88	226	14.80	376	3.80	97
22	8.55	217	23.92	608	3.95	100
23	14.25	362	29.86	758	3.75	95
24	14.25	362	43.15	1096	3.75	95
25	14.25	362	48.50	1235	3.75	95

Table 1.53: Knockout Information

Knockouts								
Symbol	A	B	C	D	E	F	G	H	I
Conduit Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2



Box 1



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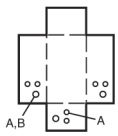

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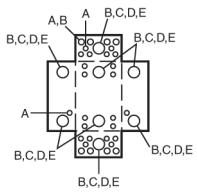

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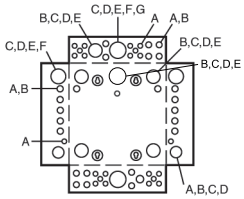

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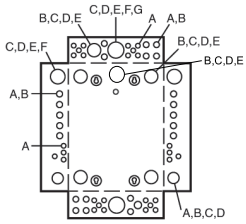

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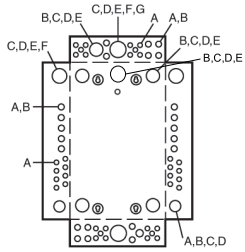

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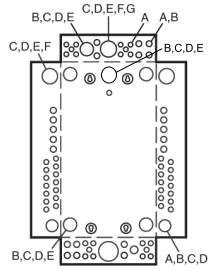

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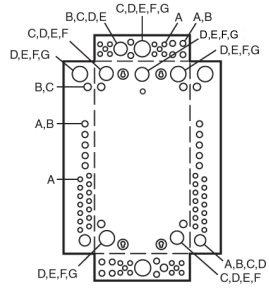

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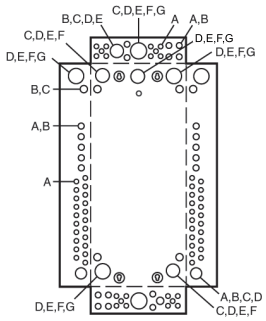

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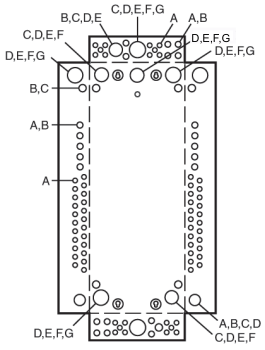

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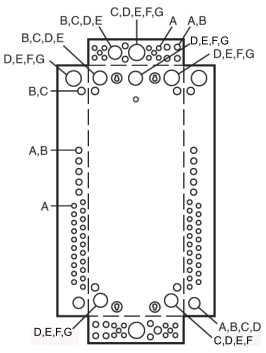

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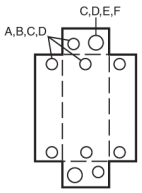

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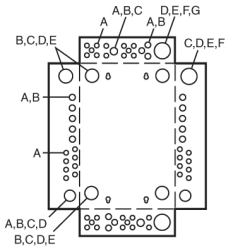

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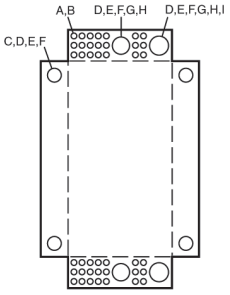

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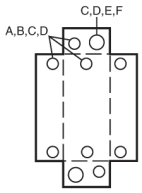

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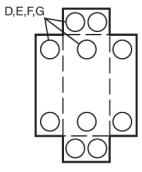

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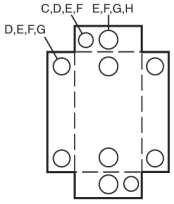

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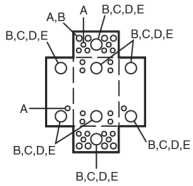

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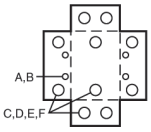

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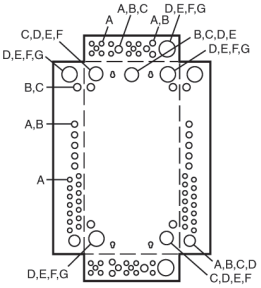

Box 23

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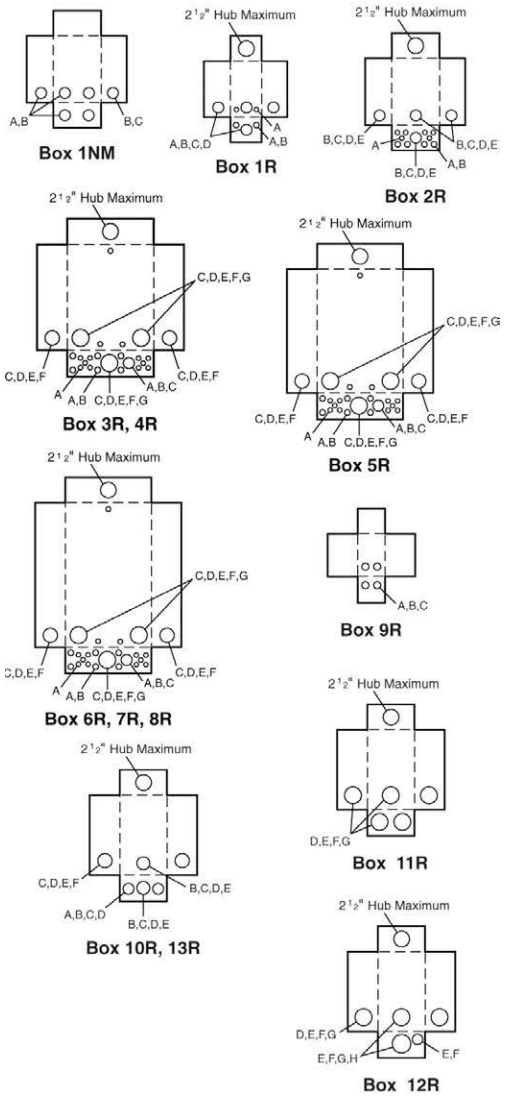


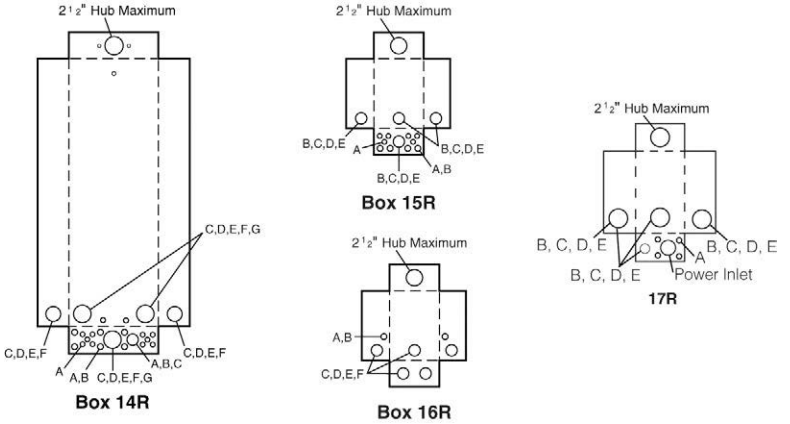
Enclosure Dimensions and Knockout Information

Table 1.54: Enclosure Dimensions

Box No.	Dimensions					
	W		H		D	
	in.	mm	in.	mm	in.	mm
1NM	6.52	166	8.79	223	3.90	99
1R *[1]*	4.88	124	9.38	238	4.00	102
2R	8.88	226	12.65	321	4.27	108
3R	14.75	375	18.92	481	4.52	115
4R	14.75	375	22.06	560	4.52	115
5R	14.75	375	26.04	661	4.52	115
6R	14.75	375	29.86	758	4.52	115
7R	14.75	375	33.78	858	4.52	115
8R	14.75	375	37.98	965	4.52	115
9R	4.56	116	6.50	165	3.88	99
10R	6.92	176	13.18	335	4.12	105
11R	7.56	192	23.24	590	4.75	121
12R	9.62	244	26.24	666	5.50	140
13R	6.92	176	16.18	411	4.12	105
14R	14.75	375	39.37	1000	4.52	115
15R	8.88	226	14.80	376	4.27	108
16R	8.55	217	24.75	629	4.16	106
17R	8.88	226	12.65	321	4.27	108

Table 1.55: Knockout Information

Knockouts								
Symbol	A	B	C	D	E	F	G	H
Conduit Size	1/2 in.	3/4 in.	1 in.	1-1/4 in.	1-1/2 in.	2 in.	2-1/2 in.	3 in.



Bolt-On Hubs

Square D equipment with “R’’ or “RB’’ suffix, designated NEMA 3R rainproof construction, utilizes bolt-on hubs listed below. “RB’’ devices will accept 3/4 in. through 2-1/2 in. bolt-on hubs without the use of reducers. Off-center conduit thread openings and elongated mounting holes provide quick and easy adjustment to eliminate costly conduit offsets and bends. Catalog suffix “R’’ devices require 3 in. through 4 in. field cut opening. Hubs are suitable for use with conduit having ANSI standard taper pipe thread.

Table 1.56: Bolt-On Hubs UL Listed for “RB” Devices

Conduit Size	3/4 in.	1 in.	1-1/4 in.	1-1/2 in.	2 in.	2-1/2 in.
Hub Cat. No.	B075	B100	B125	B150	B200	B250

NOTE: Closing cap (Cat. No. BCAP) is provided factory-installed on each device having “RB” suffix.

Table 1.57: Bolt-On Hubs UL Listed for Mounting in Field-Cut Opening

Conduit Size	3 in.	4 in.	
Hub Cat. No.	B300	B400	Designed for mounting in field cut opening. Includes gasket and four mounting bolts and nuts.

[1] HOME250SPA and QO260NATR top endwall has no hub opening.

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Catalog Number Logic for CSED

Table 1.58: Catalog Numbers for Combination Service Entrance Devices

Number Segment	Character	Description	R	C	8	16	D	200	C	H	X	S
Socket Type	Q	QO Ringless										
	R	HOM Ringless										
	C	QO Ring type										
	S	HOM Ring type										
Service Feed	Blank	Combination overhead/underground										
	C	Combination overhead/underground										
	O	Overhead only										
	U	Underground only										
Spaces (Service Discounts or Branches)	#	Maximum # of 1-pole circuits										
	#	Maximum # of 1-pole spaces										
Interior	D	Dual main service disconnects (feed-thru lugs on meter mains only)										
	F	Single main service disconnect with feed-thru lugs										
	L	Main lug interior (service disconnects field installed)										
	M	Single main service disconnect										
Amperage Rating	100	100 A										
	125	125 A										
	150	150 A										
	200	200 A										
	225	225 A										
	400	400 A										
Enclosure Mounting Style	C	Surface mount or convertible to semi-flush (use appropriate flange kit)										
	F	Semi-flush mount only										
	R	Reverse mount only										
	RB	Surface mount only with "B" hub provision in top endwall										
	S	Surface mount only										
	PF	Home PoN semi-flush mount device										
	PS	Home PoN surface mount device										
Meter Socket Bypass Type	H	Horn by-pass										
	K	K-4 bolt-on, no by-pass										
	L	Class 320 with lever by-pass										
	N	Class 320, No by-pass										
	B	Class 320 with test block by-pass										
	Blank	No by-pass										
	X	2 piece lever by-pass cover										
Application	S	Solar ready										

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Rainproof Meter Mains

Table 1.59: Rainproof Meter Mains

Ampere Rating	Bypass Type	Service (Type of Feed)		Short Circuit Current Rating	Cat. No.	Service Disconnect(s)			Load Center and Branch Circuit Breakers (Order separately [1])				Hub Type (Order separately [2])	Line Side Main Lugs AWG/ kcmil (Al/ Cu)	Service Ground Lug AWG/ kcmil (Al/Cu)	Weight Each (Lbs) and Pallet Qty.
						2P Circuits (Max.)	Type (Order separately [3])	Ampere Rating Max.	Max. Quantity			Ampere Rating Max.				
		UL	UL and EU-SERC						Spaces	1P Circuits	1P Tan-dems					
Ring Type, QO™																
Surface Mount Only																
125 A	None	OH/UG	—	10 kA	C125RB	1	QOM1-VH	125 A	—	—	—	—	B	4–1/0	8–1/0	15, 54
200 A	None	OH/UG	—	22 kA	CM200S	1	QOM2-VH	200 A	—	—	—	—	A	4–250	(2)8–2/0	26, 24
		OH/UG	— —	22 kA	C2M200S	1 1	QOM2-VH QO-VH	200 A 50 A	— —	— —	— —	— —	A	4–250	(2)8–2/0	27, 20
		OH/UG	—	10 kA	C4L200S	2	QO	100 A	—	—	—	—	A	4–250	(2)8–2/0	27, 28
Ring Type, Homeline™																
Surface Mount Only																
125 A	None	OH/UG	OH/UG	10 kA	SC8L125S	4	HOM	125 A [4]	—	—	—	—	A	6–2/0	6–2/0	31, 24
200 A	None	OH/UG	OH/UG	10 kA	SC12L200S	6	HOM	200 A [5]	—	—	—	—	A–L	4–250	8–2/0	40, 10
Semiflush Mount only																
125 A	None	OH/UG	OH/UG	10 kA	SC8L125F	4	HOM	110 A	—	—	—	—	A or B300	6–2/0	6–2/0	37, 20
200 A	None	OH [6]/ UG	OH [6]/ UG	10 kA	SC12L200F	6	HOM	200 A [7]	—	—	—	—	A–L	4–250	8–2/0	47, 10
	None	OH [6]/ UG	OH [6]/ UG	22 kA	SC816F200F [8]	1	QOM2200VH [4]	200 A	8	16	8	200 A [7]	A–L	4–250	8–2/0	51, 10
Surface Mount—Supplied with Feed-Thru Lugs and provisions for Branch Circuit Breakers																
150 A	None	OH/UG	OH/UG	22 kA	SC816F150S [8]	1	QOM2150VH [9]	150 A	8	16	8	150 A [10]	A–L	4–250	8–2/0	40, 10
			—	10 kA	SC816D150C [8] [11]	1	HOM2150 [9]	150 A	8	16	8	100 A [12]	A or A–L	6–300	8–1/0	48, 18
			UG		SU816D150C [8] [11]	1	HOM	50 A								
200 A	None	UG	OH/UG	22 kA	SC816F200S [8]	1	QOM2200VH [9]	200 A	8	16	8	200 A [13]	A–L	4–250	8–2/0	40, 10
			—	10 kA	SC816D200C [8] [11]	1	HOM2200 [9]	200 A	8	16	8	100 A [12]	A or A–L	6–300	8–1/0	48, 18
			UG		SU816D200C [8] [11]	1	HOM	50 A								
Ringless, QO™																
Surface Mount Only																
200 A	None	OH/UG	—	22 kA	RC200S [14]	1	QOM2-VH	200 A	—	—	—	—	A	6–350	(2)8–2/0	26, 24
	Lever			10 kA	RCM200SL [14] [15]	1	QOM2-VH	200 A					A	6–350	8-1/0	60 / 14
	None			22 kA	RC2M200S [14]	1	QOM2-VH	200 A					A	6–350	(2)8–2/0	27, 20
	Horn				RC2M200SH [14]	1	QO-VH	50 A					A	6–350	(2)8–2/0	27, 20
	Lever			10 kA	RC2M200SL [14] [15]	1	QOM2-VH	200 A					A	6–350	8-1/0	60 / 14
						1	QO-VH	50 A							8-1/0	
	None			22 kA	QC12L200S [14] [15] [16]	6	QO-VH	200 A					A	6–350	8–2/0	43, 21
	None			22 kA	QC12L200C [14]	6	QO-VH	200 A [7]					A	6–350	12-2/0	40, 21
Surface Mount Only, Supplied with Feed-Thru Lugs and provisions for Branch Circuit Breakers																
100 A	Horn	OH/UG	—	22 kA	QC816F100SH [8][14] [15] [16]	1	QOM2100VH [9]	100 A	8	16	8	100	A	6–350	8–2/0	43, 21
100 A	Horn	OH/UG	—	22 kA	QC816F100CH [8] [14] [15]	1	QOM2100VH [9]	100 A	8	16	8	100	A	6–350	12-2/0	40, 21
125 A	None	OH/UG	—	22 kA	QC816F125S [8][14] [15]	1	QOM2125VH [9]	125 A	8	16	8	100	A	6–350	8–2/0	43, 21
	None	OH/UG	—	22 kA	QC816F125C [8][14]	1	QOM2125VH [9]	125 A	8	16	8	100	A	6–350	12-2/0	40, 21
	Horn	OH/UG	—	22 kA	QC816F125SH [8][14] [15] [16]	1	QOM2125VH [9]	125 A	8	16	8	100	A	6–350	8–2/0	43, 21
150 A	None	OH/UG	—	22 kA	QC816F150S [8][14] [15] [16]	1	QOM2150VH [9]	150 A	8	16	8	150 A [17]	A	6–350	8–2/0	43, 21
	None	OH/UG	—	22 kA	QC816F150C [8][14]	1	QOM2150VH [9]	150 A	8	16	8	150 A [17]	A	6–350	12-2/0	40, 21
	Horn	OH/UG	—	22 kA	QC816F150SH [8][14] [15] [16]	1	QOM2150VH [9]	150 A	8	16	8	150 A [17]	A	6–350	8–2/0	43, 21
	Lever	OH/UG	—	22 kA	QC816F150SL [18] [14] [15] [16]	1	QOM2150-VH [9]	200 A	8	16	8	150 A	A	6–350	8-2/0	74 / 12

[1] To order branch circuit breakers, see QO Plug-On Circuit Breakers, page 1-10
[2] To order hubs, see Accessories and Hubs for CSEDs, page 1-31
[3] To order service disconnects, see Circuit Breakers for CSEDs, page 1-30 except as noted)
[4] Service disconnect supplied factory-installed.
[5] Use only 15–110 A and 150–200 A breakers.
[6] Suitable for OH service with addition of tunnel kit (SCTK20). Order separately.
[7] Use only 15–100 A and 150–200 A circuit breakers.
[8] Supplied with load side feed-thru lugs, for 4 AWG–250 kcmil (Al/Cu) conductors.
[9] Service disconnect supplied factory-installed.
[10] Use only 15–110 A and 150 A breakers.
[11] Convertible to semiflush with SC200F flange kit (order separately).
[12] A 100 A circuit breaker can be installed in bottom position only, all other positions are limited to 70 A max.
[13] Use only 15–110 A and 150–200 A breakers.
[14] Device supplied with barrel lock provisions factory-installed.
[15] 5th jaw factory-installed.
[16] Suitable for load wires to exit top endwall with addition of Tunnel Kit OHBS, see Table 1.65 Accessories, page 1-31, check with local utility for approval.
[17] Use only 15–100 A and 150 A circuit breakers.
[18] Supplied with load side feed-thru lugs, for 4 AWG–250 kcmil (Al/Cu) conductors.

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Table 1.59 Rainproof Meter Mains (cont'd.)

Ampere Rating	Bypass Type	Service (Type of Feed)		Short Circuit Current Rating	Cat. No.	Service Disconnect(s)			Load Center and Branch Circuit Breakers (Order separately *[1]*)				Hub Type (Order separately *[2]*)	Line Side Main Lugs AWG/ kcmil (Al/ Cu)	Service Ground Lug AWG/ kcmil (Al/Cu)	Weight Each (Lbs) and Pallet Qty.
						2P Circuits (Max.)	Type (Order separately *[3]*)	Ampere Rating Max.	Max. Quantity			Ampere Rating Max.				
									Spaces	1P						
		UL	UL and EU-SERC							Circuits	Tan-dems					
200 A	None	OH/UG	—	22 kA	QC816F200S *[19] [20] [21] [22]*	1	QOM2200VH *[23]*	200 A	8	16	8	200 A *[24]*	A	6–350	8–2/0	43, 21
	Horn	OH/UG	—	22 kA	QC816F200SH *[19] [20] [21] [22]*	1	QOM2200VH *[23]*	200 A	8	16	8	200 A *[24]*	A	6–350		
	Horn	OH/UG	—	22 kA	QC816F200CH *[19] [20]*	1	QOM2200VH *[23]*	200 A	8	16	8	200 A *[24]*	A	6–350	12-2/0	40, 21
	Lever	OH/UG	—	22 kA	QC816F200SL *[19] [20] [21] [22]*	1	QOM2200-VH *[23]*	200 A	8	16	8	200 A	A	6–350	8–2/0	74 / 12
Ringless, Homeline™																
Surface Mount Only																
125 A	None	OH/UG	—	10 kA	RC8L125S *[25]*	4	HOM	125 A *[26]*	—	—	—	—	A	6–2/0	6–2/0	27, 32
200 A	None	OH/UG	—	10 kA	RC12L200S *[20] [21] [22]*	6	HOM	200 A *[24]*	—	—	—	—	A	6–350	8–2/0	43, 21
200 A	None	OH/UG	—	22 kA	RC12L200C *[20]*	6	HOM	200 A *[24]*	—	—	—	—	A	6–350	12-2/0	40, 21
Surface Mount Only, Supplied with Feed-Thru Lugs and provisions for Branch Circuit Breakers																
100 A	Horn	OH/UG	—	22 kA	RC816F100SH *[19] [20] [21] [22]*	1	QOM2100VH *[23]*	100 A	8	16	8	100 A	A	6–350	8–2/0	43, 21
100 A	Horn	OH/UG	—	22 kA	RC816F100CH*[19] [20] [21]*	1	QOM2100VH *[23]*	100 A	8	16	8	100 A			12-2/0	40, 21
125 A	Horn	OH/UG	—	22 kA	RC816F125SH *[19] [21] [22]*	1	QOM2125VH *[23]*	125 A	8	16	8	100 A			8–2/0	43, 21
125 A	Horn	OH/UG	—	22 kA	RC816F125CH *[19] [20]*	1	QOM2125VH *[23]*	125 A	8	16	8	100 A			12-2/0	40, 21
150 A	None	OH/UG	—	22 kA	RC816F150S *[19] [20] [22]*	1	QOM2150VH *[23]*	150 A	8	16	8	150 A *[27]*			8–2/0	43, 21
	None	OH/UG	—	22 kA	RC816F150C *[19] [20]*	1	QOM2150VH *[23]*	150 A	8	16	8	150 A *[27]*			12-2/0	40, 21
	Horn	OH/UG	—	22 kA	RC816F150SH *[19] [20] [21] [22]*	1	QOM2150VH *[23]*	150 A	8	16	8	150 A *[27]*			8–2/0	43, 21
	Horn	OH/UG	—	22 kA	RC816F150CH *[19] [20] [21]*	1	QOM2150VH *[23]*	150 A	8	16	8	150 A *[27]*			12-2/0	40, 21
	Lever	OH/UG	—	22 kA	RC816F150SL *[20] [21] [28]*	1	QOM2150-VH *[23]*	200 A	8	16	8	150 A			8-2/0	72 / 12
200 A	None	OH/UG	—	22 kA	RC816F200S *[19] [20] [21] [22]*	1	QOM2200VH *[23]*	200 A	8	16	8	200 A *[24]*			8–2/0	43, 21
	None	OH/UG	—	22 kA	RC816F200C *[19] [20]*	1	QOM2200VH *[23]*	200 A	8	16	8	200 A *[24]*			12-2/0	40, 21
	Horn	OH/UG	—	22 kA	RC816F200SH*[19] [20] [21] [22]*	1	QOM2200VH *[23]*	200 A	8	16	8	200 A *[24]*			8–2/0	43, 21
	Horn	OH/UG	—	22 kA	RC816F200CH *[19] [20] [21]*	1	QOM2200VH *[23]*	200 A	8	16	8	200 A *[24]*			12-2/0	40, 21
	Lever	OH/UG	—	22 kA	RC816F200SL *[19] [20] [21] [28]*	1	QOM2200-VH *[23]*	200 A	8	16	8	200 A			8-2/0	72 / 12
200 A	Horn	OH/UG	—	10 kA	RC816D200CH *[29] [19] [21] [25]*	1 1	HOM2200 *[23]* HOM	200 A 50 A	8	16	8	100 A *[30]*	A or B300	6–300	6–1/0	48, 18

[1] To order branch circuit breakers, see QO Plug-On Circuit Breakers, page 1-10
[2] To order hubs, see Accessories and Hubs for CSEDs, page 1-31
[3] To order service disconnects, see Circuit Breakers for CSEDs, page 1-30 except as noted)
[19] Supplied with load side feed-thru lugs, for 4 AWG–250 kcmil (Al/Cu) conductors.
[20] Device supplied with barrel lock provisions factory-installed.
[21] 5th jaw factory-installed.
[22] Suitable for load wires to exit top endwall with addition of Tunnel Kit OHBS, see Table 1.65 Accessories, page 1-31, check with local utility for approval.
[23] Service disconnect supplied factory-installed.
[24] Use only 15–100 A and 150–200 A circuit breakers.
[25] Knockout provided in cover for use with barrel lock kit SCBRLLOCK (see Accessories).
[26] 125 A Homeline™ 2P circuit breaker can be installed in top position only. All other positions are limited to 100 A max.
[27] Use only 15–100 A and 150 A circuit breakers.
[28] Suitable for load wires to exit top endwall with addition of Tunnel Kit OHBL, see Table 1.65 Accessories, page 1-31, check with local utility for approval.
[29] Convertible to semiflush with SC200F flange kit (order separately).
[30] A 100 A circuit breaker can be installed in bottom position only, all other positions are limited to 70 A max.

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Meter Mains and All-In-Ones (100 to 225 A Maximum)

- Ring or ringless type meter socket designs available
- UL Listed, suitable only for use as service equipment
- Meets EUSERC standards
- Service disconnect(s) are supplied factory-installed, except where noted
- Semiflush-reverse design available, supplied with load center (indoor access)
- Supplied with 100% branch neutrals, all unused terminals may be used for equipment grounding wires.
- Meets Federal Specification W-P-115c as Type 1, Class 2

Table 1.60: All-In-One Combination Service Entrance Devices

Ampere Rating	Bypass Type	Service (Type of Feed) UL and EUSERC	Short Circuit Current Rating	Cat. No. (DE3A)	Service Disconnect(s)			Load Center and Branch Circuit Breakers (Order separately [31])				Hub Type [32] (Order separately)	Line Side Main Lugs AWG/ kcmil (Al/Cu)	Service Ground Lug AWG/ kcmil (Al/Cu)	Weight Each (Lbs) and Pallet Qty.
								Max. Quantity							
									1P						
					2P Circuits (Max.)	Type (Factory Installed)	Ampere Rating Max.	Spaces	Circuits	Tan-dems	Ampere Rating Max.				
Ring Type, Homeline™															
Surface Mount Only															
100 A	None	OH/UG	10 kA	SC1624M100S	1	HOM2100	100 A	16	24	8	100 A	A	6–2/0	6–2/0	32, 24
125 A	None	OH/UG	10 kA	SC1624M125S	1	HOM2125	125 A	16	24	8	125 A [33]	A	6–2/0	6–2/0	32, 24
200 A	None	OH/UG	22 kA	SC2040M200S	1	QOM2200VH	200 A	20	40	20	200 A [34]	A-L	4–250	6–2/0	45, 10
200 A	None	OH/UG	10 kA	SC2040M200C [35]	1	HOM2200	200 A	20	40	20	100 A	A or A-L	6–300	8–1/0	47, 18
200 A	None	UG	10 kA	SU2040M200C [35]	1	HOM2200	200 A	20	40	20	100 A	A or A-L	6–300	8–1/0	47, 18
Semiflush Mount Only															
100 A	None	OH/UG	10 kA	SC1624M100F	1	HOM2100	100 A	16	24	8	100 A	A or B30-0	6–2/0	6–2/0	44, 20
125 A	None	OH/UG	10 kA	SC1624M125F	1	HOM2125	125 A	16	24	8	110 A				
		OH[36]/UG	22 kA	SC2040M125F	1	QOM2125VH	125 A	20	40	20	110 A	A-L	4–250	8–2/0	51, 10
200 A	None	OH[36]/UG	22 kA	SC2040M200F	1	QOM2200VH	200 A	20	40	20	200 A [34]				
		OH[37]/UG	22 kA	SC2636M200FPV [38]	1	QOM2200VH	200 A	26	36	10	100 A	A-L	4–250	8–2/0	56, 10
				SC3040M200F	1	QOM2200VH	200 A	30	40	10	200 A				
225 A	None	OH[37]/UG	22 kA	SC3040M225F	1	QOM2225VH	225 A	30	40	10	200 A				
				SC2636M225FPV [38]	1	QOM2225VH	225 A	26	36	10	100 A				
Surface Mount Only															
100 A	None	OH[39]	10 kA	SO1020M100S	1	HOM2100	100 A	10	20	10	80 A	A	6–1	8–4	20, 42
200 A	None	OH[39]	22 kA	SO2040M200S	1	QOM2200VH	200 A	20	40	20	200 A	A	6–350	8–2/0	43, 21
200 A	None	OH/UG	22 kA	SC3040M200S	1	QOM2200VH	200 A	30	40	10	200 A	A-L	4–250	8–2/0	50, 10
				SC40M200S	1	QOM2200VH	200 A	40	40	0	200 A		4–250	8–2/0	52, 10
REVERSE All-In-One—Semiflush Mount with Service Disconnect (outdoor access) and Load Center (indoor access)															
200 A	None	UG	10 kA	SU3040M200R	1	QOM2200VH	200 A	30	40	10	200 A [34]	A or B30-0	6–300	12–1/0	60, 15
225 A	None	UG	10 kA	SU3040M225R	1	QOM2225VH	225 A								
Ringless, Homeline															
Surface Mount Only															
100 A	None	OH/UG [39]	10 kA	RC1624M100S	1	HOM2100	100 A	16	24	8	100 A	A	6–2/0	6–2/0	32, 24
125 A				RC1624M125S	1	HOM2125	125 A				125 A [33]				
125 A	Horn	OH/UG[39]	22 kA	RC2040M125SH [40] [41]	1	QOM2125VH	125 A	20	40	20	125 A	A	6–350	8–2/0	43, 21
125 A	Horn	OH/UG[39]	22 kA	RC2040M125CH [40][42]	1	QOM2125VH	125 A	20	40	20	125 A				40, 21
150 A	Horn	OH/UG[39]	22 kA	RC2040M150SH [40] [41]	1	QOM2150VH	150 A	20	40	20	150 A				43, 21
	Horn	OH/UG[39]	22 kA	RC2040M150CH [40][42]	1	QOM2150VH	150 A	20	40	20	150 A				40, 21
	Lever	OH/UG[39]	22 kA	RC3040M150SL [43]	1	QOM2150VH [33]	200 A	30	40	10	150 A				76 / 12
200 A	None	OH/UG[39]	22 kA	RC2040M200S [40] [41]	1	QOM2200VH	200 A	20	40	20	200 A				43, 21
	None	OH/UG[39]	22 kA	RC2040M200C [40]	1	QOM2200VH	200 A	20	40	20	200 A				40, 21
	Horn	OH/UG[39]	22 kA	RC2040M200SH [40] [41]	1	QOM2200VH	200 A	20	40	20	200 A				43, 21
	Horn	OH/UG[39]	22 kA	RC2040M200CH [40]	1	QOM2200VH	200 A	20	40	20	200 A				40, 21
	Lever	OH/UG[39]	22 kA	RC3040M200SL [43]	1	QOM2200VH [33]	200 A	30	40	10	200 A				76 / 12
	None	OH/UG[39]	22 kA	RC2040M200CGP	1	QOM2200VH	200 A	20	40	20	200 A				48 / 21
Ringless, QO															
Surface Mount Only															
150 A	Horn	OH/UG[39]	22 kA	QC2442M150SH [40] [41]	1	QOM2150VH	150 A	24	42	18	150 A	A	6–350	8–2/0	43, 21
200 A	None	OH/UG[39]	22 kA	QC2442M200S [40] [41]	1	QOM2200VH	200 A	24	42	18	200 A				43, 21
	None	OH/UG[39]	22 kA	QC2442M200C [40]	1	QOM2200VH	200 A	24	42	18	200 A				40, 21
	Horn	OH/UG[39]	22 kA	QC2442M200SH [40] [41]	1	QOM2200VH	200 A	24	42	18	200 A				43, 21
	Horn	OH/UG[39]	22 kA	QC2442M200CH [40][42]	1	QOM2200VH	200 A	24	42	18	200 A				40, 21
200 A	None	OH/UG[39]	22 kA	QC3040M200S [41]	1	QOM2200VH	200 A	30	40	10	200 A				40, 21
	Horn	OH/UG[39]	22 kA	QC3040M200SH [41]	1	QOM2200VH	200 A	30	40	10	200 A				40, 21

[31] To order branch circuit breakers, see QO Plug-On Circuit Breakers, page 1-10
[32] To order hubs, see Accessories and Hubs for CSEDs, page 1-31
[33] 125 A Homeline™ 2P circuit breaker can be installed in top position only. All other positions are limited to 100 A max.
[34] Use only 15–110 A and 150–200 A circuit breakers.
[35] Convertible to semiflush with SC200F flange kit (order separately).
[36] Suitable for OH service with addition of tunnel kit (SCTK20). Order separately.
[37] Suitable for OH service with addition of tunnel kit (SCTK30). Order separately.
[38] For use with Photovoltaic Systems. Provisions for field-installed CT. If required by adopted code, order retaining kit PK2SCPV separately, see Table 1.65 Accessories, page 1-31.
[39] Device does not meet EUSERC Specifications.
[40] Device supplied with barrel lock provisions factory-installed.
[41] Suitable for load wires to exit top endwall with addition of Tunnel Kit OHBS, (see Table 1.65 Accessories, page 1-31, check with local utility for approval.
[42] 5th jaw factory-installed.
[43] Suitable for load wires to exit top endwall with addition of Tunnel Kit OHBL, (see Table 1.65 Accessories, page 1-31, check with local utility for approval.

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Meter Mains and All-in-Ones (300–400 A Devices)

Meter Mains and All-in-Ones
- Ring or ringless type meter socket designs available
- UL Listed, suitable **only** for use as service equipment
- Meets EUSERC standards where indicated.
- Service disconnects are supplied factory-installed, except where noted
- Supplied with 100% branch neutrals; all unused terminals may be used for equipment grounding wires
- Meets Federal Specification W-P-115c as Type 1, Class 2

Meter Mains: Meets Federal Specification W-P-115c as Type 1, Class 2, UL Listed, suitable only for use as service equipment, 120/240 Vac, 1Ø3W, NEMA 3R Enclosure

Table 1.61: Meter Mains

Ampere Rating	Bypass Type	Service (Type of Feed)		Short Circuit Current Rating	Cat. No.	Service Disconnect(s) [44]			Load Center and Branch Circuit Breakers (Order separately [45])				Hub Type (Order separately [46])	Line Side Main Lugs AWG/ kcmil (Al/ Cu)	Service Ground Lug AWG/ kcmil (Al/Cu)	Weight Each (Lbs) and Pallet Qty.
						2P Circuits (Max.)	Type (Order separately [47])	Ampere Rating (Max.)	Max. Quantity			Ampere Rating Max.				
		UL	UL and EU-SERC						Spaces	1P Circuits	1P Tandems					
Ring Type, QO																
Surface and Semiflush Mount [44]																
400 A	None	UG	UG	25 kA	CU12L400CN [48] CU12L400FN [48]	1 1 4	QDL22200 [49] QDL, QGL, QJL [50] QO, QO-VH or QOH [51]	200 A 200 A 125 A [52]	— — —	— — —	— — —	— — —	A–L	(2) Studs	4–250	98, 4
400 A	Class 320 Manual Bypass	UG	—	25 kA	CU12L400CB [48] [53] CU12L400FB [48] [53]	1 1 4	QDL22200 [49] QDL, QGL, QJL [50] QO, QO-VH or QOH [51]	200 A 200 A 125 A [52]	— — —	— — —	— — —	— — —	A–L	(2) Studs	4–250	98, 4
400 A	None	UG	UG	25 kA	CU816D400CN [48] [54]	1	QDL22200 [49]	200 A	8	16	8	200 A	A–L	(2) Studs	4–250	98, 4
400 A	Class 320 Manual Bypass	UG	—	25 kA	CU816D400CB [48] [52] [53]	1	QDL, QGL, QJL [50]	200 A	8	16	8	200 A	A–L	(2) Studs	4–250	98, 4
400 A	Class 320 Manual Bypass	UG	—	65 kA [44]	CUM400CB [48] [53]	1	LJL36400U31X [49]	400 A	—	2 [55]	—	200 A	A–L	(2) Studs	4–250	115, 4
Ringless Type, QO																
400 A	Class 320 Lever	UG	—	25 kA	QU12L400SL [56] [53]	1 1 4	QDL22200 [49] QDL, QGL, QJL [50] QO, QO-VH or QOH [51]	200 A 200 A 125 A [52]	— — —	— — —	— — —	— — —	A–L	(2) Studs	4–250	98, 4
Surface Mount Only, Supplied with Feed-Thru Lugs and Provisions for Branch Circuit Breakers																
400 A	[57]	UG	—	25 kA	QU816D400SL [52] [56] [53] QU816D400CK [54] [53]	1	QDL22200 [49] QDL, QGL, QJL [50]	200 A	8	16	8	200 A	A–L	(2) Studs	4–250	98, 4
Surface and Semiflush Mount [44]																
400 A	Class 320 Lever	UG	—	25 kA	QU12L400CL [56] [58] [53] QU12L400FL [56] [58] [53]	1 1 4	QDL22200 [49] QDL, QGL, QJL [50] QO, QO-VH or QOH [51]	200 A 200 A 125 A [52]	— — —	— — —	— — —	— — —	A–L	(2) Studs	4–250	98, 4
400 A		UG	—	25 kA	QU816D400CL [56] [52] [58] [53] QU816D400FL [56] [52] [58] [53]	1 1	QDL22200 [49] QDL, QGL, QJL [50]	200 A	8	16	8	200 A	A–L	(2) Studs	4–250	98, 4
400 A	Class 320 Lever	UG	—	65 kA [44]	QUM400CL [56] [53]	1	LJL36400U31X [49]	400 A	—	2 [55]	—	200 A	A–L	(2) Studs	4–250	120, 4
400 A	K-4 Bolt-On None	UG	—	65kA [44]	QUM400CK [48] [53]	1	LJL36400U31X [49]	400 A	—	2 [55]	—	200 A	A–L	(2) Studs	4–250	123, 4

[44] UL short circuit current rating is equal to the lowest interrupting rating of any circuit breaker installed.
[45] To order branch circuit breakers, see QO Plug-On Circuit Breakers, page 1-10
[46] To order hubs, see Accessories and Hubs for CSEDs, page 1-31
[47] To order service disconnects, see Circuit Breakers for CSEDs, page 1-30 except as noted)
[48] For use only on 120/240 Vac 1Ø3W system (4-jaw meter socket).
[49] Service disconnect supplied factory-installed.
[50] Additional service disconnect for field-installation: order prefix QBL at 10 kA, QDL at 25 kA, QGL at 65 kA, or QJL at 100 kA. Order separately. For complete circuit breaker catalog number, see Digest Section 7.
[51] Order two pole circuit breakers for field installation: order catalog designation QO for 10 kA, QO-VH for 22 kA or QOH for 42 kA short circuit current rating. See Table 1.18 Plug-On Circuit Breakers, page 1-10 or Table 1.63 Circuit Breakers for use with Meter Mains and All-In-One Devices, page 1-30.
[52] QO panel is rated 200 A maximum.
[53] Device configuration is not included in EUSERC standards. Consult applicable utility for acceptance.
[54] Supplied with load side feed-thru lugs for 6 AWG–250 kcmil (Al/Cu) conductors.
[55] Option for field installation of two Q-frame, 200 A max. 2-pole branch circuit breakers used as mains for two downstream load centers. Purchase installation kit BMK2Q400 and two Q-frame circuit breakers separately. Order QBL prefix at 10 kA, QDL prefix at 25 kA, or QGL prefix at 65 kA.
[56] Fifth jaw factory-installed.
[57] Device with suffix L has Class 320 lever bypass and device with suffix K has a K-4 bolt-on, no bypass.
[58] Knockout provided in cover for use with barrel lock kit SCBRLLOCK (see Table 1.65 Accessories, page 1-31).

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Table 1.62: All-in-One Combination Service Entrance Devices

Surface and Semiflush Mount *[59]*																
Ring Type, Homeline																
300 A	Class 320 Manual	UG	—	25 kA	SU3040D300CB *[60][61][62]*	1	QDL22200 *[63]* QDL, QGL, QJL *[64]*	200 A 100 A	30	40	10	200 A	A–L	(2) Studs	4–250	100, 4
					SU3040D300FB *[60][61][62]*	1										
400 A	None	UG	UG	25 kA	SU3040D400CN *[60][61]*	1	QDL22200 *[63]* QDL, QGL, QJL *[64]*	200 A 200 A	30	40	10	200 A	A–L	(2) Studs	4–250	100, 4
					SU3040D400FN *[60][61]*	1										
400 A	Class 320 Manual	UG	—	25 kA	SU3040D400CB *[60][61][62]*	1	QDL22200 *[63]*	200 A	30	40	10	200 A	A–L	(2) Studs	4–250	100, 4
					SU3040D400FB *[60][61][62]*	1	QDL, QGL, QJL *[64]*	200 A								
Ringless, Homeline																
400 A	Class 320 Lever	UG	—	25 kA	RU3040D400CL *[61][65][62]*	1	QDL22200 *[63]*	200 A	30	40	10	200 A	A–L	(2) Studs	4–250	100, 4
					RU3040D400FL *[61][65][62]*	1	QDL, QGL, QJL *[64]*	200 A								
400 A	K-4 Bolt-on	UG	—	25 kA	RU3040D400CK *[61][62]*	1	QDL22200 *[63]* QDL, QGL, QJL *[64]*	200 A 200 A	30	40	10	200 A	A–L	(2) Studs	4–250	100, 4
					RU3040D400FK *[61][62]*	1										

Circuit Breakers for CSEDs

Table 1.63: Circuit Breakers for use with Meter Mains and All-In-One Devices

Ampere Rating *[66]*	Type: HOM, 1P	Type: HOM, 2P	Type: QO, 1P	Type: QO, 2P	Type: QO-VH, 1P	Type: QO-VH, 2P
	Cat. No. (DE3D)	Cat. No. (DE3D)	Cat. No. (DE2A)	Cat. No. (DE2A)	Cat. No. (DE2A)	Cat. No. (DE2A)
10	—	—	QO110	—	—	—
15	HOM115	—	QO115	—	QO115VH	—
20	HOM120	—	QO120	—	QO120VH	—
25	HOM125	—	QO125	—	QO125VH	—
30	HOM130	HOM230	QO130	QO230	QO130VH	QO230VH
35	—	HOM235	QO135	QO235	—	—
40	HOM140	HOM240	QO140	QO240	—	QO240VH
45	—	HOM245	QO145	QO245	—	—
50	HOM150	HOM250	QO150	QO250	—	QO250VH
60	—	HOM260	QO160	QO260	—	QO260VH
70	—	HOM270	QO170	QO270	—	QO270VH
80	—	HOM280	—	QO280	—	QO280VH
90	—	HOM290	—	QO290	—	QO290VH
100	—	HOM2100	—	QO2100	—	QO2100VH
110	—	HOM2110	—	QO2110	—	QO2110VH
125	—	HOM2125	—	QO2125	—	QO2125VH
150	—	HOM2150BB	—	QO2150	—	QO2150VH
175	—	HOM2175BB	—	QO2175	—	QO2175VH
200	—	HOM2200BB	—	QO2200	—	QO2200VH

Ampere Rating *[66]*	Type: QOM1-VH, 2P	Type: QOM2-VH, 2P	Type: QDL, 2P *[67]*
	Cat. No. (DE3D)	Cat. No. (DE3D)	Cat. No. (DE2A)
50	QOM50VH *[68]*	—	—
60	QOM60VH	—	—
70	QOM70VH	—	QDL22070
80	QOM80VH	—	QDL22080
90	QOM90VH	—	QDL22090
100	QOM100VH	QOM2100VH	QDL22100
110	QOM110VH	—	QDL22110
125	QOM125VH	QOM2125VH	QDL22125
150	—	QOM2150VH	QDL22150
175	—	QOM2175VH	QDL22175
200	—	QOM2200VH	QDL22200
225	—	QOM2225VH	—

[59] UL short circuit current rating is equal to the lowest interrupting rating of any circuit breaker installed.
[60] For use only on 120/240 Vac 1Ø3W system (4-jaw meter socket).
[61] Knockout provided in cover for use with barrel lock kit SCBRLLOCK (see Accessories).
[62] Device configuration is not included in EUSERC standards. Consult applicable utility for acceptance.
[63] Service disconnect supplied factory-installed.
[64] Additional service disconnect for field-installation: order prefix QBL at 10 kA, QDL at 25 kA, QGL at 65 kA, or QJL at 100 kA. Order separately. For complete circuit breaker catalog number, see Digest Section 7.
[65] 5th jaw factory-installed.
[66] Do not exceed mains rating of device
[67] For additional interrupting rating circuit breakers, order circuit breaker prefix QBL at 10 kA, QGL at 65 kA or QJL at 100 kA.
[68] Reference National Electrical Code Article 230-79.

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Table 1.64: Hubs and Closing Plates

Hub Series	Conduit Size (inches)	Cat. No.	Disc. Sch.
Closing Plate for "A" Hub opening		ACP	DE4
A	1.00	A100	DE4
	1.25	A125	DE4
	1.50	A150	DE4
	2.00	A200	DE4
	2.50	A250	DE4
Adapter plate to allow use of "A" Hubs on "A-L" size hub openings		AAP	DE4
Closing Plate for "A-L" Hub opening		ACPL	DE4
A-L	2.00	A200L *[69]*	DE4
	2.50	A250L	DE4
	3.00	A300L	DE4
	3.50	A350L	DE4
	4.00	A400L	DE4
Closing Plate for "B" Hub opening		BCAP	DE1A
B	0.75	B075	DE1A
	1.00	B100	DE1A
	1.25	B125	DE1A
	1.50	B150	DE1A
	2.00	B200	DE1A
	2.50	B250	DE1A
B300	3.00	B300	DE1A

Accessories and Hubs for CSEDs

Table 1.65: Accessories

Description		Cat. No.	Disc. Sch.
Generator Kit: Interlocks main service disconnect and generator circuit breaker (order separately). For : Homeline™ CSED Devices RC816F-, RC2040M-, SO2040M- containing suffix -C or -CH QO CSED Devices QC816F-, QC2442M- containing suffix -C or -CH		RCGK2 QCGK3	DE4 DE4
Backfed inverter circuit breaker retaining kit for SC2636M200FPV and SC2636M225FPV		PK2SCPV	DE4
Fifth Jaw Kit for:	Meter Main Types: C, RC, SC, QC All-In-One Types: SC, SU (100–225 A), QC, RC, SO	5J	DE4
Bypass (Horn Type) for Ringless Type Meter Mains and All-In-Ones (100–200 A) (except for RC8L125S, RC1624M100S and RC1624M125S–use RCHB).		MMHB	DE4
Lexan Meter Socket Cover Plate for: Ring and Ringless Type Meter Mains Ring and Ringless Type All-In-Ones		29007	DE4
Meter Socket Sealing Rings for Ring Type Meter Mains and All-In Ones: Snap Type Aluminum (Std.) Screw Type Aluminum Snap Type Stainless Steel		2920910001 29008W ARP00026	DE5 DE4 DE4
Anti-Inversion Kit . For use ONLY on 400 A Meter Mains and All-In-Ones with lever bypass.		MMLRK	DE4
Trim Kit for 2 in. X 6 in. stud wall, used with Reverse All-In-Ones, SU3040M200R, and SU3040M225R		SU2X6TRIM	DE4
Barrel Lock Kit (Barrel Lock not included), supplied with bracket and mounting screw, refer to listings for where used.		SCBRLLOCK	DE4
Semiflush Flange Kit for:	Meter Mains: SC816D150/200C and RC816D200CH All-In-Ones: SC2040M200C	SC200F	DE4
Semiflush Flange Kit for ring- and ringless-type Meter Mains and All-In-Ones (400 A Only)		FK400	DE4
Ringless Type Utility Cover for RU3040D400CL/FL, QU12L400CL/FL, and QU816D400CL/FL. Includes one piece meter socket and pull box cover with handles and closing plate.		R400L	DE4
Lug Kit includes (4) lugs, for use with 2 AWG–600 kcmil Al/Cu conductors. Lugs are for standard 2-Hole mounting. Meter Main and All-In-One units supplied with (2) studs per phase and neutral will accept one lug per phase and neutral. Not for use on 400 A devices with "K" suffix.		CMELK4	DE4
Branch Circuit Breaker Field Installation Kit for two Q-Frame Circuit Breakers (QBL, QDL, or QGL, order separately). For CUM400CB, QUM400CL or QUM400CK - includes (2) mounting pans, (4) wires.		BMK2Q400	DE4
Overhead Feed Trough for 400 A ring- and ringless-type Meter Mains and All-In-Ones.		OCK400	DE4
Touch-Up Paint (ASA49 Gray)		PK49SP	DE1
Ground Bar Kit, Meter Mains and All-In-Ones QC, RC, and SC (100–225 A)		PK15GTA	DE3A
Filler Plate for:	Meter Main Types: QC, CU All-In-One Types: QC	QOFP	DE3A
Filler Plate for:	Meter Main Types: RC, SC All-In-One Types: SC, RC, SU	HOMFP	DE3A
Neutral Lug (6-2/0 AWG) for:	Meter Main Types: RC, SC, QC All-In-One Types: SC, SU, QC, RC	LK100AN	DE3A
Overhead Barrier Tunnel Kit for Ringless & Horn Bypass in RC/QC Devices		OHBS	DE4
Overhead Barrier Tunnel Kit for Lever Bypass RC/QC Devices		OHBL	DE4

[69] Supplied with AAP adapter plate and "A" hub.

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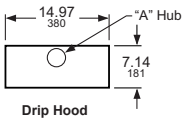
Dimensions for CSEDs

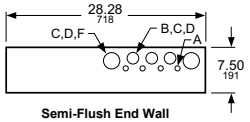
Table 1.66: Knockouts

Symbol	A	B	C	D	E	F	G	H	I	J
Conduit Size (in.)	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4

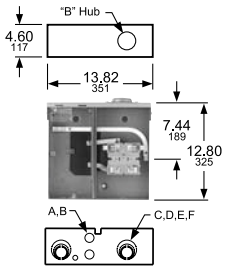
▲ Driphood supplied factory-installed and is required for surface mount installation. For semi-flush installation, remove driphood and install flange kit SC200F (order separately).
■ Unit supplied with blank top endwall (factory-installed) for surface mount installation. For semi-flush installation, install flange kit FK400 (order separately). Kit includes replacement top endwall (with knockouts) and flanges.
♦ Unit supplied with semi-flush top endwall factory installed and semi-flush flanges factory included.



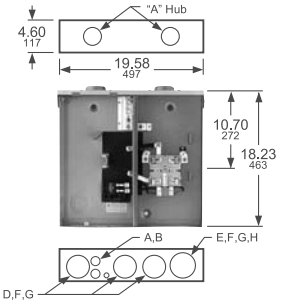
Drip Hood



Semi-Flush End Wall

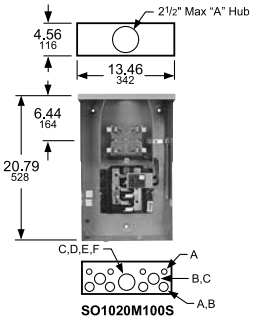


C125RB (Shown)
CQRB100

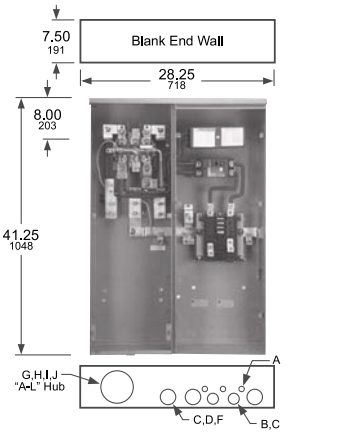


Ring Type:
CM200S
C2M200S (Shown)
C4L200S

Ringless Type:
RC200S
RC2M200S
RC2M200SH

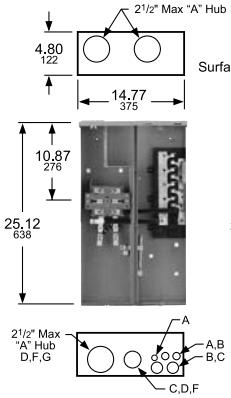


SO1020M100S

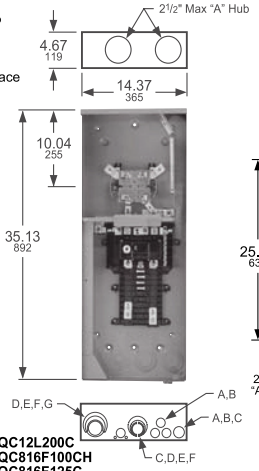


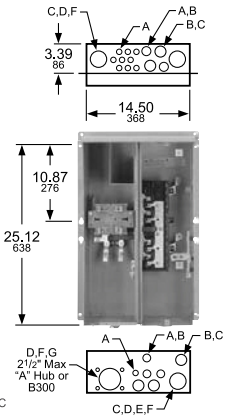
CU12L400CN■
CU12L400CB■
CU12L400CL■
QU12L400SL
CU12L400FN♦
CU12L400FB♦
CU816D400FN♦
CU816D400FB♦
QU816D400CK■
QU12L400FL♦
QU816D400FL♦

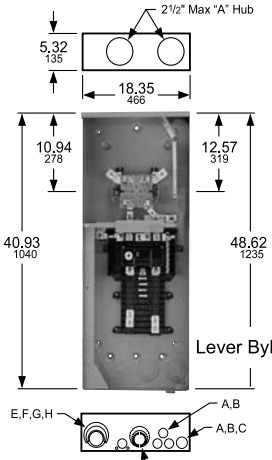
CU816D400CB■
CU816D400CN■
QU816D400CL■
QU816D400SL (Shown)



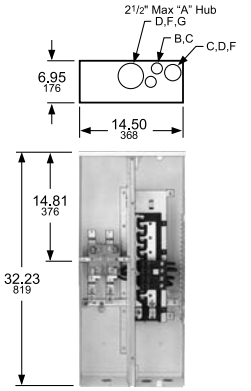
Surface







Lever ByPass Devices



SC8L125S (Shown)
RC8L125S
SC1624M100S
SC1624M125S
RC1624M100S
RC1624M125S

QC12L200C
QC816F100CH
QC816F125C
QC816F150C
QC816F200C
QC816F200CH
RC12L200C
RC816F100CH
RC816F125CH
RC816F150C
RC816F150CH

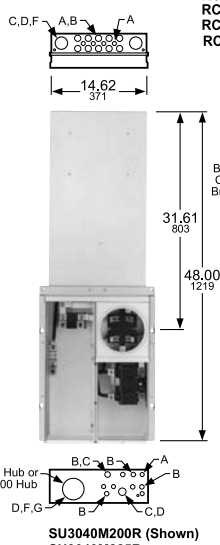
RC816F200C
RC816F200CH
RC2040M125CH
RC2040M150CH
RC2040M200C
RC2040M200CH
QC2442M200C
QC2442M200CH

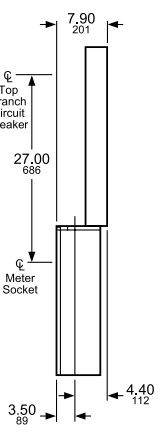
SC8L125F (Shown)
SC1624M100F
SC1624M125F

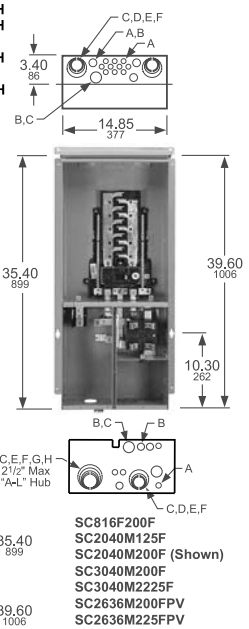
RC816F100SH
RC816F125SH
RC816F150SL
RC816F150S,SH
RC816F200SL
RC816F200S,SH
RC12L200S
RC2040M125SH
RC2040M150SH
RC2040M200S,SH
RC3040M150SL
RC3040M200SL

QC816F100SH
QC816F125SH
QC816F150S,SH (Shown)
QC816F150SL
QC816F200SL
QC816F200S,SH
QC12L200S
QC2442M150SH
QC2442M200S,SH
SO2040M200S
QC3040M200SH

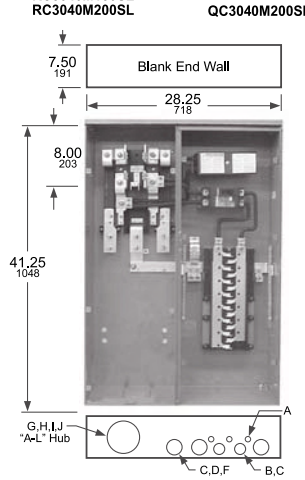
SU816D150C♠
SU816D200C♠
SU2040M200C♠
RC816D200CH♠
SC816D150C♠
SC816D200C♠ (Shown)





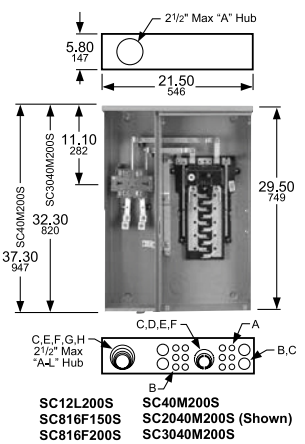


SC816F200F
SC2040M125F
SC2040M200F (Shown)
SC3040M200F
SC3040M2225F
SC2636M200FPV
SC2636M225FPV



SU3040D400CB■ (Shown)
RU3040D400CL■
RU3040D400CK■
SU3040D300FB♦
SU3040D400FB♦
SU3040D400FN♦

SU3040D300CB■
SU3040D400CN■
RU3040D400FL♦
RU3040D400FK♦
CUM400CB■
QUM400CL■
QUM400CK■



SC12L200S
SC816F150S
SC816F200S

SC40M200S
SC2040M200S (Shown)
SC3040M200S

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2/15/2017

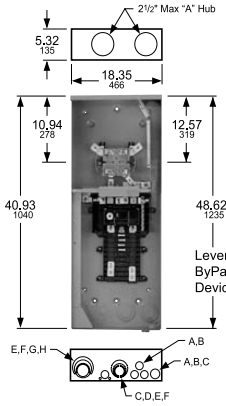
Meter Mains and All-In-Ones

- Ringless Meter Sockets with barrel lock provisions factory installed except for Cat. No. SO2040M200SS which is a Ring Style meter socket with no provisions for barrel lock to secure the meter cover
- UL Listed, suitable only for use as service equipment
- Service disconnect(s) are supplied factory-installed, except where noted
- Supplied with 100% branch neutrals, all unused terminals may be used for equipment grounding wires
- Meets Federal Specification W-P-115c as Type 1, Class 2
- All devices have a 3" KO in the bottom endwall
- Provisions for Field Installed CTs All Devices
- Solar Ready kit SR69064A fits All Devices Below, order from Table 1.66

Table 1.67: All-In-One Combination Service Entrance Devices

	Ampere Rating	Bypass Type	Service Type	Short Circuit Current Rating	Cat. No.	Service Disconnect(s)			Load Center and Branch Circuit Breakers (Order Separately *[1]*)				Hub Type (Order Separately *[2]*)	Line Side Main Lugs AWG/ kcmil (Al/Cu)	Service Ground Lug AWG/ kcmil (Al/Cu)
						2P Circuits (Max.)	Type (Factory Installed except where noted)	Ampere Rating	Max. Quantity 1P Spaces	1P Circuits	1P Tandems	Ampere Rating Max.			
Meter Mains *[3]*															
	Surface Mount Only														
	Surface Mount—Supplied with Feed-Thru Lugs and Provisions for Branch Circuit Breakers														
QO	150 A	None	OH/UG	22 kA	QC816F150SS *[4] [5]*	1	QOM2150VH	150 A	8	16	8	150 A	A	350	8–2/0
		Lever	OH/UG	22 kA	QC816F150SLS *[4] [6]*	1	QOM2150VH	150 A	8	16	8	150 A			
	200 A	None	OH/UG	22 kA	QC816F200SS *[4] [5]*	1	QOM2200VH	200 A	8	16	8	200 A			
		Lever	OH/UG	22 kA	QC816F200SLS *[4] [6]*	1	QOM2200VH	200 A	8	16	8	200 A			
	Surface Mount—Supplied with Feed-Thru Lugs and provisions for Branch Circuit Breakers														
Homeline	150 A	None	OH/UG	22 kA	RC816F150SS *[4] [5]*	1	QOM2150VH	150 A	8	16	8	150 A	A	6-350	8–2/0
		Lever	OH/UG	22 kA	RC816F150SLS *[4] [6]*	1	QOM2150VH	150 A		16	8	150 A	A	6-350	8–2/0
	200 A	None	OH/UG	22 kA	RC816F200SS *[4] [5]*	1	QOM2200VH	200 A	8	16	8	200 A	A	6-350	8–2/0
		Horn	OH/UG	22 kA	RC816F200SHS *[4] [7] [5]*	1	QOM2200VH	200 A	8	16	8	200 A	A	6-350	8–2/0
		Lever	OH/UG	22 kA	RC816F200SLS *[4] [6]*	1	QOM2200VH	200 A		16	8	200 A	A	6-350	8–2/0
All-in-One Combination Service Entrance Devices *[3]*															
	Surface Mount Only														
QO	200 A	None	OH/UG	22 kA	QC2442M200SS *[5]*	1	QOM2200VH	200 A	24	42	18	200 A	A	6-350	8–2/0
		Horn	OH/UG	22 kA	QC2442M200SHS *[7] [5]*	1	QOM2200VH	200 A	24	42	18	200 A	A	6-350	8–2/0
Homeline	150 A	Horn	OH/UG	22 kA	RC2040M150SHS *[7] [5]*	1	QOM2150VH	150 A	20	40	20	150 A	A	6-350	8–2/0
		Lever	OH/UG	22 kA	RC3040M150SLS *[6]*	1	QOM2150VH	150 A	30	40	10	150 A	A	6-350	8–2/0
	200 A	None	OH/UG	22 kA	RC2040M200SS *[5]*	1	QOM2200VH	200 A	20	40	20	200 A	A	6-350	8–2/0
		Horn	OH/UG	22 kA	RC2040M200SHS *[7] [5]*	1	QOM2200VH	200 A	20	40	20	200 A	A	6-350	8–2/0
		None	OH	22 kA	SO2040M200SS *[5]*	1	QOM2200VH	200 A	20	40	20	200 A	A	6-350	8–2/0
		Lever	OH/UG	22 kA	RC3040M200SLS *[6]*	1	QOM2200VH	200 A	30	40	10	200 A	A	6-350	8–2/0

* Kit is to be installed between meter socket and Main Disconnect. May be used with Solar PV, Wind, fuel generators, and other power generation sources up to 80% of Mains Rating Maximum 160 A.



RC816F150SS
RC816F200SS
RC816F200SHS
QC816F150SS
QC816F200SS
RC2040M150SHS
RC2040M200SS
RC2040M200SHS
SO2040M200SS
QC2442M200SS
QC2442M200SHS
QC816F150SLS
RC816F150SLS
RC3040M150SLS
QC816F200SLS
RC816F200SLS
RC3040M200SLS

Table 1.68: Knockouts

Symbol	A	B	C	D	E	F	G	H	I	J
Conduit Size (in.)	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4

Table 1.69: All-in-One Combination Service Entrance Devices—Plug on Neutral

Main Breaker	Bus Bar Ampere Rating	Bypass Type	Service Type	Short Circuit Current Rating	Cat. No.	Service Disconnect(s)		Load Center and Branch Circuit Breakers (Order Separately)				Hub Type (Order Separately)	Line Side Main Lugs AWG/ kcmil (Al/Cu)	Service Ground Lug AWG/ kcmil (Al/Cu)
						2P Circuits (Max.)	Type (Factory Installed except where noted)	Max. Quantity 1P Spaces	1P Circuits	1P Tandems	Ampere Rating Max.			
Homeline Surface Mount Only														
200 A	200 A	None	OH/UG	22 kA	RC3042M200PS *[5]*	1	QOM2200VH	30	42	12	200 A	A	6-350	12–2/0

[1] To order load centers and branch circuit breakers, see QO Plug-On Circuit Breakers, page 1-10 and Homeline Plug-On Circuit Breakers, page 1-20
[2] See Bolt-On Hubs, page 1-24
[3] **Solar Ready Kit Part Number SR69064A * (This Kit Fits All Solar Ready Devices)**
[4] Supplied with load side feed-thru lugs, for 4AWG-250 kcmil Al/Cu conductors.
[5] Suitable for load wires to exit top endwall with addition of Tunnel Kit OHBS. See (see Table 1.65 Accessories, page 1-31, check with local utility for approval.
[6] Suitable for load wires to exit top endwall with addition of Tunnel Kit OHBL. See(see Table 1.65 Accessories, page 1-31, check with local utility for approval.
[7] Device supplied with horn bypass and 5th jaw factory installed

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Homeline Solar Ready PoN CSEDs

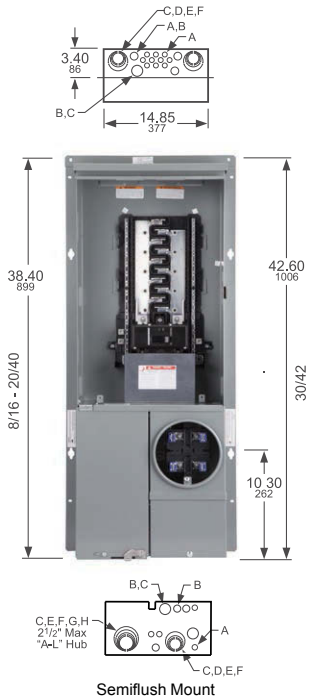
- Ring-type Meter Sockets
- UL Listed, suitable only for use as service equipment
- Service disconnect(s) are supplied factory-installed, except where noted
- Interiors accept plug-on neutral and pigtail style branch circuit breakers
- Supplied with a fully distributed neutral bar, all unused terminals may be used for equipment grounding wires
- Meets Ferderal Specification W-P-115c as Type 1, Class 2
- Solar Ready kit SR69064A fits all devices below
- All devices have a 3" KO in the bottom endwall
- Provisions for field installed CTs on All devices
- Meets EUSERC requirements

Table 1.70: All-In-One Combination Service Entrance Devices

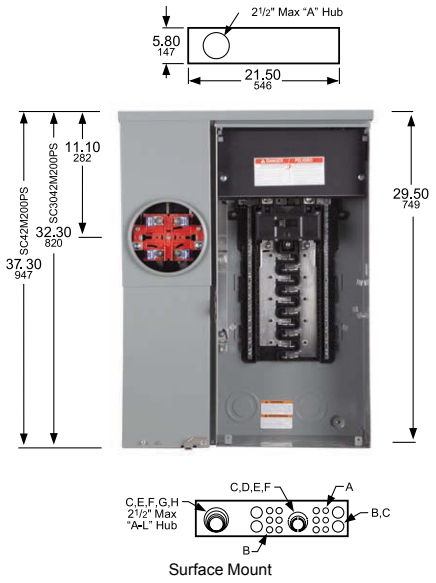
Main Breaker	Bus Bar Ampere Rating	Bypass Type	Service Type	Short Circuit Current Rating	Cat. No. *[1]*	Service Disconnect(s)		Load Center and Branch Circuit Breakers (Order Separately Pages 1-2, 1-3, 1-4)				Hub Type (Order Separately *[2]*)	Line Side Main Lugs AWG/ kcmil (Al/Cu)	Service Ground Lug AWG/ kcmil (Al/Cu)
								Max. Quantity						
									1P					
						2P Circuits (Max.)	Type (Factory Installed except where noted)	Spaces	Circuits	Tandems	Ampere Rating Max.			
Semiflush Mount Only														
200 A	225 A	None	OH*[3]*/UG	22 kA	SC816F200PF *[4]*	1	QOM2200VH	8	16	8	200 A	A-L	4-250	8-2/0
125 A		None	OH*[3]*/UG	22 kA	SC2040M125PF	1	QOM2125VH	20	40	20	110 A			
200 A		None	OH*[3]*/UG	22 kA	SC2040M200PF	1	QOM2200VH	20	40	20	200 A			
		None	OH*[5]*/UG	22 kA	SC3042M200PF	1	QOM2200VH	30	42	12	200 A			
225 A		None	OH*[5]*/UG	22 kA	SC3042M225PF	1	QOM2225VH	30	42	12	200 A			
Surface Mount Only														
150 A	200 A	None	OH/UG	22 kA	SC816F150PS *[4]*	1	QOM2150VH	8	16	8	150 A	A-L	4-250	8-2/0
200 A		None	OH/UG	22 kA	SC816F200PS *[4]*	1	QOM2200VH	8	16	8	200 A			
		None	OH/UG	22 kA	SC2040M200PS	1	QOM2200VH	20	40	20	200 A			
		None	OH/UG	22 kA	SC3042M200PS	1	QOM2200VH	30	42	12	200 A			
		None	OH/UG	22 kA	SC42M200PS	1	QOM2200VH	42	42	0	200 A			

Table 1.71: Knockouts

Symbol	A	B	C	D	E	F	G	H	I	J
Conduit Size (in.)	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4



Semiflush Mount



Surface Mount

[1] Accepts Solar Ready Kit Part Number SR69064A. Check with local utility for approval and order separately.
[2] See Bolt-On Hubs, page 1-24
[3] Suitable for OH service with addition of tunnel kit (SCTKP20). Check with local utility for approval and order separately.
[4] Supplied with load side feed-thru lugs, for 4AWG-250 kcmil Al/Cu conductors.
[5] Suitable for OH service with addition of tunnel kit (SCTKP30). Check with local utility for approval and order separately.

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QO200TRNM

QO3100BNF
With Cover Removed

1Ø3W—120/240 Vac—240 Vac—UL Listed

Table 1.72: Enclosed Molded Case Switch, Switch Included, Does NOT provide overcurrent protection

Service		Ampere Rating	General Purpose	Rainproof	Box. No. [1]
240 Vac	G B	60 A [2] [3]	QO260NATS	QO200TR	2, 9R [4]
				QO200TRNM	1NM
				QO260NATR	1R
120/240 Vac	S N	100 A [5]	QO2000NS	QO2000NRB	13, 10R

Table 1.73: Housing Bracket

Description	Cat. No.
Bracket used with QO200TR for stucco, aluminum and vinyl siding. (This item is obsolete)	PKHB

Table 1.74: Enclosed GFCI Circuit Breakers, GFCI Circuit Breaker Included—10 kA Short Circuit Current Rating

Service		Ampere Rating	Type 3R—Rainproof	Circuit Breaker Included	Box. No. [1]
120/240 Vac	S N	50 A	QOE250GFINM HOME250SPA	QO250GFI HOM250GFI	1NM (Non-metallic) 1R (Metallic)

Table 1.75: 2-Pole Circuit Breaker Enclosures—22 kA Short Circuit Current Rating

Service [6]		Ampere Rating	General Purpose [7]	Rainproof	Box. No. [1]
120/240 Vac	S N	100 A 125 A	QO2100BNF/S QO2125BNF/S	QO2100BNRB QO2125BNRB	13, 10R 18, 13R
240 Vac	S N	100 A	QO3100BNF/S	QO3100BNRB	13, 10R
60A Max. Circuit Breaker Enclosures—10 kA Short Circuit Current Rating Circuit breaker not included. Order separately from QO Plug-On Circuit Breakers, page 1-10. Will not accept QO-GFI circuit breaker nor QO circuit breakers with factory-installed accessories.					
240 Vac	G B	60 A [2]	—	QO2TR	9R [4]

Table 1.76: Q Frame Enclosures and Q Frame Circuit Breakers

Service	Enclosure Only [8]			Circuit Breaker (Order Separately)				
	Type 1—General Purpose [7]	Type 3R—Rainproof	Box No. [1]	Ampere Rating	10 k AIR	25 k AIR	65 k AIR	100 k AIR
S N 2P 240 Vac Maximum	Q22200NS [9] or Q23225NF/S	Q22200NRB [9] or Q23225NRB	19, 11R 20, 12R	70 A	QBL22070	QDL22070	QGL22070	QJL22070
				80 A	QBL22080	QDL22080	QGL22080	QJL22080
				90 A	QBL22090	QDL22090	QGL22090	QJL22090
				100 A	QBL22100	QDL22100	QGL22100	QJL22100
				110 A	QBL22110	QDL22110	QGL22110	QJL22110
				125 A	QBL22125	QDL22125	QGL22125	QJL22125
				150 A	QBL22150	QDL22150	QGL22150	QJL22150
				175 A	QBL22175	QDL22175	QGL22175	QJL22175
				200 A	QBL22200	QDL22200	QGL22200	QJL22200
				225 A	QBL22225	QDL22225	QGL22225	QJL22225
S N 3P 240 Vac	Q23225NF/S	Q23225NRB	20, 12R	70 A	QBL32070	QDL32070	QGL32070	QJL32070 [10]
				80 A	QBL32080	QDL32080	QGL32080	QJL32080 [10]
				90 A	QBL32090	QDL32090	QGL32090	QJL32090 [10]
				100 A	QBL32100	QDL32100	QGL32100	QJL32100 [10]
				110 A	QBL32110	QDL32110	QGL32110	QJL32110 [10]
				125 A	QBL32125	QDL32125	QGL32125	QJL32125 [10]
				150 A	QBL32150	QDL32150	QGL32150	QJL32150 [10]
				175 A	QBL32175	QDL32175	QGL32175	QJL32175 [10]
				200 A	QBL32200	QDL32200	QGL32200	QJL32200 [10]
				225 A	QBL32225	QDL32225	QGL32225	QJL32225 [10]

[1] See Table 1.53 Knockout Information, page 1-23
[2] Not suitable for service equipment.
[3] Maximum 10 hp 240 Vac.
[4] Top endwall has no hub opening.
[5] Maximum 20 hp 240 Vac.
[6] Not for use with one pole QO circuit breakers. Circuit breakers not included. Order QO type circuit breakers separately from pages 1-2 and 1-3. Accepts QO circuit breakers with factory-installed accessories. Order equipment ground bar PKOGTA2, if required.
[7] Order F for flush, S for surface.
[8] Factory-installed groundable neutral assembly includes (2) ground lugs and (2) neutral lugs. Equipment ground kit PKOGTA2 also included.
[9] Accepts 200 A max. 2P Q Frame circuit breakers.
[10] Equipment ground bar kit PKOGTA2 factory-included.

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Table 1.77: QOM2 Enclosures and QOM2 Circuit Breakers

Service	Enclosure Only *[11]*			QOM2 Circuit Breaker (Order Separately) *[12]*	
	Type 1 General Purpose *[13]*	Type 3R Rainproof	Box No. *[14]*	Ampere Rating	22 k AIR
	Cat. No.	Cat. No.			Cat. No.*[15]*
2P 240 Vac Maximum	QOM22225NF/S	QOM22225NRB	22, 16R	100 A	QOM2100VH
				125 A	QOM2125VH
				150 A	QOM2150VH
				175 A	QOM2175VH
				200 A	QOM2200VH
				225 A	QOM2225VH

QOM22225NS
With Cover Removed

Q22200NS
With Cover Removed

Q23225NF

(Order Q-Frame circuit breaker separately)

[11] Equipment ground bar kit PKOGTA2 factory-included.
[12] Add suffix 1021 for 120, 208 or 240 Vac shunt trip.
[13] Order F for flush, S for surface.
[14] See Table 1.53 Knockout Information, page 1-23
[15] DE3A Discount Schedule.

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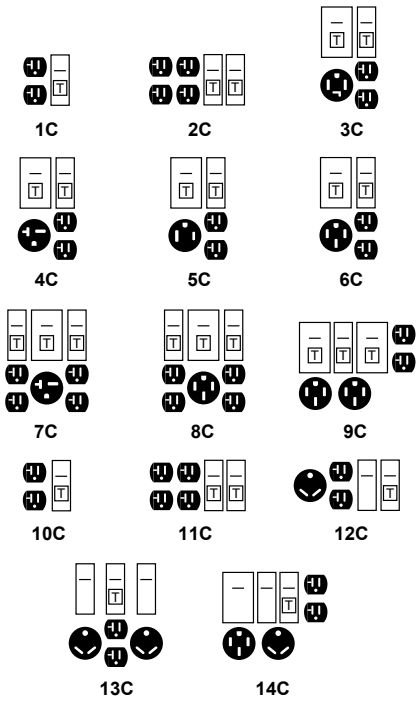

A		20 A 125 V 2W and Grd. NEMA 5-20R
B		30 A 125 V 2W and Grd ANSI 73.13
C		50 A 125/250 V 3W and Grd. NEMA 14-50R
D		20 A 250 V 2W and Grd. NEMA 6-20R
E		30 A 125/250 V 3W and Grd. NEMA 14-30R
F		50 A 250 V 2W and Grd. NEMA 6-50R

All non-pedestal devices have provisions to field-install a Type “B’’ hub on the bottom endwall for bottom feed from a conduit riser. Order Type “B’’ bolt-on hub (B250 Max.) and two mounting screws (Cat. No. 8002505501) and two hex nuts (Cat. No. 2340102000).

Power Outlet Panels for Construction Sites

- Provide temporary power at construction sites.
- Each receptacle protected by QO-GFI circuit breaker in compliance with NEC® requirements.
- Each enclosure is rainproof.
- 10 kA short circuit current rating.
- UL Listed as suitable for use as temporary site service equipment.
- Provided with neutral bonding provisions.
- Boxes have provisions for type “B’’ hubs to be field-installed.

Table 1.78: Construction Site Panels

Power Outlet Configuration	Service *[1]*	Mains Ampere Rating	Circuit Breaker (Included)	Receptacles (Included)					Cat. No. *[2]*	Main Wire Size AWG *[3]*	
				A	C	D	E	F		Cu	Al
1C	1Ø2W	40 A	(1) QO120GFI	1					PAK10C1	14–6	12–6
2C	1Ø2W	40 A	(2) QO120GFI	2					PAK11C *[4]*	14–6	12–6
2C	1Ø2W	40 A	(2) QO120GFI	2					PAK11C1	14–6	12–6
3C	1Ø3W	70 A	(1) QO120GFI (1) QO230GFI	1			1		PAK31CGFI	8–1	8–1
4C	1Ø3W	70 A	(1) QO120GFI (1) QO220GFI	1		1			PAK36C1GFI	8–1	8–1
5C	1Ø3W	70 A	(1) QO120GFI (1) QO250GFI	1				1	PAK51CGFI	8–1	8–1
6C	1Ø3W	70 A	(1) QO120GFI (1) QO250GFI	1	1				PAK55CGFI	8–1	8–1
7C	1Ø3W	70 A	(2) QO120GFI (1) QO220GFI	2		1			PAK72CGFI	8–1	8–1
8C	1Ø3W	70 A	(2) QO120GFI (1) QO250GFI	2	1				PAK76CGFI	8–1	8–1
9C	1Ø3W	100 A	(1) QO120GFI (2) QO250GFI	1	2				PAK1004CGFI	14–1	12–1

Power Outlet Panels for Recreational Vehicle Parks

- Provide electrical power to individual recreational vehicle park sites.
- Each receptacle protected by appropriate GFI or Standard QO™ circuit breaker.
- All receptacles and circuit breakers included.
- 10 kA short circuit current rating.
- UL Listed.
- All enclosures are rainproof.
- No neutral bonding provisions.
- Loop-feed provisions.

Table 1.79: Recreational Vehicle Park Panels

Power Outlet Configuration	Service *[1]*	Mains Ampere Rating	Circuit Breaker (Included)	Receptacles (Included) *[5]*			Cat. No.	Main Wire Size AWG/kcmil *[6]* Phase and Neutral	
				A	B	C		Cu	Al
Underground or Overhead Loop-Feed Terminals—Non-Pedestal *[2] [7]*									
11C	1Ø2W	40 A	(2) QO120GFI	2			PAK11CTG	14–6	12–6
12C	1Ø2W	50 A	(1) QO120GFI (1) QO130	1	1		PAK41CTG *[8]*		
			(2) QO130						12–1
14C	1Ø3W	100 A	(1) QO120GFI (1) QO250 (1) QO130	1	1	1	PAK75CTG (Not Loop Feed) *[8]*	14–1	12–1
Pedestal Mounted—Underground Loop-Feed Terminals *[9] [10]*									
11C	1Ø2W	40 A	(2) QO120GFI	2			PAK11PG	(2)6–250	(2)6–250
12C	1Ø2W	50 A	(1) QO120GFI (1) QO130	1	1		PAK41PG *[8]*		
13C	1Ø2W	75 A	(1) QO120GFI (2) QO130	1	2		PAK61PG *[8]*		
14C	1Ø3W	100 A	(1) QO120GFI (1) QO250 (1) QO130	1	1	1	PAK75PG *[8]*		

[1] (1Ø2W 120 Vac) (1Ø3W 120/240 Vac)
[2] Devices have a bolt-on factory-installed closing cap. Order type “B’’ bolt-on hub separately from page 1-18.
[3] Equipment ground terminal suitable for (2) 14 or 12 AWG Cu or (2) 12 or 10 AWG Al.
[4] Receptacles in this device are in bottom endwall and are accessible with outer door padlocked. “Order Only’’ from Lexington—Minimum order quantity is 50 devices.
[5] 20 A receptacles protected by 20 A GFI circuit breaker.
[6] Two wires each per phase, neutral, and equipment ground—for loop feed (except PAK75CTG).
[7] Equipment ground terminal suitable for (2) 14–12 AWG Cu or (2) 12–10 Al.
[8] GFI circuit breaker can be substituted for standard 30 A circuit breaker. Add suffix "FI’’ to catalog number. Example: PAK41CTGFI.
[9] Stabilizer foot available for use in unstable ground, order HNPSF
[10] Equipment ground terminals suitable for (2) 10–2/0 AWG Cu or (2) 6–2/0 AWG Al.

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Section 2

Metering Equipment

Individual Meter Socket

MP Meter-Pak Metering Equipment

EZ Meter-Pak Metering Equipment

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- Available single or three phase, 600 Vac max., with and without horn or lever bypass, overhead and underground service feed.
- 10 kA short circuit current rating (or higher with utility approval).
- UL Listed, NEMA 3R enclosure.
- Units supplied with bonded neutral.
- Units supplied with hub opening in top endwall require the use of a bolt-on hub, or closing plate.
- Units supplied with solid top are for underground feed only.
- For accessories, refer to page 2-3.

Individual Meter Sockets

This metering is generally utility specific. Always check with local utility company before installing. Contact your nearest Field Sales Office for additional catalog numbers, if required by utility.

UTRS101B

UTRS202B
(Cover not shown)

UTH5203T
(Cover not shown)

URTRS213B

Table 2.1: Individual Meter Sockets

Ampere Rating *[1]*	Jaw Qty.	Service Type	Cat. No. *[2]*	Lug Wire Range (Al/Cu)			Enclosure Information			Box No. *[3]*
				Line, Load, and Neutral (AWG/kcmil)	Wire Binding	Gnd. (AWG)	Material	Top Endwall Conf.		
								Hub Opening *[4]*	Closing Plate *[4]*	
Ringless Type, 1Ø3W 600 Vac Max., Without Bypass or Jaw Release										
125	4	UG	UTZRS101A *[5]*	8–2/0	1/2 in. Hex	14–2	Steel	Solid Top *[5]*	—	1R
125	4	OH	UTRS101B	8–2/0	Slotted	14–2	Steel	Series A	ACP	1R
125	4	OH	UATRS101B	8–2/0	Slotted	14–2	Aluminum	Series A	ACPA	1R
125	4	OH	URS101BCPL	8–2/0	Slotted	14–2	Steel	Series A	ACP	1R
125	5	OH/UG	1003880A *[6]*	8–2/0	Slotted	14–2	Steel	Series A	ACP	1R
200	4	OH	UTRS202B	8–250	1/2 in. Hex	14–2	Steel	Series A	ACP	3R
200	4	OH	UATRS202B	8–250	1/2 in. Hex	14–2	Aluminum	Series A	ACPA	3R
200	4	UG	UTRS213A *[5]*	1/0–350	1/2 in. Hex	14–2	Steel	Solid Top *[5]*	—	5R
200	4	OH/UG	UTRS213B *[6]*	1/0–350	1/2 in. Hex	14–2	Steel	Series A	ACP	5R
200	4	OH/UG	UATRS213B *[6]*	1/0–350	1/2 in. Hex	14–2	Aluminum	Series A	ACPA	5R
200	4	OH/UG	U92197CCCPL *[7]*	1/0–350	1/2 in. Hex	14–2	Steel	(2) Series A	(2) ACP*[7]*	7R
Ringless Type, 1Ø3W 600 Vac Max., With Horn Bypass, Without Jaw Release										
125	4	OH/UG	UHTRS101B	8–2/0	Slotted	14–2	Steel	Series A	ACP	1R
125	5	OH	UGHTRS101L *[8]*	8–2/0	Slotted	14–2	Steel	A125 *[8]*	—	1R
125	4	OH	URS101BDQ *[9]*	8–2/0	1/2 in. Hex	None	Steel	Series A	ACP	1R
125	5	OH/UG	UGHTRS111C *[10]*	8–2/0	Slotted	14–2	Steel	Series A	ACP *[10]*	4R
200	4	OH/UG	UBHMRS212B *[6]*	8–250	1/2 in. Hex	None	Steel	Series A	ACP	4R
200	4	OH	UHTRS202B	8–250	1/2 in. Hex	14–2	Steel	Series A	ACP	3R
200	4	OH/UG	UHTRS212B *[6]*	8–250	1/2 in. Hex	14–2	Steel	Series A	ACP	4R
200	4	OH/UG	UHTRS213B *[6]*	1/0–350	1/2 in. Hex	14–2	Steel	Series A	ACP	5R
200	4	UG	UHTRS223A *[5]*	1/0–350	1/2 in. Hex	14–2	Steel	Solid Top *[5]*	—	2R
200	4	UG	URS212ADQ *[9]*	8–250	1/2 in. Hex	None	Steel	Solid Top *[5]*	—	4R
Ringless Type, 1Ø3W 600 Vac Max., With Lever Bypass and Jaw Release										
200	4	OH	UTH4203T	6–350	1/2 in. Hex	14–2	Steel	Series A-L	ACPL	8R
200	4	OH/UG	UTH4213T *[6]*	6–350	1/2 in. Hex	14–2	Steel	Series A-L	ACPL	9R
200	5	OH	UTH5203T	6–350	1/2 in. Hex	14–2	Steel	Series A-L	ACPL	8R
200	5	OH/UG	UTH5213T *[6]*	6–350	1/2 in. Hex	14–2	Steel	Series A-L	ACPL	9R
320	4	OH/UG	UTH4330T *[11]*	Studs Only	3/8 in. dia. studs	14–1/0	Steel	Series A-L	ACPL	11R
Ringless Type, 3Ø4W 600 Vac Max., With Lever Bypass and Jaw Release										
200	7	OH/UG	UTH7213T *[6]*	6–350	1/2 in. Hex	14–2	Steel	Series A-L	ACPL	9R
320	7	OH	UTH7300T *[11]*	Studs Only	3/8 in. dia. studs	14–1/0	Steel	Series A-L	ACPL	10R
Ringless Type, 3Ø4W 600 Vac Max., Bolt-On Socket Without Bypass										
400	7	OH/UG	UK7T *[11]*	Studs Only	1/2 in.–20 dia. studs	1/2 in.–20 dia. studs	Steel	Series A-L	ACPL	12R
400	7	OH/UG	UAK7T *[11]*	Studs Only	1/2 in.–20 dia. studs	1/2 in.–20 dia. studs	Aluminum	Series A-L	ACPLA	12R
Ring Type, 1Ø3W 600 Vac Max., Without Bypass or Jaw Release										
125	4	OH/UG	URTRS101B *[6]*	8–2/0	Slotted	14–2	Steel	Series A	ACP	1R
200	4	OH/UG	URTRS213B *[6]*	1/0–350	1/2 in. Hex	14–2	Steel	Series A	ACP	5R

[1] Rating is continuous.
[2] Device requires approval from the serving utility, consult your nearest Schneider Electric sales office.
[3] For box dimensions, see page 2-4
[4] Order appropriate bolt-on hub or closing plate separately and install on TOP endwall.
[5] Device supplied with solid top endwall (without hub opening).
[6] When unit is installed for underground feed, the appropriate closing plate must be ordered separately and installed over hub opening in TOP endwall of device.
[7] Device supplied with two closing plates ACP mounted in TOP endwall.
[8] Device supplied with 1-1/4 in. bolt-on hub (Cat. No. A125) mounted on TOP endwall.
[9] Contains “Duquesne Light Co.” approved label.
[10] Device supplied with closing plate ACP mounted on TOP endwall.
[11] Order lugs separately, see page 2-3

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UT2R1121B

Horizontal Ganged Meter Sockets

- 1Ø, 600 Vac max., main lugs only, 2 through 6 meter positions, with and without horn or lever bypass, end or center feed, overhead and underground service feeds.
- 10 kA short circuit current rating (or higher with utility approval).
- UL Listed, NEMA 3R enclosure.
- Supplied with ground lugs.
- Supplied with hub opening in top endwall, requires the use of a bolt-on hub, or closing plate.

This metering is generally utility specific. Always check with local utility company before installing. Contact your nearest Field Sales Office for additional catalog numbers, if required by utility.

Table 2.2: Ringless Type, 1Ø3W, 600 Vac Max., Without Bypass or Jaw Release

Branch Ratings				Mains Rating (A)	Cat. No.	Main Lugs Phase and Neutral Al/Cu (AWG/kcmil)	Branch Lugs Phase and Neutral Al/Cu (AWG)	Top Endwall *[12]*		Box No. *[13]*
Amperes *[14]*	No. of Positions	Socket Jaw Qty. *[15]*	Service Type					Hub Type (Order Separately)	Closing Plate (Order Separately)	
100 A	2	4	OH/UG	200	UT2R1121B	6–250	8–2/0	Series A	ACP	13R
	3			205	UT3R1121B	6–250				13R1
	4			205	UT4R1131B	6–350				14R
	5			250	UT5R1131B	6–350				15R
	6			300	UT6R1131B	6–350				16R
200 A	2	4	OH/UG	205	UT2R2122B	6–250	8–250	Series A	ACP	17R
	4			360	UT4R2352T	1/0–500		Series A-L	ACPL	18R
	5			500	UT5R2392TU	1/0–500 or (2)1/0–350		Series A-L	ACPL	19R
	6			620	UT6R2392TU	1/0–500 or (2)1/0–350		Series A-L	ACPL	20R

EMT3225CB

EMT1225CB
Without Covers

Meter Mains with Test Block Bypass

Table 2.3: Ring Type, 1Ø3W and 3Ø4W, Meter Main with Test Block Bypass (Meets EUSERC Requirements)

System (Incoming) and Service (Outgoing)	Meter Socket Type	Ampere Rating (Max.)	Short Circuit Current Rating	Cat. No. *[16][17]*	Main Circuit Breaker Type (Order Separately) *[18]*
120/240 Vac 1Ø3W	5-Jaw	225 A	100 kA max.	EMT1225CB	2P Type QB, QD, QG, QJ (QO, QO-VH, QOH) *[19]*
208Y/120 Vac 3Ø4W*[20]* or 240/120 Vac 3Ø4W Delta	7-Jaw	225 A	65 kA max.	EMT3225CB	3P Type QB, QD, QG or QJ

Table 2.4: EMT Terminal Wire Size *[21]*

Line Phase Lug	Line Neutral Lug	Service Ground Lug	Equipment Ground Lug	Load Neutral Lug
6 AWG–300 kcmil Al/Cu	6 AWG–350 kcmil Al/Cu	4 AWG–300 kcmil Al/Cu	6 AWG–300 kcmil Al/Cu	4 AWG–300 kcmil Al/Cu

Meter Socket Accessories

Table 2.5: Adapter Plate, Lug Kits, and Sealing Rings

Accessory	Description	Cat. No.
Adapter Plate	To allow the use of a Series A Hub on a device that is setup for a series A-L Hub.	AAP
Lug Kits	For use on meter sockets supplied with Line, Load, and Neutral Studs only. Be sure to order enough lugs for each device (a typical 1Ø device requires 6 lugs).	
	Includes one, two-barrel lug (6-250 kcmil)	ARP00118
	Includes one, single barrel lug (4-600 kcmil)	ARP00129
	Includes three, two-barrel lugs (6-350 kcmil)	ARP00427
Sealing Ring	Snap-on Aluminum (Standard)	2920910001
	Snap-on Stainless Steel (Non-standard)	ARP00026
	Screw Type Aluminum (Non-standard)	29008W

Table 2.6: Fifth-Jaw Kit, Closing Plates, and Hubs

Accessory		Description	Cat. No.
Fifth-Jaw Kit		Converts a 4-jaw meter socket to a 5-jaw meter socket. For use on meter sockets supplied without lever bypass or jaw release only.	A5J
Closing Plates (to seal hub openings)		For Series A (steel)	ACP
		For Series A (aluminum)	ACPA
		For Series A-L (steel)	ACPL
		For Series A-L (aluminum)	ACPLA
Hubs (listed by conduit size)	Series A	1.00 inch	A100
		1.25 inch	A125
		1.50 inch	A150
		2.00 inch	A200
		2.50 inch	A250
	Series A-L	2.00 inch	A200L
		2.50 inch	A250L
		3.00 inch	A300L
		3.50 inch	A350L
		4.00 inch	A400L
	Series B	3.00 inch	B300

[12] For hubs and closing plates, see page 2-3.
[13] For box dimensions, see page 2-4
[14] Rating is continuous.
[15] Fifth jaw kit available to convert 4-jaw socket to a 5-jaw socket. See page 2-3.
[16] For box dimensions, see page 2-4
[17] Supplied with bondable neutral, suitable for use as service equipment , suiteable for overhead or underground service. UL Listed E6294.
[18] See page 2-21 to select main circuit breaker.
[19] Requires use of an EZM125QOA adapter (order separately), when using QO (40 A–125 A, 2-pole) 10 kA max. SCCR, QO-VH (40 A–60 A, 2-pole) 22 kA max. SCCR, or QOH (40 A–60 A, 2-pole) 42 kA max. SCCR.
[20] 100 kA max.
[21] Refer to circuit breaker listings for usable load lug wire sizes.

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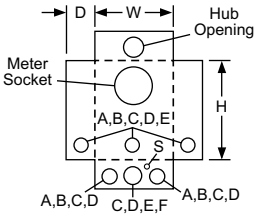
Table 2.7: Enclosure Dimensions

Dimensions (Inches)				
Box No.	H	W	D	Hub Opening (Max. Conduit Size) [22]
1R	10.88	8.00	3.50	Series A
2R	13.00	13.00	4.94	Solid Top
3R	14.00	8.00	4.38	Series A
4R	14.00	11.00	4.38	Series A
5R	15.00	11.00	4.38	Series A
6R	15.50	8.00	4.36	Series A
7R	17.13	13.00	4.94	(2) Series A
8R	19.00	10.50	4.94	Series A-L
9R	19.00	13.00	4.94	Series A-L
10R	34.50	15.00	5.68	Series A-L
11R	36.62	15.00	5.68	Series A-L
12R	43.00	20.25	6.00	Series A-L
13R	14.12	24.31	4.50	Series A
13R1	14.12	32.50	4.50	Series A
14R	14.12	40.62	4.50	Series A
15R	14.12	48.75	4.50	Series A
16R	14.12	57.00	4.50	Series A
17R	14.12	24.31	5.38	Series A
18R	14.12	40.62	5.38	Series A-L
19R	14.12	54.75	5.38	(2) Series A-L
20R	14.12	63.00	5.38	(2) Series A-L

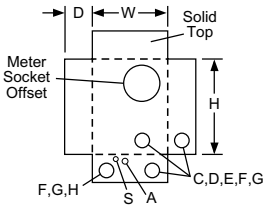
Table 2.8: Knockout Information

Knockouts						
Symbol	S	A	B	C	D	
Conduit Size (in.)	5/16 [23]	1/2	3/4	1	1-1/4	
Symbol	E	F	G	H	I	J
Conduit Size (in.)	1-1/2	2	2-1/2	3	3-1/2	4

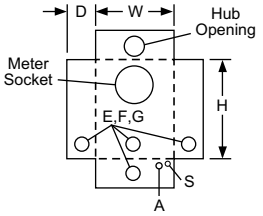
Dimensions and Knockouts for Meter Sockets



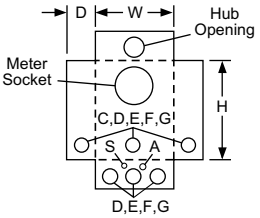
1R



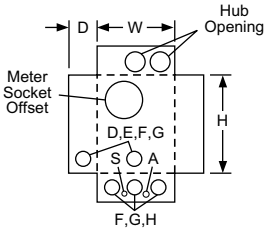
2R



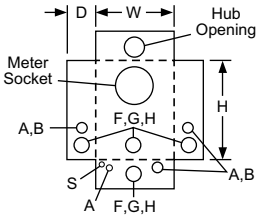
3R, 6R



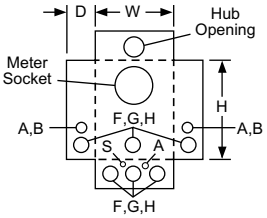
4R, 5R



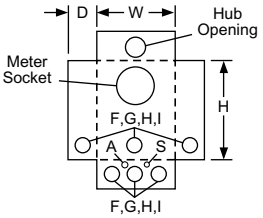
7R



8R



9R



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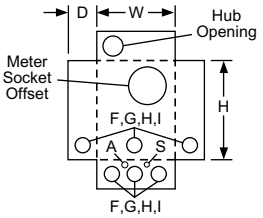

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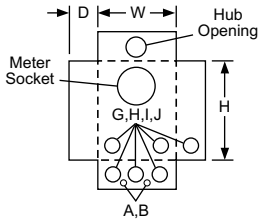
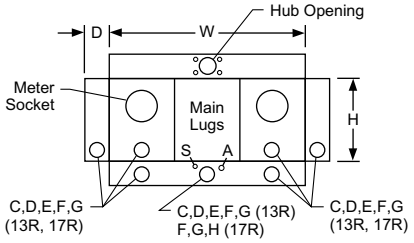
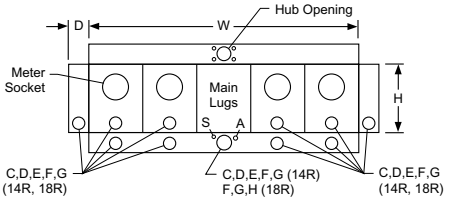


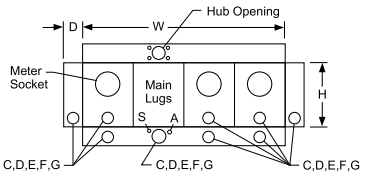
12R



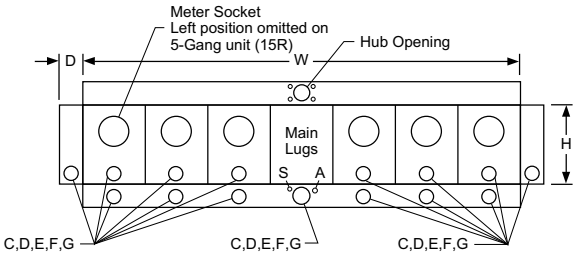
13R and 17R



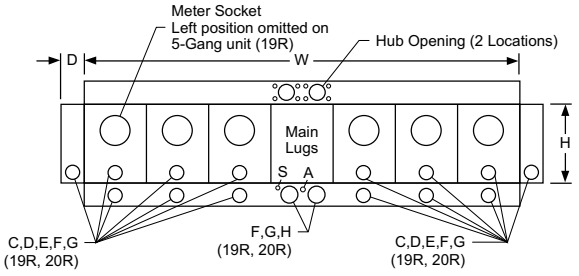
14R and 18R



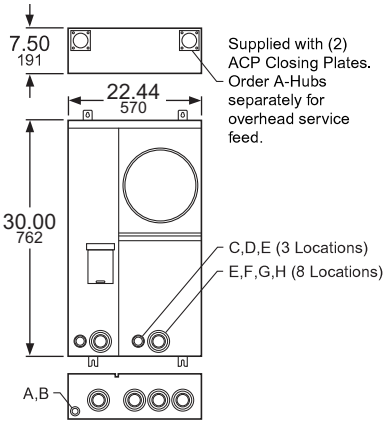
13R1



15R and 16R



19R and 20R



EMT1225CB and EMT3225CB

[22] Refer to page 2-3 for closing plates and hubs.
[23] Knockout for grounding conductor.

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MP44125

Ring and Ringless Type Devices

- Consult local utility for approval before installation.
- 120/240 Vac 1Ø3W.
- Main lugs only—two to six meter sockets.
- Enclosures are indoor/rainproof NEMA 3R construction.
- Suitable only for use as service equipment.
- Swingable mounting feet supplied at bottom of device.
- Factory-installed mechanical lugs, alternate lugs and NEMA/EUSERC lug landing kits available.
- Surface mount, convertible to semi-flush with field installed flange kit.
- Ring type devices supplied with 4-jaw meter sockets (5th jaw kits available, order separately).
- Ringless type devices supplied with 5-jaw meter sockets, available with and without horn or lever bypass.
- Provisions for mounting 2-pole circuit breaker for each meter socket position (order circuit breakers separately).
- Mounting channel supplied, except for box 1R (125 A, 2-position).
- Combination overhead/underground feed.

Table 2.9: MP Catalog Number Description

Number Segment	Character	Description	MP	H	4	4	125
Device Name	MP	Meter-Pak Meter Center					
Socket/Bypass Type	Blank	Ring Type					
	R	Ringless Type with 5th Jaw					
	H	Ringless with Horn Bypass and 5th Jaw					
	L	Ringless with Lever Bypass, Jaw Release and 5th Jaw					
Bus Ampacity	2	200 A					
	3	300 A					
	4	400 A					
	5	500 A					
	6	600 A					
	8	800 A					
Number of Meter Sockets	2	2-Positions MP, MPH, MPL, and MPR					
	3	3-Positions MP, MPH, MPL, and MPR					
	4	4-Positions MP, MPH, MPL, and MPR					
	5	5-Positions MP, MPH and MPR					
	6	6-Positions MP, MPH, MPL and MPR					
Max. Tenant Circuit Breaker Amperage	125	125 A					
	200	200 A					
	225	225 A					

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Table 2.10: Ring Type MP Meter-Pak Metering Equipment with 125 A (42 kA Maximum SCCR) or 200 A (22 kA Maximum SCCR) Meter Socket Positions

Amperes per Pos.	No. of Positions	Factory-Installed Main Lugs Ampacity (alternate lugs *[1]*)	Main Bus Ampacity (A)	Cat. No.	Line Lug Wire Size Al/Cu AWG/kcmil	Circuit Breaker Type (2P)	Hub Prov. *[2]*	Semi-Flush Flange Kit	Wt Lbs	Box No.
125	2	200	200	MP22125 *[3]*	(1) 4–250	QO, QO-VH, QOH	A/B300	MPSF12	46	1R
	3	300	300	MP33125 *[4]*	(1) 1/0–600 or (2) 1/0–250		A-L	MPSF14	95	2R
	4	400	400	MP44125 *[4]*	(1) 1/0–600 or (2) 1/0–250		A-L	MPSF14	97	2R
	5	400 Al 500 Cu	500	MP55125 *[4]*	(1) 1/0–600 or (2) 1/0–250		(4) A-L	MPSF16	130	3R
	6	400 Al 500 Cu	600	MP66125 *[4]*	(1) 1/0–600 or (2) 1/0–250		(4) A-L	MPSF16	132	3R
200	2	400	400	MP42200 *[4]*	(1) 1/0–600 or (2) 1/0–250	QOM2-MM, QOM2-MVH	(4) A-L	MPSF23	99	4R
	3	400	400	MP43200 *[4]*	(1) 1/0–600 or (2) 1/0–250			MPSF23	99	4R
	4	400	600	MP64200 *[4]*	(1) 1/0–600 or (2) 1/0–250			MPSF24	135	5R
	5	600 Al, 750 Cu	800	MP85200 *[4]*	(2) 3/0–500			MPSF26	173	6R
	6	600 Al, 750 Cu	800	MP86200 *[4]*	(2) 3/0–500			MPSF26	173	6R

Table 2.11: Ringless Type MP Meter-Pak Metering Equipment with 125 A (42 kAMaximum SCCR) or 200 A Type MPR, MPH (22 kA Maximum SCCR) or 225 A Type MPL (100 kA Maximum SCCR) Meter Socket Positions

Amperes Per Pos.	No. of Pos.	Factory-Installed Main Lugs Ampacity (alternate lugs *[1]*)	Main Bus Ampacity	No. Bypass Cat. No.	Horn Bypass Cat. No.	Lever Bypass Cat. No.	Line Lug Wire Size Al/Cu AWG/kcmil	Circuit Breaker Type (2P) *[5]*.	Hub Prov. *[2]*	Semi-Flush Flange Kit	Wt Lbs	Box No.
125	2	200	200	MPR22125	MPH22125	—	(1) 4–250	QO, QO-VH, QOH	A/B300	MPSF12	46	1R
	3	300	300	MPR33125	MPH33125	—	(1) 1/0–600 or (2) 1/0–250		A-L	MPSF14	95	2R
	4	400	400	MPR44125	MPH44125	—	(1) 1/0–600 or (2) 1/0–250			MPSF14	97	2R
	5	400 Al 500 Cu	500	MPR55125	MPH55125	—	(1) 1/0–600 or (2) 1/0–250		(2) A-L	MPSF16	130	3R
	6	400 Al 500 Cu	600	MPR66125	MPH66125	—	(1) 1/0–600 or (2) 1/0–250			MPSF16	132	3R
200	2	400	400	MPR42200	MPH42200	—	(1) 1/0–600 or (2) 1/0–250	QOM2-MM, QOM2-MVH	(2) A-L	MPSF23	99	4R
	3	400	400	MPR43200	MPH43200					MPSF23	99	4R
	4	400	600	MPR64200	MPH64200					MPSF24	135	5R
225	2	350	350	—	—	MPL32225	(1) 1/0–600 or (2) 1/0–250	QBP-TM, QDP-TM, QGP-TM or QJ-TM QO *[6]*, QO-VH *[6]* or QOH *[6]*		N/A	105	7R
	3	400	500	—	—	MPL53225				N/A	147	8R
	4	400	600	—	—	MPL64225				N/A	200	9R
200	5	600 Al, 750 Cu	800	MPR85200	MPH85200	—	(2) 3/0–500	QOM2-MM, QOM2-MVH		MPSF26	173	6R
	6	600 Al, 750 Cu	800	MPR86200	MPH86200	—	(2) 3/0–500			MPSF26	173	6R

NOTE: UL Listed short circuit current rating depends on lowest interrupting rating of circuit breaker installed.

[1] See page 2-7 for alternate lugs.
[2] For A and A-L Hubs see page 2-3, for B Hubs see Digest Section 3.
[3] Meets EUSERC standards.
[4] Meets EUSERC standards with addition of lug landing kit, MMSK2.
[5] See page 2-7
[6] Requires use of EZM125QOA adapter (order separately).

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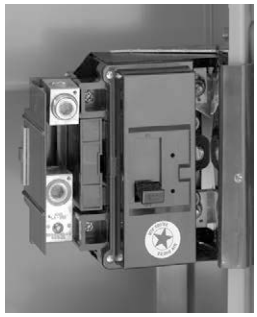

QOM2200MVH

QO2100VH
2P, Plug-on Type
Circuit Breaker

QDP22200TM
2P, Plug-on Type
Circuit Breaker

MMLK500

Tenant Circuit Breakers

UL Listed Short Circuit Current Rating depends on lowest interrupting rating of circuit breaker installed. (Refer to page 2-11 for Square D certified ratings for downstream panelboards and load centers.)

Table 2.12: Tenant Circuit Breakers

Amperes	10 k AIR 120/240 Vac	22 k AIR 120/240 Vac	42 k AIR 120/240 Vac	100 k AIR 120/240 Vac
For use in 125 A Max. Type MP, MPR and MPH Meter-Pak Metering Equipment				
40	QO240	QO240VH *[7]*	QOH240	—
50	QO250	QO250VH *[7]*	QOH250 *[7]*	—
60	QO260	QO260VH	QOH260 *[7]*	—
70	QO270	QO270VH	QOH270 *[7]*	—
80	QO280	QO280VH	QOH280 *[7]*	—
90	QO290	QO290VH	QOH290	—
100	QO2100	QO2100VH	QOH2100	—
125	QO2125	QO2125VH	QOH2125	—
For use in 200 A Max. Type MP, MPR and MPH Meter-Pak Metering Equipment				
100	QOM2100MM	QOM2100MVH	—	—
125	QOM2125MM	QOM2125MVH	—	—
150	QOM2150MM	QOM2150MVH	—	—
175	QOM2175MM	QOM2175MVH	—	—
200	QOM2200MM	QOM2200MVH	—	—
Amperes	10 k AIR 120/240 Vac	25 k AIR 120/240 Vac	65 k AIR 120/240 Vac	100 k AIR 120/240 Vac
For use in 225 A MPL Lever Bypass Meter-Pak Metering Equipment				
40	QO240 *[8]*	QO240VH *[7] [9] [8]*	QOH240 *[10] [8]*	—
50	QO250 *[8]*	QO250VH *[7] [9] [8]*	QOH250 *[10] [7] [8]*	—
60	QO260 *[8]*	QO260VH *[7] [9][8]*	QOH260 *[10] [7] [8]*	—
70	QBP22070TM	QDP22070TM	QGP22070TM	QJP22070TM
80	QBP22080TM	QDP22080TM	QGP22080TM	QJP22080TM
90	QBP22090TM	QDP22090TM	QGP22090TM	QJP22090TM
100	QBP22100TM	QDP22100TM	QGP22100TM	QJP22100TM
110	QBP22110TM	QDP22110TM	QGP22110TM	QJP22110TM
125	QBP22125TM	QDP22125TM	QGP22125TM	QJP22125TM
150	QBP22150TM	QDP22150TM	QGP22150TM	QJP22150TM
175	QBP22175TM	QDP22175TM	QGP22175TM	QJP22175TM
200	QBP22200TM	QDP22200TM	QGP22200TM	QJP22200TM
225	QBP22225TM	QDP22225TM	QGP22225TM	QJP22225TM

Accessories for MP Meter-Pak Meter Centers

Table 2.13: Accessories

Accessory	Description	Cat. No.
Fifth Jaw Kit	Fifth Jaw Kit	5J
Horn Bypass Kit	For MPR and MPH only	MMHB
QO Adapter	For Bolt-on Q2M tenant circuit breakers (40–125 A, 2P)	EZM125QOA
Slider Type Manual Circuit Closing:	125 A Ring Style 2 Position Top Meter (Only) 125 and 200 A Ring Style	MM125MB *[11]* MM200MB *[11]*
Sealing Rings:	Snap-on Aluminum Screw Type Aluminum Snap-on Type Stainless Steel	2920910001 29008W ARP00026
Meter Cover-Lexan™	Meter Cover-Lexan™	29007
Optional Lug Kits:	(1) 1/0–600 AWG/kcmil or (2) 1/0–250 AWG/kcmil per phase	MMLK250 *[12][13]*
	(2) 3/0–500 AWG/kcmil per phase (2) 2–600 AWG/kcmil per phase	MMLK500 *[13]* MMLK600 *[13]*
Semiflush Kits:	125 A 2 Position 125 A 3–4 Position 125 A 5–6 Position 200 A 2–3 Position 200 A 4 Position 200 A 5–6 Position	MPSF12 MPSF14 MPSF16 MPSF23 MPSF24 MPSF26
NEMA/EUSERC Lug Landing Kit:	For 3 through 6 position 125 A and 200 A devices. Each pad rated 600 A maximum and includes (2) 1/2-13 studs and mounting hardware.	MMSK2 *[13]*
NEMA Lug Landing Kit:	For use ONLY on MPL43225, MPL53225 and MPL64225 with optional lugs. See wiring diagram of each device for optional lugs.	MMSK4
MP Meter-Pak Wireway: (Wall Mount Pedestal)	125 A 2 Position ONLY 125 A 3–6 Position 200 A 2–6 Position MPL32-225 MPL53-225 MPL64-225	MP43X8PED MP43X11PED MP43X11PED MP35X11PED *[14]* MP43X11PED MP35X11PED *[14]*
MP Meter-Pak Wireway Extensions:	Used ONLY with MP43X8PED Used with MP43X11PED and MP35X11PED	MP12X8PEDEXT *[14]* MP12X11PEDEXT *[14]*

[7] Order only. Not stocked in PDS. Order Point: Lincoln.
[8] Requires use of EZM125QOA adapter (order separately).
[9] QO-VH tenant circuit breakers are rated 22 kAIR at 120/240 Vac.
[10] QOH tenant circuit breakers are rated 42 k AIR at 120/240 Vac.
[11] The meter center short circuit current rating is 10 kA when manual circuit closing is used. Not rated for continuous duty.
[12] Standard lug for 3 through 6 position 125 A and 2 through 4 position 200 A devices.
[13] Cannot be installed on 2 position 125 A device.
[14] Order only. Not stocked in PDS. Order point: Lexington.
For hubs and closing plates, see page 2-3.

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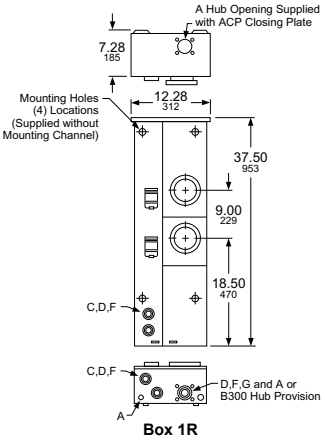
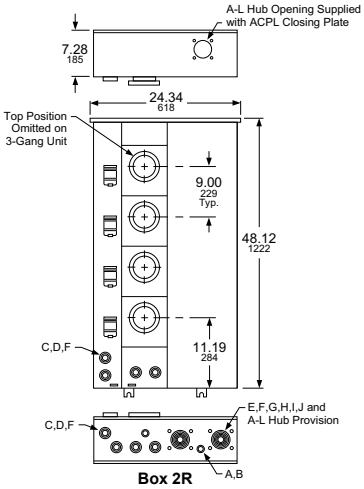
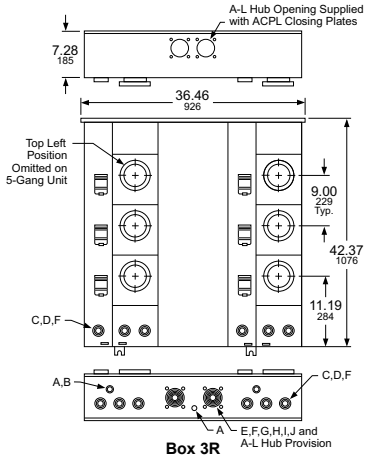
Dimensions and Knockouts for MP Meter-Pak Meter Centers



Box 1R



Box 2R



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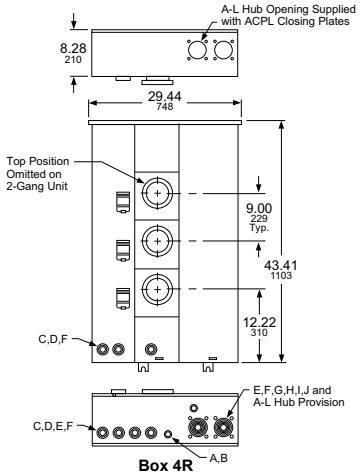

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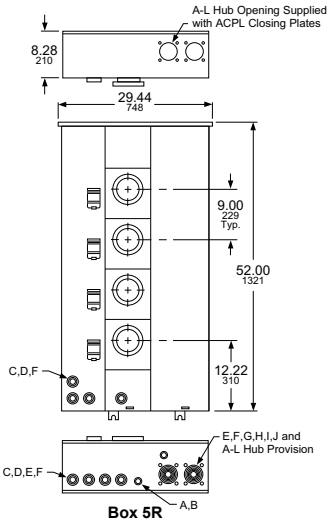

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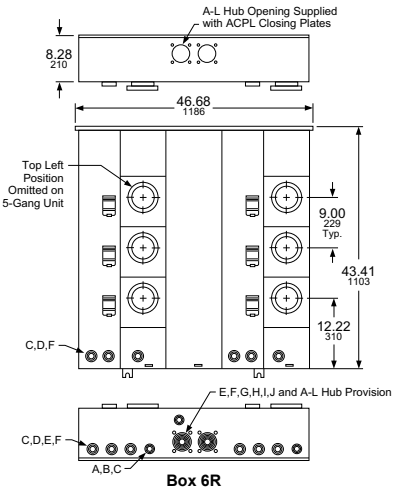
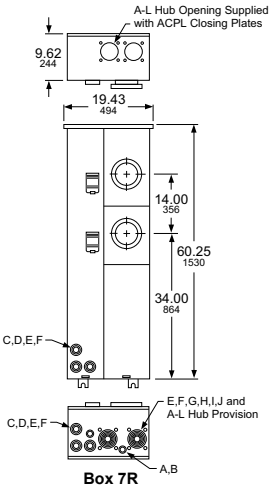
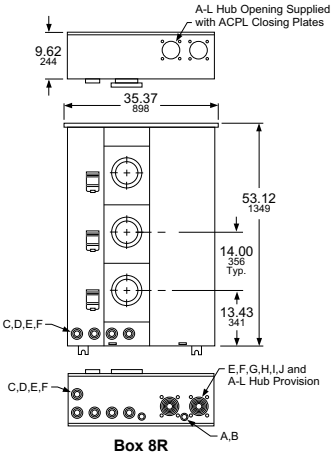


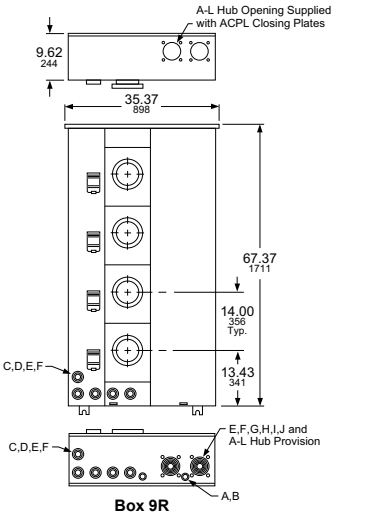
Box 6R



Box 7R



Box 8R



Box 9R

Knockouts										
Symbol	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Conduit Size (in.)	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4

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EZM General Information

NEMA 3R Construction

240 Vac Maximum, for use on AC systems, suitable for use as Service Equipment.

Utility Company Requirements Review local utility requirements to ensure that metering equipment meets their standards.

EZ Meter-Pak meter center enclosures meet NEC wire bending requirements, and are designed for wall mounting only (not suitable for floor mounting). All unmetered conductor compartments may be sealed by the utility company.

EZ Meter-Pak meter centers have UL Listed short circuit current ratings up to 100 kA at 240 Vac when properly applied. For three-tier series ratings refer to Data Bulletin 4100DB0301 and Instruction Bulletin 80043-303-22.

Suitable incoming services for an EZM main device and available outgoing feeder(s) to downstream panelboards from EZM branch section(s)—

Incoming Service to Main Device 120/240 Vac, 1Ø3W
Available outgoing feeder(s) to downstream panelboards:

- 120/240 Vac, 1Ø3W
  (4-jaw ring type meter sockets, two-pole circuit breakers),
  (5-jaw ringless meter sockets, two-pole circuit breakers).

Incoming Service to Main Device 240/120 Vac, 3Ø4W Delta
Available outgoing feeder(s) to downstream panelboards:

- 120/240 Vac, 1Ø3W (Fed from transformer's "A-Phase" and "C-Phase" only.) NOTE: Connection to High-Leg "B-Phase" not permitted for this service
  (4-jaw ring type meter sockets, two-pole circuit breakers)
  (5-jaw ringless meter sockets, two-pole circuit breakers)
  Standard 3Ø IN/1Ø OUT branch units **are not suitable for use on this Delta System.** Special branch units are available for this System by adding suffix: **"CA"** to catalog number (Typical Examples: EZM313125CA, EZM313125XCA, EZM313125CUXCA, EZM314225CA, EZM314225XCA, EZM314225CUXCA, EZM315225CA, EZM314225CUCA, etc.).
- 240/120 Vac, 3Ø4W Delta (7-jaw meter sockets, three-pole circuit breakers).

Incoming Service to Main Device 208Y/120 Vac, 3Ø4W
Available outgoing feeder(s) to downstream panelboards:

- 120/208 Vac, 1Ø3W (5-jaw meter sockets, two-pole circuit breakers)
- 208Y/120 Vac, 3Ø4W (7-jaw meter sockets, three-pole circuit breakers).

Main Devices

- 400, 600 and 800 A main disconnects may be end-mounted with branch units having 800 A or 1200 A continuous horizontal cross bus.
- 1000 and 1200 A main disconnect or terminal box **must be center mounted** when used with branch devices with main bus rated 800 A continuous.
- 1600 A main disconnect or terminal box **must be center mounted.**
- 2000 A main disconnect **must be center mounted** and requires use of branch units having 1200 A continuous horizontal cross bus.
- 400, 800 and 1200 A Type EZM-TBU terminal boxes supplied with lug landings to meet EUSERC requirements.

Main Circuit Breaker ratings: 400, 600, 800, 1000, 1200, 1600 and 2000 A
Main Fusible Switch ratings: 400, 600, 800, and 1200 A (1Ø3W only)
Main Lugs Terminal Box ratings: 225, 400, 600, 800, 1200, 1600, and 2000 A

Branch Units

- **125 and 225 A residential branch units** are available in ring type or ringless type construction and are supplied with 800 A continuous aluminum horizontal cross bus as standard (Example: EZM314125). For optional 1200 A continuous copper horizontal cross bus with aluminum vertical connectors, add suffix **"X"** to catalog number (Example: EZM314125X). For optional 1200 A continuous all-copper bussing, add suffix **"CUX"** to catalog number (Example: EZM314125CUX). NOTE: 5-gang 225 A EZM, EZMR and EZMH residential branch units are supplied with 1200 A continuous Cross Bus as standard, do not add suffix "X" or "CUX" to these units (Examples: EZMR315225 or EZMR315225CU). Plug-in style residential meter sockets are available as ring type **EZM** without bypass, ringless type **EZMR** without bypass, and ringless type **EZMH** with horn bypass.
  Tenant circuit breakers must be ordered separately for these branch units. 125 A max. units make use of Type QO, QO-VH or QO-H two-pole tenant circuit breakers (40–125 A). 225 A max. units make use of Type QDP-TM, QBP-TM, QGP-TM and QJP-TM two-pole tenant circuit breakers (70–225 A), and may also make use of two-pole Type QO (40–125 A at 10 kA max.), two-pole Type QO-VH (40–60 A at 100 kA max.), or two-pole Type QO-H (40–60 A at 100 kA max.) tenant circuit breakers.
- **225 A commercial branch units** are available in ring type or ringless type construction and are supplied with 1200 A copper horizontal cross bus with aluminum vertical connectors as standard (Example: EZML314225). For optional 1200 A continuous all-copper bussing, add suffix **"CU"** to catalog number (Example: EZML314225CU). Plug-in style commercial meter sockets are available as ring type **EZMT** with test block bypass (meets EUSERC requirements), ringless type **EZMR** without bypass, and ringless type **EZML** with lever bypass.

  225 A max. units make use of type QDP-TM, QBP-TM, QGP-TM and QJP-TM two-pole or three-pole tenant circuit breakers (70– 225 A), and may also make use of two-pole type QO (40–125 A at 10 kA max.), two-pole type QO-VH (40–60 A at 100 kA max.), or two-pole type QO-H (40–60 A at 100 kA max.) tenant circuit breakers.

Note: QO, QO-VH and QO-H tenant circuit breakers used in 225 A branch units require the use of adapter **EZM125QOA** (purchased separately).

- **400 A branch units** are available in ringless type construction only, and are supplied with 1200 A continuous all-copper bussing as standard (Example: EZML332400). These branch units are supplied with factory-installed type LJL tenant circuit breakers that have a field adjustable ampere rating trip setting from 125 A min. to 400 A max.
  A tamper-evident seal kit is available where needed, order seal kit **MICROTUSEAL** (refer to NEC 240-6 [c]). 400 A branch units are available as Type **EZML** with plug-in style lever bypass type meter sockets, or Type **EZMK** with bolt-on style with manual bypass type meter sockets.
- Units having **800 A continuous horizontal cross bus** WILL CONNECT with units having **1200 A continuous horizontal cross bus**.
- **Single phase units** (three bus bars in horizontal cross bus) WILL NOT CONNECT with **three phase units** (four bus bars in horizontal cross bus).

For Load Center Three-Tiered Series Ratings used downstream from Metering Equipment, refer to Data Bulletins: 4100DB0301 and 2700DB9901.

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Configuration Information

Table 2.14: EZM Mains Devices

Number Segment	Character	Description	EZM	1	1000	CB	U	CU
Device Name	EZM	EZ Meter-Pak Meter Center						
Service Feed	1	1Ph, 3W						
	3	3Ph, 4W						
Mains Rating		225 A						
		400 A						
		600 A						
		800 A						
		1000 A						
		1200 A						
		1600 A						
		2000 A						
Main Type	CB	Main Circuit Breaker						
	FS	Main Fusible Switch						
	TB	Terminal Box						
Feed Direction	Blank	Overhead / Underground						
	U	Underground Only, Meets EUSERC Standards up to 1200A max.						
Special Construction	Blank	Aluminum Horizontal Cross Bus Bar up to 1000A max.						
	CU	Copper Horizontal Cross Bus Bar						

Table 2.15: EZM Branch Devices

Number Segment	Character	Description	EZM	R	1	1	3	125	CU
Device Name	EZM	EZ Meter-Pak Meter Center							
Socket/Bypass Type	Blank	Ring Type							
	R	Ringless Type with 5th Jaw							
	H	Ringless with Horn Bypass and 5th Jaw							
	L	Lever Bypass with 5th Jaw, 7th Jaw if Three Phase							
	T	Ring Type Test-Block Bypass EUSERC							
	K	K-Base Bolt-On Type							
Service Feed	1	1Ph, 3W							
	3	3Ph, 4W							
Load Feed	1	1Ph, 3W							
	3	3Ph, 4W							
Number of Meter Sockets	Meter Sockets Available	1,2,3,4,5 or 6							
Maximum Tenant Circuit Breaker Amperage	125	125 A							
	225	225 A							
	400	400 A							
Special Construction	Blank	Aluminum Horizontal Cross Bus Bar							
	CA	For 240/120 Vac Delta Systems							
	CU	Copper Horizontal Cross Bus Bar							
	D	Removable Drip Hood with Indoor Top Endwall with Knockouts							
	M10	10-Inch Meter Centers							
	X	1200A Copper Horizontal Cross Bus Bar							

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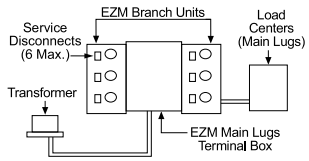
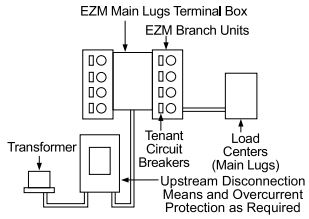
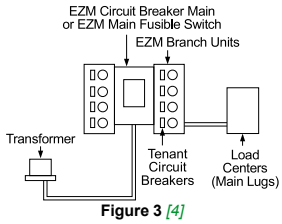
Selection Information

- Review local utility requirements to ensure that metering equipment meets their standards.
- Check local utility to determine available fault current at the meter center.
- Using the SCCR table:
  - Select meter center configuration, main lugs only (Six Disconnect Rule), or remote main, main circuit breaker, or main fusible switch.
  - Read down to select SCCR equal to, or greater than desired rating.
  - Read across to select branch unit tenant circuit breaker type.
  - Continue reading across to select EZM main device type.

Table 2.16: UL Listed Meter Center Short Circuit Current Ratings (SCCR) *[1]*

Figures	Short Circuit Current Rating (240 Vac Maximum) *[2] [3]*	EZM Meter Center Overcurrent Protection Devices	
		EZM Branch Unit Tenant Circuit Breaker Types Available (Branch Unit Amperes max., Number of Poles, Tenant Circuit Breaker Amperes Rating Range)	EZM Main Device with Integral Mounted Main, Remote Mounted Main or without an Upstream Mounted Main (Six Disconnect Rule)
 **Figure 1** *[4]*	**EZ Meter-Pak (Six Disconnect Rule Applications)—See Figure 1**		
	10 kA	QO (**125 A**, 2P, 40–125 A) QO (**225 A**, 2P, 40–125 A) *[5]* QB (**225 A**, 2P or 3P, 70–225 A)	400–2000 A Main Lugs Terminal Box (Tenant Circuit Breakers used as Service Disconnects—6 maximum)
	22 kA	QO-VH (**125 A**, 2P, 40–125 A) QO-VH (**225 A**, 2P, 40–60 A) *[5]*	
	25 kA	QD (**225 A**, 2P or 3P, 70–225 A)	
	42 kA	QOH (**125 A**, 2P, 40–125 A) QOH (**225 A**, 2P, 40–60 A) *[5]*	
	65 kA	QG (**225 A**, 2P or 3P, 70–225 A)	
	100 kA	QJ (**225 A**, 2P or 3P, 70–225 A) *[6]* LJL (**125–400 A**, 2P or 3P) *[7]*	
 **Figure 2** *[4]*	**EZ Meter-Pak 225–2000 A Main Lugs Terminal Box Applications Protected by Remote Main—See Figure 2**		
	10 kA	QO (**125 A**, 2P, 40–125 A) QO (**225 A**, 2P, 40–125 A) *[5]* QB (**225 A** 2P or 3P, 70–225 A) LJL (**125–400 A**, 2P or 3P) *[7]*	Must be protected by an upstream disconnecting means rated 10 k AIR minimum
	22 kA	QO-VH (**125 A**, 2P, 40–125 A) QO-VH (**225 A**, 2P, 40–60 A) *[5]* LJL (**125–400 A**, 2P or 3P) *[7]*	Must be protected by an upstream disconnecting means rated 22 k AIR minimum
	25 kA	QD (**225 A** 2P or 3P, 70–225 A) LJL (**125–400 A**, 2P or 3P) *[7]*	Must be protected by an upstream disconnecting means rated 25 k AIR minimum
	42 kA	QOH (**125 A**, 2P, 40–125 A) QOH (**225 A**, 2P, 40–60 A) *[5]* LJL (**125–400 A**, 2P or 3P) *[7]*	Must be protected by an upstream disconnecting means rated 42 k AIR minimum
		QO-VH (**125 A**, 2P, 40–125 A) QO-VH (**225 A**, 2P, 40–60 A) *[5]* QD (**225 A** 2P or 3P, 70–225 A)	Must be protected by a Square D circuit breaker Type LA (400 A max.) or MA (1000 A max.) Rated 42 k AIR minimum
	65 kA	QG (**225 A** 2P or 3P, 70–225 A) LJL (**125–400 A**, 2P or 3P) *[7]*	Must be protected by an upstream disconnecting means rated 65 k AIR minimum
		QO-VH (**125 A**, 2P, 40–125 A) QO-VH (**225 A**, 2P, 40–60 A) *[5]* QD (**225 A** 2P or 3P, 70–225 A) LJL (**125–400 A**, 2P or 3P) *[7]*	Must be protected by a Square D circuit breaker Type LH (400 A max.); MG or MJ (800 A max.); MH (1000 A max.); PG or PJ (1200 A max.); RG or RJ (2000 A max.).
	100 kA	QJ (**225 A** 2P or 3P, 70–225 A) *[6]* LJL (**125–400 A** 2P or 3P) *[7]*	Must be protected by an upstream disconnecting means rated 100 k AIR minimum
		QO-VH (**125 A**, 2P, 40–125 A) QO-VH (**225 A**, 2P, 40–60 A) *[5]*	Must be protected by an upstream disconnection means with Class R (600 A max.); Class J (600 A max); Class T6 (800 A max.); Class T3 (1200 A max.) or Class L (1200 A max.).
		QD (**225 A** 2P only, 70–225 A) LJL (**125–400 A**, 2P or 3P) *[7]* QD (**225 A** 3P only, 70–225 A) *[6]*	Must be protected by an upstream disconnection means with Class R (600 A max.); Class J (600 A max); Class T6 (800 A max.); Class T3 (1200 A max.) or Class L (1200 A max.) fuses or by a Square D circuit breaker Type MJ (800 A max.); MHF (1000 A max.); PJ (1200 A max.); or RJ (2000 A max.) rated 100 k AIR minimum.
	EZ Meter-Pak—Main Circuit Breaker Applications—See Figure 3		
	10 kA	QO (**125 A**, 2P, 40–125 A)	400–2000 A EZM Main Device with Type LH (400 A max.); MG or MJ (800 A max.); MH (1000 A max); PG or PJ (1200 A max.); RG or RJ (2000 A max.)
		QO (**225 A**, 2P, 40–125 A) *[5]* QB (**225 A** 2P or 3P, 70–225 A)	
	65 kA	QO-VH (**125 A**, 2P, 40–125 A) QO-VH (**225 A**, 2P, 40–60 A) *[5]* QD (**225 A** 2P or 3P, 70–225 A) LJL (**125–400 A**, 2P or 3P) *[7]*	
 **Figure 3** *[4]*	100 kA	QO-VH (**125 A**, 2P, 40–125 A) QO-VH (**225 A**, 2P, 40–60 A) *[5]* QD (**225 A** 2P only, 70–225 A) QD (**225 A** 3P only, 70–225 A) *[6]* LJL (**125–400 A**, 2P or 3P) *[7]*	1000 A Main Device with catalog number suffix "CBU" supplied with Type MHF circuit breaker.
		QD (**225 A** 2P only, 70–225 A) QD (**225 A** 3P only, 70–225 A) *[6]* LJL (**125–400 A** 2P or 3P) *[7]*	800–2000 A EZM Main Device with Type MJ (800 A max.); MHF (1000 A max.); PJ (1200 A max.) or RJ (2000 A max.)
	EZ Meter-Pak—Main Fusible Switch Applications—See Figure 3		
	10 kA	QO (**125 A**, 2P, 40–125 A) QO (**225 A**, 2P, 40–125 A) *[5]* QB (**225 A** 2P or 3P, 70–225 A)	400–1200 A EZM Main Device (1Ø or 3Ø) with Class T (300 Vac) fuses installed.
	100 kA	QO-VH (**125 A**, 2P, 40–125 A) QO-VH (**225 A**, 2P, 40–60 A) *[5]* QD (**225 A** 2P, only, 70–225 A) QD (**225 A** 3P only, 70–225 A) *[6]* LJL (**125–400 A**, 2P or 3P) *[7]*	400–1200 A EZM Main Device (1Ø or 3Ø) with Class T (300 Vac) fuses installed.

[1] Tenant circuit breakers of same frame size having higher AIR values may replace tenant circuit breakers as listed in this table and maintain the series rating.
[2] Meter center short circuit current rating is equal to the lowest short circuit current rating given in table for any circuit breaker installed in any meter panelboard in the meter center.
[3] Short circuit current rating is measured at the LINE SIDE terminals of the integral mounted or remote mounted main providing overcurrent protection for the EZM metering equipment lineup.
[4] For three-tier series ratings refer to Data Bulletin 4100DB0301 and Instruction Bulletin 80043-303-22.
[5] Requires use of EZM125QOA adapter (order separately).
[6] 3P only tenant circuit breaker(s) are limited to: 100 kA Max. at 208Y/120 Vac or 65 kA Max at 240/120 Vac.
[7] Supplied with factory-installed circuit breaker(s), with an adjustable trip range of 125–400 A.

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1Ø 3W 120/240 Vac EZ Meter-Pak Meter Centers—1Ø, Indoor/Rainproof, UL Listed

1200 A Main CB/Fusible Switch Devices come Standard with 2-STEP Removable Service Entrance Endwalls

Select EZM meter center short circuit current rating from Table 2.16 UL Listed Meter Center Short Circuit Current Ratings (SCCR), page 2-11. Using this table as a reference, make the following selections:

1. Select EZM 1Ø main device from Table 2.17 or Table 2.18, with an equal or higher short circuit rating than the application.
2. Select EZM 1Ø branch units from Table 2.19, Table 2.20 or Table 2.21.
3. Select proper 2P type QO, QO-VH, QOH, QBP-TM, QDP-TM, QGP-TM or QJP-TM branch circuit breakers for use as tenant mains in branch unit from Table 2.32 and Table 2.33.
4. Select accessories as required fromTable 2.34.
5. Dimensions; see page 2-23 and page 2-24.

Select Main Devices—NEMA 3R Construction

Table 2.17: Main Devices, Overhead Feed

EZM11200FST

Ampere Rating	Horizontal Cross Bus Rating and Bus Bar Material	Cat. No. *[8]*		Width (in.)	Factory-Installed Line Side Lug (Conductors per Phase and Neutral) Wire Size (AWG/kcmil)
Main Circuit Breaker (1Ø Incoming and 1Ø Outgoing)					
		65 kA	100 kA		
400	400 A, Al	EZM1400CB *[9]*	—	18.66	(1) 1–600 or (2) 1–250
600	600 A, Al	EZM1600CB*[9]*	—	18.66	(3) 3/0–500
800	800 A, Al	EZM1800CB*[9]*	—	18.66	(3) 3/0–500
1000	1200 A, Cu	EZM11000CB*[9]*	—	18.66	(3) 3/0–500
1200	1200 A, Al	EZM11200GCBT *[10]*	EZM11200JCBT *[10]*	23.69	(4) 3/0-500
1600	1200 A, Al/Cu	EZM11600GCBC *[9][10] [11]*	EZM11600JCBC *[9][10] [11]*	30.19	(6) 1/0–750 or (12) 1/0–250
2000	1200 A, Al/Cu	—	EZM12000CB *[9] [11]*	30.19	(6) 1/0–750 or (12) 1/0–250
Main Fusible Switches (1Ø Incoming and 1Ø Outgoing) Requires 300 Vac Class T Fuses (Order Separately)					
400	400 A, Al	—	EZM1400FS*[9]*	18.66	(1) 1–600 or (2) 1–250
600	600 A, Al	—	EZM1600FS*[9]*	18.50	(3) 3/0–500
800	800 A, Al	—	EZM1800FS*[9]*	18.50	(3) 3/0–500
1200	1200 A, Al	—	EZM11200FST *[9]*	23.69	(4) 3/0–500
Main Lug Terminal Boxes (1Ø Incoming and 1Ø Outgoing)					
225	800 A, Al	—	EZM1225TB *[9][12]*	11.66	(1) 4–300
400	800 A, Al	—	EZM1400TB *[9] [13]*	17.15	(2) 3/0–500
600	800 A, Al	—	EZM1600TB *[9] [13]*	17.15	(2) 1/0–750 or (4) 1/0–300
800	800 A, Al	—	EZM1800TB *[9] [13]*	18.66	(4) 3/0–500
800	800 A, Cu	—	EZM1800TBCU *[9][13][14]*	24.08	(4) 3/0–500
1600	1200 A, Al/Cu	—	EZM11600TB *[9] [13][14]*	22.48	(6) 1/0-600 or (12) 1/0-300
2000	1200 A, Cu	—	EZM12000TB *[9][13] [11]*	30.19	6 (Order Lugs Separately)
Main Circuit Breaker (3Ø Incoming and 3Ø Outgoing) with Energy Reduction Maintenance (ERMS)					
1200	1200 A, Cu	EMZ11200GCBTMS *[15]*	EZM11200JCBTMS *[15]*	23.69	4) 3/0–500
1600	1200 A, Cu	EMZ11600GCBCMS *[9]*	EZM11600JCBCMS *[9]*	30.19	(6) 1/0–750 or (12) 1/0–250
2000	1200 A, Cu	EMZ12000CBMS *[9]*	—	30.19	(6) 1/0-750 or (12) 1/0-250

[8] Does not meet EUSERC requirements.
[9] Overhead and underground feed.
[10] Ampere rating of the circuit breaker supplied with this device can be changed to a LOWER value in the field by changing the setting on the circuit breaker.
[11] Supplied with copper horizontal bus bars and aluminum vertical bus bars.
[12] 225 A terminal box supplied with isolated neutral that cannot be bonded Not suitable for use on the LINE side of service equipment.
[13] Terminal box is suitable for use on LINE or LOAD side of service equipment. Supplied with isolated neutral and provided with neutral bonding kit for use as required. Refer to page 2-11 for appropriate short circuit current ratings.
[14] Feed-thru lug kit available, see page 2-21.
[15] Top feed only.

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Table 2.18: Main Devices, Underground Feed Only

EZM11200GCBE

Ampere Rating	Horizontal Cross Bus Rating and Bus Bar Material	Cat. No.		Width (in.)	Factory-Installed Lug Landings for use with Crimp-Type Lugs (2-Hole Mounting) Qty. per Phase and Neutral, except non-EUSERC. *[16]*
Main Circuit Breakers (1Ø Incoming and 1Ø Outgoing)*[16]*					
		65 kA	100 kA		
400	400 A, Al	EZM1400CBU *[17]*	—	20.46	1 (Order Lugs Separately)
600	600 A, Al	EZM1600CBU *[17]*	—	26.19	2 (Order Lugs Separately)
800	800 A Al	EZM1800CBU*[17]*	—	26.19	2 (Order Lugs Separately)
1000	1200 A, Cu	—	EZM11000CBU*[18]*	34.19	2 (Order Lugs Separately)
1200	1200 A, Al	EZM11200GCBU *[19][20] [21]*	EZM11200JCBU *[19][20] [21]*	23.69	(4) 3/0–500
1200	1200 A, Al	EZM11200GCBE *[20]*	EZM11200JCBE *[20]*	24.08	3 (Order Lugs Separately)
1600	1200 A, Al/Cu	EZM11600GCBU *[19][20] [18]*	EZM11600JCBU *[19][20] [18]*	22.48	6 (Order Lugs Separately)
2000	1200 A, Al/Cu	—	EZM12000CBU *[19][18]*	30.19	6 (Order Lugs Separately)
Main Fusible Switches (1Ø Incoming and 1Ø Outgoing) *[16]* **Requires 300 Vac Class T Fuses (Order Separately)**					
400	400 A, Al	—	EZM1400FSU	20.46	1 (Order Lugs Separately)
600	600 A, Al	—	EZM1600FSU*[19]*	20.46	2 (Order Lugs Separately)
600	600 A, Al	—	EZM1600FSE	18.36	2 (Order Lugs Separately)
800	800 A, Al	—	EZM1800FSU*[19]*	20.46	2 (Order Lugs Separately)
800	800 A, Al	—	EZM1800FSE	18.36	2 (Order Lugs Separately)
1200	1200 A, Al	—	EZM11200FSB*[19] [21]*	23.69	(4) 3/0–500
1200	1200 A, Al	—	EZM11200FSE	32.39	3 (Order Lugs Separately)
Main Lug Terminal Boxes (1Ø Incoming and 1Ø Outgoing)					
400	800 A, Al	—	EZM1400TBU *[22]*	17.16	1 (Order Lugs Separately)
800	800 A, Al	—	EZM1800TBU *[22]*	25.16	2 (Order Lugs Separately)
1200	1200 A, Al/Cu	—	EZM11200TBU *[22]*	33.16	3 (Order Lugs Separately)
Main Circuit Breaker (3Ø Incoming and 3Ø Outgoing) with Energy Reduction Maintenance Switch (ERMS)					
1200	1200 A, Al	EZM11200GCBUMS	EZM11200JCBUMS	26.39	(4) 3/0–500
1200	1200 A, Al	EZM11200GCBEMS	EZM11200JCBEMS	32.39	3 (Order Lugs Separately)
1600	1200 A, Al	EZM11600GCBUMS	EZM11600JCBUMS	30.19	6 (Order Lugs Separately)
2000	1200 A, Al	EZM12000CBUMS	—	30.19	6 (Order Lugs Separately)

[16] For mechanical lugs (3/0 AWG–600 kcmil) order kit CMELK4. Kit includes 4 lugs only. Multiple kits may be required, consult factory. For crimp-type lugs refer to Anderson Electrical Connector Products Catalog AEC-40R.
[17] Available by special order with main circuit breaker supplied with other standard ampere ratings, consult local Field Office (allow 6 weeks for delivery).
[18] Supplied with copper horizontal bus bars and aluminum vertical bus bars.
[19] Does not meet EUSERC requirements.
[20] Ampere rating of the circuit breaker supplied with this device can be changed to a LOWER value in the field by changing the setting on the circuit breaker.
[21] For field installed Lug Landing Kit, order catalog number EZM1200ULL. Order lugs separately.
[22] Terminal box is suitable for use on LINE or LOAD side of service equipment. Supplied with isolated neutral and provided with neutral bonding kit for use as required. Refer to page 2-11 for appropriate short circuit current ratings.

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1 Phase Branch Devices—NEMA 3R Construction

Table 2.19: Branch Units—1Ø Incoming and 1Ø Outgoing

EZMH114125

System Type	Width (in.)	Number of Meter Sockets	Horizontal Cross Bus Rating and Bus Bar Material	Ring Type 4-Jaw Meter Socket without Bypass *[23]*	Ringless Type 5-Jaw Meter Socket without Bypass	Ringless Type 5-Jaw Meter Socket with Horn Bypass
125 A Maximum (Order Type QO, QO-VH or QOH Circuit Breakers Separately) *[24]*						
1Ø3W 120/240 Vac 2P Branch Circuit Breakers	12.25	3	800 A Al	EZM113125 *[25]*	EZMR113125 *[25]*	EZMH113125 *[25]*
			1200 A Cu	EZM113125CUX	EZMR113125CUX	EZMH113125CUX
		4	800 A Al	EZM114125 *[25]*	EZMR114125 *[25]*	EZMH114125 *[25]*
			1200 A Cu	EZM114125CUX	EZMR114125CUX	EZMH114125CUX
		5	800 A Al	EZM115125 *[25]*	EZMR115125 *[25]*	EZMH115125 *[25]*
			1200 A Cu	EZM115125CUX	EZMR115125CUX	EZMH115125CUX
		6	800 A Al	EZM116125 *[25]*	EZMR116125 *[25]*	EZMH116125 *[25]*
			1200 A Cu	EZM116125CUX	EZMR116125CUX	EZMH116125CUX
225 A Maximum Branch Units (Order Type QBP-TM, QDP-TM, QGP-TM or QJP-TM Circuit Breakers Separately) *[26]*						
1Ø3W 120/240 Vac 2P Branch Circuit Breakers	17.38	2	800 A Al	EZM112225 *[25]*	EZMR112225 *[25]*	EZMH112225 *[25]*
			1200 A Cu	EZM112225CUX	EZMR112225CUX	EZMH112225CUX
		3	800 A Al	EZM113225 *[25]*	EZMR113225 *[25]*	EZMH113225 *[25]*
			1200 A Cu	EZM113225CUX	EZMR113225CUX	EZMH113225CUX
		4	800 A Al	EZM114225 *[25]*	EZMR114225 *[25]*	EZMH114225 *[25]*
			1200 A Cu	EZM114225CUX	EZMR114225CUX	EZMH114225CUX
		5	1200 A Al/Cu	EZM115225	EZMR115225	EZMH115225
			1200 A Cu	EZM115225CU	EZMR115225CU	EZMH115225CU
		6	1200 A Cu	EZM116225	EZMR116225	EZMH116225

Table 2.20: Branch Units—225 A Maximum Commercial (Order Type QBP-TM, QDP-TM, QGP-TM or QJP-TM Circuit Breakers Separately) *[27]*

EZMT111225

EZML113225

System Type	Number of Meter Sockets	Horizontal Cross Bus Rating and Bus Bar Material	Ringless Type 5-Jaw Meter Socket with Lever Bypass and Jaw Release		Ring Type 5-Jaw Meter Socket with Test Block Bypass. Meets EUSERC Requirements	
			Cat. No.	Width (in.)	Cat. No.	Width (in.)
1Ø3W 120/240 Vac 2P Branch Circuit Breakers	1	1200 A Al/Cu	EZML111225	19.44	EZMT111225 *[28]*	22.42
		1200 A Cu	EZML111225CU		—	—
		1200 A Al/Cu	EZML111225D *[29]*		—	—
	2	1200 A Al/Cu	EZML112225	19.44	EZMT112225 *[28]*	22.42
		1200 A Cu	EZML112225CU		—	—
		1200 A Al/Cu	EZML112225D *[29]*		—	—
	3	1200 A Al/Cu	EZML113225	19.44	EZMT113225 *[28][30]*	22.42
		1200 A Cu	EZML113225CU		—	—
		1200 A Al/Cu	EZML113225D *[29]*		—	—
	4	1200 A Al/Cu	EZML114225	19.44	—	—
		1200 A Cu	EZML114225CU		—	—
		1200 A Al/Cu	EZML114225D *[29]*		—	—

Table 2.21: Branch Units—400 A Maximum Commercial

System Type	Number of Meter Sockets	Main Cross Bus Rating and Bus Bar Material	Ringless Type 5-Jaw Meter Socket with Lever Bypass and Jaw Release. Includes Factory-Installed 400 A Type LJL Circuit Breaker *[31] [32]*		Ringless Type K Bolt-on 4-Jaw Meter Socket with Manual Bypass. Includes Factory-Installed 400 A Type LJL Circuit Breaker *[32]*	
			Cat. No.	Width (in.)	Cat. No.	Width (in.)
1Ø3W 120/240 Vac 2P Branch Circuit Breakers	1	1200 A Cu	EZML111400	23.21	EZMK111400	27.56
	2	1200 A Cu	EZML112400	23.21	EZMK112400	27.56

[23] Snap-on aluminum sealing rings supplied as standard.
[24] Supplied with removable drip hood and equipped with an indoor top endwall with knockouts provided.
[25] For 1200 A main cross bus add suffix "X" to catalog number (Example: EZM314125X). Allow 6 weeks for delivery.
[26] Type QO, QO-VH and QOH branch circuit breakers (40–60 A) may be installed with use of EZM125QOA adapter kits, see page 2-21.
[27] 2P Type QO (40–125 A, 10 kA max. meter center SCCR) or QO-VH and QO-H (40–60 A, 100 kA max. meter center SCCR) may be installed using EZM125QOA adapter kit, see page 2-21.
[28] Supplied with bondable neutral, suitable for use as service equipment. Use main lugs terminal box type EZM-TBU for Six Disconnect Rule applications to feed this device. Supplied with copper horizontal bus bars and aluminum vertical bus bars.
[29] Supplied with removable drip hood and equipped with an indoor top endwall with knockouts provided.
[30] Does not meet EUSERC 48 in. minImum / 75 in. maximum meter height requirements for outdoor installations. The bottom meter socket is 37 inches above ground when the device is mounted with the top meter socket at 75 inches above ground. EUSERC indoor requirements are 36 in. minimum / 75 in. maximum.
[31] Supplied with Class 320 lever bypass meter socket. Utilizes anti-inversion clip kit MMLRK, if required, refer to page 2-21.
[32] LJL circuit breaker has adjustable trip settings from 125-400 A. Use seal kit MICROTUSEAL, if required. LJL circuit breaker terminal lug kit factory-installed and accommodates (2) 2/0-500 kcmil Cu-Al per phase. Alternate lug kit AL400L61K3 for LJL circuit breaker is available, see. page 2-21.

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3Ø4W 208Y/120 Vac or 240/120 Vac Delta EZ Meter-Pak Meter Centers—3Ø Indoor/Rainproof, UL Listed

1200 A Main CB/Fusible Switch Devices come Standard with 2-STEP Removable Service Entrance Endwalls

Select EZM meter center short circuit current rating from Table 2.16. Using this table as a reference, make the following selections:

1. Select 3Ø EZM main device below with an equal or higher short circuit rating than the application from Table 2.22 and Table 2.23.
2. Select EZM 3Ø branch units from Table 2.24, Table 2.25, and Table 2.26.
3. Select proper 2P type QO, QO-VH, QOH, QBP-TM, QDP-TM, QGP-TM or QJP-TM or 3P QBP-TM, QDP-TM, QGP-TM or QJP-TM branch circuit breakers for use as tenant mains in branch unit; from Table 2.32 and Table 2.33.
4. Select accessories as required, from page 2-21.
5. Dimensions see page 2-23.

3 Phase Main Devices—NEMA 3R Construction

Table 2.22: Main Devices, Overhead/Underground Feed

EZM31200FST

Ampere Rating	Horizontal Cross Bus Rating and Bus Bar Material	Cat. No.*[33]*		Width (in.)	Factory-Installed Line Side Lug (Conductors per Phase and Neutral) Wire Size (AWG–kcmil)
Main Circuit Breakers (3Ø Incoming and 3Ø Outgoing) 65 kA Short Circuit Current Rating (400–1600 A Max.), 100 kA Short Circuit Current Rating (2000 A Max.)					
Short Circuit Rating		65 kA	100 kA		
400	400 A, Al	EZM3400CB *[34]*	—	18.66	(1) 1–600 or (2) 1–250
600	600 A, Al	EZM3600CB*[34]*	—	18.66	(3) 3/0–500
800	800 A, Al	EZM3800CB*[34]*	—	18.66	(3) 3/0–500
1000	1200 A, Al	EZM31000CB*[34]*	—	18.66	(3) 3/0–500
1200	1200 A, Al	EZM31200GCBT *[35] [36]*	EZM31200JCBT *[35] [36]*	23.69	(4) 3/0-500
1600	1200 A, Al/Cu	EZM31600GCBC*[36] [37]*	EZM31600JCBC*[36] [37]*	30.19	(6) 1/0–750 or (12) 1/0–250
2000	1200 A, Al/Cu	—	EZM32000CB *[37]*	30.19	(6) 1/0–750 or (12) 1/0–250
Main Fusible Switches (3Ø Incoming and 3Ø Outgoing) Requires 300 Vac Class T Fuses (Order Separately)					
400	400 A, Al	—	EZM3400FS*[34]*	18.66	(1) 1–600 or (2)1–250
600	600 A, Al	—	EZM3600FS*[34]*	18.66	(3) 3/0–500
800	800 A, Al	—	EZM3800FS*[34]*	18.66	(3) 3/0–500
1200	1200 A, Al	—	EZM31200FST *[35]*	23.69	(4) 3/0–500
Main Lug Terminal Boxes (3Ø Incoming and 3Ø Outgoing)					
225	800 A, Al	—	EZM3225TB *[38]*	11.66	(1) 4–300
400	800 A, Al	—	EZM3400TB *[39]*	17.15	(2) 3/0–500
600	800 A, Al	—	EZM3600TB *[39]*	17.15	(2) 1/0–750 or (4) 1/0–300
800	800 A, Al	—	EZM3800TB *[39]*	18.66	(4) 3/0–500
800	800 A, Cu	—	EZM3800TBCU *[39] [40]*	24.08	(4) 3/0–500
1600	1200 A, Al/Cu	—	EZM31600TB *[37] [40] [39]*	22.48	(6) 1/0-600 or (12) 1/0-300
2000	1200 A, Cu	—	EZM32000TB *[39]*	30.19	6 (Order Lugs Separately)
Main Circuit Breakers (3Ø Incoming and 3Ø Outgoing) with Energy Reduction Maintenance Switch (ERMS)					
1200	1200 A, Cu	EZM31200GCBTMS*[35]*	EZM31200JCBTMS*[35]*	23.69	(4) 3/0–500
1600	1200 A, Cu	EZM31600GCBCMS*[34]*	EZM31600JCBCMS*[34]*	30.19	(6) 1/0–750 or (12) 1/0–250
2000	1200 A, Cu	EZM32000CBMS*[34]*	—	30.19	(6) 1/0–750 or (12) 1/0–250

[33] Does not meet EUSERC requirements.
[34] Overhead and underground feed.
[35] Top feed only.
[36] Ampere rating of the circuit breaker supplied with this device can be changed to a LOWER value in the field by changing the setting on the circuit breaker.
[37] Supplied with copper horizontal bus bars and aluminum vertical bus bars.
[38] 225 A terminal box supplied with isolated neutral that cannot be bonded.
[39] Terminal box is suitable for use on LINE or LOAD side of service equipment. Supplied with isolated neutral and provided with neutral bonding kit for use as required. Refer to page 2-11 for appropriate short circuit current ratings.
[40] Feed-thru lug kit available, seeTable 2.34

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Table 2.23: Main Device, Underground Feed Only

EZM31200GCBU

Ampere Rating	Horizontal Cross Bus Rating and Bus Bar Material	Cat. No.		Width (in.)	Factory-Installed Lug Landings For use with Crimp-Type Lugs (2-Hole Mounting) Qty. per Phase and Neutral, except non-EUSERC device.*[41]*
Main Circuit Breakers (3Ø Incoming and 3Ø Outgoing)					
Short Circuit Rating		65 kA	100 kA		
400	400 A, Al	EZM3400CBU *[42]*	—	20.46	1 (Order Lugs Separately)
600	600 A, Al	EZM3600CBU*[42]*	—	26.19	2 (Order Lugs Separately)
800	800 A, Al	EZM3800CBU *[42]*	—	26.19	2 (Order Lugs Separately)
1000	1200 A, Cu	—	EZM31000CBU	34.19	3 (Order Lugs Separately)
1200	1200 A, Al	EZM31200GCBU *[43] [44] [45]*	EZM31200JCBU *[43] [44] [45]*	23.69	(4) 3/0-500
1200	1200 A, Al	EZM31200GCBE *[45]*	EZM31200JCBE *[45]*	32.39	3 (Order Lugs Separately)
1600	1200 A, Al/Cu	EZM31600GCBU *[43] [45][46]*	EZM31600JCBU *[43] [45][46]*	30.19	6 (Order Lugs Separately)
2000	1200 A, Al/Cu	—	EZM32000CBU *[43][46]*	30.19	6 (Order Lugs Separately)
Main Fusible Switches (3Ø Incoming and 3Ø Outgoing) Requires 300 Vac Class T Fuses (Order Separately)					
400	400 A, Al	—	EZM3400FSU	20.46	1 (Order Lugs Separately)
600	600 A, Al	—	EZM3600FSU	26.19	2 (Order Lugs Separately)
800	800 A, Al	—	EZM3800FSU	26.19	2 (Order Lugs Separately)
1200	1200 A, Al	—	EZM31200FSB *[43][44]*	23.69	(4) 3/0-500
1200	1200 A, Al	—	EZM31200FSE	32.39	3 (Order Lugs Separately)
Main Lugs Terminal Boxes (3Ø Incoming and 3Ø Outgoing)					
400	400 A, Al	—	EZM3400TBU *[47]*	17.16	1 (Order Lugs Separately)
800	800 A, Al	—	EZM3800TBU *[47]*	25.16	2 (Order Lugs Separately)
1200	1200 A, Cu	—	EZM31200TBU *[47]*	33.16	3 (Order Lugs Separately)
Main Circuit Breaker (3Ø Incoming and 3Ø Outgoing) with Energy reduction Maintenance Switch (ERMS)					
1200	1200 A, Cu	EZM31200GCBUMS	EZM31200JCBUMS	23.69	(4) 3/0–500
1200	1200 A, Cu	EZM31200GCBEMS	EZM31200JCBEMS	32.39	3 (Order Lugs Separately)
1600	1200 A, Cu	EZM31600GCBUMS	EZM31600JCBUMS	30.19	6 (Order Lugs Separately)
2000	1200 A, Cu	EZM32000CBUMS	—	30.19	6 (Order Lugs Separately)

[41] For mechanical lugs (3/0 AWG–600 kcmil) order kit CMELK4. Kit includes 4 lugs only. Multiple kits may be required, consult factory. For crimp-type lugs refer to Anderson Electrical Connector Products Catalog AEC-40R.
[42] Available by special order with main circuit breaker supplied with other standard ampere ratings, consult your nearest Field Sales Office (allow 6 weeks for delivery).
[43] Does not meet EUSERC requirements.
[44] For field installed Lug Landing Kit order catalog number EZM1200ULL.
[45] Ampere rating of the circuit breaker supplied with this device can be changed to a LOWER value in the field by changing the setting on the circuit breaker.
[46] Supplied with copper horizontal bus bars and aluminum vertical bus bars.
[47] Terminal box is suitable for use on LINE or LOAD side of service equipment. Supplied with isolated neutral and provided with neutral bonding kit for use as required. Refer to page 2-11 for appropriate short circuit current ratings.

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3 Phase Branch Devices—NEMA 3R Construction

Table 2.24: Branch Units—3Ø Incoming and 1Ø Outgoing

System Type	Width (in.)	Number of Meter Sockets	Horizontal Cross Bus Rating *[48]* and Bus Bar Material	Cat. No.		
				Ring Type 5-Jaw Meter Socket without Bypass*[49]*	Ringless Type 5-Jaw Meter Socket without Bypass	Ringless Type 5-Jaw Meter Socket with Horn Bypass
125 A Maximum (Order Type QO, QO-VH or QOH Circuit Breakers Separately) *[50]*						
3Ø4W 208Y/120 Vac 5-Jaw-Meter Socket 2P Branch Circuit Breakers	12.25	3	800 A Al	EZM313125 *[48]*	EZMR313125 *[48]*	EZMH313125 *[48]*
			800 A Al	EZM313125M10 *[51]*	—	—
			1200 A Cu	EZM313125CUX	EZMR313125CUX	EZMH313125CUX
		4	800 A Al	EZM314125 *[48]*	EZMR314125 *[48]*	EZMH314125 *[48]*
			800 A Al	EZM314125M10 *[51]*	—	—
			1200 A Cu	EZM314125CUX	EZMR314125CUX	EZMH314125CUX
		5	800 A Al	EZM315125 *[48]*	EZMR315125 *[48]*	EZMH315125 *[48]*
			800 A Al	EZM315125M10 *[51]*	—	—
			1200 A Cu	EZM315125CUX	EZMR315125CUX	EZMH315125CUX
		6	800 A Al	EZM316125 *[48]*	EZMR316125 *[48]*	EZMH316125 *[48]*
			800 A Al	EZM316125M10 *[51]*	—	—
			1200 A Cu	EZM316125CUX	EZMR316125CUX	EZMH316125CUX
225 A Maximum (Order Type QBP-TM, QDP-TM,QGP-TM or QJP-TM Circuit Breakers Separately) *[52]*						
3Ø4W 208Y/120 Vac 5-Jaw-Meter Socket 2P Branch Circuit Breakers	17.38	2	800 A Al	EZM312225 *[48]*	EZMR312225 *[48]*	EZMH312225 *[48]*
			1200 A Cu	EZM312225CUX	EZMR312225CUX	EZMH312225CUX
		3	800 A Al	EZM313225 *[48]*	EZMR313225 *[48]*	EZMH313225 *[48]*
			1200 A Cu	EZM313225CUX	EZMR313225CUX	EZMH313225CUX
		4	800 A Al	EZM314225 *[48]*	EZMR314225 *[48]*	EZMH314225 *[48]*
			1200 A Cu	EZM314225CUX	EZMR314225CUX	EZMH314225CUX
		5	1200 A Al/Cu	EZM315225	EZMR315225	EZMH315225
			1200 A Cu	EZM315225CU	EZMR315225CU	EZMH315225CU
	17.37	6	1200 A Al/Cu	EZM316225	EZMR316225	EZMH316225
			1200 A Cu	EZM316225CU	EZMR316225CU	EZMH316225CU
			1200 A Al/Cu	EZM316225CA	EZMR316225CA	EZMH316225CA

Table 2.25: Branch Units—225 A Maximum Commercial

EZML313225

EZMT311225

EZMT311225 Without Cover

System Type	Number of Meter Sockets	Horizontal Cross Bus Rating and Bus Bar Material	Ringless Type Meter Socket without Bypass		Ringless Type Meter Socket with Lever Bypass and Jaw Release		Ring Type Meter Socket with Test Block Bypass. Meets EUSERC Requirements	
			Cat. No.	Width (in.)	Cat. No.	Width (in.)	Cat. No.	Width (in.)
3Ø Incoming and 1Ø Outgoing *[53]* (Order Type QBP-TM, QDP-TM,QGP-TM or QJP-TM circuit breakers separately) *[54]*								
3Ø4W 208Y/120 Vac 5-Jaw Meter Sockets 2P Branch Circuit Breakers	1	1200 A Al/Cu	—	—	—	—	EZMT311225 *[55]*	22.42
	2	1200 A Al/Cu	—	—	EZML312225	19.44	EZMT312225 *[55]*	22.42
		1200 A Cu	—	—	EZML312225CU		—	—
		1200 A Al/Cu	—	—	EZML312225D *[50]*		—	—
	3	1200 A Al/Cu	—	—	EZML313225	19.44	EZMT313225 *[55][56]*	22.42
		1200 A Cu	—	—	EZML313225CU		—	—
		1200 A Al/Cu	—	—	EZML313225D *[50]*		—	—
	4	1200 A Al/Cu	—	—	EZML314225	19.44	—	—
		1200 A Cu	—	—	EZML314225CU		—	
		1200 A Al/Cu	—	—	EZML314225D *[50]*		—	
3Ø Incoming and 3Ø Outgoing (Order QBP-TM, QDP-TM, QGP-TM or QJP-TM circuit breakers separately, see *[54]*								
3Ø4W 240/120 Vac Delta or 208Y/120 Vac 7-Jaw Meter Socket 3P Branch Circuit Breakers	1	1200 A Al/Cu	—	—	EZML331225	19.44	EZMT331225 *[55]*	22.42
		1200 A Cu	—	—	EZML331225CU		—	—
		1200 A Al/Cu	—	—	EZML331225D *[50]*		—	—
	2	1200 A Al/Cu	EZMR332225	19.44	EZML332225	19.44	EZMT332225 *[55]*	22.42
		1200 A Cu	EZMR332225CU		EZML332225CU		—	—
		1200 A Al/Cu	—		EZML332225D *[50]*		—	—
	3	1200 A Al/Cu	EZMR333225	19.44	EZML333225	19.44	EZMT333225 *[55][56]*	22.42
		1200 A Cu	EZMR333225CU		EZML333225CU		—	—
		1200 A Al/Cu	—		EZML333225D *[50]*		—	—
	4	1200 A Al/Cu	EZMR334225	19.44	EZML334225	19.44	—	—
		1200 A Cu	EZMR334225CU		EZML334225CU		—	
		1200 A Al/Cu	—		EZML334225D *[50]*		—	

[48] For 1200 A main cross bus, add suffix "X" to catalog number. Example: EZMR313125X.. Allow 6 weeks for delivery.
[49] Snap-On aluminum sealing rings supplied as standard.
[50] Supplied with removable drip hood and equipped with an indoor top endwall with knockouts provided.
[51] Distance between meter sockets as measured from centerline to centerline is 10 inches.
[52] 2P Type QO (40–125 A, 10 kA max. meter center SCCR) or QO-VH and QO-H (40–60 A, 100 kA max. meter center SCCR) may be installed using EZM125QOA adapter kit, see page 2-21.
[53] For 240/120 Vac Delta Systems add Suffix "CA" to catalog number (Example: EZM314125**CA**). All meter sockets are phased A and C only. Price remains the same as the base catalog number. Order only branch units, not stocked in PDS (6-week delivery).
[54] 2P Type QO (40–125 A, 10 kA max. meter center SCCR) or QO-VH and QO-H (40–60 A, 100 kA max. meter center SCCR) may be installed using EZM125QOA adapter kit, refer to.
[55] Supplied with bondable neutral, suitable for use as service equipment. Use main lugs terminal box type EZM-TBU for Six Disconnect Rule applications to feed this device. Supplied with copper horizontal bus bars and aluminum vertical bus bars.
[56] Does not meet EUSERC 48 in. minImum / 75 in. maximum meter height requirements for outdoor installations. The bottom meter socket is 37 inches above ground when the device is mounted with the top meter socket at 75 inches above ground. EUSERC indoor requirements are 36 in. minimum / 75 in. maximum.
For 400 A maximum Commercial Branch Units, see page 2-18.

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EZMK311400

Table 2.26: Branch Units—400 A Maximum Commercial

System Type	Number of Meter Sockets	Horizontal Cross Bus Rating	Ringless Type Meter Socket with Lever Bypass and Jaw Release—Includes Factory-Installed 400 A Type LJL Circuit Breaker. *[57]*, *[58]*		Ringless Type K Bolt-on Meter Socket with Manual Bypass—Includes Factory-Installed 400 A Type LJL Circuit Breaker. *[58]*	
			Cat. No.	Width (in.)	Cat. No.	Width (in.)
3Ø Incoming and 1Ø Outgoing *[59]*						
3Ø4W 208Y/120 Vac 5-Jaw Meter Socket 2P Circuit Breakers	1	1200 A Cu	EZML311400	23.21	EZMK311400	27.56
	2	1200 A Cu	EZML312400	23.21	EZMK312400	27.56
3Ø Incoming and 3Ø Outgoing						
3Ø4W 240/120 Vac Delta or 208Y/120 Vac 7-Jaw Meter Socket 3P Circuit Breakers	1	1200 A Cu	EZML331400	23.21	EZMK331400	27.56
	2	1200 A Cu	EZML332400	23.21	EZMK332400	27.56

Starting Position		Possible Ending Position (By moving only one "Z" connector)
AØ and BØ	can be changed to	AØ and CØ
AØ and CØ	can be changed to	AØ and BØ or BØ and CØ
BØ and CØ	can be changed to	AØ and CØ

3Ø–1Ø OUT EZM Branch Unit Phase Balancing Flexibility

The major benefit of factory phase balancing is that most jobs will not require field phase balancing. To see if meter socket phase balancing in the field is required (refer to wiring diagram for complete instructions):

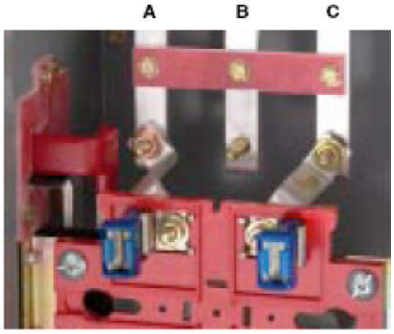
A. Determine if the load in amperes on each phase of the transformer using handle rating of tenant circuit breakers installed at each number of meter sockets. Use Phase Balancing Chart to determine total number of connections each meter socket makes on each phase of transformer.

B. If phase balancing is required, determine which meter sockets should be changed to properly phase balance metering equipment lineup.

C. Once meter socket(s) is selected to be phase balanced, remove individual meter socket cover from each meter socket to be phase balanced. The vertical bus bars running top to bottom in the branch unit behind each meter socket are phased: **AØ, BØ, CØ, left to right.**

D. By moving only the line side meter socket "Z" shaped connectors per meter socket to be changed, phase balancing can easily be accomplished on-site:

Table 2.27: Example: To change an AØ and CØ meter socket to a BØ and CØ socket



Starting Position
Meter Socket Phaseing: AØ and CØ

Step 2: Loosen hex nut from AØ line side meter socket jaw and slide "Z" connector down to free connector from stud.

Step 1: Remove hex nut from AØ line side connection to vertical bus.

Step 3: Rotate "Z" connector to right and align with stud on BØ vertical bus.

Step 4: Slide "Z" connector up to engage stud on BØ vertical bus. Torque hex nut of meter socket jaw to 75 lb-in (8 N•m).

Step 6: Replace hex nut (removed in Step 1) onto stud of BØ vertical bus and torque to 75 lb-in (9 N•m).
Phase balancing of meter socket is complete: BØ and CØ.

[57] Supplied with Class 320 lever bypass meter socket. Use anti-inversion clip kit, catalog number MMLRK, if required. See page 2-21.

[58] LJL circuit breaker has adjustable trip settings from 125-400 A. Use seal kit MICROTUSEAL, if required. LJL circuit breaker terminal lug kit factory-installed and accommodates (2) 2/0-500 kcmil Cu-Al per phase. Alternate lug kit AL400L61K3 for LJL circuit breaker is available, see page 2-21.

[59] For 240/120 Vac Delta Systems add Suffix "CA" to catalog number (Example: EZML312400**CA**). All meter sockets are phased A and C only. Price remains the same as the base catalog number. "Order only" branch units, not stocked in PDS (4–6 week delivery). Order point Lexington.

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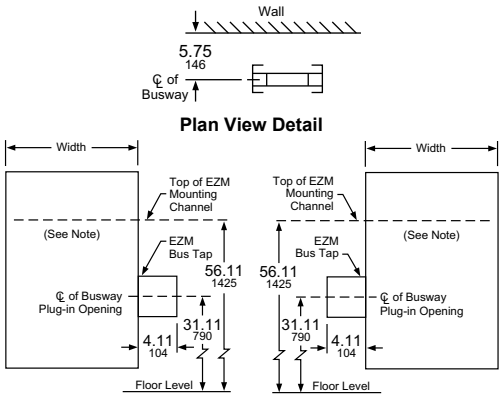


EZM3800CBNFBTR **EZM3800FSNBBTL**

EZM Main with Busway Tap

EZ Meter-Pak metering equipment is available for use in high rise applications for connection to 800–5000 A I-Line™ or I-Line II plug-in busway installed as a vertical riser. Three phase only EZM main devices in the form of a main circuit breaker or main fusible switch are available with an integral busway tap extending from the right or left side of the main device and phased to align with the busway for either neutral front or neutral back installations.

Busway Mains, 3Ø only (Indoor only) ordering instructions:

Step 1: Determine height to center line of busway plug-in opening, check local utility requirements for minimum and maximum meter socket heights.

Step 2: Determine side of EZM main section for busway tap to extend from (busway tap is an integral part of the main and extends to the left or right on the EZM device as viewed from the front).

Step 3: Check phasing of busway riser to insure that it matches phasing of busway tap on main section (indicated as neutral front or neutral back as viewed from the front).

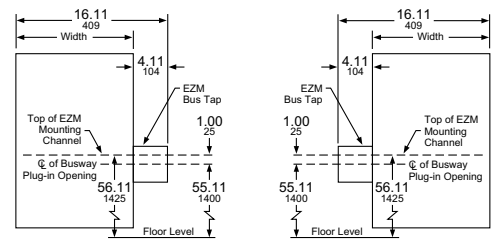
Step 4: Select Cat. No. from tables below.

Step 5: Busway main devices are build to order specials and require 4 to 6 weeks for delivery (order point Lexington).

Table 2.28: 1200 A EZM Mains with Busway Tap (Three Phase Only—Note positioning left or right below)

Ampere Rating	Width (in.)	Horizontal Cross Bus Rating	Busway to LEFT of EZM Metering Equipment Lineup		Busway to RIGHT of EZM Metering Equipment Lineup	
			Neutral Front	Neutral Back	Neutral Front	Neutral Back
Main Circuit Breaker with Busway Tap						
65,000 RMS Symmetrical Amperes Maximum Short Circuit Current Rating						
400	18.66	400 A Al	EZM3400CBNFBTL	EZM3400CBNBBTL	EZM3400CBNFBTR	EZM3400CBNBBTR
600	18.66	600 A Al	EZM3600CBNFBTL	EZM3600CBNBBTL	EZM3600CBNFBTR	EZM3600CBNBBTR
800	18.66	800 A Al	EZM3800CBNFBTL	EZM3800CBNBBTL	EZM3800CBNFBTR	EZM3800CBNBBTR
1000	23.36	1000 A Al	EZM31000CBNFBTL *[60]*	EZM31000CBNBBTL *[60]*	EZM31000CBNFBTR *[60]*	EZM31000CBNBBTR *[60]*
1200	23.36	1200 A Cu	EZM31200GBNFBTL *[60]*	EZM31200GBNBBTL*[60]*	EZM31200GBNFBTR *[60]*	EZM31200GBNBBTR *[60]*
100,000 RMS Symmetrical Amperes Maximum Short Circuit Current Rating						
1200	23.36	1200 A Cu	EZM31200JBNFBTL *[60]*	EZM31200JBNBBTL *[60]*	EZM31200JBNFBTR *[60]*	EZM31200JBNBBTR *[60]*
Main Fusible Switch with Busway Tap Requires Class T (300 Vac) Fuses - Order Separately						
100,000 RMS Symmetrical Amperes Maximum Short Circuit Current Rating						
400	18.66	400 A Al	EZM3400FSNFBTL	EZM3400FSNBBTL	EZM3400FSNFBTR	EZM3400FSNBBTR
600	18.66	600 A Al	EZM3600FSNFBTL	EZM3600FSNBBTL	EZM3600FSNFBTR	EZM3600FSNBBTR
800	18.66	800 A Al	EZM3800FSNFBTL	EZM3800FSNBBTL	EZM3800FSNFBTR	EZM3800FSNBBTR
1200	22.36	1200 A Cu	EZM31200FSNFBTL *[60]*	EZM31200FSNBBTL *[60]*	EZM31200FSNFBTR *[60]*	EZM31200FSNBBTR *[60]*

NOTE: Dimensions shown position the centerline of top meter socket of a 125 A, 5-Gang or 6-Gang branch unit at 72" above floor level. Check with utility to meet local requirements.



EZM3BUSRF and EZM3BUSRB **EZM3BUSLF and EZM3BUSLB**

Busway Transition Section

EZM busway transition section provides no overcurrent protection for the downstream EZM branch units.

Tenant main circuit breakers in these branch units must be selected as “fully rated” equipment. (Examples: QO for 10 kA, QO-VH for 22 kA or QOH for 42 kA.)

Table 2.29: EZM Busway Transition Sections (3Ø only)

Ampere Rating	I-Line™ Busway location	Neutral Front	Neutral Back	Width (in.)
1200	RIGHT of EZM Transition Section	EZM3BUSRF	EZM3BUSRB	12.00
1200	LEFT of EZM Transition Section	EZM3BUSLF	EZM3BUSLB	12.00

EZM Main with Center-Mounted Busway Tap

The EZM Main with center-mounted busway tap is a space-saving design for high rise applications that is installed as an integral component of the vertical riser busway and allows standard EZM branches to be mounted from both sides. See online digest updates for availability or contact your local field sales office for additional information

[60] Requires use of branch units supplied with 1200 A horizontal cross bus.

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EZM Busway Center Tap Mains

The EZM Busway Center Tap mains offer provides a convenient space saving method for connecting EZM Branch Meter sections to I-Line II Busway in vertical riser applications. The mains are connected "inline" with the Busway column conserving precious electrical room space.

1. The Part Number Coding Table is to be used for interpreting existing part numbers only. All possible combinations are not available. Please contact product support for additional references needed.
2. Outgoing Feeder Bus Joint-Pak is included with each EZM CTM Section.
3. EZM Horizontal Cross Bus is 1200 A Copper Only
4. Busway Center Tap Mains are fully NEMA 3R Rated.
5. Mains Devices are fully sealable by utility.
6. EZM Branch units are installed using the mounting kit - EZMCTMKIT.
7. EZM CTM is configured for neutral front only (G-> N-> C-> B->A-> G) as viewed front to rear.
8. Compatible with I-LINE II Busway rated 2000–5000 A.
9. Includes factory installed PowerPact M- and P-frame Circuit Breakers and Switches (Rated 600–1200 A.)
10. Fully compatible with all standard EZ Meter-Pak Branch Devices and Extenders.

Table 2.30: Part Number Coding

Number Segment	Character	Description	EZM	3	1000	JCB	C	20
Device Name	EZM	EZM Busway Center Tap Main						
System Connection (Phase Order: Front to Back)	3	3 Phase (N, C, B, A)						
Maximum Current of Main Service Disconnect	600	600 A						
	800	800 A						
	1000	1000 A						
	1200	1200 A						
Type of Main Service Disconnect (with AIC Rating)	GCB	65 k Circuit Breaker						
	JCB	100 k Circuit Breaker						
	FS	100 k Fused Switch						
Material of I-Line II	C	Copper						
	A	Aluminum						
Amperage of I-Line II	20	2000 A						
	25	2500 A						
	30	3000 A						
	32	3200 A						
	40	4000 A						
	50	5000 A						

Table 2.31: EZM Busway Center Tap Mains

Main CB Ampere Rating (A)	I-Line II Busway Rating Material	Cat. No.		Height (in.)	Width (in.)	Depth (in.)	MC Height (in.)
Main Circuit Breakers (3Ø Incoming and 3Ø Outgoing)							
SCCR		65 kA	100 kA				
600	2000A, Al	—	EZM3600JCBA20	43.08	22.70	14.78	56.11
	3000A, Al	—	EZM3600JCBA30	43.08	22.70	14.78	56.11
	4000A, Al	—	EZM3600JCBA40	43.08	27.96	14.78	56.11
	4000A, Al	EZM3600GCBA40	—	43.08	27.96	14.78	56.11
	4000A, Cu	EZM3600GCBC40	—	43.08	27.96	14.78	56.11
800	2000A, Al	EZM3800GCBA20	—	43.08	22.70	14.78	56.11
	3000A, Al	EZM3800GCBA30	—	43.08	22.70	14.78	56.11
	3000A, Cu	EZM3800GCBC30	—	43.08	22.70	14.78	56.11
	3000A, Al	—	EZM3800JCBA30	43.08	22.70	14.78	56.11
	4000A, Al	—	EZM3800JCBA40	43.08	27.96	14.78	56.11
	4000A, Al	EZM3800GCBA40	—	43.08	27.96	14.78	56.11
1000	4000A, Al	EZM31000GCBA40	—	43.08	27.96	14.78	56.11
	4000A, Al	—	EZM31000JCBA40	43.08	27.96	14.78	56.11
	4000A, Cu	—	EZM31000JCBC40	43.08	27.96	14.78	56.11
1200	4000A, Al	EZM31200GCBA40	—	43.08	27.96	14.78	56.11
	4000A, Al	—	EZM31200JCBA40	43.08	27.96	14.78	56.11

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Tenant Circuit Breakers and EZM Accessories

Table 2.32: 125 A Max. EZM Branch Unit Tenant Circuit Breakers

	Poles	Ampere Rating	10 k AIR	22 k AIR	42 k AIR	100 k AIR
QO2100VH, Plug-on Type Circuit Breaker	2	40 50 60	QO240 QO250 QO260	QO240VH QO250VH QO260VH	QOH240 QOH250 QOH260	— — —
		70 80 90	QO270 QO280 QO290	QO270VH QO280VH QO290VH	QOH270 QOH280 QOH290	— — —
		100 110 125	QO2100 QO2110 QO2125	QO2100VH QO2110VH QO2125VH	QOH2100 QOH2110 QOH2125	— — —

Table 2.33: 225 A Max. EZM Branch Unit Tenant Circuit Breakers

	Poles	Ampere Rating	10 k AIR	25 k AIR	65 k AIR	100 k AIR
QDP22200TM	2	40 50 60	QO240 *[61]* QO250 *[61]* QO260 *[61]*	QO240VH *[61] [62]* QO250VH *[61] [62]* QO260VH *[61] [62]*	QOH240 *[61] [63]* QOH250 *[61] [63]* QOH260 *[61] [63]*	— — —
		70 80 90	QBP22070TM QBP22080TM QBP22090TM	QDP22070TM QDP22080TM QDP22090TM	QGP22070TM QGP22080TM QGP22090TM	QJP22070TM QJP22080TM QJP22090TM
		100 110 125	QBP22100TM QBP22110TM QBP22125TM	QDP22100TM QDP22110TM QDP22125TM	QGP22100TM QGP22110TM QGP22125TM	QJP22100TM QJP22110TM QJP22125TM
		150 175 200	QBP22150TM QBP22175TM QBP22200TM	QDP22150TM QDP22175TM QDP22200TM	QGP22150TM QGP22175TM QGP22200TM	QJP22150TM QJP22175TM QJP22200TM
		225	QBP22225TM	QDP22225TM	QGP22225TM	QJP22225TM
	3	70 80 90	QBP32070TM QBP32080TM QBP32090TM	QDP32070TM QDP32080TM QDP32090TM	QGP32070TM QGP32080TM QGP32090TM	QJP32070TM *[64]* QJP32080TM *[64]* QJP32090TM *[64]*
		100 110 125	QBP32100TM QBP32110TM QBP32125TM	QDP32100TM QDP32110TM QDP32125TM	QGP32100TM QGP32110TM QGP32125TM	QJP32100TM*[64]* QJP32110TM *[64]* QJP32125TM *[64]*
		150 175 200	QBP32150TM QBP32175TM QBP32200TM	QDP32150TM QDP32175TM QDP32200TM	QGP32150TM QGP32175TM QGP32200TM	QJP32150TM *[64]* QJP32175TM *[64]* QJP32200TM *[64]*
		225	QBP32225TM	QDP32225TM	QGP32225TM	QJP32225TM *[64]*

[61] Must use EZM125QOA adapter.
[62] QO-VH tenant circuit breaker is rated 22 k AIR max.
[63] QOH tenant circuit breaker is rated 42 k AIR max.
[64] 3-pole QJP tenant circuit breaker is rated 65 k AIR max. at 240/120 Vac, 3Ø4W High Leg Delta, or 100 k AIR max. at 208Y/120 Vac, 3Ø4W.

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Table 2.34: Accessories

Accessory	Description	Cat. No.
1200 A Bus Extension (Indoor/ Outdoor Cu bus)	1Ø3W Bus Extension (6 in.wide) 1Ø3W Bus Extension (12 in.wide) 3Ø4W Bus Extension (6 in. wide) 3Ø4W Bus Extension (12 in. wide)	EZM1EXT6 EZM1EXT EZM3EXT6 EZM3EXT
1200 A Bussed Corner Sections (Indoor Cu bus only)	1Ø3W Inside Corner (14.75 in. wide) 1Ø3W Outside Corner (6.20 in. wide) 3Ø4W Inside Corner (14.75 in. wide) 3Ø4W Outside Corner (6.20 in. wide)	EZM1CORNER EZM1ELBOW EZM3CORNER EZM3ELBOW
1200 A Transition Sections— Old to New (10.7 in. wide Cu bus)	Add right of old style 1Ø EZM lineup Add right of old style 3Ø EZM lineup Add left of old style 1Ø EZM lineup Add left of old style 3Ø EZM lineup	EZM1TRANR EZM3TRANR EZM1TRANL EZM3TRANL
Mounting Channel	72" long	EZM72MC
Secondary Surge Arrester Mounting kit	For use with 1 or 2-SDSA1175 or 1-SDSA3650 (order surge arrester separately)	MMSAMK *[65]*
Stud Kit for EZM-TB 400–600 A terminal box	Includes (2) 1/2 in.-13 studs per pad and mounting hardware. Four pads per kit.	EZMSK2
Al/Cu Lug Kits (Each kit includes three, 2-barrel lugs.)	(1) 1/0–600 kcmil or (2) 1/0–250 kcmil per lug	MMLK250
	(2) 3/0–500 kcmil per lug	MMLK500
	(2) 2–600 kcmil per lug	MMLK600
Feed -Thru for EZM-TB 800 A Terminal Box	(4) 750 kcmil Al/Cu lugs per phase and neutral. Al wire 600 A max. Cu wire 800 A max.	EZM600FTLK3
Feed-Thru for EZM-TB 1600 A Terminal Box	(24) additional lugs, 600 kcmil Al/Cu, (6) per phase and neutral.	EZM1600FTLK3
EZM Mains Right Side Closure Cap	Replacement right side end cap for EZM Cross Bus Opening	EZMSCAP
EZM Mains Left Side Closure Cap	Replacement left side end cap for EZM Cross Bus Opening	EZMCAP
Fifth Jaw Kit	1 per kit	5J *[66]*
Horn Bypass Kit	Use with Type EZMR 1Ø meter socket only	MMHB
Slider Type Manual Circuit Closer	For (1) 125–225 A ring-type socket only—indoor/outdoor	MM200MB *[67] [68]*
Anti-inversion Clip	Rejects 100 A and 200 A watt-hour meters in Class 320 meter sockets in Type EZML branch units.	MMLRK
QO Adapter for bolt-on Q-frame tenant circuit breakers	For 2P Type QO (40–125 A, 10 kA max. meter center SCCR) or QO-VH and QOH (40–60 A, 100 kA max. meter center SCCR)	EZM125QOA
LJL Circuit Breaker Alternate Lug (DE2)	Kit includes (3) separate lugs for (1) #2 AWG - 500 kcmil Al or (1) #2 AWG - 600 kcmil Cu per lug.	AL400L61K3
LJL Circuit Breaker Seal Kit	Tamper-evident kit to seal LJL trip dial cover, (1) per circuit breaker, if required. Meets NEC 240-6 [c]	MICROTUSEAL
Meter Socket Closing Plates	Lexan Closing Plate—EZM, EZMR, EZMH, EZMT Metal Closing plate—EZMR, EZMH, EZML	29007 RSG4
Sealing Rings	Snap-on (Stainless Steel) Screw-Type (Aluminum) Latch-Type (Aluminum)-standard	ARP00026 29008W 2920910001
Barrel Lock Kit	For use on ringless EZM or MP branch unit covers, includes 6 each of head protectors, lock nuts and sealing caps. (Barrel lock not included.)	MMBLC
Tenant Circuit Breaker Filler Plates	125 A Branches—2P Type QO (2 per opening) 225 A Branches—2P and 3P Q-Frame	QOFP
Lug Landing Kit	For use with EZM 1200 A Mains suffix -CBU or -FSB. Order lugs separately.	EZM1200ULL
Branch Section Mounting Kit for Riser Applications.	This kit is needed when installing and connecting meter center branch sections to EZ-Meter Pak busway center tap mains in multi-floor riser applications (1 per branch section)	EZMCTMKIT

[65] Consult your nearest Schneider Electric sales office for details.
[66] All sockets include 5th Jaw factory-installed except EZM11__ devices.
[67] Meter center short circuit current rating is 10,000 RMS symmetrical amperes with manual circuit closers installed (bypass is not designed for use as continuous duty).
[68] For use on ring type meter sockets only.

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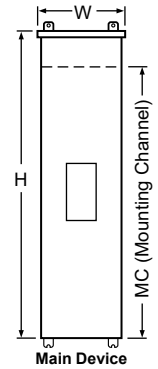
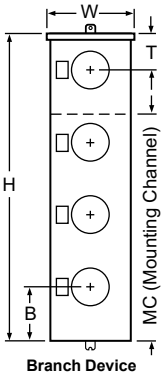
Dimensions for EZ Meter-Pak Meter Centers

Table 2.35: Main Device Dimensions (in.)



Main Device



Branch Device

Cat. No.	Height (H)	Width (W)	Depth (D)	MC Channel (MC)	Cat. No.	Height (H)	Width (W)	Depth (D)	MC Channel (MC)
EZM11000CB	53.91	18.66	11.50	34.30	EZM1ELBOW *[69] [70] [71]*	19.50	14.52	8.01	11.85
EZM11000CBU	70.05	34.19	18.33	46.99	EZM31000CB	53.91	18.66	11.50	34.30
EZM11200G/JCBT	46.90	23.69	13.69	13.75	EZM31000CBU	70.05	34.19	18.33	46.99
EZM11200G/JCBE	66.20	32.39	13.69	50.09	EZM31200G/JCBT	46.90	23.69	13.69	13.75
EZM11200FST	46.90	23.69	13.69	13.75	EZM31200G/JCBE	66.20	32.39	13.69	50.09
EZM11200FSE	66.20	32.39	13.69	50.09	EZM31200TBU	44.71	33.16	11.68	31.17
EZM11200G/JCBU	65.30	23.69	13.69	49.11	EZM31200G/JCBU	65.30	23.69	13.69	49.11
EZM11200FSB	65.30	23.69	13.69	49.11	EZM31200FSB	65.30	23.69	13.69	49.11
EZM11200TBU	44.71	33.16	11.68	31.17	EZM31200FST	46.90	23.69	13.69	13.75
EZM11200GCBUMS	65.30	23.69	13.63	49.12	EZM31200FSE	66.20	32.39	13.69	51.09
EZM11200GCBEMS	66.27	32.39	13.70	50.09	EZM31200GCBUMS	65.30	23.69	13.63	49.12
EZM11200GCBTMS	46.93	23.69	13.63	13.75	EZM31200GCBEMS	66.27	32.39	13.70	50.09
EZM11200JCBUMS	65.30	23.69	13.63	49.12	EZM31200GCBTMS	46.93	23.69	13.63	13.75
EZM11200JCBEMS	66.27	32.39	13.70	50.09	EZM31200JCBUMS	65.30	23.69	13.63	49.12
EZM11200JCBTMS	46.93	23.69	13.63	13.75	EZM31200JCBEMS	66.27	32.39	13.70	50.09
EZM11600G/JCBC	68.70	30.19	18.33	38.13	EZM31200JCBTMS	46.93	23.69	13.63	13.75
EZM11600G/JCBU	68.70	30.19	18.33	49.12	EZM31600G/JCBC	68.70	30.19	18.33	38.13
EZM11600TB	55.09	22.48	13.00	27.92	EZM31600G/JCBU	68.70	30.19	18.33	49.12
EZM11600GCBUMS	68.91	30.19	18.31	44.50	EZM31600TB	55.09	22.48	13.00	27.92
EZM11600GCBCMS	68.91	30.19	18.31	44.50	EZM31600GCBUMS	68.91	30.19	18.31	44.50
EZM11600JCBUMS	68.91	30.19	18.31	44.50	EZM31600GCBCMS	68.91	30.19	18.31	44.50
EZM11600JCBCMS	68.91	30.19	18.31	44.50	EZM31600JCBUMS	68.91	30.19	18.31	44.50
EZM12000CB	68.70	30.19	18.33	44.25	EZM31600JCBCMS	68.91	30.19	18.31	44.50
EZM12000CBU	68.70	30.19	18.33	44.25	EZM32000CB	68.70	30.19	18.33	44.25
EZM12000TB	71.09	30.19	21.46	37.62	EZM32000CBU	68.70	30.19	18.33	44.25
EZM12000CBMS	68.91	30.19	18.31	44.50	EZM32000TB	71.09	30.19	21.46	37.62
EZM12000CBUMS	68.91	30.19	18.31	44.50	EZM32000CBMS	68.91	30.19	18.31	44.50
EZM1225TB *[71]*	21.81	11.66	6.37	13.00	EZM32000CBUMS	68.91	30.19	18.31	44.50
EZM1400CB	53.97	18.66	11.50	34.30	EZM3225TB *[71]*	21.81	11.66	6.37	13.00
EZM1400CBU	69.03	20.46	11.50	49.37	EZM3400CB	53.97	18.66	11.50	34.30
EZM1400FS	53.97	18.66	11.50	34.30	EZM3400CBU	69.03	20.46	11.50	49.37
EZM1400FSU	69.03	20.46	11.50	49.37	EZM3400FS	53.97	18.66	11.50	34.30
EZM1400TB	30.46	17.15	7.09	16.29	EZM3400FSU	69.03	20.46	11.50	49.37
EZM1400TBU	35.71	17.16	8.00	27.17	EZM3400TB	30.46	17.15	7.09	16.29
EZM1600CB	53.97	18.66	11.50	34.30	EZM3400TBU	35.71	17.16	8.00	27.17
EZM1600CBU	69.03	20.46	11.50	49.37	EZM3600CB	53.97	18.66	11.50	34.30
EZM16000FS	53.97	18.66	11.50	34.30	EZM3600CBU	69.03	20.46	11.50	49.37
EZM1600FSU	69.03	20.46	11.50	49.37	EZM36000FS	53.97	18.66	11.50	34.30
EZM1600TB	30.46	17.15	7.09	16.29	EZM3600FSU	69.03	20.46	11.50	49.37
EZM1800CB	53.97	18.66	11.50	34.30	EZM3600TB	30.46	17.15	7.09	16.29
EZM1800CBU	69.03	20.46	11.50	49.37	EZM3800CB	53.97	18.66	11.50	34.30
EZM1800FS	53.97	18.66	11.50	34.30	EZM3800CBU	69.03	20.46	11.50	49.37
EZM1800FSU	69.03	20.46	11.50	49.37	EZM3800FS	53.97	18.66	11.50	34.30
EZM1800TB	53.97	18.66	11.50	34.30	EZM3800FSU	69.03	20.46	11.50	49.37
EZM1800TBCU	51.76	22.48	7.09	28.01	EZM3800TB	53.97	18.66	11.50	34.30
EZM1800TBU	39.96	25.16	11.68	31.17	EZM3800TBCU	51.76	22.48	7.09	28.01
EZM1EXT *[71]*	19.34	11.66	6.37	11.85	EZM3800TBU	39.96	25.16	11.68	31.17
EZM1EXT6 *[71]*	19.34	6.00	6.37	11.85	EZM3EXT *[71]*	19.34	11.66	6.37	11.85
EZM1CORNER *[69][71][72]*	19.50	14.40	8.02	11.85	EZM3EXT6 *[71]*	19.34	6.00	6.37	11.85
					EZM3CORNER *[69] [71] [72]*	19.50	14.40	8.02	11.85

[69] Indoor only.
[70] Each leg of elbow section measures 6.17 in. corner of wall to start of next enclosure.
[71] Device supplied without mounting channel, secure to wall by use of swingable mounting feet.
[72] Each leg of this corner section measures 14.72 in. from wall to start of next enclosure.

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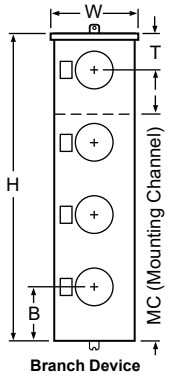

Branch Device

Table 2.36: Single Phase Branch Device Dimensions (in.) *[73]*

Cat. No. [available suffix]	Height (H)	Width (W)	Depth (D)	MC Channel (MC)	Top Meter (T)	Bottom Meter (B)	Cat. No. [available suffix]	Height (H)	Width (W)	Depth (D)	MC Channel (MC)	Top Meter (T)	Bottom Meter (B)
EZM112225 [X, CUX]	43.41	17.38	8.09	32.34	22.18	12.23	EZML111400	44.55	23.21	9.44	37.81	24.02	21.53
EZM113125 [X, CUX]	42.37	12.25	7.09	31.30	13.18	11.19	EZML112225 [CU]	39.06	19.44	9.44	25.51	11.67	13.39
EZM113225 [X, CUX]	43.41	17.38	8.09	32.34	13.18	12.23	EZML112225D	39.06	19.44	9.44	25.51	11.67	13.39
EZM114125 [X, CUX]	48.12	12.25	7.09	31.30	9.93	11.19	EZML112400	69.61	23.21	9.44	37.81	20.64	21.53
EZM114225 [X, CUX]	52.00	17.38	8.09	32.34	12.77	12.23	EZML113225 [CU]	53.06	19.44	9.44	39.51	11.67	13.39
EZM115125 [X, CUX]	57.12	12.25	7.09	31.30	9.93	11.19	EZML113225D	53.06	19.44	9.44	39.51	11.67	13.39
EZM115225 [CU]	61.00	17.38	8.09	32.35	12.77	12.23	EZML114225 [CU]	67.06	19.44	9.44	39.51	11.67	13.39
EZM116125 [X, CUX]	66.12	12.25	7.09	40.30	9.93	11.19	EZML114225D	67.06	19.44	9.44	39.51	11.67	13.39
EZM16225	69.94	17.387	8.09	41.33	12.72	12.22	EZMR112225 [X, CUX]	43.41	17.38	8.09	32.34	22.18	12.23
EZMH112225 [X, CUX]	43.41	17.38	8.09	32.34	22.18	12.23	EZMR113125 [X, CUX]	42.37	12.25	7.09	31.30	13.18	11.19
EZMH113125 [X, CUX]	42.37	12.25	7.09	31.30	13.18	11.19	EZMR113225 [X, CUX]	43.41	17.38	8.09	32.34	13.18	12.23
EZMH113225 [X, CUX]	43.41	17.38	8.09	32.34	13.18	12.23	EZMR114125 [X, CUX]	48.12	12.25	7.09	31.30	9.93	11.19
EZMH114125 [X, CUX]	48.12	12.25	7.09	31.30	9.93	11.19	EZMR114225 [X, CUX]	52.00	17.38	8.09	32.34	12.77	12.23
EZMH114225 [X, CUX]	52.00	17.38	8.09	32.34	12.77	12.23	EZMR115125 [X, CUX]	57.12	12.25	7.09	31.30	9.93	11.19
EZMH115125 [X, CUX]	57.12	12.25	7.09	31.30	9.93	11.19	EZMR115225 [CU]	61.00	17.38	8.09	32.35	12.77	12.23
EZMH115225 [CU]	61.00	17.38	8.09	32.35	12.77	12.23	EZMR116125 [X, CUX]	66.12	12.25	7.09	40.30	9.93	11.19
EZMH116125 [X, CUX]	66.12	12.25	7.09	40.30	9.93	11.19	EZMR116225	69.94	17.37	8.09	41.33	12.72	12.22
EZMH116225	69.94	17.37	8.09	41.33	12.72	12.22	EZMT111225	25.45	22.42	9.38	16.19	4.67	20.45
EZMK111400	45.55	27.56	9.74	37.81	24.51	21.04	EZMT112225	60.56	22.42	9.38	43.63	12.67	28.89
EZMK112400	72.99	27.56	9.74	37.81	22.26	21.04	EZMT113225	79.56	22.42	9.38	48.25	12.67	28.89
EZML111225 [CU]	39.06	19.44	9.44	25.51	25.67	13.39							
EZML111225D	39.06	19.44	9.44	25.51	25.67	13.39							

Table 2.37: Three Phase Branch Device Dimensions (in.) *[73]*

Cat. No. [available suffix]	Height (H)	Width (W)	Depth (D)	MC Channel (MC)	Top Meter (T)	Bottom Meter (B)	Cat. No. [available suffix]	Heig-ht (H)	Width (W)	Depth (D)	MC Channel (MC)	Top Meter (T)	Bottom Meter (B)
EZM312225 [X, CUX, CA, XCA, CUXCA]	43.41	17.38	8.09	32.34	22.18	12.23	EZML314225 [CU, CA, CUCA]	67.06	19.44	9.44	39.51	11.67	13.39
EZM313125 [X, CUX, CA, XCA, CUXCA]	42.37	12.25	7.09	31.30	13.18	11.19	EZML314225D [CA]	67.06	19.44	9.44	39.51	11.67	13.39
EZM313125M10	42.37	12.25	7.09	24.29	10.18	12.19	EZML331225 [CU]	39.06	19.44	9.44	25.51	25.67	13.39
EZM313225 [X, CUX, CA, XCA, CUXCA]	43.41	17.38	8.09	32.34	13.18	12.23	EZML331225D	39.06	19.44	9.44	25.51	25.67	13.39
EZM314125 [X, CUX, CA, XCA, CUXCA]	48.12	12.25	7.09	31.30	9.93	11.19	EZML331400	45.55	23.21	9.44	37.81	24.02	21.53
EZM314125M10	52.12	12.25	7.09	34.29	9.93	12.19	EZML332225 [CU]	39.06	19.44	9.44	35.51	11.67	13.39
EZM314225 [X, CUX, CA, XCA, CUXCA]	52.00	17.38	8.09	32.34	12.77	12.23	EZML332225D	39.06	19.44	9.44	35.51	11.67	13.39
EZM315125 [X, CUX, CA, XCA, CUXCA]	57.12	12.25	7.09	31.30	9.93	11.19	EZML332400 [CU]	69.61	23.21	9.44	37.82	20.64	21.53
EZM315125M10	62.12	12.25	7.09	34.29	9.93	12.19	EZML333225 [CU]	53.06	19.44	9.44	39.51	11.67	13.39
EZM315225 [CU, CA, CUCA]	61.00	17.38	8.09	32.35	12.77	12.23	EZML333225D	53.06	19.44	9.44	39.51	11.67	13.39
EZM316125 [X, CUX, CA, XCA, CUXCA]	66.12	12.25	7.09	40.30	9.93	11.19	EZML334225 [CU]	67.06	19.44	9.44	39.51	11.67	13.39
EZM316225 [CU, CA]	69.94	17.37	8.09	41.33	12.72	12.22	EZML334225D	67.06	19.44	9.44	39.51	11.67	13.39
EZMH312225 [X, CUX, CA, XCA]	43.41	17.38	8.09	32.34	22.18	12.23	EZMR312225 [X, CUX, CA, XCA]	43.41	17.38	8.09	32.34	22.18	12.23
EZMH313125 [X, CUX, CA, XCA]	42.37	12.25	7.09	31.30	13.18	11.19	EZMR313125 [X, CUX, CA, XCA]	42.37	12.25	8.09	31.30	13.18	11.19
EZMH313225 [X, CUX, CA, XCA]	43.41	17.38	8.09	32.34	13.18	12.23	EZMR313225 [X, CUX, CA, XCA]	43.41	17.38	8.09	32.34	13.18	12.23
EZMH314125 [X, CUX, CA, XCA]	48.12	12.25	7.09	31.30	9.93	11.19	EZMR314125 [X, CUX, CA, XCA]	48.12	12.25	7.09	31.30	9.93	11.19
EZMH314225 [X, CUX, CA, XCA]	52.00	17.38	8.09	32.34	12.77	12.23	EZMR314225 [X, CUX, CA, XCA]	52.00	17.38	8.09	32.34	12.77	12.23
EZMH315125 [X, CUX, CA, XCA]	57.12	12.25	7.09	31.30	9.93	11.19	EZMR315125 [X, CUX, CA, XCA]	57.12	12.25	7.09	31.30	9.93	11.19
EZMH315225 [CU, CA, CUCA]	61.00	17.38	8.09	32.35	12.77	12.23	EZMR315225 [CU, CA, CUXCA]	61.00	17.38	8.09	32.35	12.77	12.23
EZMH316125 [X, CUX, CA, XCA]	66.12	12.25	7.09	40.30	9.93	11.19	EZMR316125 [X, CUX, CA, XCA]	66.12	12.25	7.09	40.30	9.93	11.19
EZMH316225 [CU, CA]	69.94	17.37	8.09	41.33	12.72	12.22	EZMR316225 [CU, CA]	69.94	17.37	8.09	41.33	12.72	12.22
EZMK311400 [CA]	45.55	27.56	9.74	30.60	24.51	21.04	EZMR332225 [CU]	39.06	19.44	9.44	25.51	11.67	13.39
EZMK312400 [CA]	72.99	27.56	9.74	37.81	22.26	21.04	EZMR333225 [CU]	53.06	19.44	9.44	39.51	11.67	13.39
EZMK331400	45.55	27.56	9.74	30.60	24.51	21.04	EZMR334225 [CU]	67.06	19.44	9.44	39.51	11.67	13.39
EZMK332400	72.99	27.56	9.74	37.81	22.26	21.04	EZMT311225 [CA]	25.45	22.42	9.38	16.19	4.67	20.45
EZML311400 [CA]	45.55	23.21	9.44	37.81	24.02	21.53	EZMT312225 [CA]	60.56	22.42	9.38	43.63	12.67	28.89
EZML311225 [CU, CA, CUCA]	39.06	19.44	9.44	25.51	25.67	13.39	EZMT313225 [CA]	79.56	22.42	9.38	48.25	12.67	28.89
EZML312225 [CU, CA, CUCA]	39.06	19.44	9.44	25.51	11.67	13.39	EZMT331225	25.12	22.42	9.38	16.19	4.67	20.45
EZML312225D [CA]	39.06	19.44	9.44	25.51	11.67	13.39	EZMT332225	60.56	22.42	9.38	43.63	12.67	28.89
EZML312400 [CA]	69.61	23.21	9.44	37.82	20.64	21.53	EZMT333225	79.56	22.42	9.38	48.25	12.67	28.89
EZML313225 [CU, CA, CUCA]	53.06	19.44	9.44	39.51	11.67	13.39							
EZML313225D [CA]	53.06	19.44	9.44	39.51	11.67	13.39							

[73] Standard branch units are available without suffix added.

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Section 3
Safety Switches

Light Duty

General Duty

Heavy Duty

Stainless Steel Heavy Duty

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General Duty Safety Switches 3-2

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L221N

Light Duty—Visible Blades 10 kA Short Circuit Current Rating

The Square D light duty enclosed switch is ideal for home applications in disconnecting power to workshops, hobby rooms, furnaces, and garages. The light duty safety switch has visible blades and a ground lug as standard features.

Table 3.1: Fusible

System	Amperes	Fuse	NEMA Type 1 Indoor Cat. No.	Horsepower Ratings			
				120 Vac		240 Vac	
				Std.	Max.	Std.	Max.
				1Ø	1Ø	1Ø	1Ø
2 Wire (1 Blades and Fuseholders, 1 Neutral)—120 Vac							
	30	Plug	L111N	—	—	—	—
3 Wire (2 Blades and Fuseholders, 1 Neutral)—120/240 Vac							
	30	Plug Cart	L211N L221N	1/2 1/2	2 2	1-1/2 1-1/2	3 3

General Duty—Up To 100 kA Short Circuit Current Rating

General duty safety switches are designed for residential and commercial applications where durability and economy are prime considerations. Typical loads are lighting, air conditioning, and appliances. They are suitable for use as service equipment when equipped with a factory or field-installed neutral assembly or a field-installed service grounding kit, (see page 3-4) as applicable.

General duty safety switches are UL Listed, File E2875, and meet or exceed the NEMA Standard KS1.

240 Volt—Single Throw Fusible Switches

D223N

Table 3.2: Fusible

System	Amperes	Fuse	NEMA Type 1 Indoor	NEMA Type 3R *[1]* Rainproof	Class R Fuse Kits *[2]*	Horsepower Ratings			
						Std. (Fast Acting One-Time Fuses)		Max. (Dual Element Time-Delay Fuses)	
			Cat. No.	Cat. No.	Cat. No.	1Ø	3Ø	1Ø	3Ø
2 Wire (1 Blade and Fuseholder, 1 Neutral)—120 Vac									
	30	Plug	Use Light Duty Device for this Application (see above)			—	—	—	—
	30	Cart.	Use three-wire devices for this application.			—	—	—	—
3 Wire (2 Blades and Fuseholders, 1 Neutral)—120/240 Vac (Plug), 240 Vac (Cart.) Maximum									
	30	Plug	D211N	D211NRB	—	1-1/2	—	3	—
	30	Cart.	D221N	D221NRB	DRK30	1-1/2	3*[3]*	3	7-1/2 *[3]*
	60	Cart.	D222N	D222NRB	RFK03H	3	7-1/2*[3]*	10	15*[3]*
	100	Cart.	D223N	D223NRB	RFK10	7-1/2	15*[3]*	15	30*[3]*
	200	Cart.	D224N *[4]*	D224NRB *[4]*	HRK1020	15	25*[3]*	—	60*[3]*
	400	Cart.	D225N	D225NR	DRK40	—	—	—	—
	600 *[5]*	Cart.	D226N	D226NR	DRK600	—	—	—	—
4 Wire (3 Blades and Fuseholders, 1 Neutral)—240 Vac Maximum									
	30	Cart.	D321N	D321NRB	DRK30	1-1/2	3	3	7-1/2
	60	Cart.	D322N	D322NRB	RFK03H	3	7-1/2*[6]*	10	15*[6]*
	100	Cart.	D323N	D323NRB	RFK10	7-1/2	15*[6]*	15	30*[6]*
	200	Cart.	D324N *[4]*	D324NRB *[4]*	HRK1020	15	25*[6]*	—	60*[6]*
	400	Cart.	D325N	D325NR	DRK40	—	50	—	125
	400 *[7]*	Class T	D325NT	D325NTR	—	—	50	—	—
	600 *[5]*	Cart.	D326N	D326NR	DRK600	—	75	—	150
	600 *[7]*	Class T	D326NT	D326NTR	—	—	75	—	—
	800 *[7]*	Class T	T327N	T327NR	—	—	100	—	—

[1] Bolt-on hubs —Refer to Rainproof Bolt-On Hubs, Table 1.27, page 3-13.
[2] When properly installed, the Class R Fuse Kit rejects all but Class R fuses.
[3] For corner grounded delta systems only. Use switching poles for ungrounded conductors. See data bulletin 2700DB0202 for additional information.
[4] For 200% neutral, order (1) additional neutral kit SN20A and (1) neutral jumper kit SN20NI.
[5] Order Class J Fuse Kit GDJK600 if using Class J fuses.
[6] If corner grounded delta, use outer switching poles for ungrounded conductors.
[7] D325NT, D325NTR, D326NT, D326NTR, T327N and T327NR accept only 300Vac Class T fuses.

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240 Volt—Single Throw Non-Fusible Switches

Table 3.3: Non-Fusible

System	Amperes	NEMA Type 1 Indoor	NEMA Type 3R Rainproof *[8]*	Horsepower Ratings (Max.)	
		Cat. No.	Cat. No.	1Ø	3Ø
2 Wire (2 Blades)—240 Vac Maximum					
	30	—	DU221RB	3	—
	60	—	DU222RB	10	—
	60	QO260NATS *[9] [10]*	QO200TR *[9] [10] [11]*	10	—
	100	QO2000NS *[9] [10]*	QO2000NRB *[9] [11]*	20	—
	200	Use 3P Switch	Use 3P Switch	—	—
	400	Use 3P Switch	Use 3P Switch	—	—
	600	Use 3P Switch	Use 3P Switch	—	—
3 Wire (3 Blades)—240 Vac Maximum					
	30	DU321	DU321RB	3	7-1/2
	60	DU322	DU322RB	10	15
	100	DU323 *[12]*	DU323RB *[12]*	15	40
	200	DU324 *[13]*	DU324RB *[13]*	15	60
	400	DU325	—	—	125
	600	DU326 *[14]*	—	—	150

UL Listed Maximum Short Circuit Current Ratings — AC Only

Table 3.4: Fusible Safety Switch Short Circuit Current Rating

Fuse Class	UL Listed Short Circuit Rating
Plug	10 kA
H, K	10 kA
J *[15]*, R	100 kA
T *[16]*	100 kA

Non-Fusible Safety Switches

Systems equal or less than 10 kAIR SCCR —Any brand of circuit breaker or fuse not exceeding the ampere rating of the switch may be used in conjunction with a non-fusible safety switch.

Systems above 10 kAIR SCCR—The UL Listed short circuit current rating for Square D non-fusible switches is based upon the switch being used in conjunction with fuses or Square D circuit breakers or Mag-Gard motor circuit protectors.

Table 3.5: Non-Fusible Safety Switch Short Circuit Current Rating

Fuse Class or Circuit Breaker Type *[17]*	UL Listed Short Circuit Rating
Any Brand Circuit Breaker	10 kA
H or J PowerPact Circuit Breaker	Up to 65 kA *[18]*
H, K	10 kA
J, R	100 kA *[19]*
T	100 kA *[20]*

[8] Bolt-on hubs—Refer to Hubs, page 3-13.
[9] Enclosed molded case switch—Refer to Section 1.
[10] Includes factory-installed grounding kit.
[11] Not service entrance rated—Refer to Table 3.34 for more information.
[12] If a neutral assembly is required, order and field install SN0610.
[13] If a neutral assembly is required, order and field install a SN20A Neutral Assembly Kit. For a 200% neutral application, order and field install (2) SN20A Neutral Assembly Kits and (1) SN20NI Neutral Jumper Kit.
[14] If a neutral assembly is required, order and field install D600SN.
[15] Only applicable to 200 A - 600 A except D325NT, D325NTR, D326NT and D326NTR.
[16] Only applicable to D325NT, D325NTR, D326NT, D326NTR, T327N and T327NR.
[17] Ampere rating of fuse or circuit breaker not to exceed switch ampere rating.
[18] Only applicable to DU324 and DU324RB. HD, JD = 25 kA maximum.
[19] SCCR = 50 kA, applicable to DU222RB, DU322 and DU322RB.
[20] Only applicable to DU323, DU323RB, DU325 and DU326.

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Fuse Puller Kit
Series F Fusible Switches Only

Field-Installed Fuse Puller Kits

Kit consists of three fuse pullers as required for a 3P, fusible, 60 or 100 A general duty switch. Kits can be installed only in 60 or 100 A Series F fusible switches.

Table 3.6: Fuse Puller Kits

Switch Ampere Rating	Series No.	Cat. No.
60	F	FPK03
100	F	FPK0610

Field-Installed Electrical Interlock Kits

Electrical interlocks for Series F 100–200 A general duty safety switches & Series F 60 A fusible general duty safety switches are available in kit form for field installation. Each kit contains instructions for proper field mounting. A pivot arm operates from switch mechanism, breaking the control circuit before the main switch blades break. Switches with electrical interlocks installed are UL Listed.

Table 3.7: Electrical Interlock Kit

Switch Amperes Rating	Electrical Interlock Kit Cat. No. *[21]*
Fusible Series F 60	EIK031 or EIK032
Series F 100–200	EIK1 or EIK2

Table 3.8: Electrical Interlock Contact Ratings *[22]*

Interlock Type	AC 50 or 60Hz				DC		
	Volts	Make	Break	Cont.	Volts	Make / Break	Cont.
1 N. O. / 1 N. C. Contact (-1 Suffix *[23]*)	120	40.00 A	15.00 A	15.00 A	115	0.50 A	15.00 A
	240	20.00 A	10.00 A	15.00 A	230	0.25 A	15.00 A
2 N. O. / 2 N. C. Contacts (-2 Suffix *[24]*)	120	30.00 A	3.00 A	10.00 A	115	1.00 A	10.00 A
	240	15.00 A	1.5 A	10.00 A	230	0.30 A	10.00 A

PK3GTA1

GTK0610

PK0TGA2

Equipment Grounding Kits

Table 3.9: Equipment Grounding Kits

Switch Ampere Rating	Cat. No.	Lug Wire Range (AWG)
30*[25]*	Std.	(1) 14 – 10 Cu or (1) 12 – 8 Al
30	PK3GTA1	(3) 14 – 4 Cu or (3) 12 – 4 Al or (6) 14 – 12 Cu or (6) 12 – 10 Al
60 *[26]*	GTK03	(2) 14 – 4 Cu or (2) 12 – 4 Al (4) 14 – 12 Cu or (4) 12 – 10 Al
100	GTK0610	(2) 14 – 1/0 Cu or (2) 12 – 1/0 Al (2) 14 – 6 Cu or (2) 12 – 6 Al
200	PKOGTA2	(2) 10 – 2/0 Cu or (2) 6 – 2/0 Cu Al
400, 600	PKOGTA2 *[27]*	(2) 10 – 2/0 Cu or (2) 6 – 2/0 Cu Al
800	PKOGTA3	(6) 6 – 3/0 Al/Cu Max.

Field-Installed Lug Kit 400 A – 600 A

Table 3.10: Field-Installed Lug Kit 400 A – 600 A

Switch Ampere Rating	Lug Kit Cat. No.	Wire Range/NEC	Lug Wire Range
400 or 600 Series *[28]*	GD4060LK	1-1/0-600 kcmil 2-1/0-500 kcmil 4-1/0-250 kcmil	2-1/0-600 kcmil 4-1/0-250 kcmil

Terminal Lug Data

Table 3.11: Terminal Lug Data *[29]*

Amperes	Conductors Per Phase	Wire Range Wire Bending Space Per NEC Table 312.6 AWG/kcmil	Lug Wire Range AWG/kcmil
30*[30]*	1	12–8 (Al) or 14–8 (Cu)	12–8 (Al) or 14–8 (Cu)
30	1	12–6 (Al) or 14–6 (Cu)	12–6 (Al) or 14–6 (Cu)
60	1	12–3 (Al) or 14–3 (Cu)	12–2 (Al) or 14–2 (Cu)
100	1	12–1 (Al) or 14–1 (Cu)	12–1/0 (Al) or 14–1/0 (Cu)
200	1	6 –250 (Al/Cu)	6 –300 (Al/Cu)
400 NEMA Type 1	1 or 2	1/0 –600 (Al/Cu) or 1/0 –300 (Al/Cu)	(1) 1/0 –750 (Al/Cu) or (2) 1/0 –300 (Al/Cu)
400 NEMA Type 3R	2	1/0–250 (Al/Cu)	(1) 1 –600 (Al/Cu) or (2) 1/0 –250 (Al/Cu)
600	2	4 –500 (Al/Cu)	4 –600 (Al/Cu)
800	3	3/0 –500 (Al/Cu)	3/0 –500 (Al/Cu)

[21] Electrical interlock kit catalog numbers with -1 suffix indicate one normally open and one normally closed contact; -2 indicates two normally open and two normally closed contacts. Kits are UL Listed.
[22] Single-pole single-throw interlock kits are rated 1/2 hp at 110 and 220 Vac.
[23] -1 Suffix uses a 9007A01 limit switch.
[24] -2 Suffix uses a 9007C03 limit switch.
[25] Light duty safety switches.
[26] 60 A non-fusible switches accept PK3GTA1.
[27] Two required if ground conductors are run in parrellel.
[28] Not suitable for use on 400 A NEMA Type 3R.
[29] 30–100 A switches suitable for 60ºC or 75ºC conductors. 200–800 A switches suitable for 75ºC conductors.
[30] Light duty switches only.

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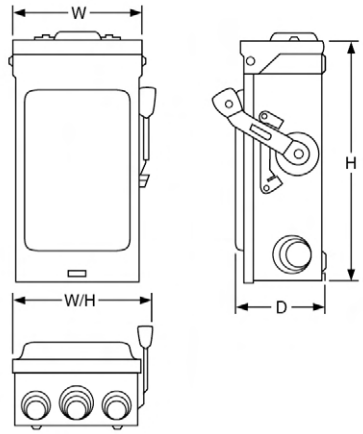

Dimensions for General Duty Safety Switches

Table 3.12: Approximate Dimensions

Cat.No.	Series	H		W		W/H		D		Std. Pack
		in.	mm	in.	mm	in.	mm	in.	mm	
L111N	E2	7.63	194	5.00	127	6.13	156	4.00	102	1
L211N	E2	7.63	194	5.00	127	6.13	156	4.00	102	1
L221N	E2	7.63	194	5.00	127	6.13	156	4.00	102	1
D211N	E3	9.25	235	6.75	171	7.25	184	3.63	92	5
D211NRB	E2	9.63	245	7.25	184	7.75	197	3.75	95	5
D221N	E3	9.25	235	6.75	171	7.25	184	3.63	92	5
D221NRB	E3	9.63	245	7.25	184	7.75	197	3.75	95	5
D222N	F1	14.63	372	6.50	165	7.45	189	4.88	124	1
D222NRB	F1	14.88	378	6.63	168	7.45	189	4.88	124	1
D223N	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
D223NRB	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
D224N	F1	29.00	737	17.25	438	19.00	483	8.25	210	1
D224NRB	F1	29.25	743	17.25	438	19.00	483	8.25	210	1
D225N	E3	45.12	1146	24.00	610	24.88	632	8.88	226	1
D225NR	E1	30.63	778	21.38	543	22.25	565	10.13	257	1
D226N	E3	49.13	1248	24.00	610	24.88	632	8.88	226	1
D226NR	E1	49.13	1248	24.75	629	25.13	638	8.88	226	1
D321N	E3	9.25	235	6.75	171	7.25	184	3.63	92	5
D321NRB	E3	9.63	245	7.25	184	7.75	197	3.75	95	5
D322N	F1	14.63	372	6.50	165	7.45	189	4.88	124	1
D322NRB	F1	14.88	378	6.63	168	7.45	189	4.88	124	1
D323N	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
D323NRB	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
D324N	F1	29.00	737	17.25	438	19.00	483	8.25	210	1
D324NRB	F1	29.25	743	17.25	438	19.00	483	8.25	210	1
D325N	E3	45.12	1146	24.00	610	24.88	632	8.88	226	1
D325NT	E3	45.12	1146	24.00	610	24.88	632	8.88	226	1
D325NR	E1	30.63	778	21.38	543	22.25	565	10.13	257	1
D325NTR	E1	30.63	778	21.38	543	22.25	565	10.13	257	1
D326N	E3	49.13	1248	24.00	610	24.88	632	8.88	226	1
D326NT	E3	49.13	1248	24.00	610	24.88	632	8.88	226	1
D326NR	E1	49.13	1248	24.75	629	25.13	638	8.88	226	1
D326NTR	E1	49.13	1246	24.75	629	25.13	638	8.88	226	1
DU221RB	E2	9.63	245	7.25	184	7.75	197	3.75	95	5
DU222RB	E1	9.63	245	7.25	184	7.75	197	3.75	95	5
DU321	E2	9.25	235	6.75	171	7.25	184	3.63	92	5
DU321RB	E2	9.63	245	7.25	184	7.75	197	3.75	95	5
DU322	E1	9.25	235	6.75	171	7.25	184	3.63	92	5
DU322RB	E1	9.63	245	7.25	184	7.75	197	3.75	95	5
DU323	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
DU323RB	F3	17.50	445	8.50	216	10.50	267	6.50	165	1
DU324	F1	29.00	737	17.25	438	19.00	483	8.25	210	1
DU324RB	F1	29.25	743	17.25	438	19.00	483	8.25	210	1
DU325	E3	45.12	1146	24.00	610	24.88	632	8.88	226	1
DU326	E3	49.13	1248	24.00	610	24.88	632	8.88	226	1
QO200TR	G3	6.50	165	4.63	118	—	—	3.88	99	5
QO260NATS	E2	9.25	235	4.88	124	—	—	3.25	83	1
QO2000NRB	E1	14.00	356	7.75	197	—	—	4.50	114	1
QO2000NS	E1	13.38	340	6.13	156	—	—	3.50	89	1
T327N	E1	49.13	1248	24.00	610	24.88	632	8.88	226	1
T327NR	E1	49.13	1248	24.75	629	25.13	638	8.88	226	1

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NEMA Type 1

NEMA Type 3R

NEMA Type 4, 4X, 5 Stainless Steel

NEMA Type 12

Heavy Duty Safety Switches

Visible blade heavy duty safety switches are designed for application where maximum performance and continuity of service are required. All heavy duty safety switches feature quick-make, quick-break operating mechanism, a dual cover interlock and a color coded indicator handle. They are suitable for use as service equipment when equipped with a field- or factory-installed neutral assembly or equipment grounding kit, unless a 600Y/347 V or 480 Y/277 V, 1000 A or greater, solidly grounded WYE system is used, per NEC 230-95. Heavy duty safety switches are UL Listed (except as noted). Files E2875 and E154828 meet or exceed the NEMA Standard KS1. For UL Listed short circuit current ratings, see UL Listed Maximum Short Circuit Current Ratings-AC only, page 3-9.

Table 3.13: 240 Volt—Single Throw Fusible

System	Amperes	NEMA Type 1 Indoor	NEMA Type 3R Rainproof (Bolt-on Hubs *[1]*)	NEMA Type 4, 4X, 5, *[2]* 304 Stainless Steel *[3]*) Dust tight, Watertight, Corrosion Resistant (Watertight Hubs *[1]*)	NEMA Type 12K With Knockouts (Watertight Hubs *[1]*)	NEMA Type 3R, 5 or 12 *[4]* Without Knockouts (Watertight Hubs *[1]*)	Horsepower Ratings 240 Vac Std. (Using Fast Acting, One Time Fuses) 1Ø	Std. 3Ø	Max. (Using Dual Element, Time Delay Fuses) 1Ø	Max. 3Ø	250 Vdc *[5]*
		Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.					
2-Wire (2 Blades and Fuseholders)—240 Vac, 250 Vdc											
	30	Use three-wire devices For two-wire applications		H221DS	H221A	H221AWK	1-1/2	3 *[6]*	3	7-1/2 *[6]*	5
	30			—	—	H2212AWK *[7]*	1-1/2	—	3	—	5
	60			H222DS	—	H222AWK	3	7-1/2 *[6]*	10	15 *[6]*	10
	100			H223DS	H223A	H223AWK	7-1/2	15 *[6]*	15	30 *[8]*	20
	200			H224DS	H224A	H224AWK	15	25 *[6]*	—	60 *[6]*	40
	400	H225	H225R	H225DS	—	H225AWK	—	—	—	—	50
	600	H226	H226R	H226DS	—	H226AWK	—	75 *[6]*	—	200 *[6]*	50
	800	H227	H227R	—	—	H227AWK	50	—	—	—	50
	1200	H228	H228R	—	—	H228AWK	50	—	—	—	50
3-Wire (2 Blades and Fuseholders, 1 Neutral)—240 Vac, 250 Vdc											
	30	H221N	H221NRB	Use two-wire devices, See Field-Installed Neutral Assemblies, page 3-15			1-1/2	3 *[6]*	3	7-1/2 *[8]*	5
	60	H222N	H222NRB				3	7-1/2 *[6]*	10	15 *[6]*	10
	100	H223N	H223NRB				7-1/2	15 *[6]*	15	30 *[6]*	20
	200	H224N	H224NRB				15	25 *[6]*	—	60 *[6]*	40
	400	H225N	H225NR	H225NDS	—	H225NAWK	—	50 *[6]*	—	125 *[6]*	50
	600	H226N	H226NR	H226NDS	—	H226NAWK	—	75 *[6]*	—	200 *[6]*	50
	800	H227N	H227NR *[9]*	—	—	H227NAWK	50	—	—	—	50
	1200	H228N	H228NR *[9]*	—	—	H228NAWK	50	—	—	—	50
3-Wire (3 Blades and Fuseholders)—240 Vac, 250 Vdc											
	30	Use four-wire devices For three-wire applications		H321DS	H321A	H321AWK	1-1/2	3	3	7-1/2	5
	60			H322DS	H322A	H322AWK	3	7-1/2	10	15	10
	100			H323DS	H323A	H323AWK	7-1/2	15	15	30	20
	200			H324DS	H324A	H324AWK	15	25	—	60	40
	400	H325	H325R	H325DS	—	H325AWK	—	50	—	125	50
	600	H326	H326R	H326DS	—	H326AWK	—	75	—	200	50
	800	H327	H327R *[9]*	—	—	H327AWK	50	100	—	250	50
	1200	H328	H328R *[9]*	—	—	H328AWK	50	100	—	250	50
4-Wire (3 Blades and Fuseholders, 1 Neutral)—240 Vac, 250 Vdc											
	30	H321N	H321NRB	Use three-wire devices, See Field-Installed Neutral Assemblies, page 3-15			1-1/2	3	3	7-1/2	5
	60	H322N	H322NRB				3	7-1/2	10	15	10
	100	H323N	H323NRB				7-1/2	15	15	30	20
	200	H324N	H324NRB				15	25	—	60	40
	400	H325N	H325NR	H325NDS	—	H325NAWK	—	50	—	125	50
	600	H326N	H326NR	H326NDS	—	H326NAWK	—	75	—	200	50
	800	H327N	H327NR *[9]*	—	—	H327NAWK	50	100	—	250	50
	1200	H328N	H328NR *[9]*	—	—	H328NAWK	50	100	—	250	50
4-Wire (4 Blades and Fuseholders)											
	30	Use 600 Vac devices. See 600 Volt—Single Throw Fusible Switches, page 3-7.									
	60										
	100										
	200										
	400										
	600										

Accessories: see page 3-13
Dimensions: NEMA Type 1 and 3R, see page 3-19
Dimensions: NEMA Type 4, 4X and 5 Stainless and NEMA Type 12, see page 3-20

[1] For Rainproof Bolt-On Hubs and Watertight Hubs see Hubs, page 3-13.
[2] Complete rating is NEMA Type 3, 3R, 4, 4X, 5 and 12. For NEMA Type 3R applications, remove drain screw from bottom endwall.
[3] See 316 Grade Stainless Steel—NEMA Type 3, 3R, 4, 4X, 5, 12, page 3-10.
[4] Also suitable for NEMA Type 3R application by removing drain screw from bottom endwall.
[5] For switching dc, use two outside switching poles.
[6] For corner grounded delta systems, use switching poles for ungrounded conductors. See data bulletin 2700DB0202 for additional information.
[7] 60 ampere switch with 30 ampere fuse spacing and clips. Must use 60 A enclosure accessories including electrical interlocks.
[8] For corner grounded delta systems, use switching poles for ungrounded conductors.
[9] Suitable for NEMA Type 5 applications with drain screw installed.

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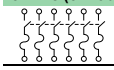
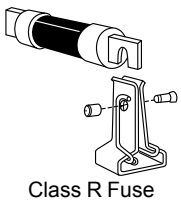
600 Volt—Single Throw Fusible

Table 3.14: 600 Volt—Single Throw Fusible

System	Amperes	NEMA Type 1 Indoor	NEMA Type 3R Rainproof (Bolt-on Hubs *[10]*)	NEMA Type 4, 4X, 5 *[11]* 304 Stainless Steel (316 stainless *[12]*) Dust tight, Watertight, Corrosion Resistant (Watertight Hubs *[10]*)	NEMA Type 12K With Knockouts (Watertight Hubs *[10]*)	NEMA Type 3R, 5 or 12 *[13]* Without Knockouts (Watertight Hubs *[10]*)	Horsepower Ratings					
							480 Vac		600 Vac		dc *[14]*	
							Std. (Using Fast Acting, One Time Fuses)	Max. (Using Dual Element, Time Delay Fuses)	Std. (Using Fast Acting, One Time Fuses)	Max. (Using Dual Element, Time Delay Fuses)		
		Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	3Ø	3Ø	3Ø	3Ø	250	600
2-Wire (2 Blades and Fuseholders)—600 Vac, 600 Vdc												
	30	Use three-wire devices for two-wire applications					—	—	—	—	—	—
	60						—	—	—	—	—	—
	100						—	—	—	—	—	—
	200						—	—	—	—	—	—
	400	H265	H265R	H265DS	—	H265AWK	100 *[15]*	250 *[15]*	—	—	50	50
	600	H266	H266R	H266DS	—	H266AWK	150 *[15]*	400 *[15]*	—	—	50	50
	800	H267	H267R *[16]*	—	—	H267AWK	—	—	—	—	—	50
	1200	H268	H268R *[16]*	—	—	H268AWK	—	—	—	—	—	50
3-Wire (3 Blades and Fuseholders)—600 Vac, 600 Vdc												
	30	H361	H361RB	H361DS	H361A	H361AWK	5	15	7-1/2	20	5	15
	30	H361-2 *[16] [17]*	H3612RB *[17]*	—	H361-2A *[17]*	H3612AWK *[17]*	5	15	7-1/2	20	—	15
	60	H362	H362RB	H362DS	H362A	H362AWK	15	30	15	50	—	30
	100	H363	H363RB	H363DS	H363A	H363AWK	25	60	30	100	—	50
	200	H364	H364RB	H364DS	H364A	H364AWK	50	125	60	150	40	50
	400	H365	H365R	H365DS	—	H365AWK	100	250	125	350	50	50
	600	H366	H366R	H366DS	—	H366AWK	150	400	200	500	50	50
	800	H367	H367R *[16]*	—	—	H367AWK	200	500	250	500	—	50
	1200	H368	H368R *[16]*	—	—	H368AWK	200	500	250	500	—	50
4-Wire (3 Blades and Fuseholders, 1 Neutral)—600 Vac, 600 Vdc												
	30	H361N	H361NRB	Use three-wire devices, See Field-Installed Neutral Assemblies, page 3-15			5	15	7-1/2	20	—	15
	60	H362N	H362NRB				15	30	15	50	—	30
	100	H363N	H363NRB				25	60	30	75	—	50
	200	H364N	H364NRB	H364NDS	H364NA	H364NAWK	50	125	60	150	40	50
	400	H365N	H365NR	H365NDS	—	H365NAWK	100	250	125	350	50	50
	600	H366N	H366NR	H366NDS	—	H366NAWK	150	400	200	500	50	50
	800	H367N	H367NR *[16]*	—	—	H367NAWK	200	500	250	500	—	50
	1200	H368N	H368NR *[16]*	—	—	H368NAWK	200	500	250	500	—	50
4-Wire (4 Blades and Fuseholders)—600 Vac, 600 Vdc *[18]*							2Ø	2Ø	2Ø	2Ø		
	30	H461	—	H461DS	—	H461AWK	7-1/2	20	10	25	5	15
	60	H462	—	H462DS	—	H462AWK	15	40	20	50	10	30
	100	H463	—	H463DS	—	H463AWK	25	60	30	75	20	30
	200	H464	—	H464DS	—	H464AWK	50	125	60	150	40	50
	400	H465	—	—	—	H465AWK	**100**	**250**	**125**	**350**	**50**	**50**
	600	H466	—	—	—	—	**150**	**400**	**200**	**500**	**50**	**50**
6-Wire (6 Blades and Fuseholders)—600 Vac *[18]*							3Ø	3Ø	3Ø	3Ø		
	100	—	—	H663DS	—	H663AWK	25	60	30	75	—	—
	200	—	—	H664DS	—	H664AWK	For applications requiring motor disconnect capability, see Electrical Interlock Kits, page 3-14					

Accessories: see page 3-13
Dimensions: NEMA Type 1 and 3R, see page 3-19
Dimensions: NEMA Type 4, 4X and 5 Stainless and NEMA Type 12, see page 3-20

Class H, R, J, and L Fuse Provisions:


Class R Fuse

Class H or K Fuse Provisions: Fusible Square D 30–600 A heavy duty safety switches accept Class H or K fuses as standard. With Class H or K fuses installed, the switch is UL Listed for use on systems with up to 10 kA available fault current.

Class R Fuse Provisions: Fusible Square D 30–600 A heavy duty safety switches will accept Class R fuses as standard. A field-installed rejection kit is available which, when installed, rejects all but Class R fuses. With the installation of the rejection kit and Class R fuses, the switch is UL Listed for use on systems with up to 200 kA available fault current. See Class R Fuse Kits, page 3-14.

Class J Fuse Provisions: Provisions for installing Class J fuses are included in 30–400 A 600 Volt, and 100–400 A 240 Volt, fusible heavy duty safety switches. Conversion to Class J fuse spacing requires relocating the load side fuse base assembly from the standard Class H fuse location to an alternate position as marked in the enclosure. With Class J fuses installed, the switch is UL Listed for use on systems with up to 200 kA available fault current. Switches rated 600 A, 240 or 600 Volt, require the addition of an adapter kit, H600J. One kit per three-pole switch.

Class L Fuse Provisions: Fusible 800 A and 1200 A safety switches use Class L bolt-in fuses and are rated for use on systems with up to 200 kA at 600 Vac maximum. 1200 A switches accept class L fuses from 601–1200 A, 800 A switches accept class L fuses from 601–800 A.

[10] For Rainproof Bolt-On Hubs and Watertight Hubs see Hubs, page 3-13.
[11] Complete rating is NEMA Type 3, 3R, 4, 4X, 5 and 12..
[12] See Table 3.18 316 Grade Stainless Steel 3 Pole 600 Vac, 600 Vdc, page 3-10.
[13] Also suitable for NEMA Type 3R application by removing drain screw from bottom endwall.
[14] For switching dc, use two outside switching poles.
[15] For corner grounded delta systems, use switching poles for ungrounded conductors. See data bulletin 2700DB0202 for additional information.
[16] Suitable for NEMA Type 5 applications with drain screw installed.
[17] 60 A switch with 30 A fuse spacing and clips. Must use 60 A enclosure accessories including electrical interlocks.
[18] Not suitable for use as service equipment.

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600 Volt—Single Throw Non-Fusible

Table 3.15: 600 Volt—Single Throw Non-Fusible

System	Amperes	NEMA Type 1 Indoor	NEMA Type 3R Rainproof *[19]*	NEMA Type 4, 4X, 5 *[20]* 304 Stainless Steel *[21]* Dust tight, Watertight Corrosion Resistant *[19]*	NEMA Type 12K With Knockouts *[19]*	NEMA Type 3R, 5 or 12 *[22]* Without Knockouts *[19]*	Horsepower Ratings (Max.)							
							Volts ac						dc *[23]*	
							240		480		600			
		Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	250	600
2-Wire (2 Blades)—600 Vac, 600 Vdc														
	30	Use three-wire devices for two-wire applications.					—	—	—	—	—	—	—	—
	60						—	—	—	—	—	—	—	—
	100						—	—	—	—	—	—	—	—
	200						—	—	—	—	—	—	—	—
	400	HU265	HU265R	HU265DS	—	HU265AWK	—	125	—	250	—	—	50	50
	600	HU266	HU266R	HU266DS	—	HU266AWK	—	200	—	400	—	—	50	50
	800	HU267	HU267R *[24]*	—	—	HU267AWK	—	—	—	—	50	—	—	50
	1200	HU268	HU268R *[24]*	—	—	HU268AWK	—	—	—	—	50	—	—	50
3-Wire (3 Blades)—600 Vac, 600 Vdc														
	30	HU361	HU361RB	HU361DS	HU361A	HU361AWK	5	10	7-1/2	20	10	30	5	15
	30	HU361EI*[25]*	HU361RBEI *[25]*	HU361DSEI *[25]*	HU361AEI *[25]*	HU361AWKEI*[25]*	5	10	7-1/2	20	10	30	5	15
	30	—	HU3612RB *[26]*	—	HU3612A*[26]*	HU3612AWK*[26]*	5	10	7-1/2	20	10	30	5	15
	60	HU362	HU362RB	HU362DS	HU362A	HU362AWK	10	20	25	50	30	60	10	30
	60	—	—	HU362DSEI*[25]*	—	—	10	20	25	50	30	60	10	30
	100	HU363	HU363RB	HU363DS	HU363A	HU363AWK	20	40	40	75	40	100	20	50
	200	HU364	HU364RB	HU364DS	HU364A	HU364AWK	15	60	50	125	50	150	40	50
	400	HU365	HU365R	HU365DS	—	HU365AWK	—	125	—	250	—	350	50	50
	600	HU366	HU366R	HU366DS	—	HU366AWK	—	200	—	400	—	500	50	50
	800	HU367	HU367R *[24]*	—	—	HU367AWK	—	—	—	500	50	500	—	50
	1200	HU368	HU368R *[24]*	—	—	HU368AWK	—	—	—	—	50	500	—	50
4-Wire (4 Blades)—600 Vac, 600 Vdc *[27]*							2Ø	3Ø	2Ø	3Ø	2Ø	3Ø		
	30	HU461 *[28]*	—	HU461DS	—	HU461AWK *[29]*	10	10	20	20	25	30	10*[30]*	15*[30]*
	60	HU462 *[28]*	—	HU462DS	—	HU462AWK	20	20	40	50	50	60	10	30
	100	HU463 *[28]*	—	HU463DS	—	HU463AWK	30	40	50	75	50	75	20	30
	200	HU464 *[28]*	—	HU464DS	—	HU464AWK	50	60	50	125	50	150	40	50
	400	HU465	—	—	—	HU465AWK	—	**125**	—	**250**	—	350	50	50
	600	HU466	—	—	—	—	—	**200**	—	**400**	—	**500**	50	50
6-Wire (6 Blades)—600 Vac *[27]*								3Ø		3Ø		3Ø		
	30	—	—	HU661DS	—	HU661AWK	—	10	—	20	—	30	—	—
	60	—	—	HU662DS	—	HU662AWK	—	20	—	50	—	60	—	—
	100	—	—	HU663DS	—	HU663AWK	—	50	—	75	—	75	—	—
	200	—	—	HU664DS	—	HU664AWK	—	60	—	125	—	150	—	—

[19] For Rainproof Bolt-On Hubs and Watertight Hubs see Hubs, page 3-13.
[20] Complete rating is NEMA Type 3, 3R, 4, 4X, 5 and 12.
[21] For 316 stainless, see 316 Grade Stainless Steel—NEMA Type 3, 3R, 4, 4X, 5, 12, page 3-10.
[22] Also suitable for NEMA Type 3R application by removing drain screw from bottom endwall.
[23] For switching dc, use two outside switching poles.
[24] Suitable for NEMA Type 5 applications with drain screw installed.
[25] Switches with EI suffix are stocked with factory-installed electrical interlocks with one normally-open and one normally-closed contact.
[26] Use 60 A enclosure accessories, including electrical interlocks.
[27] Not suitable for use as service equipment.
[28] No knockouts are provided.
[29] Requires 60 A accessories. See NEMA Type 4, 4X, 5, 7, 9, and 12, page 3-20 for series rating.
[30] HU461AWK (Series F6) is rated 5 hp@250 Vdc, 15 hp@600 Vdc.

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NOTE: Consult the wiring diagram of the switch to verify the UL Listed short circuit current rating.

UL Listed Maximum Short Circuit Current Ratings—AC only

Table 3.16: Fusible Safety Switches

Heavy Duty Safety Switch Type	UL Listed Fuse Class	UL Listed Short Circuit Current Ratings
Fusible	H, K	10 kA
	R, J, L	200 kA *[31]*

Non-Fusible Safety Switches

Systems equal or less than 10 kAIR SCCR —Any brand of circuit breaker or fuse not exceeding the ampere rating of the switch may be used in conjunction with a non-fusible safety switch.
Systems above 10 kAIR SCCR—The UL Listed short circuit current rating for Square D non-fusible switches is based upon the switch being used in conjunction with fuses or Square D circuit breakers or Mag-Gard motor circuit protectors.

Table 3.17: Non-Fusible Safety Switches *[32] [33]*

Switch Rating (A)	Fuse or Circuit Breaker Type *[34]*	3-Phase			250 Vdc / 600 Vdc
		240 Vac	480 Vac	600 Vac	
With Upstream Fuse Protection					
All	H, K	10 kA	10 kA	10 kA	Up to 10 kA
	R,T,J,L	200 kA	200 kA	200 kA	
With Upstream Circuit Breaker Protection					
All	Any brand circuit breaker	10 kA	10 kA	10 kA	Up to 10 kA
30–100	HD	25 kA	18 kA	14 kA	
30–100	HG	65 kA	35 kA	18 kA	
30–100	HJ	65 kA	35 kA	25 kA	
30–100	HL	65 kA	35 kA	35 kA	
30–100	HR	65 kA	35 kA	35 kA	
30–100	FA	14 kA	14 kA	14 kA	
30–100	FH	18 kA	18 kA	18 kA	
200	HD, JD	25 kA	18 kA	14 kA	
200	HG, JG	65 kA	35 kA	18 kA	
200	HJ, JJ	65 kA	35 kA	25 kA	
200	HL, JL	65 kA	35 kA	35 kA	
200	HR, JR	65 kA	35 kA	35 kA	
400	LA	22 kA	22 kA	22 kA	
400	LH	25 kA	25 kA	25 kA	
400–600	LD	25 kA	18 kA	14 kA	
400–600	LG	65 kA	35 kA	18 kA	
400–600	LJ	100 kA	65 kA	25 kA	
400–600	LL	100 kA	65 kA	50 kA	
400–600	LR	100 kA	65 kA	65 kA	

[31] On 600 V, 200 A switches, 100,000 A max. on corner grounded delta when protected by Class J or R fuses.
[32] For NEMA Type 4X Fiberglass Reinforced Polyester switches, see page 3-10.
[33] NEMA Type 7/9 SCCR 10 kAIR 600 Vac maximum.
[34] Ampere rating of fuse or circuit breaker not to exceed switch ampere rating.

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H361SS

Special Application Heavy Duty Safety Switches

316 Grade Stainless Steel—NEMA Type 3, 3R, 4, 4X, 5, 12

316 stainless steel enclosure safety switches offer superior corrosion resistance to a wider range of chemicals than 304 stainless switches. 316 better resists chloride and is often used in marine, waste treatment and transportation applications. Use watertight hubs, see Hubs, page 3-13. Equipment grounding lugs are supplied as standard through 200 A. See Table 3.42 Terminal Lug Data, page 3-18 for wire Termination data for grounding lugs. (For 304 stainless switches, see 240 Volt, page 3-6 and 600 Volt, page 3-7.

Table 3.18: 316 Grade Stainless Steel 3 Pole 600 Vac, 600 Vdc

Amperes	Cat. No	Horsepower Ratings– 3Ø				
		480 Vac *[35]*		600 Vac *[35]*		600 Vdc *[36]*
		Std.	Max.	Std.	Max.	Max.
Fusible—3P, 600 Vac, 600 Vdc						
30	H361SS	5	15	7-1/2	20	15
60	H362SS	15	30	15	50	30
100	H363SS	25	60	30	75	50
200	H364SS	50	125	60	150	50
400	H365SS	100	250	125	350	50
600	H366SS	150	400	200	500	50
Non-Fusible—3P, 600 Vac, 600 Vdc						
30	HU361SS	—	20	—	30	15
60	HU362SS	—	50	—	60	30
100	HU363SS	—	75	—	100	50
200	HU364SS	—	125	—	150	50
400	HU365SS	—	250	—	350	50
600	HU366SS	—	400	—	500	50

H363DF

Fiberglass Reinforced Polyester Enclosures—NEMA Type 4X

Fiberglass reinforced polyester enclosures are watertight, corrosion resistant, and impervious to windblown dust, rain, and splashing liquid. The molded fiberglass is extremely stable in a wide range of operating temperatures and can withstand heavy impact. Switches are furnished with hubs, conduit provisions Table 3.43, and equipment grounding lugs. See CAD drawings of the switch to verify the UL listed short circuit current rating or the enclosed safety switch catalog. UL Listed.

Table 3.19: Fiberglass Reinforced Polyester Enclosures NEMA Type 4X 3 Pole 600 Vac, 600 Vdc

Amperes	Cat. No.	Solid Neutral Assembly Kit	Class R Fuse Kits	Electrical Interlock Kits Field-Installed Cat. No.		Horsepower Ratings– 3Ø					Hubs*[37]*
						480 Vac *[35]*		600 Vac *[35]*		600 Vdc *[36]*	
			Cat. No.	1 NO/1 NC Contacts	2 NO/2 NC Contacts	Std.	Max.	Std.	Max.	Max.	
Fusible—3P, 600 Vac, 600 Vdc											
30	H361DF	SN03	RFK06	9999TC10	9999TC20	5	15	7-1/2	20	15	3/4
60	H362DF	SN03	RFK06H	9999TC10	9999TC20	15	30	15	50	30	1-1/4
100	H363DF	SN0610	RFK10	9999TC10	9999TC20	25	60	30	75	50	2
200	H364DF	—	HRK1020	9999R8	9999R9	50	125	60	150	50	2-1/2
Non-Fusible—3P, 600 Vac, 600 Vdc											
30	HU361DF	SN03	—	9999TC10	9999TC20	—	20	—	30	15	3/4
60	HU362DF	SN03	—	9999TC10	9999TC20	—	50	—	60	30	1-1/4
100	HU363DF	SN0610	—	9999TC10	9999TC20	—	75	—	75	50	2
200	HU364DF	—	—	9999R8	9999R9	—	125	—	150	50	2-1/2

[35] Std.—Using fast acting, one time fuses. Max.—Using dual element time delay fuses.
[36] For switching dc use two switching poles.
[37] Two hubs and hub drilling template are provided for field installation.

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H361DX

Krydon™ Enclosures—NEMA Type 4X

Krydon enclosures are compression molded of fiberglass reinforced polyester, specially formulated to withstand attack from almost any corrosive atmosphere found in the toughest industrial application. Switches are furnished with watertight hubs and equipment grounding lugs. See CAD drawing of the switch to verify the UL listed short circuit current rating or the enclosed safety switch catalog. UL Listed.

Table 3.20: Krydon™ Enclosures — NEMA Type 4X 3 Pole 600 Vac, 600 Vdc

Amperes	Cat. No.	Solid Neutral Assembly Kit	Class R Fuse Kits	Electrical Interlock Kits Field-Installed Cat. No.		Horsepower Ratings– 3Ø					Hubs *[38]*
						480 Vac *[39]*		600 Vac *[39]*		600 Vdc *[40]*	
			Cat. No.	1 NO/1 NC Contact	2 NO/2 NC Contacts	Std.	Max.	Std.	Max.	Max.	
Fusible—3P, 600 Vac, 600 Vdc											
30	H361DX	H60SN	RFK06	9999TC10	9999TC20	5	15	7-1/2	20	15	3/4
60	H362DX	H60SN	RFK06H	9999TC10	9999TC20	15	30	15	50	30	1-1/4
100	H363DX	SN0610	RFK10	9999TC10	9999TC20	25	60	30	75	50	2
Non-Fusible—3P, 600 Vac, 600 Vdc											
30	HU361DX	H60SN	—	9999TC10	9999TC20	—	20	—	30	15	3/4
60	HU362DX	H60SN	—	9999TC10	9999TC20	—	50	—	60	30	1-1/4
100	HU363DX	SN0610	—	9999TC10	9999TC20	—	75	—	75	50	2

H60XFA

NEMA Type 7 and 9

An enclosed automatic molded case switch for use in Divisions 1 and 2 of the following: Class I, Groups C and D; Class II, Groups E, F and G; or Class III, Hazardous Locations as defined in NEC™ Article 500. Furnished with threaded conduit openings in both top and bottom endwall. Suitable for use as service equipment and listed as "Raintight" for outdoor applications. cULus Listed. Equipment grounding lugs supplied as standard. See CAD drawing of the switch to verify the UL listed short circuit current rating or the enclosed safety switch catalog.

Table 3.21: NEMA Type 7/9, 3 Pole Molded Case Switch, 600 Vac, 250 Vdc *[41]*, Short Circuit Current Rating 10 kA AIR

Amperes	Enclosed Molded Case Switch *[42]*	Solid Neutral Assembly	Horsepower Ratings—3Ø			Size of Threaded Conduit Openings Provided (in.) *[43]*
	Cat. No.	Cat. No.	240 Vac	480 Vac	600 Vac	
60	H60XFA	100SNA	15	30	50	3/4
60	H60XFA1212 *[44]*	100SNA	15	30	50	3/4
100	H100XFA	100SNA	30	60	75	1-1/4
100	H100XFA1212*[44]*	100SNA	30	60	75	1-1/4
225	H225XJG*[45]*	225SNA	60	125	150	2-1/2
225	H225XJGAA*[45] [44]*	225SNA	60	125	150	2-1/2

[38] Two hubs and hub drilling template are provided for field installation.
[39] Std.—Using fast acting one time fuses. Max.—Using dual element time delay fuses.
[40] For switching dc, use two outside switching poles.
[41] For switching dc, use two outside switching poles. Not for use on dc motor applications.
[42] Includes PKDB1, breather and drain kit, required for rainproof application.
[43] Threaded conduit opening provided in top and bottom endwall.
[44] Includes 1NO/1NC auxiliary contacts.
[45] Not cULus listed due to wire bending space.

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Interlocked Receptacle Switches

Interlocked Receptacle Switches *[46]* are furnished with a factory-installed three-phase four-wire Appleton Powertite™, Crouse-Hinds Style 2 Arktite™, or Hubbellock™ receptacle. The fourth wire is connected to the switch equipment grounding terminal and is not a solid neutral termination. Interlocking linkage between the receptacle and switch mechanism prevents insertion or removal of the plug while the switch is in the "ON" position or insertion of any plug other than specified. Grounding lugs are included. See wiring diagram of the switch to verify the UL listed short circuit current rating or the enclosed safety switch catalog.

Appleton Powertite Receptacle

H362AWA
Interlocked Receptacle Switch with Appleton Powertite Receptacle

- UL Listed and CSA Certified
- Available in 30 -100 A, 600 Vac/250 Vdc, fused or non-fused, NEMA Type 1, NEMA Type 4/4X/5 stainless steel and NEMA Type 12/3R
- Suitable for use as service equipment (USA only)
- Receptacles are epoxy powder coated over copper-free cast aluminum

Table 3.22: Appleton Powertite Receptacle Switches

Amperes	NEMA Type 1	NEMA Type 3, 3R, 4, 4X, 5, 12 304 Stainless Steel Enclosure	NEMA Type 12, 3R	Use with Plug *[47]*	Horsepower Ratings–3Ø					
					480 Vac *[48]*		600 Vac *[48]*		250 Vdc*[49]*	
					Std.	Max.	Std.	Max.	Std.	Max.
Fusible—3P, 600 Vac, 250 Vdc										
30	H361WA	H361DSWA	H361AWA	ACP3034BC	5	15	7-1/2	20	5	—
60	H362WA	H362DSWA	H362AWA	ACP6034BC	15	30	15	50	10	—
100	H363WA	H363DSWA	H363AWA	ACP1034CD	25	60	30	75	20	—
Non-Fusible—3P, 600 Vac, 250 Vdc										
30	HU361WA	HU361DSWA	HU361AWA	ACP3034BC	—	20	—	30	—	5
60	HU362WA	HU362DSWA	HU362AWA	ACP6034BC	—	50	—	60	—	10
100	HU363WA	HU363DSWA	HU363AWA	ACP1034CD	—	75	—	100	—	20

Table 3.23: Appleton Powertite 600 Vac Short Circuit Current Rating

Amperes	10 kAIR Fuses	100 kAIR Fuses	200 kAIR Fuses	14 kAIR Circuit Breaker	18kAIR Circuit Breaker
Fusible—3P, 600 Vac, 250 Vdc					
30	H, K	—	J, R	—	—
60	H, K	—	J, R	—	—
100	H, K	—	J, R	—	—
Non-Fusible—3P, 600 Vac, 250 Vdc					
30	H, K	J, R, T*[50]*	J, R, T	FA	FH
60	H, K	—	J, R, T	FA	FH
100	H, K	—	J, R, T	FA	FH

Crouse-Hinds Arktite Receptacle

H362AWC
Interlocked Receptacle Switch with Crouse-Hinds Arktite Receptacle

- UL Listed
- Available in 30 -100 A, 600 Vac/250 Vdc, fused or non-fused, NEMA Type 1, NEMA Type 4/4X/5 stainless steel and NEMA Type 12/3R
- Suitable for use as service equipment
- Receptacles are cast aluminum, copper free for NEMA Type 1 and NEMA Type 12/3R safety switches
- Receptacles are epoxy powder coated, copper free cast aluminum for NEMA Type 4/4X/5 stainless steel safety switches

Table 3.24: Crouse-Hinds Arktite Safety Switch

Amperes	NEMA Type 1	NEMA Type 4, 4X, 5 304 Stainless Steel Enclosure	NEMA Type 12, 3R	Use with Plug	Horsepower Ratings–3Ø					
					480 Vac *[48]*		600 Vac *[48]*		250 Vdc *[49]*	
	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Std.	Max.	Std.	Max.	Std.	Max.
Fusible—3P, 600 Vac, 250 Vdc										
30	H361WC	H361DSWC	H361AWC	APJ3485	5	15	7-1/2	20	5	—
60	H362WC	H362DSWC	H362AWC	APJ6485	15	30	15	50	10	—
100	H363WC	H363DSWC	H363AWC	APJ10487	25	60	30	75	20	—
Non-Fusible—3P, 600 Vac, 250 Vdc										
30	HU361WC	HU361DSWC	HU361AWC	APJ3485	—	20	—	30	—	5
60	HU362WC	HU362DSWC	HU362AWC	APJ6485	—	50	—	60	—	10
100	HU363WC	HU363DSWC	HU363AWC	APJ10487	—	60	—	100	—	20

[46] Accessories and Special Features, page 3-13
[47] Receptacle UL listed for use with Appleton™ ACP or CPH plugs; UL Classified for use with Crouse-Hinds APJ Arktite™ plugs. (see Table 3.24.
[48] Std.—Using fast acting one time fuses. Max.—Using dual element time delay fuses.
[49] For switching dc, use two outside switching poles.
[50] SCCR when using 60 Amp Max fuse.

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Table 3.25: Crouse-Hinds 600 Vac Short Circuit Current Rating

Amperes	10 kAIR Fuses	100 kAIR Fuses	200 kAIR Fuses	14 kAIR Circuit Breaker	18kAIR Circuit Breaker
Fusible—3P, 600 Vac, 250 Vdc					
30	H, K	—	J, R	—	—
60	H, K	—	J, R	—	—
100	H, K	—	J, R	—	—
Non-Fusible—3P, 600 Vac, 250 Vdc					
30	H, K	J, R, T *[51]*	J, R, T	FA	FH
60	H, K	—	J, R, T	FA	FH
100	H, K	—	J, R, T	FA	FH

Hubbellock Receptacle

H362AWH
Interlocked Receptacle Switch with Hubbell™ Hubbellock Receptacle

- UL Listed
- Available in 30 -100 A, 600 Vac/250 Vdc, fused or non-fused, NEMA Type 1, and NEMA Type 12
- Suitable for use as service equipment *[52]*
- Receptacles are zinc plated steel for NEMA Type 1 and 12 safety switches
- Short Circuit Current Rating for fusible switches is 10 kAIR maximum when used with Class H, K, J or R fuses
- Short Circuit Current Rating for non-fusible switches is 10 kAIR maximum when protected by Class H, K, J, R or T fuses

Table 3.26: Hubbellock Receptacle Safety Switch

Amperes	NEMA Type 1	NEMA Type 12	Use with Plug*[53]*	Horsepower Ratings—3Ø			
				480 Vac *[54]*		600 Vac *[54]*	
	Cat. No.	Cat. No.	Cat. No.	Std.	Max.	Std.	Max.
Fusible—3P, 600 Vac							
60	H362WH	H362AWH	SD12781	15	30	15	50
Non-Fusible—3P, 600 Vac							
60	HU362WH	HU362AWH	SD12781	—	50	—	60

Square D by Schneider Electric brand heavy duty safety switches are UL listed for use with the following accessories:

Rainproof Bolt-On Hubs

- UL Listed for indoor or rainproof applications
- Suitable for use with conduit having ANSI standard taper pipe thread
- NEMA Type 3R switches with catalog number ending in RB have a bolt-on closing cap factory installed
  - Accepts 3/4 in. through 2-1/2 in. bolt-on hubs
  - No gaskets required
- NEMA Type 3R switches with R suffix have blank top endwalls
  - Accepts 3 in. through 4 in. bolt on hubs
  - Gaskets provided
  - Conduit entry holes must be cut in the field

Table 3.27: Rainproof Bolt-On Hubs *[55]*

Conduit Size	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	Closing Cap
Hub Cat. No	B075	B100	B125	B150	B200	B250	B300	B400	BCAP

Watertight Hubs

Watertight Hubs

- UL Listed for dusttight and watertight applications
- Suitable for use with conduit having ANSI standard taper pipe thread
- Watertight hubs are field installed on NEMA Type 4/4X/5 stainless steel and NEMA Type 12/3R and 12K enclosures
- Watertight hubs are available in zinc or chrome plated finish
- Gaskets provided

Table 3.28: Watertight Hubs *[56]*

Conduit Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4
Standard-Zinc Hub Cat. No	H050	H075	H100	H125	H150	H200	H250	H300	H350	H400
Chrome Plated Hub Cat. No.	H050CP	H075CP	H100CP	H125CP	H150CP	H200CP	—	—	—	—

[51] SCCR when using 60 Amp Max fuse.
[52] Receptacle only rated for NEMA Type 1 and 12 applications.
[53] Hubbell plug is furnished with a Kellems grip for 1-1/2 in. to 1-21/64 in. cable diameter.
[54] Std.—Using fast acting one time fuses. Max.—Using dual element time delay fuses.
[55] Gaskets are provided on 3 in. and larger hubs.
[56] Gaskets are provided.

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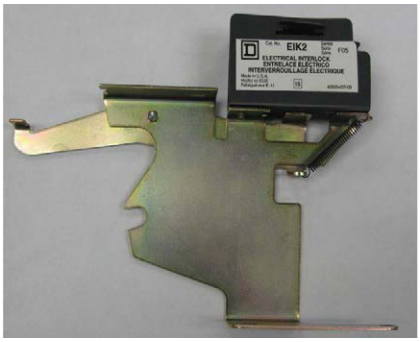

EIK2 Electrical Interlock Kit

Electrical Interlock Kits

Electrical interlocks for heavy duty safety switches 30 A through 1200 A are available factory installed or in kit form for field installation. A pivot arm operates from the switch mechanism, breaking the control circuit before the main switch blades break. For factory-installed electrical interlocks add EI (for one contact) or EI2 (for two contacts) suffix to catalog number. See Supplemental Digest Section 2 for electrical interlock contact ratings. UL Listed, factory or field installed.

Table 3.29: Electrical Interlock Kit *[57] [58]*

Switch's Amperes Rating	Series Number *[59]*	Electrical Interlock Kit Cat. No. *[60]*
30	F5–F6	EIK031
		EIK032
60 (600 V)	F5–F6	EIK1
		EIK2
60 (240 V)	F5–F6	EIK031
		EIK032
100–200	F5–F6	EIK1
		EIK2
30–100 Receptable Switches	F5–F7	EIK1
		EIK2
30–200 Four- and Six-Pole Switches	F5–F6	EIK1
		EIK2
400–1200	E4–E5	EIK40601
		EIK40602

Class R Fuse Kits

When installed, this kit rejects all but Class R fuses. Kits are available for field installation. One kit required for a three pole switch. For factory installation, add "CLR'' suffix to catalog number.

Table 3.30: 240 Vac — Class R Fuse Kits *[61]*

Amperes	Series Number	Class R Fuse Kit Cat. No.
30	F5–F6	RFK03L
60	F5–F6	RFK03H
100	F5–F6	RFK10
200	F5–F6	HRK1020
400–600	E4–E5	HRK4060

Table 3.31: 600 Vac — Class R Fuse Kits *[61] [62]*

Amperes	Series Number	Class R Fuse Kit Cat. No.
30 *[63]*	F5–F6	RFK03H
30 A Receptacle Switches	F7	RFK06
30 A Four-Pole Switches	F5–F6	RFK06
60	F5–F7	RFK06H
100	F5–F7	RFK10
200	F5–F6	HRK1020
400–600	E4–E5	HRK4060

Internal Barrier Kits

Internal Barrier Kits provide an additional barrier that helps prevent accidental contact with live parts. Field-installed transparent barriers do not restrict visual inspection of the switch. Barriers provide IEC529 IP2X "finger safe" protection when door of enclosed disconnect switch is open. Convenient door allows use of test probes without accessing fuses and replacement of fuses without removing barrier. For use with three-pole switches.

Table 3.32: Internal Barrier Kits

Cat. No.	Description	Safety Switch Application (F Series Only)
SS03	Interior Barrier for 30 A and 240 V 60 A Safety Switch *[64]*	240 / 600 Vac – 30 A 240 Vac – 60 A
SS06	Interior Barrier for 600 V, 60 A Safety Switch	600 Vac – 60 A
SS10	Interior Barrier for 240 / 600 V, 100 A Safety Switch	240 / 600 Vac – 100 A
SS20	Interior Barrier for 240 / 600 V, 200 A Safety Switch	240 / 600 Vac – 200 A

[57] For series not shown in table refer to the switch wiring diagram.
[58] Electrical interlocks for NEMA Type 4X fiberblass reinforced polyester and Krydon™ see Table 3.19 and Table 3.20 respectively.
[59] See page 3-19 and page 3-20 for safety switch series.
[60] Electrical interlock kit catalog numbers ending in 1 indicates one normally open and one normally closed contact. These kits use a 9007A01 industrial snap switch. Electrical interlock kit catalog numbers ending in 2 indicates two normally open and two normally closed contacts. These kits use a 9007C03 industrial snap switch.
[61] For series not shown in the table, refer to the switch wiring diagram.
[62] Class R Fuse Kits for Fiberglass Reinforced Polyester enclosures and Krydon™ enclosures see Table 3, page 3-10 and Table 5, page 3-11 respectively.
[63] H361-2, H361-2A, H361-2AWK and H361-2RB use RFK06.
[64] Requires arc shield on 240 V switches be changed to 600 V arc suppressor. Contact the Customer Care Center at 1–888–778–2733 fo the arc suppressor part number.

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Fuse Puller Kits

Fuse Puller Kits

Fuse Puller Kits are standard equipment on the following 30 A - 100 A switches: NEMA Type 12 and 12K, NEMA Type 4/4X/5 stainless steel, NEMA Type 4X fiberglass reinforced polyester and Krydon™.

Fuse Puller Kit available for field installation on NEMA Type 1 and NEMA Type 3R, 30 A – 100 A switches. One Fuse Puller Kit required for a 3 pole fusible 240 V or 600 V heavy duty switch. Fuse Puller Kits can be field installed on switches manufactured since February 1980.

Amperes	Series Number *[65]*	Fuse Puller Kit Cat. No.
30	F5–F7	FPK03 *[66]*
60 60	F5–F7 (600 V) F5 (240 V)	FPK0610 FPK03
100	F5–F7	FPK0610

Solid Neutral Assembly Kits

Table 3.33: Solid Neutral Assembly Kits *[65] [67] [68] [69]*

Amperes	Series Number *[70]*	Standard Neutral Kit Cat. No.	Terminal Data AWG/kcmil	Optional Copper Only Neutral Kit Cat. No.	Terminal Data AWG/kcmil
30	F5–F6	SN03 *[71]*	(2) 14-3 Al/Cu plus (1) 14-3 Al/Cu Svc Ground	SN03C *[71]*	(2) 14-6 Cu plus (1) 14-6 Cu Svc Ground
60	F5–F6, (600 V)	SN0610	(2) 14-1/0 Al/Cu plus (2) 14-6 Al/Cu Svc Ground	SN0610C	(2) 14-1/0 Cu plus (2) 14-6 Cu Svc Ground
	F5–F6 (240 V)	SN03	(2) 14-3 Al/Cu plus (1) 14-3 Al/Cu Svc Ground	SN03C	(2) 14-1/0 Cu plus (2) 14-6 Cu Svc Ground
100	F5–F6,	SN0610	(2) 14-1/0 Al/Cu plus (2) 14-6 Al/Cu Svc Ground	SN0610C	(2) 14-1/0 Cu plus (2) 14-6 Cu Svc Ground
200 *[72]*	F5–F6	SN20A	(2) 6-250 Al/Cu plus (1) 14-10 Al/Cu Svc Ground	SN20C	(2) 6-250 Cu plus (1) 14-1/0 Cu Svc Ground
400 and 600	E4–E5	H600SN	(4) 1-750 Al/Cu plus (1) 4-300 Al/Cu Svc Ground	H600SNC	(2) 1-600 Cu and (2) 4-350 Cu plus (2) 6-250 Cu Svc Ground
800	E4	H800SNE4	(6) 3/0-750 Al/Cu plus (2) 6-350 Al/Cu Svc Ground	–	–
1200	E4	H1200SNE4	(8) 3/0-750 Al/Cu plus (2) 6-350 Al/Cu Svc Ground	–	–

Equipment Grounding Kits

Equipment grounding kits are available for factory or field installation. For factory installation of equipment grounding kit, add suffix GL to standard Cat. No. (Example: H361GL).

Table 3.34: Equipment Grounding Kits and Terminal Data *[73] [74]*

Amperes	Series Number	Standard Cat. No.	Terminal Data AWG/kcmil	Optional Copper Only Cat. No.	Terminal Data AWG/kcmil
30	F5–F6	GTK03 *[75]*	(2) 14-4 Cu or (2) 12-4 Al or (4) 14-12 Cu or (4) 12-10 Al	GTK03C *[75] [76]*	(2) 14-6 Cu
60	F5–F6 (600 V)	GTK0610	(2) 14-1/0 Cu or (2) 12-1/0 Al and (2) 14-6 Cu or (2) 12-6 Al	GTK0610C	(2) 14-1/0 Cu and (2) 14-6 Cu
60	F5–F6 (240 V)	GTK03	(2) 14-4 Cu or (2) 12-4 Al or (4) 14-12 Cu or (4) 12-10 Al	GTK03C	(2) 14-6 Cu
100	F5–F6	GTK0610	(2) 14-1/0 Cu or (2) 12-1/0 Al and (2) 14-6 Cu or (2) 12-6 Al	GTK0610C	(2) 14-1/0 Cu and (2) 14-6 Cu
200	F5–F6	PKOGTA2	(2) 10-2/0 Cu or (2) 6-2/0 Al	PKOGTC2	(2) 14-4 Cu
400 and 600	E4–E5	PKOGTA2 *[77]*	(2) 10-2/0 Cu or (2) 6-2/0 Al	PKOGTC3	(4) 14-1/0 Cu
800	E4	PKOGTA7	(4) 4-350 Al/Cu	—	—
1200	E4	PKOGTA8	(8) 4-350 Al/Cu	—	—

[65] For series not shown in chart refer to the switch wiring diagram.
[66] 30 A 4 pole, H361-2 and H361-2RB Series F5, H361WA and H361WC Series F6 use FPK0610.
[67] For solid Neutral Assembly Kits for Krydon ™ enclosure see Table 3.20.
[68] For Solid Neutral Assembly Kits for Fiberglass Reinforced Ployester enclosures see Table 3.19.
[69] Neutrals cannot be installed in 4 or 6 pole switches or receptable switches.
[70] See page 3-19 and page 3-20 for safety switch series.
[71] The following 30 A Series F5-F6 switches use SN0610 or SN0610C: H3612, H3612RB, H3612A, H3612AWK, HU3612, HU3612RB, HU3612A and HU3612AWK.
[72] For 200% neutral, order (2) SN20A Neutral Kits and (1) SN20NI Neutral Jumper Kit.
[73] For series not shown in table refer to the switch wiring diagram.
[74] Equipment Ground Kits (Al/Cu) are factory installed standard in 30-200 A Series F NEMA Type 4/4X/5 (stainless steel), 12 and 12K. Equipment Ground Kits are standard factory installed on all receptacle switches and all Series F 30-200 A, 4 and 6 pole switches.
[75] H2212AWK accepts GTK03 or GTK03C. H3612A or AWK accepts GTK03C. H3612 and H3612RB accepts GTK0610 HU3612AWK accepts GTK03C. HU3612A accepts GTK0610C. HU3612RB accepts GTK0610 or GTK0610C.
[76] Optional copper equipment grounding kit for the 4 and 6 pole 30 A F Series: H461DS, H461AWK, HU461DS, HU661DS and HU661AWK accepts GTK03C HU461AWK accepts GTK0610C.
[77] Two required if equipment grounding conductors are run in parallel.

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Special Paint and Touch-Up Paint

UL Listed heavy duty switches are available painted with special safety colors. To order safety colored switches, add suffixes from the Safety Colors table to the standard switch catalog number.

Not available on NEMA Type 4X Fiberglass, Krydon, NEMA Type 4/4X/5 Stainless Steel nor NEMA Type 7 and 9 switches.

All colors comply with OSHA Standard 1910.144 and ANSI Specification Z535.1 for marking physical hazards.

Table 3.35: Safety Colors *[78]*

Safety Color	Suffix	Safety Color	Suffix
Black	SP0	Blue	SP6
Red	SP2	Purple	SP7
Orange	SP3	Gray	SP8 *[79]*
Yellow	SP4	Gray ANSI 61	SP861
Green	SP5	White	SP9

Table 3.36: Square D Gray Touch-Up Paint

Description	Cat. No.
12 oz. Aerosol Paint Can, Square D ANSI-49 Gray Touch-Up Paint	PK49SP

NOTE: Minimum quantity of 6 required.

Lock-Off Guard Kits *[80] [81]*

Available factory- or field-installed the lock-off guard works by covering the lockout/tagout opening whenever the switch is in the ON position. This prevents a padlock from being inadvertantly inserted into the switch lockplate. The device is designed to help prevent accidental misapplication of a lockout device. These kits are marked cURus (UL Component Recognized) for field or factory installation.

Table 3.37: Lock-Off Guard Kits

Switch Rating	Cat. No.
30 A 60 A 240 V	LOGK1
60 A 600 V 100 and 200 A	LOGK2

Optional Lock-OFF Guard Kit Installed

Key Interlock Systems

Factory-installed only on heavy duty safety switches and double throw safety switches.

Interlocks are used to prevent the authorized operator from making an unauthorized operation. Not available on NEMA Type 4X Fiberglass, Krydon or NEMA Type 7 and 9 switches.

The key interlock system is a simple and easy method of applying individual key interlock units and assemblies to the above equipment so as to require operation in a predetermined sequence. UL Listed.

Quoting: Contact Schneider Electric for catalog number, availability, and pricing prior to quoting a job. Detailed information is required before an order can be processed. Please see Supplemental Digest Section 2 for further information.

Use these suffixes on switch catalog numbers:

- KI = 1 lock per switch
- KI2 = 1 lock with 2 cylinders (2 keys) per switch
- KIKI = 2 separate locks per switch

Key Interlock System

Lock-ON Provisions

Lock-OFF provisions are standard on all heavy duty safety switches. Provision for one 3/8 inch hasp padlock is available factory-installed on 30–1200 A, NEMA Type 1, 3R, 4-4X-5 stainless steel 12 and 12K switches. Not avaliable on NEMA Type 4X, Fiberglass, Krydon or NEMA Type 7 and 9 switches. This modification will allow the switch to be locked in the “ON’’ position. UL Listed.

To order, add suffix SPLO to standard catalog number. Example: H364-SPLO

[78] **A minimum quantity of 10 is required.**
[79] Standard Square D ANSI 49 grey paint, when selecting this suffix, switches will receive additional coat of paint.
[80] Available factory assembled or as a field installable kit on NEMA Type 1, 3R, 12 or 12K switches. Not available for use on NEMA Type 4X Fiberglass, Krydon, NEMA Type 4/4X/5 Stainless Steel nor NEMA Type 7 and 9 switches.
[81] For factory installation add suffix LOG to the standard switch catalog number.

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Cover Viewing Window

Optional cover viewing window is positioned over the blades to allow visual verification of "ON-OFF" status. Available on 30 through 1200 A heavy duty switches, NEMA Type 1, 3R, 4/4X/5 Stainless Steel, 12 and 12K. (Not avaliable on NEMA Type 4X, Fiberglass, Krydon or NEMA Type 7 and 9 switches). Add VW suffix to the catalog number for factory installation.

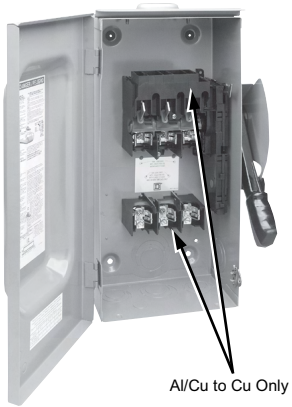
Voltage Monitors

Voltage monitors installed on safety switches indicate when voltage is present, helping to prevent arc-flash hazards and electric shocks during maintenance work. Voltage monitors can be combined with other safety features such as Key Interlock, Viewing Windows or Lock-ON provisions.

- UL Listed
- Factory installed only
- Order the voltage monitors by adding the appropriate suffix shown in the table below to the switch catalog number
- Not available on NEMA Type 7 and 9 and NEMA Type 4X Fiberglass and Krydon™ switches

Table 3.38: Voltage Monitors *[82]*

Description	Suffix *[83]*
Line Side Monitor	SI
Load Side Monitor	LI
Line and Load Side Monitors	LI2



Copper Lug Kits

Lug kits that accept only copper wire are available for field or factory installation:

- UL Listed
- UL Marine Listed
  - UL Marine listing is applicable ONLY to 30 - 200 A, NEMA Type 12/3R, NEMA Type 12K and NEMA Type 4/4X/5 stainless steel, safety switches
  - When copper only lugs kits are factory installed the switch will bear the UL Marine mark and be suitable for use on vessels over 65 feet long
  - When the copper only lugs kits are field installed the switch will not bear the UL Marine mark and would not be suitable for use on vessels over 65 feet long
- Not available for use on NEMA Type 4X Fiberglass, Krydon or NEMA Type 7 and 9 switches
- For field installation, order copper lug kits. See Table below
- For factory installation of copper lugs, add the suffix SLC to the standard catalog number

Table 3.39: Copper Lug Kits *[84]*

Amperes	Lug Kit Cat. No.	Lug Wire Range AWG/kcmil
30–60	CL0306F	(1) 14-8 Cu solid or 14-4 Cu stranded
100	CL10F	(1) 14-8 Cu solid or 14-1/0 Cu stranded
200	CL20F	(1) 6-250 Cu
400	CL40F	(1) 1-600 Cu plus (1) 6-250 Cu
600	CL60F	(1) 4-350 Cu
800	—	—
1200	—	—

[82] Available on 30-1200 A Heavy Duty Safety Switches and 30-400 A Double Throw Safety Switches.
[83] In addition to the suffix shown in the table above, a 3 must be added to the switch catalog number for all 30 and 60 A switches, i.e. H361AWK becomes H3613AWKLI. 30 and 60 A switches require 100 A enclosure accessories.
[84] One kit includes all phase line/load lugs for a 3-pole switch. CL0306F, CL10F and CL20F includes six lugs. CL40F and CL60F includes twelve lugs.

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Double Lug Kits

200 A heavy duty F-series switches are supplied standard with lugs suitable for one wire per phase. For two wires per phase and neutral, order the Double Lug Kit.

Not UL Listed. Not listed on switch's wiring diagram as an accessory.

Table 3.40: Double Lug Kits

Amperes	Cat. No. *[85]*	Lug Wire Range per Phase and Neutral AWG/kcmil	Wire Range Wire Bending Space per NEC Table 312.6 AWG/kcmil
200	AL20DTF	(2) 6 –300 Cu/Al	(2) 6 –250 Cu/Al

Compression Lug Kits — 800 A and 1200 A Safety Switches

- UL Listed.
- Compression Lug Kits available for field installation
- Compression Lug Kits available for factory installation; Add suffix LK to standard catalog number
- Compression Lug Kits contain VCEL07512H1 Versa-Crimp™ compression lugs
- Order one Compression Lug Kit per switching pole and/or neutral (see Table below)

Table 3.41: Compression Lug Kits

Amperes	Lug Kit Cat. No.	Conductors per Phase	Lug Wire Range kcmil
800	H8LKE2	(3) Line and (3) Load	500-750 kcmil (Al) or 500 kcmil (CU)
1200	H12LKE2	(4) Line and (4) Load	500-750 kcmil (Al) or 500 kcmil (CU)

Table 3.42: Terminal Lug Data *[86]*

Rating (A)	Wires Per Phase and Neutral	Wire Range Wire Bending Space per NEC Table 312.6 AWG/kcmil	Lug Wire Range AWG/kcmil	Optional *[87]*Compression Lug Field-Installed	Optional Copper Only *[87]* Compression Lug Field-Installed *[88]*
30	1	12–6 (Al) or 14–6 (Cu)	12–2 (Al) or 14–2 (Cu)	C10–14,*[89]* D8–14–SK, or E6–14	—
	2	12–10 (Al) or 14–10 (Cu)			
60 *[90]*	1	12–3 (Al) or 14–3 (Cu)	12–2 (Al) or 14–2 (Cu)	C10–14,*[89]* D8–14–SK, or E6–14	—
100 *[91]*	1	12–1/0 (Al) or 14–1/0 (Cu)	12–1/0 (Al) or 14–1/0 (Cu)	VCEL02114S1	VCELC02114S1
200 *[92]*	1	6–250 (Al/Cu)	6–300 (Al/Cu)	VCEL030516H1	VCELC030516H1
400*[93]*	1 or 2	1/0–750 (Al/Cu) or 1/0–300 (Al/Cu)	1/0–750 (Al/Cu) or 1/0–300 (Al/Cu)	VCEL07512H1 or VCEL030516H1 *[94]* and VCEL05012H1	VCELC07512H1 or VCELC030516H1*[95]* and VCELC05012H1
600	2	3/0–500 (Al/Cu)	3/0–500 (Al/Cu)	VCEL05012H1	VCELC05012H1
800	3	3/0–750 (Al/Cu)	3/0–750 (Al/Cu)	H8LKE2*[96]*	—
1200	4	3/0–750 (Al/Cu)	3/0–750 (Al/Cu)	H12LKE2*[96]*	—

Table 3.43: Conduit Provisions

Amperes	Top and Bottom Endwall	
	NEMA Type 4X Fiberglass Reinforced Polyester and Krydon *[97]*	NEMA Type 7 and 9 *[98]*
30	3/4 in.	—
60	1-1/4 in.	3/4 in.
100	2 in.	1-1/4 in.
200	2-1/2 in.	2-1/2 in.

[85] Kit contains 3 lugs. Order two kits for line and load lugs.
[86] 30–100 A switches suitable for 60°C or 75°C conductors. 200–1200 A switches suitable for 75°C conductors.
[87] Hubbell Versa-Crimp™ unless otherwise noted.
[88] For NEMA Type 1, 12/3R, 12K and 4/4X/5 stainless steel switches only.
[89] Order from Thomas and Betts.
[90] H60XFA and H60XFA1212 — use 75°C copper wire only. #6 AWG copper wire required for 60 A rating.
[91] H100XFA and H100XFA1212 — use 75°C copper wire only. #3 AWG copper wire required for 100 A rating.
[92] H225XJG and H225XJGAA — use 75°C copper wire only. Lug wire range is #3 AWG – 350 kcmil. Not UL Listed due to inadequate wire bending space (5" on ON end, 6" on OFF end).
[93] Maximum wire bending space allows for (1) 600 kcmil or (2) 300 kcmil Al/Cu on NEMA Type 4/4X/5 stainless steel and NEMA Type 12 switches.
[94] Order two PK516KN mounting kits when installing VCEL030516H1 lugs. Only one kit is required on 2 pole switches. PK516KN consists of (4) 5/16-18 Keps Nuts.
[95] Order two PK516KN mounting kits when installing VCEL030516H1 or VCELC030516H1 lugs. Only one kit is required on 2 pole switches. PK516KN consists of (4) 5/16-18 Keps Nuts.
[96] For 800 and 1200 A compression lug kits see Table 3.41 for additional information.
[97] Hubs and hub drilling templates are provided for field-installation.
[98] Threaded conduit opening.

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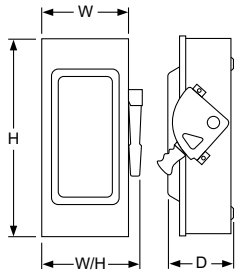
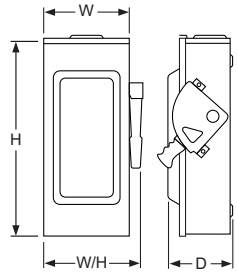
NEMA Type 1 and 3R

See Table 3.42 Terminal Lug Data, page 3-18 for terminal lug data for the series switches listed in the dimension table below.



Typical NEMA Type 1



Typical NEMA Type 3R

Table 3.44: Approximate Dimensions

Cat. No.	Series	H		W		D		W/H		Cat. No.	Series	H		W		D		W/H	
		in.	mm	in.	mm	in.	mm	in.	mm			in.	mm	in.	mm	in.	mm	in.	mm
H221N	F5	14.60	371	6.50	165	4.88	124	7.55	192	H364, N	F5	29.00	737	17.13	435	8.25	210	18.50	470
H221NRB	F5	14.88	378	6.63	168	4.88	124	7.55	192	H364RB, NRB	F5	29.25	743	17.25	438	8.50	216	18.63	473
H222N	F5	14.60	371	6.50	165	4.88	124	7.55	192	H365, N	E4	50.25	1276	27.63	702	10.13	257	27.63	702
H222NRB	F5	14.88	378	6.63	168	4.88	124	7.55	192	H365R, NR	E5	50.31	1278	27.76	705	9.53	242	27.88	708
H223N	F5	21.25	540	8.50	216	6.38	162	10.50	267	H366, N	E4	50.25	1276	27.63	702	10.13	257	27.63	702
H223NRB	F5	21.25	540	8.50	216	6.38	162	10.50	267	H366NR, R	E5	50.31	1278	27.76	705	9.53	242	27.88	708
H224N	F5	29.00	737	17.13	435	8.25	210	18.50	470	H367, N	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H224NRB	F5	29.25	743	17.25	438	8.50	216	18.63	473	H367NR, R	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H225, N	E4	50.25	1276	27.63	702	10.13	257	27.63	702	H368, N	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H225NR, R	E5	50.31	1278	27.76	705	9.53	242	27.88	708	H368NR, R	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H226, N	E4	50.25	1276	27.63	702	10.13	257	27.63	702	H461	F5	20.50	521	14.75	375	6.85	174	16.13	410
H226NR, R	E5	50.31	1278	27.76	705	9.53	242	27.88	708	H462	F5	20.50	521	14.75	375	6.85	174	16.13	410
H227, N	E4	69.13	1756	36.62	930	17.75	451	36.62	930	H463	F5	20.50	521	14.75	375	6.85	174	16.13	410
H227NR, R	E4	69.13	1756	36.62	930	17.75	451	36.62	930	H464	F5	29.00	737	23.25	591	8.75	222	24.88	632
H228, N	E4	69.13	1756	36.62	930	17.75	451	36.62	930	H465	E4	50.25	1276	33.88	861	10.13	257	33.88	861
H228NR, R	E4	69.13	1756	36.62	930	17.75	451	36.62	930	H466	E4	50.25	1276	33.88	861	10.13	257	33.88	861
H265	E4	50.25	1276	27.63	702	10.13	257	27.63	702	HU265	E4	50.25	1276	27.63	702	10.13	257	27.63	702
H265R	E5	50.31	1278	27.76	705	9.53	242	27.88	708	HU265R	E5	50.31	1278	27.76	705	9.53	242	27.88	708
H266	E4	50.25	1276	27.63	702	10.13	257	27.63	702	HU266	E4	50.25	1276	27.63	702	10.13	257	27.63	702
H266R	E5	50.31	1278	27.76	705	9.53	242	27.88	708	HU266R	E5	50.31	1278	27.76	705	9.53	242	27.88	708
H267	E4	69.13	1756	36.62	930	17.75	451	36.62	930	HU267	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H267R	E4	69.13	1756	36.62	930	17.75	451	36.62	930	HU267R	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H268	E4	69.13	1756	36.62	930	17.75	451	36.62	930	HU268	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H268R	E4	69.13	1756	36.62	930	17.75	451	36.62	930	HU268R	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H321N	F5	14.60	371	6.50	165	4.88	124	7.55	192	HU361	F5	14.60	371	6.50	165	4.88	124	7.55	192
H321NRB	F5	14.88	378	6.63	168	4.88	124	7.55	192	HU361RB	F5	14.88	378	6.63	168	4.88	124	7.55	192
H322N	F5	14.60	371	6.50	165	4.88	124	7.55	192	HU361WA	F6	18.19	462	9.00	229	6.81	173	10.50	267
H322NRB	F5	14.88	378	6.63	168	4.88	124	7.55	192	HU361WC	F6	18.19	462	9.00	229	6.81	173	10.50	267
H323N	F5	21.25	540	8.50	216	6.38	162	10.50	267	HU362	F5	17.50	445	9.00	229	6.38	162	10.50	267
H323NRB	F5	21.25	540	8.50	216	6.38	162	10.50	267	HU362RB	F5	17.50	445	9.00	229	6.38	162	10.50	267
H324N	F5	29.00	737	17.13	435	8.25	210	18.50	470	HU362WA	F6	18.19	462	9.00	229	6.81	173	10.50	267
H324NRB	F5	29.25	743	17.25	438	8.50	216	18.63	473	HU362WC	F6	16.75	425	9.00	229	7.00	178	10.50	267
H325, N	E4	50.25	1276	27.88	708	10.13	257	27.88	708	HU362WH	F5	18.19	462	9.00	229	6.81	173	10.50	267
H325R, NR	E5	50.31	1278	27.76	705	9.53	242	27.88	708	HU363	F5	21.25	540	8.50	216	6.38	162	10.50	267
H326, N	E4	50.25	1276	27.63	702	10.13	257	27.63	702	HU363RB	F5	21.25	540	8.50	216	6.38	162	10.50	267
H326R, NR	E5	50.31	1278	27.76	705	9.53	242	27.88	708	HU363WA	F6	21.85	462	9.00	229	6.81	173	10.50	267
H327, N	E4	69.13	1756	36.62	930	17.75	451	36.62	930	HU363WC	F6	21.85	555	9.00	229	6.81	173	10.50	267
H327R, NR	E4	69.13	1756	36.62	930	17.75	451	36.62	930	HU364	F5	29.00	737	17.13	435	8.25	210	18.50	470
H328, N	E4	69.13	1756	36.62	930	17.75	451	36.62	930	HU364RB	F5	29.25	743	17.25	438	8.50	216	18.63	473
H328R, NR	E4	69.13	1756	36.62	930	17.75	451	36.62	930	HU365	E4	50.25	1276	27.63	702	10.13	257	27.63	702
H361, N	F5	14.60	371	6.50	165	4.88	124	7.55	192	HU365R	E5	50.31	1278	27.76	705	9.53	242	27.88	708
H361-2	F5	17.50	445	9.00	229	6.38	162	10.50	267	HU366	E4	50.25	1276	27.63	702	10.13	257	27.63	702
H361NRB, RB	F5	14.88	378	6.63	168	4.88	124	7.55	192	HU366R	E5	50.31	1278	27.76	705	9.53	242	27.88	708
H361WA	F6	18.19	462	9.00	229	6.81	173	10.50	267	HU367	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H361WC	F6	18.19	462	9.00	229	6.81	173	10.50	267	HU367R	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H362, N	F5	17.50	445	9.00	229	6.38	162	10.50	267	HU368	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H362NRB, RB	F5	17.50	445	9.00	229	6.38	162	10.50	267	HU368R	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H362WA	F6	18.19	462	9.00	229	6.81	173	10.50	267	HU461	F5	20.50	521	14.75	375	6.85	174	16.13	410
H362WC	F6	16.75	425	9.00	229	7.00	178	10.50	267	HU462	F5	20.50	521	14.75	375	6.85	174	16.13	410
H362WH	F5	18.19	462	9.00	229	6.81	173	10.50	267	HU463	F5	20.50	521	14.75	375	6.85	174	16.13	410
H363, N	F5	21.25	540	8.50	216	6.38	162	10.50	267	HU464	F5	29.00	737	23.25	591	8.75	222	24.88	632
H363NRB, RB	F5	21.25	540	8.50	216	6.38	162	10.50	267	HU465	E4	50.25	1276	33.88	861	10.13	257	33.88	861
H363WA	F6	21.85	462	9.00	229	6.81	173	10.50	267	HU466	E4	50.25	1276	33.88	861	10.13	257	33.88	861
H363WC	F6	21.85	555	9.00	229	6.81	173	10.50	267										

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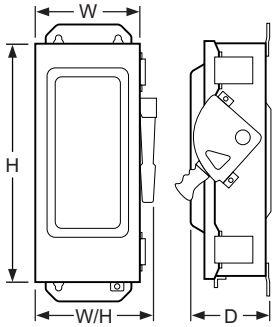
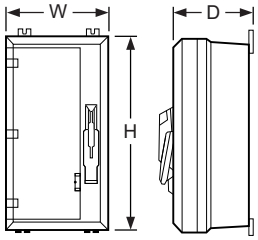
NEMA Type 4, 4X, 5, 7, 9, and 12

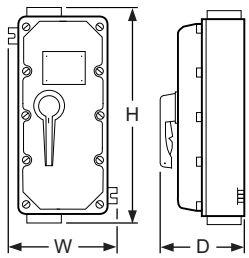
See Table 3.42 Terminal Lug Data, page 3-18 for terminal lug data for the series switches listed in the dimension table below.



Typical NEMA Type 4, 4X, 5, 12, 12K
(Stainless has flat front)



Typical NEMA Type 4X
Fiberglass and Krydon



Typical NEMA Type 7, 9

Table 3.45: Approximate Dimensions

Cat. No.	Series	H		W		D		W/H	
		in.	mm	in.	mm	in.	mm	in.	mm
H60XFA	E1	15.93	405	9.87	251	6.96	177	9.87	251
H100XFA	E1	15.93	405	9.87	251	6.96	177	9.87	251
H221AWK,A	F6	14.60	371	6.63	168	4.96	125	7.55	192
H221DS	F6	14.93	379	7.22	183	5.11	130	8.67	220
H221-2AWK	F6	16.50	419	9.00	229	7.00	178	10.50	267
H222AWK,A	F6	14.60	371	6.63	168	4.96	125	7.55	192
H222DS	F6	14.93	379	7.22	183	5.11	130	8.67	220
H223AWK,A	F6	20.50	521	9.00	229	7.00	178	10.50	267
H223DS	F6	20.82	529	9.36	238	6.97	177	11.25	286
H224A,AWK	F6	29.00	737	17.25	438	8.75	216	18.63	473
H224DS	F6	29.00	737	17.75	451	8.88	226	19.25	489
H225AWK,DS	E4	46.25	1175	26.25	667	10.13	259	26.25	667
H225NAWK,NDS	E4	46.25	1175	26.25	667	10.13	259	26.25	667
H225XJG	A1	22.56	573	10.88	276	7.75	197	10.88	276
H226AWK,DS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H226NAWK,NDS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H227AWK,NAWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H228AWK,NAWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H265AWK,DS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H266AWK,A,DS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H267AWK,NAWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H268AWK,NAWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H321AWK,A	F6	14.60	371	6.63	168	4.96	125	7.55	192
H321DS	F6	14.93	379	7.22	183	5.11	130	8.67	220
H322AWK,A	F6	14.60	371	6.63	168	4.96	125	7.55	192
H322DS	F6	14.93	379	7.22	183	5.11	130	8.67	220
H323AWK,A	F6	20.50	521	9.00	229	7.00	178	10.50	267
H323DS	F6	20.82	529	9.36	238	6.97	177	11.25	286
H324A,AWK	F6	29.00	737	17.25	438	8.75	216	18.63	473
H324DS	F6	29.00	737	17.75	451	8.88	226	19.25	489
H325AWK,DS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H325NAWK,NDS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H326AWK,DS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H326NAWK,NDS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H327AWK,NAWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H328AWK,NAWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H361AWA	F7	16.50	419	9.00	229	7.00	178	10.50	267
H361AWC	F7	16.50	419	9.00	229	7.00	178	10.50	267
H361AWK,A	F6	14.60	371	6.63	168	4.96	125	7.55	192
H361DS	F6	14.93	379	7.22	183	5.11	130	8.67	220
H361DSWA	F7	16.87	428	8.92	227	5.11	130	10.81	275
H361DSWC	F7	16.87	428	8.92	227	5.11	130	10.79	274
H361DF	F1	16.50	419	11.00	279	8.80	224	11.00	279
H361DX	F1	19.40	493	11.40	290	8.60	218	11.40	290
H361SS	F6	14.93	379	7.22	183	5.11	130	8.67	220
H361-2AWK,A	F6	16.50	419	9.00	229	7.00	178	10.50	267
H362AWA	F7	16.50	419	9.00	229	7.00	178	10.50	267
H362AWC	F7	16.50	419	9.00	229	7.00	178	10.50	267
H362AWH	F6	16.50	419	9.00	229	7.00	178	10.50	267
H362AWK,A	F6	16.50	419	9.00	229	7.00	178	10.50	267
H362DS	F6	16.87	428	8.92	227	6.97	177	10.81	275
H362DSWA	F7	16.87	428	8.92	227	5.11	130	10.81	275
H362DSWC	F7	16.87	428	8.92	227	5.11	130	10.79	274
H362DF	F1	16.50	419	11.00	279	8.80	224	11.00	279
H362DX	F1	19.40	493	11.40	290	8.60	218	11.40	290
H362SS	F6	16.87	428	8.92	227	6.97	177	10.81	275
H363AWA	F7	20.50	521	9.00	229	7.00	178	10.50	267
H363AWC	F7	20.50	521	9.00	229	7.00	178	10.50	267
H363AWK,A	F6	20.50	521	9.00	229	7.00	178	10.50	267
H363DS	F6	20.82	529	9.36	238	6.97	177	11.25	286
H363DSWA	F7	20.82	529	9.36	238	6.97	177	11.25	286
H363DSWC	F7	20.82	529	9.36	238	6.97	177	11.25	286
H363DF	F1	24.80	630	13.70	348	12.00	305	13.70	348
H363DX	F1	25.25	641	11.40	290	8.60	218	11.40	290
H363SS	F6	20.82	529	9.36	238	6.97	177	11.25	286
H364A,AWK	F6	29.00	737	17.25	438	8.75	216	18.63	473
H364DS,NDS	F6	29.00	737	17.75	451	8.88	226	19.25	489
H364NA,NAWK	F6	29.00	737	17.25	438	8.75	216	18.63	473
H364DF	E1	31.30	795	26.30	668	11.80	300	26.30	668
H364SS	F6	29.00	737	17.75	451	8.88	226	19.25	489
H365AWK,DS,SS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H365NAWK,NDS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H366AWK,DS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H366NAWK,NDS,SS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
H367AWK,NAWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H368AWK,NAWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
H461AWK	F6	20.50	521	14.75	375	6.80	173	16.13	410
H461DS	F6	20.82	529	15.08	383	6.97	177	16.85	428
H462AWK	F6	20.50	521	14.75	375	6.80	173	16.13	410
H462DS	F6	20.82	529	15.08	383	6.97	177	16.85	428
H463AWK	F6	20.50	521	14.75	375	6.80	173	16.13	410
H463DS	F6	20.82	529	15.08	383	6.97	177	16.85	428
H464AWK	F6	29.00	737	23.25	591	8.75	222	24.88	632
H464DS	F6	29.00	737	23.75	603	8.88	226	25.25	641
H465AWK	E5	46.25	1175	32.50	826	10.13	259	32.50	826
H663AWK	F6	20.50	521	14.75	375	6.80	173	16.13	410
H663DS	F6	20.82	529	15.08	383	6.97	177	16.85	428
H664AWK	F6	29.00	737	23.25	591	8.75	222	24.88	632
H664DS	F6	29.00	737	23.75	603	8.88	226	25.25	641
HU265AWK,DS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
HU266AWK,DS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
HU267AWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
HU268AWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
HU361AWA	F7	16.50	419	9.00	229	7.00	178	10.50	267
HU361AWC	F7	16.50	419	9.00	229	7.00	178	10.50	267
HU361AWK,A	F6	14.60	371	6.63	168	4.96	125	7.55	192
HU361DS	F6	14.93	379	7.22	183	5.11	130	8.67	220
HU361DSWA	F7	16.87	428	8.92	227	5.11	130	10.81	275
HU361DSWC	F7	16.87	428	8.92	227	5.11	130	10.79	274

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Table 3.45 Approximate Dimensions (cont'd.)

Cat. No.	Series	H		W		D		W/H	
		in.	mm	in.	mm	in.	mm	in.	mm
HU361DF	F1	16.50	419	11.00	279	8.80	224	11.00	279
HU361DX	F1	19.40	493	11.40	290	8.60	218	11.40	290
HU361SS	F6	14.93	379	7.22	183	5.11	130	8.67	220
HU362AWA	F7	16.50	419	9.00	229	7.00	178	10.50	267
HU362AWC	F7	16.50	419	9.00	229	7.00	178	10.50	267
HU362AWH	F6	16.50	419	9.00	229	7.00	178	10.50	267
HU362AWK,A	F6	16.50	419	9.00	229	7.00	178	10.50	267
HU362DS	F6	16.87	428	8.92	227	6.97	177	10.81	275
HU362DSWA	F7	16.87	428	8.92	227	5.11	130	10.81	275
HU362DSWC	F7	16.87	428	8.92	227	5.11	130	10.79	274
HU362DF	F1	16.50	419	11.00	279	8.80	224	11.00	279
HU362DX	F1	19.40	493	11.40	290	8.60	218	11.40	290
HU362SS	F6	16.87	428	8.92	227	6.97	177	10.81	275
HU363AWA	F7	20.50	521	9.00	229	7.00	178	10.50	267
HU363AWC	F7	20.50	521	9.00	229	7.00	178	10.50	267
HU363AWK,A	F6	20.50	521	9.00	229	7.00	178	10.50	267
HU363DS	F6	20.82	529	9.36	238	6.97	177	11.25	286
HU363DSWA	F7	20.82	529	9.36	238	6.97	177	11.25	286
HU363DSWC	F7	20.82	529	9.36	238	6.97	177	11.25	286
HU363DF	F1	24.80	630	13.70	348	12.00	305	13.70	348
HU363DX	F1	25.25	641	11.40	290	8.60	218	11.40	290
HU363SS	F6	20.82	529	9.36	238	6.97	177	11.25	286
HU364A,AWK	F6	29.00	737	17.25	438	8.75	216	18.63	473
HU364DF	E1	31.30	795	26.30	668	11.80	300	26.30	668
HU364DS	F6	29.00	737	17.75	451	8.88	226	19.25	489
HU364SS	F6	29.00	737	17.75	451	8.88	226	19.25	489
HU365AWK,DS,SS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
HU366AWK,DS,SS	E5	46.25	1175	26.25	667	10.13	259	26.25	667
HU367AWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
HU368AWK	E4	69.13	1756	36.62	930	17.75	451	36.62	930
HU461AWK	F6	20.50	521	14.75	375	6.80	173	16.13	411
HU461DS	F6	20.82	529	15.08	383	6.97	177	16.85	428
HU462AWK	F6	21.25	540	16.13	410	6.80	173	16.13	410
HU462DS	F6	20.82	529	15.08	383	6.97	177	16.85	428
HU463AWK	F6	20.50	521	14.75	375	6.80	173	16.13	410
HU463DS	F6	20.82	529	15.08	383	6.97	177	16.85	428
HU464AWK	F6	29.00	737	23.25	591	8.75	222	24.88	632
HU464DS	F6	29.00	737	23.75	603	8.88	226	25.25	641
HU465AWK	E5	46.25	1175	32.50	826	10.13	259	32.50	826
HU661AWK	F6	20.50	521	14.75	375	6.80	173	16.13	410
HU661DS	F6	20.82	529	15.08	383	6.97	177	16.85	428
HU662AWK	F6	20.50	521	14.75	375	6.80	173	16.13	410
HU662DS	F6	20.82	529	15.08	383	6.97	177	16.85	428
HU663AWK	F6	20.50	521	14.75	375	6.80	173	16.13	410
HU663DS	F6	20.82	529	15.08	383	6.97	177	16.85	428
HU664AWK	F6	29.00	737	23.25	591	8.75	222	24.88	632
HU664DS	F6	29.00	737	23.75	603	8.88	226	25.25	641

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30–100 A DT, DTU (Series F)
NEMA Type 1

30–100 A Types DT, DTU (Series F)

- Fusible (DT) and non-fusible (DTU) switches available
- Manually-operated switch suitable for use in accordance with article 702 of the NEC, ANSI/NFPA 70
- Standards: UL 98, Type KS1, CSA, and NOM
- Modular design—switch handle, lock-plate, switch mechanism; line and load bases are field replaceable
- UL Listed short circuit current ratings up to 200 kA (using with (fusible) or protected by (non-fusible) Class R, J, or T fuses—see table for rating)
- Load make/break rated
- Horsepower rated
- Dual cover interlock
- May be padlocked ON (I) or OFF (O)
- Lock-off accepts up to three padlocks
- Side-opening door
- Quick make / quick break mechanism
- Meets NEMA requirements as heavy duty switch
- Field-installed electrical interlock kits
- Field-installed neutral assembly kits (2P and 3P switches)
- UL Listed as suitable for use as service equipment
- Supplied as standard for switching one load between two power sources, and may be field-converted to switch one power source between two loads.

82,000 Line
NEMA Type 1

30 (Series T4), 200–600 A Types 82,000 and 200 A DTU (Series E, A)

- Non-fusible
- Designed for manual transfer of one load between two power sources
- UL Listed switches are suitable for use in accordance with Article 702 of the National Electrical Code, ANSI / NFPA 70
- All 82,000 and DTU double throw switches are continuous duty rated for their nameplate ampere rating
- The 82,000 and DTU (Series E, A) switches are load make/break rated
- UL Listed as suitable for use as service equipment
- Horsepower rated only as footnoted

Field-Installable Accessories

- Neutral
- Electrical Interlock
- Grounding Terminals

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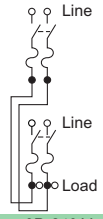
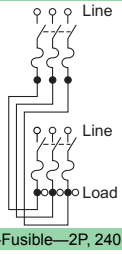
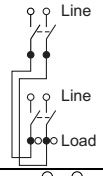
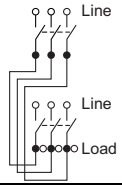
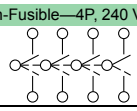
Double-Throw Safety Switches

Table 3.46: 240 V Double Throw Safety Switches

System	Amperes	Current Series	NEMA Type 1	NEMA Type 3R	NEMA Type 4,4X,5 304 Stainless Steel	NEMA Type 12 Gasketed	Horsepower Ratings *[1][2]*				
							240 Vac				250 Vdc*[3]*
							Std.		Max.		
			Cat. No.	Cat. No.	Cat. No.	Cat. No.	1Ø	3Ø	1Ø	3Ø	
Fusible—2P, 240 Vac—250 Vdc											
	100	F	DT223	DT223RB	—	—	7.5	15 *[4]*	15	30 *[4]*	20
Fusible—3P, 240 Vac—250 Vdc											
	30	F	DT321	DT321RB	—	—	1.5 *[5]*	3 *[4]*	3 *[5]*	7.5 *[4]*	5
	60	F	DT322	DT322RB	—	—	3 *[5]*	7.5 *[4]*	10 *[5]*	15 *[4]*	10
	100	F	DT323	DT323RB	—	—	7.5 *[5]*	15 *[4]*	15 *[5]*	30 *[4]*	20
Non-Fusible—2P, 240 Vac—250 Vdc											
	60	F	DTU222	—	—	—	—	—	10	—	10 *[6]*
	100	F	DTU223	DTU223RB	—	—	—	—	15	—	20 *[6]*
	30	T4	92251 *[7]*	—	—	—	—	—	—	—	—
	200	E	82254	DTU224NRB *[7] [8]*	—	H82254	15	—	—	—	—
	400	A	82255 *[7]*	82255R *[7]*	—	H82255 *[7]*	—	—	—	—	—
Non-Fusible—3P, 240 Vac—250 Vdc											
	30	F	DTU321	—	—	—	—	3 *[4]*	5 *[5]*	10 *[4]*	5 *[6]*
	60	F	DTU322	—	—	—	—	—	10 *[5]*	15 *[4]*	10 *[6]*
	100	F	DTU323	DTU323RB	—	—	—	—	15 *[5]*	30 *[4]*	20 *[6]*
	30	T4	92351 *[7]*	—	—	—	—	—	—	—	—
	200	E	82354 *[7]*	—	—	H82354 *[7]*	—	15	—	—	—
	200	E	DTU324N *[7] [8]*	DTU324NRB *[7] [8]*	—	—	—	15	—	—	—
	400	A	82355 *[7]*	82355R *[7]*	—	H82355 *[7]*	—	—	—	—	—
	600	A	DTU326	DTU326R	—	—	—	125	—	—	50
Non-Fusible—4P, 240 Vac											
	30	T4	92451	—	—	—	—	—	—	—	—
	200	E	82454 *[9]*	82454R *[9]*	—	H82454 *[10]*	—	15 *[10]*	—	—	—
	400	A	82455	82455R	—	H82455	—	—	—	—	—
	600	A	DTU426	DTU426R	—	—	—	125	—	—	50

600 V Double Throw: page 3-24
Accessories: page 3-25
Application Data: Application Data, page 3-27
Dimensions, 30–100 A (Series F): page 3-29
Dimensions, 30, 200–600 A (Series E, T4, A): page 3-30

[1] The starting current of motors or more than standard horsepower may require the use of fuses with appropriate time delay characteristics.
[2] Std.—Using fast acting one time fuses. Max.—Using dual element time delay fuses.
[3] For switching dc, use two switching poles.
[4] If used on corner grounded delta systems, install neutral and use outer switching pole for ungrounded conductors. See data bulletin 2700DB0202 for additional information.
[5] Use outer switching poles.
[6] Maximum rating.
[7] 240 Vac only. Not Vdc rated.
[8] Neutral included with device.
[9] 240 Vac, 250 Vdc.
[10] Hp rating applies only to H82454.

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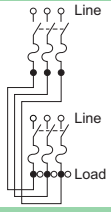
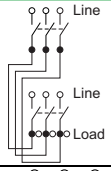
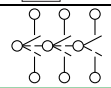
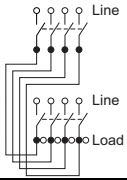
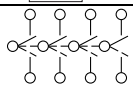
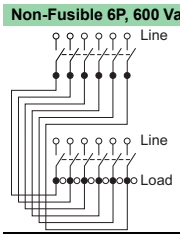
Double Throw Safety Switches

Table 3.47: 600 V Double Throw Safety Switches

System	Amperes	Current Series	NEMA Type 1	NEMA Type 3R	NEMA Type 4,4X,5 304 Stainless Steel	NEMA Type 12 Gasketed	Horsepower Ratings [11][12]							
							240 Vac		480 Vac		600 Vac		Vdc [13]	
							Std	Max	Std	Max	Std	Max	250	600
			Cat. No.	Cat. No.	Cat. No.	Cat. No.	3Ø	3Ø	3Ø [14]	3Ø[14]	3Ø	3Ø		
Fusible 3P, 600 Vac—600 Vdc														
	30	F	DT361	DT361RB	—	—	—	—	5 [15]	15 [15]	7.5	20	5	15 [16]
	60	F	DT362	DT362RB	—	—	—	—	15 [17]	30 [17]	15	50	—	30 [18]
	100	F	DT363	DT363RB	—	—	—	—	25 [19]	60 [19]	30	75	—	50 [20]
Non-Fusible 3P, 600 Vac—600 Vdc							1Ø [13] [21]	3Ø [14] [21]	1Ø [13] [21]	3Ø [14] [21]	1Ø [13] [21]	3Ø [21]		
	30	F	DTU361	DTU361RB	—	—	5	10	7.5	20	10	30	5	15
	60	F	DTU362	DTU362RB	DTU362DS	DTU362AWK[22]	10	20[23]	25	50 [24]	30	60 [25]	10	30
	100	F	DTU363	DTU363RB	DTU363DS	DTU363AWK[22]	20	40[26]	40	75[26]	40	100 [26]	20	50
	200	E	82344 [27]	82344RB [27]	82344DS [27] [28]	H82344 [27]	—	—	—	15 [29]	—	—	—	—
	400	A	82345 [30]	82345R[30]	82345DS[30]	H82345[30]	—	—	—	—	—	—	—	—
	600	A	DTU366[30]	DTU366R[30]	—	DTU366AWK[30]	—	125	—	250	—	350	50	—
Non-Fusible 4P, 600 Vac—600 Vdc							2Ø	3Ø	2Ø	3Ø	2Ø	3Ø		
	60	F	DTU462[31]	Use NEMA Type 12	DTU462DS [31]	DTU462AWK[22] [31]	20	20	40	50	50	60	10	30
	100	F	DTU463 [31]		DTU463DS [31]	DTU463AWK[22] [31]	30	40	50	75	50	100	20	50
	200	E	82444[30]	82444R[30]	82444DS[30]	H82444 [22] [31] [32] [30]	—	—	—	—	—	—	—	—
	400	A	82445[30]	82445R[30]	—	H82445[30]	—	—	—	—	—	—	—	—
	600	A	DTU466[30]	DTU466R[30]	—	—	—	125	—	250	—	350	50	—
Non-Fusible 6P, 600 Vac—600 Vdc							1Ø	3Ø	1Ø	3Ø	1Ø	3Ø		
	60	F	—	—	—	DTU662AWK[22] [31]	—	20	—	50	—	60	10	30
	100	F	—	—	—	DTU663AWK[22] [31]	—	40	—	75	—	100	20	50

240 V Double Throw: page 3-23
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Dimensions, 30, 200–600 A (Series E, T4, A): page 3-30

[11] The starting current of motors of more than standard horsepower may require the use of fuses with appropriate time delay characteristics.
[12] Std.—Using fast acting one time fuses. Max.—Using dual element time delay fuses. (Non-fusible switches have max rating unless noted.)
[13] Use outer switching poles.
[14] If used on corner grounded delta systems, install neutral and use outer switching pole for ungrounded conductors.See data bulletin 2700DB0202 for additional information.
[15] 480 Vac 1 Phase HP = 3 Std, 7.5 Max
[16] 10 Std, 15 Max
[17] 480 Vac 1 Phase HP = 5 Std, 20 Max
[18] 25 Std, 30 Max
[19] 480 Vac 1 Phase HP = 10 Std, 30 Max
[20] 40 Std, 50 Max
[21] Maximum HP
[22] Complete rating on switch is NEMA Type 3R, 5 or 12. For 3R applications, remove drain screw from bottom endwall.
[23] Maximum HP is 15 for corner grounded delta systems.
[24] Maximum HP is 30 for corner grounded delta systems.
[25] Use 75ºC #4 Cu or #2 Al conductors only on DTU362 and DTU362RB.
[26] Use 75ºC #1 Cu conductors only.
[27] 480 Vac, 250 Vdc maximum
[28] Not UL Listed.
[29] Standard Hp rating.
[30] 250 Vdc maximum.
[31] Not suitable for use as service equipment.
[32] 480 Vac, 250 Vdc maximum.

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Accessories

Table 3.48: Electrical Interlocks (For Electrical Interlock Contact Ratings, see Supplemental Digest Section 2)

Switch	Field-Installed Electrical Interlock Kit Cat. No.*[33]*
30–100 A Type DT, DTU (Series F)	EIK1, EIK2*[34]*[35]
200 A Type 82000 and DTU (Series E)*[36]*	*[37]*
400 A Type 82000 (Series A)	EK400DTU2
600 A Type DTU (Series A)	DS200EK2D

Table 3.49: Neutral Assembly

Switch	Field-Installed Standard Neutral Kit Cat. No.	Terminal Data AWG/kcmil	Field-Installed Copper only Neutral Kit Cat. No.	Terminal Data AWG/kcmil
30–100 A Type DT, DTU (Series F) (2- and 3-pole switches only)	SN0310	(3) 14-1/0 Al/Cu plus (2) 14-6 Al/Cu Svc Ground	SN0310C	(3) 14-1/0 Cu plus (2) 14-6 Cu Svc Ground
30 A (Series T4) (2- and 3-pole switches only)	*[38]*	(3) 14-4 Al/Cu plus (2) 14-4 Al/Cu Svc Ground	—	—
200 A Type 82000 (Series E) (2 and 3 pole switches only)*[39]*	*[38]*	(3) 6-300 Al/Cu plus (1) 6-2/0 Al or 10-2/0 Cu Svc Ground	—	—
200A Type DTU (Series E)	Factory Installed	(3) 4-300 Al/Cu plus (1) 4-300 Al/Cu Svc Ground	—	—
400 A Type 82000 (Series A)	DT400N	(1) 1/0 - 600 Al/Cu or (2) 1/0 - 250 Al/Cu plus (2) 6-300 Al/Cu Svc Ground	—	—
600 A Type DTU (Series A)	DT600NKD	(6) 250-500 Al/Cu plus (1) 6-250 Al/Cu Svc Ground	—	—

Table 3.50: Service Grounding Kit—Required for service equipment use

Switch	Field-Installed Service Grounding Lug Kit Cat. No.	Terminal Data AWG/kcmil
30–60 A Type DT, DTU (Series F)	Included	(3) 14-2 Al/Cu or (6) 14-10 Al/Cu
100 A Type DT, DTU (Series F)	Included	(3) 14 - 1/0 Al/Cu
30 A Type 92,000 (Series T4)	DT30SG	(4) 14-4 Al/Cu
200 A Type 82000 and DTU (Series E)	DT100SG	(3) 14–1/0 Al/Cu
400 A Type 82000 (series A)	PKOGTA2 (2 required)	(4) 10–2/0 Cu or (4) 6–2/0 Al
600 A Type DTU (Series A)	DS468GKD	(2) 6–250 Al/Cu *[40]*

Table 3.51: Class R Fuse Kits

When properly installed, this kit rejects all but Class R fuses. Kits are available for field installation. For factory installation add suffix CLR to the switch catalog number.

Switch	Series Number	Class R Fuse Kit Cat. No.
Class R Fuse Kits—240 V (two kits per 3P switch)		
30 A	F5	RFK03
60 A	F5	RFK06
100 A	F5	RFK10
Class R Fuse Kits—600 V (two kits per 3P switch)		
30 A	F5	RFK06
60 A	F5	RFK06H
100 A	F5	RFK10

Viewing Windows: Accessory available on 30–100 A DTU switches only. Add the suffix VW to the catalog number.

Key Interlock Systems: For factory-installed key interlocks, refer to page 3-16.

Phenolic Legend Plate: For factory-installed phenolic legend plates, refer to Supplemental Digest section 2.

Lock-ON Provisions: Standard feature on 30–100 A type DT and DTU (Series F), 82,000 (400 A only) and type 92,000 switches.

Feature available as factory installed option for Type 82,000 (200 A only) and 200 A DTU (Series E) switches. Add the suffix SPLO to the catalog number.

[33] Electrical interlock kit catalog numbers with "1" suffix indicate one normally open and normally closed contact; "2" indicates two normally open and two normally closed contacts. See Table 3.29 Electrical Interlock Kit, page 3-14 for electrical interlock ratings.
[34] 30–100 A Type DT, DTU (Series F) switches contain (2) separate switching mechanisms. Each mechanism will accept an electrical interlock. Some applications may therefore require (2) electrical interlocks.
[35] Double throw switches 92251, 92351, and 92451 are not available with factory or field installed electrical interlocks.
[36] Electrical interlock EK400DTU2 can be added to 200 A, 4-pole Type 82000 switches in the field.
[37] Type 82000 and DTU switches are available with electrical interlock factory-installed only. Not UL listed. Electrical interlocks are furnished with 2 N.O./N.C. contacts and are installed in both "ON" positions. To order, add suffix EI to standard switch catalog number.
[38] For 200 A Type 82000 and 30 A Type 92000 switches, a neutral assembly is available factory installed on 2P and 3P switches. Not UL Listed. To order, add suffix N to the standard catalog number. Terminated data = (3) 4 - 250 Al / Cu plug, (1) 4 - 250 Al / Cu SVC ground.
[39] Neutral assembly catalog number DT200N can be added to 4P, 200 A, Type 82000 switches in the field.
[40] (3) 6-250 ground lugs are provided as standard. DS468GKD provides an additional (2) 6-250 ground lugs.

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Rainproof Bolt-On Hubs

- UL Listed for indoor or rainproof applications
- Suitable for use with conduit having ANSI standard taper pipe thread
- NEMA Type 3R switches with catalog number ending in RB have a bolt-on closing cap factory installed
  - Accepts 3/4 in. through 2-1/2 in. bolt-on hubs
  - No gaskets required
- NEMA Type 3R switches with R suffix have blank top endwalls
  - Accepts 3 in. through 4 in. bolt on hubs
  - Gaskets provided
  - Conduit entry holes must be cut in the field

Table 3.52: Rainproof Bolt-On Hubs *[41]*

Conduit Size	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	Closing Cap
Hub Cat. No	B075	B100	B125	B150	B200	B250	B300	B350	B400	BCAP

Watertight Hubs

Watertight Hubs

- UL Listed for dusttight and watertight applications
- Suitable for use with conduit having ANSI standard taper pipe thread
- Watertight hubs are field installed on NEMA Type 4/4X/5 stainless steel and NEMA Type 12/3R and 12K enclosures
- Watertight hubs are available in zinc or chrome plated finish
- Gaskets provided

Table 3.53: Watertight Hubs *[42]*

Conduit Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4
Standard-Zinc Hub Cat. No	H050	H075	H100	H125	H150	H200	H250	H300	H350	H400
Chrome Plated Hub Cat. No.	H050CP	H075CP	H100CP	H125CP	H150CP	H200CP	—	—	—	—

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Dimensions, 30, 200–600 A (Series E, T4, A): page 3-30

[41] Gaskets are provided on 3 in. and larger hubs.
[42] Gaskets are provided.

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Application Data for Double Throw Safety Switches

Situations Requiring Fuses

30–100 A Type DT (Series F):

Select DT switches from 240 Volt Double-Throw Safety Switches, page 3-23 and 600 Volt Double Throw Safety Switches, page 3-24 which have provisions for accepting fuses.

30 A, 200–600 A Type 82,000 (Series E, T4, A), all DTU devices:

Use the non-fusible double throw switches from 240 Volt Double-Throw Safety Switches, page 3-23 and 600 Volt Double Throw Safety Switches, page 3-24 in conjunction with standard fusible devices, and install them according to diagram 1 or 2, below.

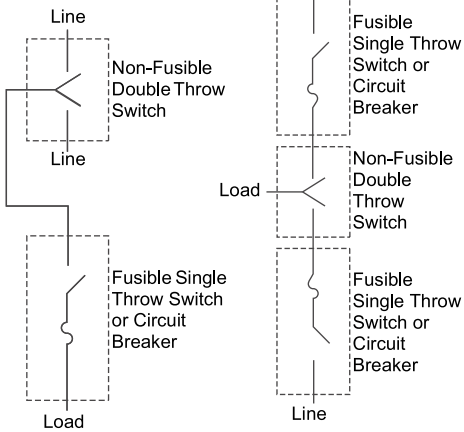

Diagram 1 **Diagram 2**

Table 3.54: UL Listed Short Circuit Current Ratings

Switch Type	Amperes	Voltage Rating	UL Listed Fuse Class	Short Circuit Current Rating *[43]* (A)
Type 92000	30 A	240 V	H, K	10,000 *[44]*
Type DT (Series F)	30–100 A	240 V or 600 V	H, K	10,000
			R, J	200,000
Type DTU*[45]* (Series F)	30–100 A	240 V or 600 V	H or K	10,000 *[44]*
			R, J or T	200,000
DTU224NRB and DTU324NRB (Series E)	200 A	240 V	H, K	10,000*[46]*
DTU324N (Series E)	200 A	240 V	H, K	10,000*[46]*
			R, J	100,000
Type 82,000	All	240 V or 600 V	H, J	10,000*[46]*
Type DTU (Series A)	600 A	240 V or 600 V	H, K	10,000
			R, J, T	100,000

[43] Rating applies to AC only. The UL Listed short circuit current rating for non-fusible switches is based on the switch being used in conjunction with the corresponding fuse type. Evaluation of non-fusible switches in conjunction with molded case circuit breakers has not been performed.

[44] Any brand of circuit breaker or fuse not exceeding the ampere rating of the switch may be used ahead of a non-fusible safety switch when there is up to 10 kA short circuit current available.

[45] The DTU361 and DTU361RB are also suitable for use on a circuit capable of delivering not more than
(A) 18 kA, 600 Vac maximum when protected by Type FH circuit breaker rated 30 A maximum or
(B) 14 kA, 600 Vac maximum when protected by Type FA circuit breaker rated 30 A maximum.

[46] Any brand of circuit breaker or fuse not exceeding the ampere rating of the switch may be used ahead of a non-fusible safety switch when there is up to 10 kA short circuit current available.

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Terminal Lug Data

Table 3.55: Terminal Lug Data for Type DT, DTU (Series F) Double Throw Safety Switches *[47]*

Switch Type	Wires per Phase	NEMA Type 1, 3R, 4, 4X, 12			Optional Copper Only Lug
		Wire Range Wire Bending Space Per NEC Table 373-6 AWG/kcmil	Standard Lug Wire Range AWG/kcmil	Optional Compression Lug Field-Installed	
30–60 A Type DT, DTU (Series F)	1	12–2 Al or 14–2 Cu	12–2 Al or 14–2 Cu	C10-14, D8-14-SK, or E6-14 *[48]*	See Table 3.39 Copper Lug Kits, page 3-17 and Double Lug Kits, page 3-18 for appropriate kit. Order two kits per switch.
100 A Type DT, DTU (Series F)	1	12–1/0 Al or 14–1/0 Cu	12–1/0 Al or 14–1/0 Cu	VCEL02114S1*[49]*	

Table 3.56: Terminal Lug Data for Types 82,000 and for A and E-Series DTU devices *[47]*

Amperes	Wires per Phase	Wire Range Wire Bending Space Per NEC Table 373-6 AWG/kcmil	Lug Wire Range AWG/kcmil	Optional Compression Lugs Field-Installed
30 A (Series T4)	1	14–8 Al/Cu	12–2 Al or 14–2 Cu	—
200	1	6–300 Al/Cu	6–300 Al/Cu	VCEL030516H1*[49]*
400	1 or 2	1/0–600 Al/Cu or 1/0–300 Al/Cu	1/0 - 750 Al/Cu or 1/0 - 300 Al/Cu	—
600	2	250–500 Al/Cu	250–500 Al/Cu	—

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Accessories: page 3-25
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Dimensions, 30, 200–600 A (Series E, T4, A): page 3-30

[47] 30-100 A switches suitable for 60° C or 75° C conductors. 200-600 A switches suitable for 75° C conductors.
[48] Order from Thomas and Betts
[49] Hubbell Versa-Crimp™ catalog numbers.

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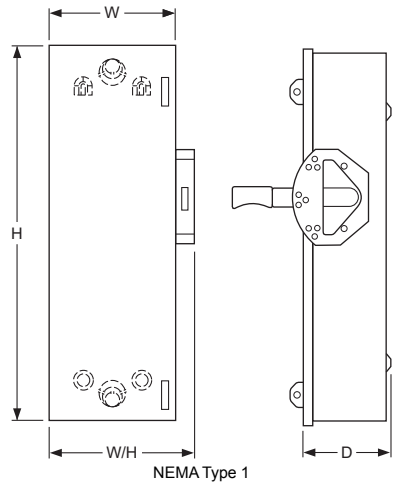
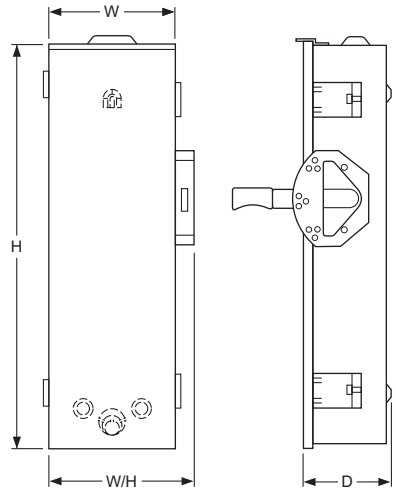
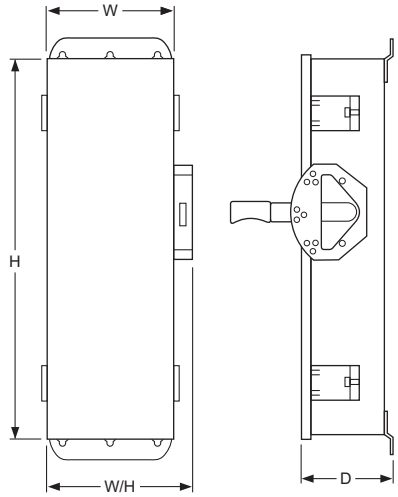


NEMA Type 1



NEMA Type 3R



NEMA Type 4, 4X, 5, and 12

Series F Devices 30–100 A

Table 3.57: 30–100 A Type DT, DTU (Series F)—Approximate Dimensions

Cat. No.	Series	H		W		W/H		D	
		in.	mm	in.	mm	in.	mm	in.	mm
DT223	F5	38.00	965	9.88	251	11.13	283	6.75	171
DT223RB	F5	38.00	965	6.87	174	8.12	206	6.60	168
DT321	F5	38.00	965	10.25	260	11.50	292	6.75	171
DT321RB	F5	38.00	965	10.25	260	11.80	300	6.60	168
DT322	F5	38.00	965	10.25	260	11.50	292	6.75	171
DT322RB	F5	38.00	965	10.25	260	11.80	300	6.60	168
DT323	F5	38.00	965	9.88	251	11.13	283	6.75	171
DT323RB	F5	38.00	965	6.87	174	8.12	206	6.60	168
DT361	F5	38.00	965	10.25	260	11.50	292	6.75	171
DT361RB	F5	38.00	965	10.25	260	11.80	300	6.60	168
DT362	F5	38.00	965	10.25	260	11.50	292	6.75	171
DT362RB	F5	38.00	965	10.25	260	11.80	300	6.60	168
DT363	F5	38.00	965	9.88	251	11.13	283	6.75	171
DT363RB	F5	38.00	965	6.87	174	8.12	206	6.60	168
DTU222	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU223	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU223RB	F5	30.50	775	10.25	260	11.96	304	6.93	176
DTU321	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU322	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU323	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU323RB	F5	30.50	775	10.25	260	11.96	304	6.93	176
DTU361	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU361RB	F5	30.50	775	10.25	260	11.96	304	6.93	176
DTU362	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU362AWK	F6	29.94	760	10.25	260	11.96	304	6.93	176
DTU362DS	F6	30.26	769	10.25	260	11.50	292	7.12	181
DTU362RB	F5	30.50	775	10.25	260	11.96	304	6.93	176
DTU363	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU363AWK	F6	29.94	760	10.25	260	11.96	304	6.93	176
DTU363DS	F6	30.26	769	10.25	260	11.50	292	7.12	181
DTU363RB	F5	30.50	775	10.25	260	11.96	304	6.93	176
DTU462	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU462AWK	F6	30.26	769	15.50	394	16.75	425	7.12	181
DTU462DS	F6	30.26	769	15.50	394	16.75	425	7.12	181
DTU463	F5	29.94	760	10.25	260	11.96	304	6.93	176
DTU463AWK	F6	30.26	769	15.50	394	16.75	425	7.12	181
DTU463DS	F6	30.26	769	15.50	394	16.75	425	7.12	181
DTU662AWK	F6	30.26	769	15.50	394	16.75	425	7.12	181
DTU663AWK	F6	30.26	769	15.50	394	16.75	425	7.12	181

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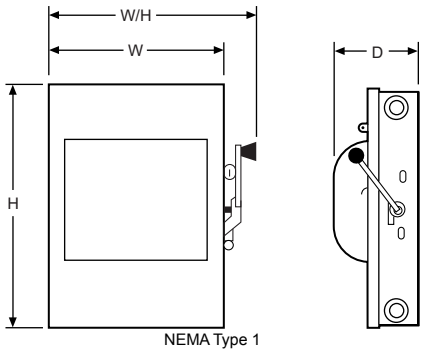
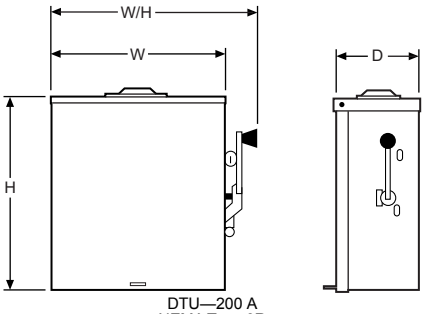


NEMA Type 1



DTU—200 A
NEMA Type 3R

Series A, E, and T4 Devices

Table 3.58: 200–600 A Types 82,000 and E-Series DTU and 30 A devices—Approximate Dimensions

Cat. No.	Series	H		W		W/H		D	
		in.	mm	in.	mm	in.	mm	in.	mm
DTU224NRB	E1	32.50	826	20.63	524	24.00	610	10.63	270
82254	E1	30.88	784	15.75	400	19.63	499	9.75	248
82254NW	E1	30.88	784	20.00	508	23.88	607	11.75	298
82344	E2	30.88	784	20.00	508	23.88	607	11.75	298
82344RB	E1	32.50	826	20.63	524	24.00	610	10.63	270
82354	E1	30.88	784	20.00	508	23.88	607	11.75	298
92251	T4	10.00	254	8.00	203	9.75	248	4.75	121
82344DS	E1	30.88	784	20.00	508	23.88	607	11.75	298
DTU324N	E1	32.50	826	24.50	622	26.25	667	10.63	270
DTU324NRB	E1	32.50	826	24.50	622	26.25	667	10.63	270
H82344	E2	32.50	826	24.50	622	26.25	667	10.63	270
H82444	E2	32.50	826	30.21	767	33.61	854	10.63	270
H82454	E3	32.50	826	30.21	767	33.61	854	10.63	270
82454	E3	38.00	965	29.62	753	33.02	839	10.63	270
82444	E3	38.00	965	29.62	753	33.02	839	10.63	270
82454R	E3	38.00	965	29.62	753	33.02	839	10.63	270
82444R	E3	38.00	965	29.62	753	33.02	839	10.63	270
H82254	E3	32.50	826	24.50	622	26.25	667	10.63	270
H82354	E3	32.50	826	24.50	622	26.25	667	10.63	270
82444DS	E3	38.00	965	29.62	753	33.02	839	10.63	270
82255	A1	38.50	978	26.10	663	29.51	750	10.63	270
82255R	A1	39.00	991	26.62	676	30.02	763	10.63	270
82345	A1	38.50	978	26.10	663	29.51	750	10.63	270
82345DS	A1	39.00	991	26.62	676	30.02	763	10.63	270
82345R	A1	39.00	991	26.62	676	30.02	763	10.63	270
82355	A1	38.50	978	26.10	663	29.51	750	10.63	270
82355R	A1	39.00	991	26.62	676	30.02	763	10.63	270
82445	A1	38.50	978	30.10	765	33.50	851	10.63	270
82445R	A1	39.00	991	30.21	767	33.61	854	10.63	270
82455	A1	38.50	978	30.10	765	33.50	851	10.63	270
82455R	A1	39.00	991	30.21	767	33.61	854	10.63	270
H82255	A1	39.00	991	26.62	676	30.02	763	10.63	270
H82345	A1	39.00	991	26.62	676	30.02	763	10.63	270
H82355	A1	39.00	991	26.62	676	30.02	763	10.63	270
H82445	A1	39.00	991	30.21	767	33.61	854	10.63	270
H82455	A1	39.00	991	30.21	767	33.61	854	10.63	270
DTU326	A1	63.31	1608	23.66	601	24.46	621	8.88	226
DTU426	A1	63.31	1608	27.00	686	27.80	706	8.88	226
DTU366	A1	63.31	1608	23.66	601	24.46	621	8.88	226
DTU466	A1	63.31	1608	27.00	686	27.80	706	8.88	226
DTU326R	A1	63.76	1619	23.66	601	24.46	621	8.88	226
DTU426R	A1	63.76	1619	27.00	686	27.80	706	8.88	226
DTU366R	A1	63.76	1619	23.66	601	24.46	621	8.88	226
DTU466R	A1	63.76	1619	27.00	686	27.80	706	8.88	226
DTU366AWK	A1	63.76	1619	23.66	601	24.46	621	8.88	226

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1000 Vdc Photovoltaic Heavy Duty Disconnect Switch

Put over 100 years of Schneider Electric's experience as a global specialist in energy management to work on your photovoltaic (PV) project. The Square D 1000 Vdc disconnect switch is the perfect solution for your 1000 Vdc, PV disconnect applications. It is compact and available in both a 100 and 200 amp non-fusible versions. IEC 60947-1 and UL 98 certified (file E343341).

Extended Life Expectancy

- Exceeds IEC 60947-3 mechanical endurance requirements by factor of 18
- Exceeds IEC 60947-1 electrical endurance requirements by factor of 10
- Exceeds NEMA KS-1 mechanical endurance requirements by factor of 3.

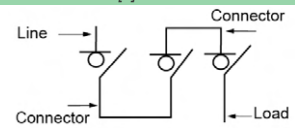
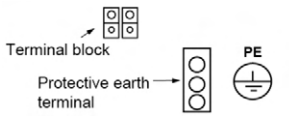
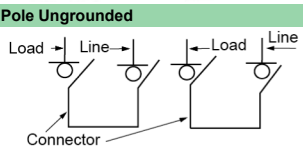
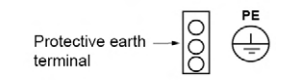
Designed for Harsh PV Environments

- NEMA Type 3 and IP63 enclosure
- Resists windblown dirt/dust
- Exceeds NEMA Type 1, 3R and 12
- Operating range of -37°C to 50°C
- Specially designed PV paint reduces solar gain up to 35% over standard grey enclosures

Easy to Install

- Preconfigured solar solution
- Familiar enclosed safety switch design
- Suitable for both grounded and ungrounded PV

Table 3.59: 1000 Vdc Photovoltaic Heavy Duty Disconnect Switch Accessories *[1]*

System	NEMA Type 1, 3R, 12, 3 and IP63		Factory Installed Accessories							
			Electrical Interlock Single Contact *[2]*	Electrical Interlock Two Contacts *[3]*	Viewing Windows	Terminal Blocks (Copper) *[4]*	3 Wire Ground Lug *[5]*	Height (in.)	Width (in.)	Depth (in.)
	Amperes	Cat. No.	No. Suffix	No. Suffix	No. Suffix	No. Suffix	No. Suffix			
3 Pole Grounded *[6]*										
	100	REHU393IP	EI	EI2	VW	TBC	GL	22.13	18.63	8.75
	200	REHU394IP	EI	EI2	VW	TBC	GL	22.13	18.63	8.75
4 Pole Ungrounded										
	100	REHU493IP	EI	EI2	VW	—	GL	29.00	18.63	8.75
	200	REHU494IP	EI	EI2	VW	—	GL	29.00	18.63	8.75

[1] Kit consist of 3 line and 3 load and 2 neutral lugs as required for a 3 pole 400A or 600A General Duty Switch.
[2] Order EIK1PV for single contact field-installed kit.
[3] Order EIK2PV for double contact field-installed kit.
[4] Accommodates (2) 250 max Cu or (1) 1/0 max Cu wiring; Order SN20CPV for field-installed kit.
[5] Order REHGND KIT for field installable kit.
[6] Terminal blocks standard with 3 pole switches; accommodates (2) 1/0 max Al/Cu or (2) 6 max Al/Cu wiring.

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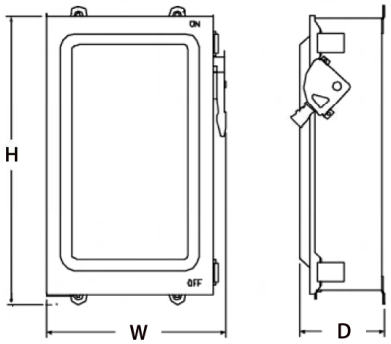

200 A Enclosed Switch Dimensions (inches)

Table 3.60: 200 A Enclosed Switch—Approximate Dimensions

Switch	H		W		D	
	in.	mm	in.	mm	in.	mm
100 A	21.75	552	18.86	479	8.75	197
200 A	29.00	737	18.86	479	8.75	197

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Section 4

Power Monitoring and Control

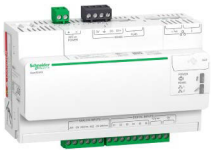
StruxureWare Power Monitoring Expert Software

ION8650 Power and Energy Meters

ION7550 and ION7650 Power and Energy Meters

PowerLogic PM8000 Power and Energy Meters

CM400T with VFD Display



Com'X Data Loggers and Energy Servers

Ethernet Gateways

Sepam Series 80

Vamp 321 Arc Flash Protection and Mitigation

ReactiVar Low Voltage Automatic Capacitor Bank

AccuSine PCS+

AccuSine PFV+

VarSet Low-Voltage Capacitor Banks

PowerLogic™ Energy and Power Management Systems 4-2

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  - StruxureWare Power Monitoring Expert Software 4-4
  - StruxureWare PowerSCADA Expert 4-6
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- **Actionable intelligence**
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- **Proactive capabilities**
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+

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Delivers cost and operational efficiencies

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Application

		Data Presentment & Management		Data Acquisition, Alarms & Monitoring		
		Enterprise	Online Energy Analysis	Supervisory Control & Data Acquisition	Power Monitoring System	Tenant Submetering
		Data Centers; Industrial Buildings, Property Management, Utilities	Utilities	Water/Wastewater, Heavy Process Industry, Data Centers, Critical Power	Industrial, large commercial buildings, Military Bases, Healthcare	Commercial Buildings, Government Buildings, Military Bases
Cost Management	Meter Application					
	Automatic Meter Reading			•	••••	••
	Revenue Metering			•	••••	••
	WAGES Utility Pulses				•••	
	Sub-billing	•••	•••			••••
	Measurement & Verification	••••	••		•••	
	Cost Allocation & Utility Billing					
	Energy Usage Analysis	••••	•••	•	••	•
	Procurement Optimization	••	•••	•	•	
	Allocate Energy Costs	•			•	
	Interval Benchmarking & Profiling	••••	•••	•	••	
	Total Load Aggregation	••••				
	Energy Efficiency					
	Emissions Tracking	••	•••			
	Power Factor Correction	•	•		•••	
	Peak Demand Reduction	••	•	•••	•••	
	Demand Response & Curtailment			•••	•••	
Ensure Power Quality	Improve Maintenance Practices					
	Commissioning & Troubleshooting			•••	••••	
	Equipment Monitoring: transformers, MCCs, switchgear, switchboards, circuit breaker status, protective equipment, capacitors, generators, panelboards, PDU, UPS, etc.			•••	••••	
	Facility Planning					
	Identify Equipment Capacity				•••	
	Determine Transformer Stress				•••	
	Equipment Asset Optimization	••		••	•••	
	Improve Efficiency					
	Balance Circuit Loading				•••	
	Balance Generator Usage				•••	
	Optimize Chiller & Mechanical Equipment				•	
Network Management	System Monitoring & Analysis					
	Transient Voltage Detection				••••	
	Sag/Swell Disturbance Monitoring				••••	
	Power Quality & Harmonic Analysis				••••	
	Power Quality Compliance	••••		•	•••	
	Alarm & System Diagnositics					
	Electrical Distribution Alarm & Event Analysis	•		•••	••••	
	Waveform capture viewing				••••	
	Remote alarm notification			••••	•••	
Engineering Services	Energy Services					
	Total Energy Control Services	••••	see Engineering Services, page 4-28		•••	
	Peak Shaving/Generator Control	see Engineering Services, page 4-28		••••	••	see Engineering Services, page 4-28
	Load Management/ Shedding			••••	••	
	WAGES				•••	
	Advanced Reliability Services					
	Auto Throw Over (ATO)	see Engineering Services, page 4-28		••••	••	see Engineering Services, page 4-28
	Emergency Power Supply System Test Reporting				••••	
	Sequence of Events Recording (1ms time/ stamp)			••••	•••	
	GPS Time Stamping			••••	•••	
	Power System Control			••••	•	
	Network Protection			••••	••	
	Consulting Services					
	System Studies (SC/TCC/ Arc Flash)	see Engineering Services, page 4-28				
	Power System Assessments					

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- Manage power quality, availability, and reliability
- Optimize use of your electrical and infrastructure assets
- Drive energy efficiency initiatives and improve financial performance

Modular Design:
Power Monitoring Expert also features many application modules that add specific functionality to extend the base platform. Available modules include

- Energy Analysis
- UPS Performance
- Breaker Performance
- Energy Cost Allocation & Billing
- Automated Generator Testing

StruxureWare Power Monitoring Expert Software

StruxureWare Power Monitoring Expert

StruxureWare™ Power Monitoring Expert is an integrated power & energy management software platform that enables you to optimize your power distribution infrastructure, maximize operational efficiency, and improve your bottom-line performance. This complete, interoperable, and scalable solution will help you

- Maximize facility uptime and reliability
- Analyze and mitigate power quality related issues
- Track and optimize equipment performance
- Analyze energy consumption, uncover savings opportunities and accurately allocate energy related costs
- Enable compliance with power quality and energy standards such as ANSI/IEEE and ISO50001

Typical Applications

- Monitor the facility electrical network to verify reliable operation and proactively optimize performance
- Maximize facility uptime by improving response to power-related events and restore operations quickly
- Perform root cause analysis to power-related disturbances through sequence of events reporting
- Analyze and isolate the source of power quality problems
- Analyze total energy use from all electrical and piped utilities identify waste and reduce cost
- Improve sustainability performance with greenhouse gas emissions tracking and industry compliance reporting
- Identify billing discrepancies and avoid contract penalties by validating utility bills to verify accuracy
- Allocate energy costs to departments to drive accountability, awareness and support energy action programs like ISO50001
- Reduce peak demand and power factor penalties with monitoring, alerts, and corrective actions
- Negotiate rates with energy suppliers and enable participation in demand response programs
- Confirm return on investment for infrastructure improvements with advanced reporting and analysis
- Optimize existing infrastructure capacity and avoid over-building
- Prolong asset life with proactive maintenance and optimization

Functional Components:

- Power quality analytics
  - Monitor events and waveform plotting system-wide
  - Monitor harmonics, K-factor, crest factor, symmetrical components
  - Diagnose and isolate PQ problems to increase reliability
  - Automatically detect and report on voltage disturbances
  - Quickly evaluate PQ events plotted on standard ITIC curve
- Customized real-time monitoring
  - Access real-time status of sensitive power distribution components
  - Trend chart tools with customized views to reveal patterns and anomalies quickly
- Data analytics and visualization
  - Smart dashboards with configurable presentation widgets and kiosk options
  - Powerful graphics templates and libraries
  - Automated power quality reports and waveform analysis tools
  - Comprehensive templates for energy and power reporting, with flexible report distribution options
- Alarm and event management
  - Powerful alarm triggering, notification, and analysis tools
  - Accurate time-stamped sequence of events reporting for power system event root cause analyses
- Robust technical infrastructure
  - Solid data acquisition architecture including ready-to-use communications drivers with many electrical distribution devices
  - Fully compatible with current operating systems and databases
  - Interoperable with integration to other systems and devices through open data and protocol standards (ODBC, OPC, XML, Modbus, Web/SOAP Services)
  - Scalable to thousands of metered points through flexible deployment options

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Segment Editions:

Power Monitoring Expert also features segment-specific solutions for data centers, healthcare, industry and buildings, delivering pre-engineered functionality customized to meet your needs.

StruxureWare Power Monitoring Expert Data Center Edition

- Decrease the number and duration of unplanned outages
- Manage power capacity and reduncancy
- Improve effectiveness of maintenance activities
- Improve power distribution efficiency
- Support energy cost allocation and billing

StruxureWare Power Monitoring Expert Data Healthcare Edition

- Improve energy availability
- Manage power system reliability
- Perform power quality analysis and management
- Support energy efficiency initiatives to improve financial performance

StruxureWare Power Monitoring Expert Data Buildings Edition

- Ensure electrical system health
- Optimize operational efficiency
- Gain energy insight
- Improve energy accountability

Description	Catalog Number
Power Monitoring Expert Standard Edition BASE license (includes 1 Engineering Client)	PSWSANCZZSPEZZ
Power Monitoring Expert Data Center Edition BASE license (includes 1 Engineering Client)	PSWSDNCZZSPEZZ
Power Monitoring Expert Healthcare Edition BASE license (includes 1 Engineering Client)	PSWSHNCZZSPEZZ
Power Monitoring Expert Buildings Edition BASE license (includes 1 Engineering Client)	PSWSBNCZZSPEZZ
5 Device Pack for Power Monitoring Expert software	PSWDANCZZNPEZZ
25 Device Pack for Power Monitoring Expert software	PSWDBNCZZNPEZZ
50 Device Pack for Power Monitoring Expert software	PSWDCNCZZNPEZZ
100 Device Pack for Power Monitoring Expert software	PSWDDNCZZNPEZZ
200 Device Pack for Power Monitoring Expert software	PSWDFNCZZNPEZZ
Unlimited Devices for Power Monitoring Expert software	PSWDZNCZZSPEZZ
Engineering Client for Power Monitoring Expert software	PSWCENCZZNPEZZ
Web Client for Power Monitoring Expert software	PSWCWNCZZNPEZZ
Unlimited Engineering and Web Clients for Power Monitoring Expert software	PSWCZNCZZSPEZZ
Event Notification Module for Power Monitoring Expert software	PSWMVNCZZSPEZZ
Cost Allocation & Billing Module for Power Monitoring Expert software	PSWMBNCZZSPEZZ
Breaker Performance Module for Power Monitoring Expert software	PSWMXNCZZSPEZZ
Energy Analysis Module for Power Monitoring Expert software	PSWMZNCZZSPEZZ
Energy Awareness Module for Power Monitoring Expert software	PSWMYNCZZSPEZZ
UPS Performance Module for Power Monitoring Expert software	PSWMUNCZZSPEZZ
EPSS Module for Power Monitoring Expert software (HealthCare)	PSWMENCZZSPEZZ
Generator Performance Module for Power Monitoring Expert software (Data Centers)	PSWMGNCZZSPEZZ
IT Billing Module for Power Monitoring Expert software (Data Centers)	PSWMTNCZZSPEZZ
Power Capacity Module for Power Monitoring Expert software (Data Centers)	PSWMPNCZZSPEZZ
Power Efficiency Module for Power Monitoring Expert software (Data Centers)	PSWMNNCZZSPEZZ
SQL Server 2012 License - 2 COREs	IE7SQLCZSNPEZZ

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StruxureWare PowerSCADA Expert

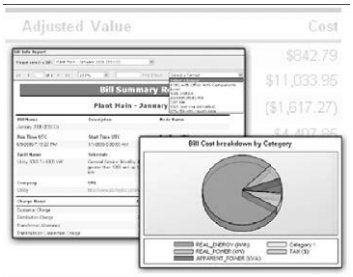
- Increase uptime of power systems
- Provides accurate and actionable information in real time
- Highlights issues, remediation, and their impacts

StruxureWare™ PowerSCADA Expert is electrical distribution network monitoring and control software that provides vital tools to enhance your power system reliability and operational efficiency. Its powerful architecture combines our proven expertise in electrical distribution with the speed and control of high-performance SCADA to reduce outages while increasing power system efficiency. An excellent fit for virtually every industry and application, PowerSCADA Expert delivers exceptional scalability so that it can grow to match your changing business requirements while driving down the total cost of ownership. Components interact seamlessly across Schneider Electric's extensive product portfolio and third party suppliers.

- Dynamic electrical network view to improve production, reduce costs and boost safety
- Highly reliable monitoring and control tailored to unique electrical network needs
- Detailed electrical information across the multi-vendor network
- Fast issue resolution and reporting to improve electrical network quality and energy use
- Report KPIs, energy costs, and filtered alarming
- Real-time visualization of the network
- Disturbance waveform views for analysis and control for remediation

For quoting and pricing, please contact PowerLogic Sales at 615-287-3535.

Personalized dashboards help management and operations personnel monitor all aspects of energy use



Produce aggregate billing, load profile, cost allocation, power quality, forecasting or budget reports to help inform stakeholders and track results against goals.

PowerLogic ION EEM Software

PowerLogic™ ION EEM is a complete Enterprise Energy and Sustainability Management System (EESMS) to provide energy data warehousing capabilities, integrating data from multiple sites and disparate systems. For example, the EESMS will be capable of integrating data from building and process systems, power management systems, energy billing and pricing systems, business and accounting systems, weather services, spot-market energy pricing feeds etc. to facilitate green economic policies (such as reducing CO2 emissions), energy conservation measures, or sustainability targets.

Typical applications:

- Display visually rich energy intelligence dashboards to drive energy behavior change.
- Allocate costs and usage across facilities, departments, and other organizational units.
- Benchmark, measure and verify energy key performance indicators for performance versus target.
- Track and manage environmental impact carbon/GHG emissions and carbon inventories (by source, scope and pollutant), using appropriate global emission factors.
- Reduce peak demand surcharges and power factor penalties.
- Identify billing discrepancies.
- Model energy accurately using statistical regression techniques.
- Forecast energy needs and compare rates for efficient procurement.
- Facilitate participation in load curtailment programs.
- Track performance of energy and sustainability programs, and assess cumulative savings and return on investments.
- Manage energy and sustainability projects and scenarios and assess potential financial impact prior to implementation.
- Store and manage energy invoices in a central repository.

Key features:

- True enterprise-level software architecture: data quality assurance, data warehouse, web framework
- Web portal: personalized dashboards, key performance indicators, charts, trends, real-time conditions
- Reporting: rich and customized content, support for complex data and graphics, scheduled distribution
- Trending: advanced visualization, dimensional analysis, prediction, statistical rollups
- Modeling: regression analysis, normalization, correlation, integration of all relevant drivers and contextual data
- Billing: built-in rate engine and rate wizard
- Power quality analysis: wide-area event monitoring, classification, filtering, correlation
- Alarms and events: triggering on complex conditions, notification, logging
- Integration: data acquisition systems, weather and pricing feeds, other enterprise applications (e.g. BAC, ERP)
- Greenhouse Gas Emissions (CO2) Reporting

For quoting and pricing, please contact PowerLogic Sales at 615-287-3535.

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ION8650 Power and Energy Meters

The web-enabled PowerLogic ION8650 is used to monitor electric distribution networks, service entrances and substations. It enables businesses to manage complex energy supply contracts that include power quality guarantees. Low-range current accuracy makes it ideal for independent power producers and cogeneration applications that require the accurate bi-directional measurement of energy. It is well suited to load curtailment, equipment monitoring and control and energy pulsing and totalization applications. Integrate it with Power Management Software applications.

ION8650 Power and Energy Meter Features

Feature set C includes:

- 9S, 35S, 36S socket and switchboard cases
- True RMS 3-phase voltage, current, power and meets stringent ANSI revenue metering standards including ANSI C12.20 0.2 and Class 2, 10, & 20
- Power quality: sag/swell, individual, even, odd, total harmonics to the 31st and symmetrical components
- 32MB log/event memory, min/max for any parameter, historical logs up to 80 channels, timestamp resolution to 0.001 seconds and GPS time synchronization
- Transformer/line loss compensation and Instrument transformer correction
- Communications: Ethernet, Serial, Modem, Internet and Ethernet to serial gateway and ION, DNP 3.0, Modbus RTU, Modbus TCP, MV-90 protocols, IEC 61850
- C model limited to IR + 2 other ports at one time. Ports can be enabled/disabled by user
- Dial-out capability when memory is near full
- Multi-user, multi-level security with control and customized access to sensitive data for up to 50 users
- Data push capability through SMTP (email)
- 65 setpoints — math, logic, trig, log, linearization formulas
- Password protection and anti-tamper seal protection
- Built-in I/O: 4 KYZ digital outs and 3 form A digital ins, 4 KYZ digital outs and 1 form A digital out and 1 form A digital in, an optional external I/O expander provides additional I/O

Feature set B adds the following to feature set C:

- Harmonics—individual, total even, total odd up to the 63rd
- 64MB standard memory
- Historical logs up to 320 channels
- Modbus RTU Master on serial ports
- Cycle setpoint minimum response time

Feature set A adds the following to feature sets C and B:

- Waveform capture up to 1024 samples/cycle, PQ compliance monitoring, flicker to EN50160 Ed2, IEC 61000-4-7/4-15 (also configurable to IEEE519 2014, IEEE159, SEMI) CBEMA/ITIC
- Transient detection to 6517µs at 60Hz;
- Harmonics: magnitude, phase and inter-harmonics to the 50th
- 128MB standard memory
- Max 96 cycles of waveform logs and 800 channels of historical logs

Table 4.1: Typical PowerLogic ION8650 Power and Energy Meter Ordering Configurations

Description	Catalog No.
ION8650, feature set A, 9S socket base, 5 A nominal current inputs, 10MB memory, 127–177 Vac, 60 Hz, communications card with: 10BaseT, RS-232/485, RS-485, Optical port, 4 Digital Outputs, 3 Digital Inputs	S8650A0C0E6E1B0A
ION8650, feature set A, 35S socket base, 5 A nominal current inputs, 10MB memory, 120–480 Vac, 60 Hz, communications card with: 10Base T, RS-232/485, RS-485, Optical port, 4 Digital Outputs, 3 Digital Inputs	S8650A1C0E6E1B0A
ION8650, feature set C, 9S socket base, 5 A nominal current inputs, 2MB memory, 120–277 Vac, 60 Hz, communications card with: RS-232/485, RS-485, Optical port, 4 Digital Outputs, 3 Digital Inputs	S8650C0C0E6A0B0A
ION8650, feature set C, 35S socket base, 5 A nominal current inputs, 2MB memory, 120–277 Vac, 60 Hz, communications card with: RS-232/485, RS-485, Optical port, 4 Digital Outputs, 3 Digital Inputs	S8650C1C0E6A0B0A

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ION7550 and ION7650 Power and Energy Meters

Used at key distribution points and sensitive loads, the web-enabled PowerLogic ION7550 and PowerLogic ION7650 meters combine a wealth of advanced features from power quality analysis capabilities, revenue accuracy and multiple communications options, through web compatibility, and control capabilities. Both are compatible with PowerLogic Power Management Software applications and can be integrated with other energy management or building control systems through multiple communication channels and protocols.

The meters are ideal for compliance monitoring, disturbance analysis, cost allocation and billing, demand and power factor control and equipment monitoring and control. The meters have a high visibility, adjustable front panel display that can depict TOU, harmonics, event logs, phasers, and instantaneous power parameters. They meet stringent ANSI C12.20 0.2, Class 10 & 20 revenue metering standards.

PowerLogic ION7550 and ION7650 Power and Energy Meter Features:

- 3.5” x 4.5” (87 x 112 mm) backlit LCD display
- True RMS 3-phase voltage, current, and power that meets stringent ANSI C12.20 0.2, Class 2, 10, & 20
- Power quality: sag/swell, harmonics - individual, even, odd, total to the 63rd, waveform capture at 256 samples/cycle
- 5MB log/event memory (10MB optional), waveform logging up to 96 cycles, up to 800 channels historical, min/max, timestamp resolution to 0.001 seconds, GPS time synchronization and historical trends through front panel
- Communications: fiber, Ethernet, serial, internal modem, optical port, and a gateway functionality, ION, DNP 3.0, Modbus RTU - master & slave, Modbus TCP, MV-90, and IEC 61850. IEC 61850 only available with Ethernet options
- Dial-out capability when memory is near full
- Data push capability through SMTP (email)
- Multi-user, multi-level security with control and customized access to sensitive data for up to 16 users
- 65 configurable 1/2 cycle setpoints for single, multi-condition and dial out on alarm and math, logic, trig, log, linearization formulas
- Password protection and anti-tamper seal protection enhance meter security
- Extensive standard I/O includes: 8 digital inputs, 4 digital outputs and 3 onboard relays
- Disturbance direction detection determines disturbance location and direction relative to the meter.
- Alarm setpoint learning analyzes the circuit and recommends optimum alarm setpoints to minimize nuisance or missed alarms.
- Customize metering or analysis functions at your work station, without hard wiring via ION Frameworks technology.

The ION7650 has all the features of the ION7550 and adds:

- Waveform capture up to 1024 samples/cycle
- Transient detection to 17µs at 60Hz
- Harmonics: magnitude, phase and inter-harmonics to the 40th
- Flicker to EN50160 and IEC 61000-4-7/4-15 (also configurable for IEEE 519-1992, IEEE159, SEMI), plus CBEMA/ITIC
- Symmetrical components
- Power quality measurements per IEC 61000-4-30 Class A, Ed. 2

Table 4.2: Typical PowerLogic ION7550/7650 Power and Energy Meter Ordering Configurations

Description	Catalog No.
Typical PowerLogic ION7550 Power and Energy Meter Ordering Configurations	
Integrated display, with 256 samples/cycle, 5 MB logging memory, 5 A inputs, standard power supply, standard comms. (1 RS232/RS485 port, 1 RS485, 1 Type 2 optical port) plus Ethernet, standard I/O	S7550A0C0B6E0A0A
Integrated display, with 256 samples/cycle, 5 MB logging memory, 5 A inputs, standard power supply, standard comms. (1 RS232/RS485 port, 1 RS485, 1 Type 2 optical port), standard I/O	S7550A0C0B6A0A0A
Typical PowerLogic ION7650 Power and Energy Meter Ordering Configurations	
Integrated display, with 1024 samples/cycle, 10 MB logging memory, 5 A inputs, standard power supply, standard comms. (1 RS232/RS485 port, 1 RS485, 1 Type 2 optical port) plus Ethernet, standard I/O, EN50160 compliance monitoring	S7650B1C0B6E0A0E
Integrated display, with 512 samples/cycle, 5 MB logging memory, 5 A inputs, standard power supply, standard comms. (1 RS232/RS485 port, 1 RS485, 1 Type 2 optical port) plus Ethernet, standard I/O	S7650A0C0B6E0A0A
Integrated display, with 512 samples/cycle, 5 MB logging memory, 5 A inputs, standard power supply, standard comms. (1 RS232/RS485 port, 1 RS485, 1 Type 2 optical port) plus Ethernet and 56k modem, standard I/O	S7650A0C0B6C1A0A
Integrated display, with 512 samples/cycle, 5 MB logging memory, 5 A inputs, standard power supply, standard comms. (1 RS232/RS485 port, 1 RS485, 1 Type 2 optical port), standard I/O	S7650A0C0B6A0A0A
Integrated display, with 1024 samples/cycle, 10 MB logging memory, 5 A inputs, standard power supply, standard comms. (1 RS232/RS485 port, 1 RS485, 1 Type 2 optical port) plus Ethernet, standard I/O	S7650B1C0B6E0A0A

NOTE: Please refer to www.schneider-electric.us for the most complete and up-to-date list of feature availability. Some features are optional.

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CM4000T with VFD Display

Series 4000 Circuit Monitor

The award winning, Web-enabled PowerLogic Series 4000 Circuit Monitor (CM4000T) is the most advanced permanently mounted circuit monitor in the industry today. Designed for critical power and large energy users who cannot afford to be shut down, the CM4000T provides the ability to monitor, troubleshoot and preempt power quality problems. Transients (disturbances lasting less than one cycle) are particularly difficult to detect, due to their short duration. The CM4000T detects and captures oscillatory and impulsive transients (up to 10,000V peak, line-to-line at 5 MHz per channel) as short as one microsecond in duration. The CM4000T automatically performs a high-speed transient waveform capture and a longer disturbance capture to show the conditions surrounding an event. The CM4000T maintains a complete historical record of the number of transients per phase, along with the magnitude, duration and time of occurrence of each. It also performs a stress calculation to determine the circuits that have received the greatest stress from transient overvoltages.

- Waveform capture with up to 512 samples/cycle
- Built-in Trending and Forecasting functionality allows you to forecast energy usage up to 4 days in advance
- Sag/Swell disturbance monitoring
- Two option card slots for field installable cards
- Optional field installable Ethernet communications card with standard and custom web pages
- Alarm Setpoint Learning feature allowing optimum threshold setting (patent pending)
- Multiple alarms: standard, digital, Boolean, high-speed, and disturbance alarms
- Waveshape alarm monitoring
- High speed transient voltage detection at 5 MHz per channel with field installable CVMT current/voltage module
- True RMS Metering through the 255th harmonic
- Extended waveform capture (up to 110 seconds)
- Field installable Digital/Analog I/O cards and flexible I/O extender modules
- Harmonic powerflows up to the 40th harmonic
- Standard KYZ pulse output
- Standard 32 MB of non-volatile memory
- Integrated power quality standards including EN50160, IEC 61000-4-15 (Flicker)
- Sequence of events recording using GPS synchronization technology
- Oscillatory transient detection and recording
- UL Listed, CSA Approved, NOM Approved, FCC compliant

PowerLogic Series 4000 Circuit Monitor Optional Displays

- High visibility remote VF (vacuum fluorescence) display
- Displays metering data, min/max values, alarms, inputs
- Remote LC (liquid crystal) display with backlighting also available
- Optional user configurable display screens

ECC21

IOC44 I/O Card

Table 4.3: Series 4000 Circuit Monitors

Description	Catalog No.
Series 4000 Circuit Monitors	
Instrumentation, On-board Data Logging, Waveform Capture, Disturbance Recording, Configurable I/O, 0.04% Accuracy, Impulsive Transient Detection and Flicker (IEC 61000-4-15)	CM4000T
Series 4000 Circuit Monitor Accessories	
Field installable I/O card with 3 relay outputs, 1 pulse output (KYZ) and 4 status inputs	IOC44
I/O Extender module with 4 DC status inputs, 2 DC digital outputs, 1 analog input and 1 analog output	IOX2411
I/O Extender module with 4 status inputs and 4 analog inputs (4–20 mA)	IOX0404
I/O Extender module with 8 status inputs	IOX08
I/O Extender module with no pre-installed I/O *[1]*	IOX
Ethernet Communications Card; 100 MB Fiber or 10/100 MB UTP Ethernet port and 1 RS-485 master port	ECC21
Current/Voltage module with high speed transient detection	CVMT
4-line x 20—character liquid crystal display with backlighting	CMDLC
4-line x 20—character vacuum fluorescent display with proximity sensor	CMDVF
4 foot display cable	CAB4
12 foot display cable	CAB12
30 foot display cable	CAB30

Table 4.4: SER Time Synchronization

Description	Catalog No.
PowerLogic Satellite Time System, Circuit Monitor and SEPAM GPS Time Synchronization, 100 microsecond accuracy	STS3000
Satellite Time Reference Module	STRM
CyTime Sequence of Events Recorder, 24 Vdc power / 24 Vdc inputs, 32 inputs, web server	9788SER3200
SER 3200 EZ connector for IRIG-B signal	9788EZCIRIGB
Smart Antenna Module	SAM
Smart Antenna Module Interface Cable—200 FT	SAIF200
Power Supply, 24DC/50W, DIN-mountable	PS080

[1] Contact your nearest Square D/Schneider Electric sales office for additional I/O options.

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New!

PowerLogic ION7400

Applications and benefits

- Maximize profits by providing the highest output possible with the least amount of risk to availability.
- Optimize availability and reliability of electrical systems and equipment.
- Monitor power quality (PQ) for compliance and to prevent problems.
- Meters fully supported by StruxureWare Power Monitoring Expert and PowerSCADA Expert Software.

Main Characteristics

- Precision metering
- PQ compliance reporting and basic PQ analysis
- Used with StruxureWare Power Monitoring Expert software, provides detailed PQ reporting across entire network
- Onboard data and event logging
- Alarming and control
- Excellent quality: ISO 9001 and ISO 14000 certified manufacturing.

Table 4.5: PowerLogic ION7400 Meters

Description	Catalog Number
ION7400 Panel mount meter (integrated display with optical port and 2 energy pulse LEDs)	METSEION7400
DIN rail mount - utility meter base	METSEION7403

Table 4.6: PowerLogic ION7400 Accessories

Description	Catalog Number
Remote display, 3 metre cable, mounting hardware for 30mm hole (nut & centering pin), mounting hardware for DIN96 cutout (92x92mm) adapter plate	METSEPM89RD96
Digital I/O module (6 digital inputs & 2 relay outputs)	METSEPM89M2600
Analog I/O module (4 analog inputs & 2 analog outputs)	METSEPM89M0024
Display Cable, 10 meters	METSECAB10

PowerLogic ION7400 showing active alarms.

PowerLogic ION7400 with harmonics display.

PowerLogic ION7400 with phasor display.

PowerLogic ION7400 Utility Feeder Meter

The PowerLogic ION7400 utility feeder meter is a highly accurate, extremely reliable power and energy meter with unmatched flexibility and usability. The meter combines accurate 3-phase energy and power measurements with data logging, power quality analysis, alarming and I/O capabilities not typically available in such a compact meter.

The panel or DIN mounted ION7400 meter is flexible enough to fit into a utility's existing billing or SCADA system, providing industry leading cost management (Class 0.2) and network management (Class S PQ) data. It is compliant with stringent international standards that guarantee their metering accuracy and power quality measurements. Ideal for installations that are responsible for maintaining the operation and profitability of a facility.

Table 4.7: PowerLogic ION7400 Features

Description		ION7400
General		
Use on LV and MV systems		■
Current accuracy (5A Nominal)		0.1 % reading
Voltage accuracy (90-690 V AC L-L, 50, 60, 400 Hz)		0.1 % reading
Active energy accuracy		0.2 %
Number of samples/cycle or sample frequency		256
Instantaneous rms values		
Current, voltage, frequency		■
Active, reactive, apparent power	Total and per phase	■
Power factor	Total and per phase	■
Current measurement range (autoranging)		0.05 - 10A
Energy values		
Active, reactive, apparent energy		■
Settable accumulation modes		■
Demand values		
Current	Present and max. values	■
Active, reactive, apparent power	Present and max. values	■
Predicted active, reactive, apparent power		■
Synchronisation of the measurement window		■
Setting of calculation mode	Block, sliding	■
Power quality measurements		
Harmonic distortion	Current and voltage	■
Individual harmonics	Via front panel and web page	63
	Via StruxurWare software	127
Waveform capture		■
Detection of voltage swells and sags		■
Flicker		■
Fast acquistion	1/2 cycle data	■
EN 50160 compliance checking		■
Customizable data outputs (using logic and math functions)		■
Data recording		
Min/max of instantaneous values		■
Data logs		■
Event logs		■
Trending/forecasting		■
SER (Sequence of event recording)		■
Time stamping		■
GPS synchronization (+/- 1 ms)		■
Memory (in Mbytes)		512 10 MB for Frameworks
Display and I/O		
Front panel display 89 mm (3.5 in.) TFT		■
Wiring self-test		■
Pulse output		1
Digital Analogue		6 in / 2 out 4 in / 2 out
Digital or analogue outputs (max, including pulse output)		1 digital 8 relay 8 analog
Communication		
RS 485 port		1
10/100BaseTX		2
Serial port (Modbus, ION, DNP3)		■
Ethernet port (Modbus/TCP, ION TCP, DNP3 TCP, IEC 61850 *[2]*)		■
ANSI C12.19 Optical port		■
Standards		
IEC 61000-4-30, IEC 61000-4-7, IEC 61000-4-15, IEC 61326-1, ANSI C12.20, IEC 62052-11, IEC 62053-22, CLC/TR50579		

[2] All the communication ports may be used simultaneously.

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New!

PowerLogic PM8000 Power and Energy Meters

These compact meters help ensure the reliability and efficiency of your facility by making the management of power quality, availability, and reliability easy. Measure, understand, and act on insightful power and energy data gathered from your entire system.

The best choice for power management

PM8000 meters combine accurate 3-phase energy and power measurements with data logging, power quality analysis, alarming and I/O capabilities not typically available in such compact meters. Four-metered current inputs allow direct measurement of 3-phase currents and neutral current for enhanced view of harmonics. Dual Ethernet ports support daisy-chaining, removing need for an Ethernet switch inside power equipment, while redundant ring topology provides enhanced availability. Modular, field installable I/O provides expandable scalability. Patented ION technology combines convenient, pre-configured functionality with the ability to customize the meter configuration to meet unique requirements. This embedded capability can save the expense and complexity of additional equipment, both today and tomorrow. Plus, simple installation and networking make energy information quickly accessible, while integration with StruxureWare™ software and your energy management system make it immediately actionable.

Address power issues before they cause problems

- Monitor harmonics to mitigate excessive heating and premature failure of transformers
- Use trending and alarming to detect fluctuations in current pull of critical equipment to prevent motor failure
- Utilize millisecond time stamping to analyze sequence of events
- Identify root cause by analyzing electrical faults with patented disturbance direction detection
- Identify power quality issues per EN 50160, including frequency inconsistency, voltage fluctuations and unbalance, and harmonic contribution
- Allocate costs for water, air, gas, electricity, and steam (WAGES) across departments, phases of industrial process, or cost centers
- Utilize time-of-use calendar to capture electrical consumption for specific times, including on/off peak and holidays

Table 4.8: PM8000 Power and Energy Meter Catalog Numbers

Description	Catalog Number
PM8000 Panel Mount Meter with Integrated Display	METSEPM8240
PM8000 DIN Rail Mount Meter without Display	METSEPM8243
PM8000 DIN Rail Mount Meter + Remote Display	METSEPM8244
Remote Display, Color LCD, 96 x 96	METSEPM89RD96
I/O module, 2 relay outputs, 6 digital inputs	METSEM89M2600
I/O module, 2 analog outputs, 4 analog inputs	METSEM89M0024
Display Cable, 10 meters	METSECAB10
Display Cable, 3 meters	METSECAB3
Display Cable, 1 meters	METSECAB1
Sealing kit	METSEPM8000SK
Mounting adapter kit (ANSI 4")	METSEPMAK
Replacement hardware kit, PM8000 meter	METSEPM8HWK
Replacement hardware kit, PM8000 remote display	METSEPM8RDHWK

Table 4.9: PM8000 Series Features

Intermediate meter		
General		
Use on LV and MV systems		■
Current accuracy (5A Nominal)		0.1 % reading
Voltage accuracy (57 V LN/100 V LL to 400 V LN/690 V LL)		0.1 % reading
Active energy accuracy		0.2 %
Number of samples/cycle or sample frequency		256
Instantaneous rms values		
Current, voltage, frequency		■
Active, reactive, apparent power	Total and per phase	■
Power factor	Total and per phase	■
Current measurement range (autoranging)		0.05–10 A
Energy values		
Active, reactive, apparent energy		■
Settable accumulation modes		■
Demand values		
Current	Present and max. values	■
Active, reactive, apparent power	Present and max. values	■
Predicted active, reactive, apparent power		■
Synchronization of the measurement window		■
Setting of calculation mode	Block, sliding	■
Power quality measurements		
Harmonic distortion	Current and voltage	■
Individual harmonics	Via front panel and web page	63
	Via StruxureWare software	127
Waveform capture		■
Detection of voltage swells and sags		■
Fast acquisition	1/2 cycle data	■
EN 50160 compliance checking		■
Customizable data outputs (using logic and math functions)		■
Data recording		
Min/max of instantaneous values		■
Data logs		■
Event logs		■
Trending/forecasting		■
SER (Sequence of event recording)		■
Time stamping		■
GPS synchronization (+/- 1 ms)		■
Memory (in Mbytes)		512
Display and I/O		
Front panel display		■
Wiring self-test		■
Pulse output		1
Digital or analog inputs(max)		27 digital 16 analog
Digital or analog outputs (max, including pulse output)		1 digital 8 relay 8 analog
Communication		
RS 485 port		1
Ethernet ports		2
Serial port (Modbus, ION, DNP3)		■
Ethernet port (Modbus/TCP, ION TCP, DNP3 TCP, IEC 61850)		■
Ethernet gateway		■
Alarm notification via email		■
HTTP web server		■
SNMP with custom MIB and traps for alarms		■
SMTP email		■
NTP time synchronization		■
FTP File transfer		■

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Power Quality Meter Selection

Features [3]	ION8650			ION7650	ION7550	CM4000T	ION7400	PM8000
	A	B	C					
Inputs, outputs and control power								
3-phase / single-phase	• / •	• / •	• / •	• / •	• / •	• / •	• / •	• / •
Digital in and out / analog in and out	16 / 4	16 / 4	16 / 4	20 / 8	20 / 8	24 / 4	36/24	36/24
Power supply options	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC
Power and energy measurements								
Voltage, current, frequency, power factor	•	•	•	•	•	•	•	•
Power / Demand	• / •	• / •	• / •	• / •	• / •	• / •	• / •	• / •
Energy / time-of-use (energy per shift)	• / •	• / •	• / •	• / •	• / •	• / •	• / •	• / •
IEC / ANSI energy accuracy class (% of reading)	0.2(1)	0.2(1)	0.2(1)	0.2	0.2	0.2	0.2	0.2
Loss compensation	•	•	•	•	•	-	-	-
Power quality analysis								
EN50160 compliance reporting / IEC 61000-4-30 Class A or S	• / A	• / S	- / -	• / A	- / -	• / -	• / S	• / S
Flicker measurement	•	•	-	•	-	•	-	-
Transient detection duration	17 µs	-	-	17 µs	-	200 ns	-	-
Sag and swell monitoring / disturbance direction detection	• / -	• / -	• / -	• / •	• / •	• / •	• / •	• / •
Harmonic distortion: total/ individual / inter	• / • / •	• / • / -	• / • / -	• / • / •	• / • / -	• / • / -	• / • / -	• / • / -
Waveform capture	•	-	-	•	•	•	•	•
On-board data and event logging								
Trending / forecasting / billing	• / - / •	• / - / •	• / - / •	• / • / •	• / • / •	• / • / •	• / • / •	• / • / •
Minimum and maximum	•	•	•	•	•	•	•	•
Events and alarms with timestamps	•	•	•	•	•	•	•	•
Timestamp resolution (seconds)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Time sync: Network / GPS / IRIG-B / DCF77-B	•/•/•/-	•/•/•/-	•/•/•/-	• / • / - / -	• / • / - / -	• / • / - / •	• / • / • / -	• / • / • / -
Setpoints, alarms and control								
Log alarm conditions / call out on alarm	• / •	• / •	• / •	• / •	• / •	• / •	• / •	• / •
Trigger data logging / waveform capture	• / •	• / -	• / -	• / •	• / •	• / •	• / •	• / •
Trigger relay or digital output	•	•	•	•	•	•	•	•
Special features								
Custom programming	•	•	•	•	•	•	•	•
Downloadable firmware	•	•	•	•	•	•	•	•
Communications								
Ports:								
Ethernet: Copper / Fiber	• / •	• / •	• / •	• / •	• / •	• / •	2 / -	2 / -
Ethernet-to-serial gateway	•	•	•	•	•	•	2 / -	•
Telephone modem	•	•	•	•	•	-	-	-
Modem-to-serial gateway	•	•	•	•	•	-	-	-
Infrared port	•	• / •	• / •	• / •	• / •	-	•	-
RS485/RS232	• / •	• / •	• / •	• / •	• / •	• / •	• / -	• / -
Misc: Web server / Email / SNMP / XML	• / • / - / •	• / • / - / •	• / • / - / •	• / • / • / •	• / • / • / •	• / • / - / •	• / • / • / •	• / • / • / •
Protocols: Modbus / DNP / MV-90 / DLMS	• / • / • / -	• / • / • / -	• / • / • / -	• / • / • / -	• / • / • / -	• / - / - / -	• / • / • / -	• / • / • / -
Protocols: IEC61850 / Jbus / M-Bus / LON / BACnet	• / - / - / - / -	• / - / - / - / -	• / - / - / - / -	• / - / - / - / -	• / - / - / - / -	- / - / - / - / -	• / - / - / - / -	• / - / - / - / -

NOTE:

1. The ION8650 is two times more accurate than the 0.2 IEC/ANSI accuracy classes according to the same conditions used to specify the 0.2 accuracy class.
2. ION8800, ION8650, ION8600, ION7650, ION7550, PM8000 also offer Modbus Master capabilities.

[3] Specifications represent maximum capabilities with all options installed. Some options are not available concurrently. This is not a complete feature list, please refer to detailed product specifications.

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New!

Series 5000 Power Meters

The PowerLogic PM5000 series power meters are the new benchmark in affordable, precision metering. It is the ideal fit for high-end cost management applications, providing measurement capabilities needed to allocate energy usage, perform tenant metering and sub-billing, pin-point energy savings, optimize equipment efficiency and utilization, and perform a high level assessment of the power quality in electrical networks.

All meters provide Modbus serial communications. PM5500 level meters are also capable of simultaneous ModBus TCP and BTL-certified BACnet IP communications over Ethernet.

- Panel instrumentation (OEMs)
- Sub-billing and cost allocation
- Remote monitoring of an electrical installation
- Harmonic monitoring (THD)

PM5000 Series
Power Meter

Table 4.10: Series 5000 Power Meters

Description	Catalog No.
Power Meter, Class 0.5 Serial Port	METSEPM5110
Meter, Class 0.5 Alarms TOU Serial Port	METSEPM5330
Power Meter, Class 0.5 Alarms TOU Ethernet Port	METSEPM5340
Power Meter Class 0.2 Serial Port and Dual Ethernet	METSEPM5560
Power Meter without Display Class 0.2 Serial Port and Dual Ethernet	METSEPM5563
Remote Display for METSEPM5563	METSEPM5RD
Power Meter with Remote Display Class 0.2 Serial Port and Dual Ethernet	METSEPM5563RD*[4]*

ION6200 Power and Energy Meter

The modular PowerLogic ION6200 is a low-cost, ultra-compact meter that offers outstanding versatility and functionality. It is simple to use, and has a big, bright LED display. It offers four-quadrant power, demand, energy, power factor and frequency measurements, and is available in a variety of flexible configurations. It is available as a low-cost base model to which enhanced functionality can be added over the long term. The PowerLogic ION6200 is ideal for customers who need revenue-accurate and/or certified measurements and want easy integration with power distribution assemblies and building automation systems. A Megawatt version is available for applications requiring readings in megawatts and kilovolts. It is well suited for sub-metering, energy cost tracking load profiling, and substation panel metering and is an ideal replacement for analog meters. It can be used for stand-alone metering in custom panels, switchboards, switchgear, gensets, motor control centers and UPS systems.

PowerLogic ION6200 Series

The meter consists of a base unit with options card and a power supply pack, with a remote display being optional.

PowerLogic ION6200 Power and Energy Meter Features

- Only two inches deep, and fits a standard ANSI four-inch switchboard cutout, or as a TRAN model with no display and can be fastened to a flat surface with a 4” (10cm) ANSI bolt pattern or mounted to a DIN rail. A remote display module (RMD) can be ordered for the TRAN and mounted through an ANSI 4” (10cm) and DIN 96 cutout.
- LED display with twelve 3/4” (19mm) high digits that display all basic power parameters
- Pulse Outputs: optional kWh, kVARh and/or kVAh pulsing
- Via two Form A outputs
- Communications: optional RS-485 port with Modbus RTU and ION compatible
- 64 samples per cycle true RMS
- 3-phase voltage and current inputs

The standard ION6200 is available with the following: Voltage L-N average and per phase, Voltage L-L average and per phase, Current average and per phase.

Option EP#1, includes the standard measurements and provides the following additional parameters:I4, kW/mW total, kWh/mWh total, kW/mW peak, Current demand average and per phase, Current peak demand average and per phase, Power factor total.

Optional Enhanced Package, includes the standard measurements and provides the following additional parameters: kW/mW per phase, kVAR/mVAR total and per phase, kVA/mVA total and per phase, kWh/mWh and del/rec per phase, kVARh/mVARh total and del/rec per phase, kVAh/mVAh total and per phase, kW/mW demand, kVAR/mVAR demand and peak, kVA/mVA demand and peak, Power Factor per phase, Voltage THD per phase, Current THD per phase.

[4] METSEPM5563RD includes both METSEPM5563 and METSEPM5RD.

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Table 4.11: Typical PowerLogic ION6200 Ordering Configurations

Description	Catalog No.
Integrated display, 10 A inputs, standard 100–240 Vac power supply, RS485 port (Modbus RTU), 2 pulse outputs, Enhanced Package #2	S6200A0A0B0A0B0R
TRAN Model, with remote display, 10 A inputs, standard 100–240 Vac power supply, RS485 port (Modbus RTU), 2 pulse outputs, Enhanced Package #2	S6200R1A0B0A0B0R
TRAN Model, (no display), 10 A inputs, standard 100–240 Vac power supply, RS485 port (Modbus RTU), 2 pulse outputs, Enhanced Package #2	S6200T1A0B0A0B0R

NOTE: Please refer to www.schneider-electric.us for the most complete and up-to-date list of feature availability. Some features are optional.

Series 3500 Energy and Power Meter

EM3500 Series
Energy and Power Meter

The EM3500 series Energy and Power Meter combines exceptional performance and easy installation to deliver a cost-effective solution for power monitoring applications. The EM3500 series can be installed on standard DIN rail or surface mounted, and has bi-directional monitoring designed expressly for renewable energy applications.

- Pulse output and phase alarms
- Data logging capability in some models
- Modbus and BACnet output options

Table 4.12: Series 3500 Energy and Power Meters

Description	Catalog Number
Power Meter, DIN-rail, Pulse Output Only, for LVCTs	METSEEM3502
Power Meter, DIN-rail Pulse Output Only, for U018 Rope CTs	METSEEM3502A
Power Meter, DIN-rail Modbus Output for LVCTs	METSEEM3550
Power Meter, DIN-rail, Modbus Output, for U018 Rope CTs	METSEEM3550A
Power Meter, DIN-rail Modbus Output, Bi-Directional, Logging for LVCTs	METSEEM3555
Power Meter, DIN-rail Modbus Output, Bi-Directional, Logging for U018 rope CTs	METSEEM3555A
Power Meter, DIN-rail, BACnet Output, Logging for LVCTs	METSEEM3560
Power Meter, DIN-rail, BACnet Output, Logging for U018 Rope CTs	METSEEM3560A
Power Meter, DIN-rail, BACnet Output, for LVCTs	METSEEM3561
Power Meter, DIN-rail, BACnet Output, for U018 Rope CTs	METSEEM3561A

U018 Series Rope-Style Current Transformers

The U018 series works exclusively with the EM3500A series power and energy meters. These meters have a built in power supply and integrator, so CT connecton is fast and simple. The coil opens at the connector juncton for fast and easy installaton onto an existng cable or buss-bar. The flexible core makes it easy to fit in tght enclosure

- Agency Approvals cURus, ANSI/IEEE 57.13, CE, RoHS
- Accuracy ±1% from 50 A to 5000 A
- Insulation up to 600 Vac

Description	Catalog Number
12 inch dia. Rope CT for use with EM3500A DIN-Rail Meters, 50 A–5000 A, 1%, 8 ft. leads	U018-0001
18 inch dia. Rope CT for use with EM3500A DIN-Rail Meters, 50 A–5000 A, 1%, 8 ft. leads	U018-0002
24 inch dia. Rope CT for use with EM3500A DIN-Rail Meters, 50 A–5000 A, 1%, 8 ft. leads	U018-0003
36 inch dia. Rope CT for use with EM3500A DIN-Rail Meters, 50 A–5000 A, 1%, 8 ft. leads	U018-0004
12 inch dia. Rope CT for use with EM3500A DIN-Rail Meters, 50 A–5000 A, 1%, 12 ft. leads	U018-0005
18 inch dia. Rope CT for use with EM3500A DIN-Rail Meters, 50 A–5000 A, 1%, 12 ft. leads	U018-0006
24 inch dia. Rope CT for use with EM3500A DIN-Rail Meters, 50 A–5000 A, 1%, 12 ft. leads	U018-0007
36 inch dia. Rope CT for use with EM3500A DIN-Rail Meters, 50 A–5000 A, 1%, 12 ft. leads	U018-0008

LVCT Series Current Transformers

LVCT current transducers provide a 0.333 V output for use with EM3500 series meters. Available in both solid and split core styles.

- Solid core accuracy ±0.5 of reading from 5% to 120% of rated current
- Split core accuracy 1% from 10% to 100% of rated current
- Leads 22 AWG, 600 Vac, UL 1015 bonded pair, 6 ft. (1.8 m) standard length

Description	Catalog Number
Split core	
Low-Voltage CT, Split Core, Size 0, 50 A:0.33 V	LVCT00050S
Low-Voltage CT, Split Core, Size 1, 100 A:0.33 V	LVCT00101S
Low-Voltage CT, Split Core, Size 2, 100 A:0.33 V	LVCT00102S
Low-Voltage CT, Split Core, Size 1, 200 A:0.33 V	LVCT00201S
Low-Voltage CT, Split Core, Size 2, 200 A:0.33 V	LVCT00202S
Low-Voltage CT, Split Core, Size 2, 300 A:0.33 V	LVCT00302S
Low-Voltage CT, Split Core, Size 3, 400 A:0.33 V	LVCT00403S
Low-Voltage CT, Split Core, Size 3, 600 A:0.33 V	LVCT00603S
Low-Voltage CT, Split Core, Size 3, 800 A:0.33 V	LVCT00803S
Low-Voltage CT, Split Core, Size 4, 800 A:0.33 V	LVCT00804S
Low-Voltage CT, Split Core, Size 4, 1000 A:0.33 V	LVCT01004S
Low-Voltage CT, Split Core, Size 4, 1200 A:0.33 V	LVCT01204S
Low-Voltage CT, Split Core, Size 4, 1600 A:0.33 V	LVCT01604S
Low-Voltage CT, Split Core, Size 4, 2000 A:0.33 V	LVCT02004S
Low-Voltage CT, Split Core, Size 4, 2400 A:0.33 V	LVCT02404S
Solid core	
Low-Voltage CT, Solid Core, Size 0, 50 A:0.33 V	LVCT20050S
Low-Voltage CT, Solid Core, Size 0, 100 A:0.33 V	LVCT20100S

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Description	Catalog Number
Low-Voltage CT, Solid Core, Size 2, 200 A:0.33 V	LVCT20202S
Low-Voltage CT, Solid Core, Size 3, 400 A:0.33 V	LVCT20403S

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PM3000 Series Power Meter

New!

PowerLogic PM3000 Power and Energy Meters

PM3000 series power meters are a cost-attractive, feature-rich range of DIN rail-mounted power meters that offers all the measurement capabilities required to monitor an electrical installation. Ideal for power metering and network monitoring applications that seek to improve the availability and reliability of your electrical distribution system, the meters are also fully capable of supporting sub billing and cost allocation applications. Four different models are available. Choose from models that provide Display Only, Display + Pulse Output, Display + Modbus, and Display + Modbus + DI/DO + Logging. All models use 1A/5A CTs.

Table 4.13: PM3000 Features

Available Features	PM3200 Range			
	PM3200	PM3210	PM3250	PM3255
Performance Standard				
IEC61557-12 PMD/Sx/K55/0.5	•	•	•	•
General				
Use on LV and HV systems	•	•	•	•
Number of samples per cycle	32	32	32	32
CT input 1A/5A	•	•	•	•
VT input	•	•	•	•
Multi-tariff	4	4	4	4
Multi-lingual backlit display	•	•	•	•
Instantaneous rms Values				
Current, voltage Per phase and average	•	•	•	•
Active, reactive, apparent power Total and per phase	•	•	•	•
Power factor Total and per phase	•	•	•	•
Energy Values				
Active, reactive and apparent energy; import and export	•	•	•	•
Demand Values				
Current, power (active, reactive, apparent) demand; present	•	•	•	•
Current, power (active, reactive, apparent) demand; peak		•	•	•
Power Quality Measurements				
THD Current and voltage		•	•	•
Data Recording				
Min/max of the instantaneous values	•	•	•	•
Power demand logs				•
Energy consumption log (day, week, month)				•
Alarms with time stamping		5	5	15
Digital inputs/digital outputs		0/1		2/2
Communication				
RS-485 port			•	•
Modbus protocol			•	•

Table 4.14: PM3000 Series Power Meters

Description	Catalog Number
PM3200 3PH energy meter, DIN rail mount, 1A or 5A CT, Class 0.5S, no communications, MID compliant	METSEPM3200
PM3210 3PH energy meter, DIN rail mount, 1A or 5A CT, Class 0.5S, pulse out, MID compliant, THD, one (1) DO	METSEPM3210
PM3250 3PH energy meter, DIN rail mount, 1A or 5A CT, Class 0.5S, Modbus, THD	METSEPM3250
PM3255 3PH energy meter, DIN rail mount, 1A or 5A CT, Class 0.5S, Modbus, MID compliant, THD, two (2) DI, two (2) DO	METSEPM3255

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New!

iEM3000 Energy Meters

The economical iEM3000 energy meters are ideal for helping facilities become more energy efficient. These feature-rich meters reduce installation and commissioning costs thanks to their efficient design and include native support for a variety of protocols, including Modbus, BACnet, LON, and M-Bus, for seamless integration into networks. Choose from models supporting a variety of current-sensing methods, including standard 1A/5A current transformers, 0.333 V low-voltage CTs, and U018 Rogowski coils. There are also direct connect models with internal current sensors that save installation time. The compact size is ideal for new and retrofit installations. Whether metering for energy awareness, billing, or advanced energy programs requiring full-featured, multi-tariff energy meters, there is an iEM3000 meter that fits the application.

iEM3000 Series Energy Meter

NOTE:

- For meter part number replace “i” in model name with “A9M”. (Example: iEM3150 = A9MEM3150)
- DIN rail housing size is 18mm x 5 width. (iEM33xx is 18mm x 7 width.)
- Digital input is selectable for Tariff control or WAGES
- Digital output is selectable for kWh pulse or kW alarm. (iEM3x10 is kWh pulse only.)

Table 4.15: iEM3000 Features

Function	Acti 9 iEM3000 Series Three-Phase Meters						
Current Input / Accuracy							
63A Direct / Class 1	iEM3100	iEM3110	iEM3135	iEM3150	iEM3155	iEM3165	iEM3175
1A or 5A CT / Class 0.5S	iEM3200	iEM3210	iEM3235	iEM3250	iEM3255	iEM3265	iEM3275
125A Direct / Class 1	iEM3300	iEM3310	iEM3335	iEM3350	iEM3355	iEM3365	iEM3375
0.333V or 1.0V LVCT / Class 0.5S					iEM3455	iEM3465	
Rogowski coil / Class 0.5S					iEM3555	iEM3565	
Protocol							
M-Bus			•				
Modbus				•	•		
BACnet						•	
LonWorks							•
Measurement							
MID compliant		•	•		•	•	•
4 quadrant energy			•		•	•	•
Multi Tariff							
Internal clock			4		4	4	4
External control			2		4	4	4
Digital I/O							
Number of inputs/outputs		-/1	1/1		1/1	1/1	1/1

Measurement parameters

- Total and partial kWh shows consumption behavior
- Four-quadrant metering differentiates energy consumption
- Target green technologies (delivered/received)
- Reduce utility penalties (active/reactive)
- Additional parameters (P, Q, S, 3xI, V, PF, F) to monitor network balance and overload behavior

Smart Alarm

- kW overload alarm helps prevent utility demand charges

Multiple Tariffs

- Save up to four different time slots to manage multiple tariffs (peak/off-peak, workday/weekend)
- Control tariffs via digital inputs, internal clock, or communication

Digital Inputs

- Use the meter as a pulse counter for another meter (WAGES monitoring)
- Manage double-source applications (e.g., utility main plus on-site generator)
- Monitor circuit breaker status or cabinet door opening

Digital Outputs

- Use to trip a light or sound an alarm
- Configure as a pulse output

Table 4.16: iEM3000 Series Energy Meters

Description	Catalog Number
iEM3100 3PH energy meter, DIN rail mount, direct connect 63A, Class 1	A9MEM3100
iEM3110 3PH energy meter, DIN rail mount, direct connect 63A, Class 1, pulse out, MID, one (1) DO	A9MEM3110
iEM3135 3PH energy meter, DIN rail mount, direct connect 63A, Class 1, M-Bus, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3135
iEM3150 3PH energy meter, DIN rail mount, direct connect 63A, Class 1, Modbus	A9MEM3150
iEM3155 3PH energy meter, DIN rail mount, direct connect 63A, Class 1, Modbus, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3155
iEM3165 3PH energy meter, DIN rail mount, direct connect 63A, Class 1, BACnet, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3165
iEM3175 3PH energy meter, DIN rail mount, direct connect 63A, Class 1, LON, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3175
iEM3200 3PH energy meter, DIN rail mount, 1A or 5A CT, Class 0.5S	A9MEM3200
iEM3210 3PH energy meter, DIN rail mount, 1A or 5A CT, Class 0.5S, pulse out, MID one (1) DO	A9MEM3210
iEM3235 3PH energy meter, DIN rail mount, 1A or 5A CT, Class 0.5S, M-Bus, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3235
iEM3250 3PH energy meter, DIN rail mount, 1A or 5A CT, Class 0.5S, Modbus	A9MEM3250
iEM3255 3PH energy meter, DIN rail mount, 1A or 5A CT, Class 0.5S, Modbus, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3255
iEM3265 3PH energy meter, DIN rail mount, 1A or 5A CT, Class 0.5S, BACnet, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3265
iEM3275 3PH energy meter, DIN rail mount, 1A or 5A CT, Class 0.5S, LON, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3275
iEM3300 3PH energy meter, DIN rail mount, direct connect 125A, Class 1	A9MEM3300
iEM3310 3PH energy meter, DIN rail mount, direct connect 125A, Class 1, pulse out, MID, one (1) DO	A9MEM3310
iEM3335 3PH energy meter, DIN rail mount, direct connect 125A, Class 1, M-Bus, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3335
iEM3350 3PH energy meter, DIN rail mount, direct connect 125A, Class 1, Modbus	A9MEM3350
iEM3355 3PH energy meter, DIN rail mount, direct connect 125A, Class 1, Modbus, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3355
iEM3365 3PH energy meter, DIN rail mount, direct connect 125A, Class 1, BACnet, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3365
iEM3375 3PH energy meter, DIN rail mount, direct connect 125A, Class 1, LON, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3375
iEM3455 3PH energy meter, DIN rail mount, LVCT, Class 0.5S, Modbus, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3455
iEM3465 3PH energy meter, DIN rail mount, LVCT, Class 0.5S, BACnet, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3465
iEM3555 3PH energy meter, DIN rail mount, Rogowski coil, Class 0.5S, Modbus, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3555
iEM3565 3PH energy meter, DIN rail mount, Rogowski coil, Class 0.5S, BACnet, MID, 4-quadrant energy, one (1) DI, one (1) DO	A9MEM3565

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Multiple Meter Unit Enclosures for iEM3000 Energy Meters

MMU-24

MMU-8

MMU-4

Schneider Electric's Multi-Meter Unit (MMU) enclosures are the ideal complement for the iEM3000 Series of energy meters. This compact solution saves wall space and is scalable for the exact number of meters required. Factory-assembled, pre-wired, and tested enclosures can speed installation, reduce the amount of field wiring, and save time troubleshooting.

Multi-meter unit enclosures and iEM3000 meters provide the highest quality, best value hardware for tenant sub-metering, and are designed for contractor convenience and simplicity.

MMU enclosures are available in three sizes:

- Small MMU enclosures with capacity for up to 4 iEM3000 meters.
- Medium size MMU enclosures with capacity for up to 8 iEM3000 meters, plus one gateway/data logger/energy server.
- Extra-large MMU enclosures with capacity for up to 24 iEM3000 meters, plus one gateway/ data logger/energy server.

Multi meter units are configured to order as described below.

MMU	1	08	08	A	D	1

Series
MMU = Multi-meter unit

NEMA Rating
1 = NEMA Type 1

Enclosure Capacity
04 = 4 meters, 16"H x 12"W x 6"D
08 = 8 meters, 20"H x 20"W x 6"D
24 = 24 meters, 30"H x 24"W x 6"D

Number of Meters Installed
01 = 1 meter
xx = up to capacity limit

Meter Type (Sensor, Serial Protocol)
A = iEM3455 (LVCT, Modbus)
B = iEM3465 (LVCT, BACnet)
C = iEM3555 (Rogowski, Modbus)
D = iEM3565 (Rogowski, BACnet)

System Type
1 = Prewired for single-phase 208Y/120V L-L-N metering
2 = Prewired for single-phase 120V or 277V L-N metering
2 = Prewired for single-phase 120/240V L-L-N metering
2 = Prewired for three-phase 208Y/120V or 480Y/277V L-L-L-N metering

Gateway/Data Logger/Energy Server
N = None (Required if Meter Type is B or D, or Meter Capacity = 04)
L = EGX150 gateway
D = EBX210 data logger
E = EBX510 energy server
X = EGX300 energy server
B = EGX300 energy server with Tenant Bill 32 application
T = EGX300 energy server with Tenant Bill 64 application

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Power and Energy Meter Selection

Features *[5]*	PM5110	PM5330	PM5340	PM5500	ION6200	EM3500	PM3000	iEM3000
Inputs, outputs and control power								
3-phase / single-phase	• / •	• / •	• / •	• / •	• / •	• / •	• / •	• / •
Digital in and out / analog in and out	1 / 0	4 / 0	4 / 0	6 / 0	2/-	2 or 3 / 0	up to 2/2	up to 1/1
Power supply options	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC/DC	AC
Power and energy measurements								
Voltage, current, frequency, power factor	•	•	•	•	•	•	•	•
Power / Demand	• / •	• / •	• / •	• / •	• / •	• / •	• / •	• / –
Energy / time-of-use (energy per shift)	• / -	• / •	• / •	• / •	• / -	- / -	• / •	• / •
IEC / ANSI energy accuracy class (% of reading)	0.5	0.5	0.5	0.2	0.5	0.2	0.5	0.5
Loss compensation	-	-	-	-	-	-	-	-
Power quality analysis								
EN50160 compliance reporting / IEC 61000-4-30 Class A or S	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -
Flicker measurement	-	-	-	-	-	-	-	-
Transient detection duration	-	-	-	-	-	-	-	-
Sag and swell monitoring / disturbance direction detection	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -
Harmonic distortion: total/ individual / inter	• / • / -	• / • / -	• / • / -	• / • / -	• / - / -	- / - / -	• / - / -	- / - / -
Waveform capture	-	-	-	-	-	-	-	-
On-board data and event logging								
Trending / forecasting / billing	- / - / -	- / - / -	- / - / -	- / - / -	- / - / -	- / - / -	- / - / -	- / - / -
Minimum and maximum	•	•	•	•	-	-	•	-
Events and alarms with timestamps	-	•	•	•	-	-	•	-
Timestamp resolution (seconds)	1	1	1	1	-	1	1	-
Time sync: Network / GPS / IRIG-B / DCF77-B	- / - / - / -	- / - / - / -	- / - / - / -	- / - / - / -	- / - / - / -	- / - / - / -	- / - / - / -	- / - / - / -
Setpoints, alarms and control								
Log alarm conditions / call out on alarm	- / -	• / •	• / •	• / •	- / -	- / -	• / -	
Trigger data logging / waveform capture	- / -	- / -	- / -	- / -	- / -	- / -	- / -	- / -
Trigger relay or digital output	-	•	•	•	-	-	•	•
Special features								
Custom programming	-	-	-	-	-	-	-	-
Downloadable firmware	•	•	•	•	-	-	-	-
Communications								
Ports:								
Ethernet: Copper / Fiber	- / -	- / -	1 / -	2/ -	- / -	- / -	- / -	- / -
Ethernet-to-serial gateway	-	-	-	•	-	-	-	-
Telephone modem	-	-	-	-	-	-	-	-
Modem-to-serial gateway	-	-	-	-	-	-	-	-
Infrared port	-	-	-	-	-	-	-	-
RS485/RS232	• / -	• / -	- / -	• / -	• / -	• / -	• / -	• / -
Misc: Web server / Email / SNMP / XML	- / - / - / -	- / - / - / -	- / - / - / -	• / - / - / -	- / - / - / -	- / - / - / -	- / - / - / -	- / - / - / -
Protocols: Modbus / DNP / MV-90 / DLMS	• / - / - / -	• / - / - / -	• / - / - / -	• / - / - / -	• / - / - / -	• / - / - / -	• / - / - / -	• / - / - / -
Protocols: IEC61850 / Jbus / M-Bus / LON / BACnet	- / - / - / - / -	- / - / - / - / -	- / - / - / - / -	- / - / - / - / •	- / - / - / - / -	- / - / - / - / •	- / - / - / - / -	- / - / • / • / •

[5] Specifications represent maximum capabilities with all options installed. Some options are not available concurrently. This is not a complete feature list, please refer to detailed product specifications.

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Energy Meter

PowerLogic Energy Meter

The Energy Meter is ideal for stand-alone and systems-based submetering applications. It is easy to install and provides exceptional metering accuracy. Available in Basic and Extended Range models. The Basic model is designed for metering of 120/240 and 208Y/120 volt services. The Extended Range model will meter 120/240 volt up to 480 volt Wye connected services. Extended Range meters come with pulse output and phase loss output not available on the Basic unit. Optional Modbus™ RS-485 serial communications are provided with the Energy Meter Comms Board, EMCB. Optional kW demand is also provided by the EMCB.

Meter up to 3 individual services with one Energy Meter. The Energy Meter will allow the addition of up to 3 sets of parallel CTs for metering multiple electric loads. Additional sets of CTs can be ordered separately. Please refer to the multiple CT application notes in the Energy Meter instruction bulletin for the proper installation procedures.

Table 4.17: Basic 120/240 V to 208Y/120 V

Description	Catalog No.
Basic 100 A, .518"x1.28" ID, 1 CT	EMB1010
Basic 200 A, 0.75" x 1.10" ID, 1 CT	EMB1021
Basic 300 A, .90"x1.90" ID, 1 CT	EMB1032
Basic 100 A, .518"x1.28" ID, 2 CTs	EMB2010
Basic 200 A, 0.75" x 1.10" ID, 2 CTs	EMB2021
Basic 300 A, .90"x1.90" ID, 2 CTs	EMB2032
Basic 400 A, 2.45"x2.89" ID, 2 CTs	EMB2043
Basic 800 A, 2.45"x2.89" ID, 2 CTs	EMB2083
Basic 100 A, .518"x1.28" ID, 3 CTs	EMB3010
Basic 200 A, 0.75" x 1.10" ID, 3 CTs	EMB3021
Basic 300 A, .90"x1.90" ID, 3 CTs	EMB3032
Basic 400 A, 2.45"x2.89" ID, 3 CTs	EMB3043
Basic 800 A, 2.45"x2.89" ID, 3 CTs	EMB3083
Basic 800 A, 2.45"x5.50" ID, 3 CTs	EMB3084
Basic 1600 A, 2.45"x5.50" ID, 3 CTs	EMB3164

Table 4.18: Extended Range 120/240 V to 480Y/277 V

Description	Catalog No.
Extended Range 100 A, .518"x1.28" ID, 1 CT	EME1010
Extended Range 200 A, 0.75" x 1.10" ID, 1 CT	EME1021
Extended Range 300 A, .90"x1.90" ID, 1 CT	EME1032
Extended Range 100 A, n.518"x1.28" ID, 2 CTs	EME2010
Extended Range 200 A, 0.75" x 1.10" ID, 2 CTs	EME2021
Extended Range 300 A, .90"x1.90" ID, 2 CTs	EME2032
Extended Range 400 A, 2.45"x2.89" ID, 2 CTs	EME2043
Extended Range 800 A, 2.45"x2.89" ID, 2 CTs	EME2083
Extended Range 100 A, .518"x1.28" ID, 3 CTs	EME3010
Extended Range 200 A, 0.75" x 1.10" ID, 3 CTs	EME3021
Extended Range 300 A, .90"x1.90" ID, 3 CTs	EME3032
Extended Range 400 A, 2.45"x2.89" ID, 3 CTs	EME3043
Extended Range 800 A, 2.45"x2.89" ID, 3 CTs	EME3083
Extended Range 800 A, 2.45"x5.50" ID, 3 CTs	EME3084
Extended Range 1600 A, 2.45"x5.50" ID, 3 CTs	EME3164

Table 4.19: Energy Meter Accessories

Description	Catalog No.
Energy Meter Communication Board *[6]*	EMCB
Energy Meter Fuse Pack, Set of 1	EMFP1
Energy Meter Fuse Pack, Set of 2	EMFP2
Energy Meter Fuse Pack, Set of 3	EMFP3
Energy Meter Bonding Kit	EMBOND

Table 4.20: Additional CT Sets

Description	Catalog No.
100 A, .518" x 1.28" ID, 1 CT	EMCT010
200 A, 0.75" x 1.10" ID, 1 CT	EMCT021
300 A, .90" x 1.90" ID, 1 CT	EMCT032
400 A, 2.45" x 2.89" ID, 1 CT	EMCT043
800 A, 2.45" x 2.89" ID, 1 CT	EMCT083
800 A, 2.45" x 5.50" ID, 1 CT	EMCT084
1600 A, 2.45" x 5.50" ID, 1 CT	EMCT164

NOTE: CT quantity and amperage must match meter model. Total of combined loads must not exceed rating of meter. All additional CTs shipped with 6 ft. white and black color-coded wire leads.

New!

PowerLogic EM4200 Enercept Meter

Next generation Enercept meters provide a unique solution for measuring energy data. The small form factor enables retrofit installation in existing panels to save wall space, installation time, and material cost. They are compatible with O.333V LVCT split-core, solid-core and U018 rope-style current transducers 50–5000A and communicate using Modbus and BACnet protocols.

EM4200 Series Enercept

Features

- High reliability with ANSI C12.20 0.2% accuracy, IEC 62053-22 Class 0.2S, 90 to 480 Vac
- Compact size for easy in-panel mounting, DIN rail or screw mount options
- Easy integration with a variety of CT form factors – split-core, solid-core, and Rope-Style Rogowski (U018), and compatibility from 5 to 5000A
- Seamless integration with StruxureWare Power Monitoring Expert (PME), StruxureWare Building Operation (SBO), and StruxureWare Building Expert (SBE)
- Configurable with or without power
- Quick connection with auto protocol, baud rate, and uni-directional/bi-directional detection
- Native Modbus and BACnet protocols along with uni-directional and bi-directional feature sets in one unit

Table 4.21: EM4200 Enercept Meter

Description	Catalog Number
Enercept Power Meter, Class 0.2S, Modbus/BACnet RS485, ANSI wire code, compatible with LVCT and Rogowski coils, order separately	EM4236

[6] Energy Meter communication board (EMCB) can be used with all models of the Energy Meter. Order one EMCB for each Energy Meter where either kW demand and/or communication is specified.

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Enercept Meter

PowerLogic Enercept™ Meter

The Enercept Meter is the ideal solution for submetering electric loads where space is at a premium. The compact design consists of three interconnected split-core CTs with the metering and communication electronics built into the CT housing. Simply snap on the CTs, connect the voltage inputs, the communication lines, and installation is complete. Both versions can be connected to either three-phase or single-phase circuits.

Enercept meters employ the Modbus™ RTU 2-wire communication protocol, and can utilize the same communication network and Power Management Software applications as other PowerLogic devices. Data from the Enercept meters can be presented in tabular or graphical format, used for alarming and historical logging and trending, and to produce reports.

Optional Submeter display (SMD) acts as a stand-alone operator interface supporting up to 32 meters (63 with a repeater). In addition, the Submeter display (SMD) can act as a network adapter allowing Enercept meters to be incorporated into a network.

Table 4.22: Enercept Meter

Description	Catalog No.
Basic 100 A, 1.25" x 1.51" ID	3020B012*[7]*
Basic 300 A, 1.25" x 1.51" ID	3020B032 *[7]*
Basic 400 A, 2.45" x 2.89" ID	3020B043 *[7]*
Basic 800 A, 2.45" x 2.89" ID	3020B083 *[7]*
Basic 800 A, 2.45" x 5.50" ID	3020B084 *[7]*
Basic 1600 A, 2.45" x 5.50" ID	3020B164 *[7]*
Basic 2400 A, 2.45" x 5.50" ID	3020B244 *[7]*
Enhanced 100 A, 1.25" x 1.51" ID	3020E012
Enhanced 300 A, 1.25" x 1.51" ID	3020E032
Enhanced 400 A, 2.45" x 2.89" ID	3020E043
Enhanced 800 A, 2.45" x 2.89" ID	3020E083
Enhanced 800 A, 2.45" x 5.50" ID	3020E084
Enhanced 1600 A, 2.45" x 5.50" ID	3020E164
Enhanced 2400 A, 2.45" x 5.50" ID	3020E244

Table 4.23: Accessories

Description	Catalog No.
Submeter display mounted in enclosure	SMD
Open style submeter display, no enclosure	SMD OPN
2-Wire 232–485 Conv	30502W485C
Enercept Mounting Brackets (Set of 3)	3050EMBK-3

Table 4.24: Enercept Metering Quantities

Basic*[7]*	Enhanced•
kWh, energy usage kW, real power	kWh, kW per phase and total, min kW, max kW, kWd, kVAR, kVA, PF per phase and total voltage- V, L-L, L-N per phase and avg. Current - A, per phase and average

SA Split-Core Current Transformers

PowerLogic Instrument Grade 5 Amp Split-Core Current Transformers

The 3090 SCCT series of split-core current transformers provide secondary amperage proportional to the primary (sensed) current. For use with Circuit Monitors, Power Meters, data loggers, chart recorders and other instruments the 3090 SCCT series provides a cost-effective means to transform electrical service amperages to a 0–5A level compatible with monitoring equipment.

Table 4.25:

Description	Catalog No.
Split Core CT—200 A (sz.2): 1.25" x 1.51	3090SCCT022
Split Core CT—300 A (sz.2): 1.25" x 1.51	3090SCCT032
Split Core CT—400 A (sz.3): 2.45" x 2.89	3090SCCT043
Split Core CT—600 A (sz.3): 2.45" x 2.89	3090SCCT063
Split Core CT—800 A (sz.3): 2.45" x 2.89	3090SCCT083
Split Core CT—800 A (sz.4): 2.45" x 5.05	3090SCCT084
Split Core CT—1200 A (sz.4): 2.45" x 5.50	3090SCCT124
Split Core CT—1600 A (sz.4): 2.45" x 5.50	3090SCCT164

NOTE: Max. Voltage without additional insulation 600 Vac. Do not apply 600 V Class current transformers to circuits having a phase-to-phase voltage greater than 600 V, unless adequate additional insulation is applied between the primary conductor and the current transformers. Square D assumes no responsibility for damage of equipment or personal injury caused by transformers operated on circuits above their published ratings.

[7] See Handout / Instruction Bulletin for derating properties.

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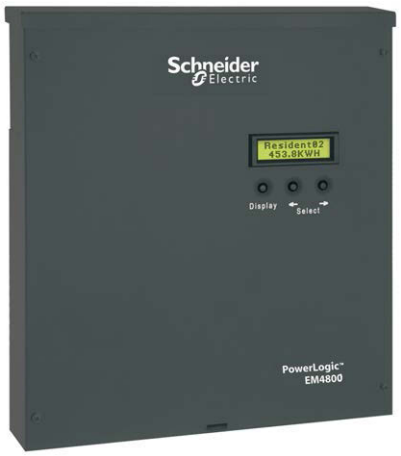

Multi Circuit Energy Meters

The PowerLogic EM4800 and EM4000 multi-circuit energy meters combine accurate electricity sub-metering with advanced communications technology. They are ideal for multi-tenant or departmental metering and M&V applications within office towers, condominiums, apartment buildings, shopping centers and other multipoint environments, or small footprint retail. This meter is available separately or as part of a Square D integrated power center (IPC) for use in building retrofits or new construction.

Each compact multipoint meter provides energy measurement for up to 24 (1CT) or 12 (2CT) single-phase circuits or 8 (3CT) 3-phase circuits. Select a model to match the desired CT type. The 0.333 V output CT option does not require shorting blocks, making it the ideal choice for retrofit installations.

All meters have an accuracy of Class 0.5%, have onboard interval logging, and feature flexible communication options with an Ethernet port that supports multiple protocols: Modbus TCP/IP, HTTP, BACnet/IP, FTP, and SNTP. EM4800 series meters have a V.90 modem while EM4000 series meters provide Modbus RTU over RS-485.

Table 4.26: Multi Circuit Energy Meters

Description	Catalog No.
EM4800 series; Ethernet; modem; compatible with 80mA low-power CTs; 120V control power 60 Hz	METSEEM488016
EM4800 series; Ethernet; modem; compatible with 333mV low-power CTs; 120V control power 60 Hz	METSEEM483316
EM4800 series; Ethernet; modem; compatible with standard 5A CTs; 120V control power 60 Hz	METSEEM480516
EM4000 series; Ethernet; Modbus RTU over RS-485; compatible with 80mA low-power CTs; 120V control power 60 Hz	METSEEM408016
EM4000 series; Ethernet; Modbus RTU over RS-485; compatible with 80mA low-power CTs; 277V control power 60 Hz	METSEEM408036
EM4000 series; Ethernet; Modbus RTU over RS-485; compatible with 333mV low-power CTs; 120V control power 60 Hz	METSEEM403316
EM4000 series; Ethernet; Modbus RTU over RS-485; compatible with 333mV low-power CTs; 277V control power 60 Hz	METSEEM403336
200 A current transformer (CT), 80 mA secondary, solid-core (1 CT)	METSECT80200
400 A current transformer (CT), 80 mA secondary, solid-core (1 CT)	METSECT80400
600 A current transformer (CT), 80 mA secondary, solid-core (1 CT)	METSECT80600
50 A .333 V Split Core Current Transformer with 0.75 in Window Size	ECT075050SC
100 A .333 V Split Core Current Transformer with 0.75 in Window Size	ECT075100SC
150 A .333 V Split Core Current Transformer with 0.75 in Window Size	ECT075150SC
200 A .333 V Split Core Current Transformer with 0.75 in Window Size	ECT075200SC
100 A .333 V Split Core Current Transformer with 1.25 in Window Size	ECT125100SC
150 A .333 V Split Core Current Transformer with 1.25 in Window Size	ECT125150SC
200 A .333 V Split Core Current Transformer with 1.25 in Window Size	ECT125200SC
400 A .333 V Split Core Current Transformer with 1.25 in Window Size	ECT125400SC
200 A .333 V Split Core Current Transformer with 2.00 in Window Size	ECT200200SC
400 A .333 V Split Core Current Transformer with 2.00 in Window Size	ECT200400SC
600 A .333 V Split Core Current Transformer with 2.00 in Window Size	ECT200600SC
600 A .333 V Split Core Current Transformer with 3 x 5 in Window Size	ECT300600SC
800 A .333 V Split Core Current Transformer with 3 x 5 in Window Size	ECT300800SC

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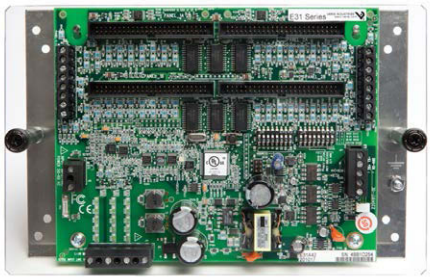
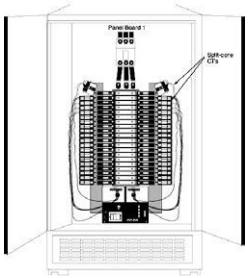


50 A CT | 100 A CT | 200 A CT



Typical BCPMSC panelboard installation

PowerLogic Branch Circuit Power Meter

The ideal solution for data center managers, energy or facility managers, engineers and operational executives who are responsible for delivering power to critical applications. In corporate and hosted data center facilities, this technology helps you plan and optimize the critical power infrastructure to meet the demands of continuous availability.

The PowerLogic BCPM is a highly accurate, full-featured metering product designed for the unique, multi-circuit and minimal space requirements of a high performance power distribution unit (PDU) or remote power panel (RPP). It offers class 1 (1%) power and energy system accuracy (including 50 A or 100 A CTs) on all branch channels.

The BCPM monitors up to 84 branch circuits with a single device and also monitors the incoming power mains to provide information on a complete PDU. It also offers multi-phase measurement totals with flexible support for any configuration of multi-phase breakers. Full alarming capabilities ensure that potential issues are dealt with before they become problems.

Unlike products designed for specific hardware, the flexible BCPM will fit any PDU or RPP design and supports both new and retrofit installations. It has exceptional dynamic range and accuracy, and optional feature sets to meet the energy challenges of mission critical data centers.

Key Features:

- Integrated Ethernet with advanced SNMP, BACnet, and Modbus TCP support on BCPME models
- Class 1% system accuracy (including 50 A or 100 A branch CTs
- Flexible configuration of Logical Meters for multi-phase loads
- Full PDU monitoring
- Flexible configuration
- Split core version for retrofit installations
- Wide monitoring range
- Low current monitoring
- Advanced alarming
- Easily integrates into a PowerLogic system or other existing networks using Modbus™ communications

Table 4.27: BCPM with Solid-Core CTs

Description	Catalog Number
42-circuit solid-core power & energy meter, 100A CTs (2 strips), ¾ in. spacing	BCPMA042S
84-circuit solid-core power & energy meter, 100A CTs (4 strips), ¾ in. spacing	BCPMA084S
42-circuit solid-core power & energy meter, 100A CTs (2 strips), 1 in. spacing	BCPMA142S
84-circuit solid-core power & energy meter, 100A CTs (4 strips), 1 in. spacing	BCPMA184S
24-circuit solid-core power & energy meter, 100A CTs (2 strips), 18 mm spacing	BCPMA224S
36-circuit solid-core power & energy meter, 100A CTs (2 strips), 18 mm spacing	BCPMA236S
42-circuit solid-core power & energy meter, 100A CTs (2 strips), 18 mm spacing	BCPMA242S
48-circuit solid-core power & energy meter, 100A CTs (4 strips), 18 mm spacing	BCPMA248S
72-circuit solid-core power & energy meter, 100A CTs (4 strips), 18 mm spacing	BCPMA272S
84-circuit solid-core power & energy meter, 100A CTs (4 strips), 18 mm spacing	BCPMA284S
42-circuit solid-core branch current, mains power meter, 100A CTs (2 strips), ¾ in. spacing	BCPMB042S
84-circuit solid-core branch current, mains power meter, 100A CTs (4 strips), ¾ in. spacing	BCPMB084S
42-circuit solid-core branch current, mains power meter, 100A CTs (2 strips), 1 in. spacing	BCPMB142S
84-circuit solid-core branch current, mains power meter, 100A CTs (4 strips), 1 in. spacing	BCPMB184S
24-circuit solid-core branch current, mains power meter, 100A CTs (2 strips), 18 mm spacing	BCPMB224S
36-circuit solid-core branch current, mains power meter, 100A CTs (2 strips), 18 mm spacing	BCPMB236S
42-circuit solid-core branch current, mains power meter, 100A CTs (2 strips), 18 mm spacing	BCPMB242S
48-circuit solid-core branch current, mains power meter, 100A CTs (4 strips), 18 mm spacing	BCPMB248S
72-circuit solid-core branch current, mains power meter, 100A CTs (4 strips), 18 mm spacing	BCPMB272S
84-circuit solid-core branch current, mains power meter, 100A CTs (4 strips), 18 mm spacing	BCPMB284S
42-circuit solid-core branch current meter, 100A CTs (2 strips), ¾ in. spacing	BCPMC042S
84-circuit solid-core branch current meter, 100A CTs (4 strips), ¾ in. spacing	BCPMC084S
42-circuit solid-core branch current meter, 100A CTs (2 strips), 1 in. spacing	BCPMC142S
84-circuit solid-core branch current meter, 100A CTs (4 strips), 1 in. spacing	BCPMC184S
24-circuit solid-core branch current meter, 100A CTs (2 strips), 18 mm spacing	BCPMC224S
36-circuit solid-core branch current meter, 100A CTs (2 strips), 18 mm spacing	BCPMC236S
42-circuit solid-core branch current meter, 100A CTs (2 strips), 18 mm spacing	BCPMC242S
48-circuit solid-core branch current meter, 100A CTs (4 strips), 18 mm spacing	BCPMC248S
72-circuit solid-core branch current meter, 100A CTs (4 strips), 18 mm spacing	BCPMC272S
84-circuit solid-core branch current meter, 100A CTs (4 strips), 18 mm spacing	BCPMC284S
42-circuit solid-core power & energy meter w/Ethernet, 100A CTs (2 strips), ¾ in. spacing	BCPME042S
84-circuit solid-core power & energy meter w/Ethernet, 100A CTs (4 strips), ¾ in. spacing	BCPME084S
42-circuit solid-core power & energy meter w/Ethernet, 100A CTs (2 strips), 1 in. spacing	BCPME142S
84-circuit solid-core power & energy meter w/Ethernet, 100A CTs (4 strips), 1 in. mm spacing	BCPME184S
24-circuit solid-core power & energy meter w/Ethernet, 100A CTs (2 strips), 18 mm spacing	BCPME224S
36-circuit solid-core power & energy meter w/Ethernet, 100A CTs (2 strips), 18 mm spacing	BCPME236S
42-circuit solid-core power & energy meter w/Ethernet, 100A CTs (2 strips), 18 mm spacing	BCPME242S
48-circuit solid-core power & energy meter w/Ethernet, 100A CTs (4 strips), 18 mm spacing	BCPME248S
72-circuit solid-core power & energy meter w/Ethernet, 100A CTs (4 strips), 18 mm spacing	BCPME272S
84-circuit solid-core power & energy meter w/Ethernet, 100A CTs (4 strips), 18 mm spacing	BCPME284S

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Table 4.28: BCPM with Split-Core CTs

Description	Catalog Number
42-circuit split-core power and energy meter, CTs and cables sold separately	BCPMSCA1S
84-circuit split-core power and energy meter, CTs and cables sold separately	BCPMSCA2S
30-circuit split-core power and energy meter, (30) 50A CTs & (2) 4 ft. cables	BCPMSCA30S
42-circuit split-core power and energy meter, (42) 50A CTs & (2) 4 ft. cables	BCPMSCA42S
60-circuit split-core power and energy meter, (60) 50A CTs & (4) 4 ft. cables	BCPMSCA60S
42-circuit split core power and energy meter, all boards on backplate, CTs and cables sold separately	BCPMSCAY63S
84-circuit split-core power and energy meter, with (84) 50A CTs & (4) 4 ft. cables	BCPMSCA84S
42-circuit split-core branch current, mains power meter, CTs and cables sold separately	BCPMSCB1S
84-circuit split-core branch current, mains power meter, CTs and cables sold separately	BCPMSCB2S
30-circuit split-core branch current, mains power meter, (30) 50A CTs & (2) 4 ft. cables	BCPMSCB30S
42-circuit split-core branch current, mains power meter, (42) 50A CTs & (2) 4 ft. cables	BCPMSCB42S
60-circuit split-core branch current, mains power meter, (60) 50A CTs & (4) 4 ft. cables	BCPMSCB60S
42-circuit split-core branch current, mains, all boards on backplate, CTs and cables sold separately	BCPMSCBY63S
84-circuit split-core branch current, mains power meter, (84) 50A CTs & (4) 4 ft. cables	BCPMSCB84S
42-circuit split-core current meter, CTs and cables sold separately	BCPMSCC1S
84-circuit split-core current meter, CTs and cables sold separately	BCPMSCC2S
30-circuit split-core current meter, (30) 50A CTs & (2) 4 ft. cables	BCPMSCC30S
42 circuit split-core current meter, (42) 50A CTs & (2) 4 ft. cables	BCPMSCC42S
60-circuit split-core current meter, (60) 50A CTs & (4) 4 ft. cables	BCPMSCC60S
42-circuit split-core current meter, all boards on backplate, CTs and cables sold separately	BCPMSCCY63S
84-circuit split-core current meter, (84) 50A CTs & (4) 4 ft. cables	BCPMSCC84S
42-circuit split-core power and energy meter w/Ethernet, CTs and cables sold separately	BCPMSCE1S
84-circuit split-core power and energy meter w/Ethernet, CTs and cables sold separately	BCPMSCE2S
30-circuit split-core power and energy meter w/Ethernet, (30) 50A CTs & (2) 4 ft. cables	BCPMSCE30S
42-circuit split-core power and energy meter w/Ethernet, (42) 50A CTs & (2) 4 ft. cables	BCPMSCE42S
60-circuit split-core power and energy meter w/Ethernet, (60) 50A CTs & (4) 4 ft. cables	BCPMSCE60S
84-circuit split-core power and energy meter w/Ethernet, (84) 50A CTs & (4) 4 ft. cables	BCPMSCE84S

Table 4.29: 1/3 V Low-Voltage Split-Core CTs for Aux Inputs (Mains)

Amperage Rating	Inside Dimensions	Catalog Number
50A	10 x 11 mm	LVCT00050S
200A	16 x 20 mm	LVCT00101S
200A	32 x 32 mm	LVCT00202S
100A	30 x 31 mm	LVCT00102S
200A	30 x 31 mm	LVCT00202S
300A	30 x 31 mm	LVCT00302S
400A	62 x 73 mm	LVCT00403S
600A	62 x 73 mm	LVCT00603S
800A	62 x 73 mm	LVCT00803S
800A	62 x 139 mm	LVCT00804S
1000A	62 x 139 mm	LVCT01004S
1200A	62 x 139 mm	LVCT01204S
1600A	62 x 139 mm	LVCT01604S
2000A	62 x 139 mm	LVCT02004S
2400A	62 x 139 mm	LVCT02404S

Table 4.30: 1/3 V Low-Voltage Solid-Core CTs for Aux Inputs (Mains)

Amperage Rating	Inside Dimensions	Catalog Number
50A	10 mm	LVCT20050S
100A	10 mm	LVCT20100S
200A	25 mm	LVCT20202S
400A	31 mm	LVCT20403S

Table 4.31: BCPM Split-Core Branch CTs and Adapter Boards

Description	Catalog Number
BCPM adapter boards, quantity 2, for split core BCPM	BCPMSCADPBS
BCPM 50A split core CTs, Quantity 6, 1.8 m lead lengths	BCPMSCCT0
BCPM 50A split core CTs, quantity 6, 6 m lead lengths	BCPMSCCT0R20
BCPM 100A split core CTs, Quantity 6, 1.8 m lead lengths	BCPMSCCT1
BCPM 100A split core CTs, Quantity 6, 6 m lead lengths	BCPMSCCT1R20
BCPM 200A split core CTs, Quantity 1, 1.8 m lead lengths	BCPMSCCT3
BCPM 200A split core CTs, Quantity 1, 6 m lead lengths	BCPMSCCT3R20

Table 4.32: Additional Accessories for use with BCPM Products

Description	Catalog Number
BCPM circuit board cover	BCPMCOVERS
CT repair kit for solid core BCPM (includes one CT)	BCPMREPAIR
Additional 100A split core CT for use with solid core repair kit	H6803R-0100
Modbus to BACnet protocol converter	E8951
Flat Ribbon cable (quantity 1) for BCPM, length = 0.45 m	CBL008
Flat Ribbon cable (quantity 1) for BCPM, length = 1.2 m	CBL016
Flat Ribbon cable (quantity 1) for BCPM, length = 1.5 m	CBL017
Flat Ribbon cable (quantity 1) for BCPM, length = 1.8 m	CBL018
Flat Ribbon cable (quantity 1) for BCPM, length = 2.4 m	CBL019
Flat Ribbon cable (quantity 1) for BCPM, length = 3.0 m	CBL020
Flat Ribbon cable (quantity 1) for BCPM, length = 6.1 m	CBL021
Round Ribbon cable (quantity 1) for BCPM, length = 1.2 m	CBL022
Round Ribbon cable (quantity 1) for BCPM, length = 3 m	CBL023
Round Ribbon cable (quantity 1) for BCPM, length = 6.1 m	CBL024
Round Ribbon cable (quantity 1) for BCPM, length = 0.5 m	CBL031
Round Ribbon cable (quantity 1) for BCPM, length = 0.8 m	CBL033

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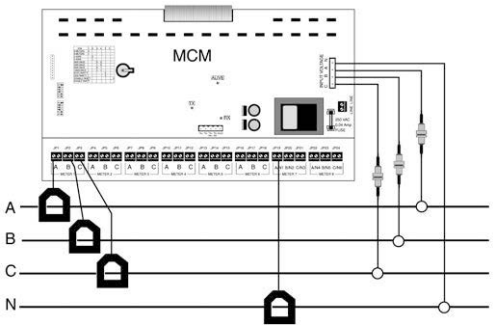

3-phase, 4-wire
(with neutral current

PowerLogic Multi-Circuit Meter

Designed for OEM style placement in electrical distribution equipment the MCM8364 is configurable to meter 1 or 3 phases of up to eight individual loads, six loads if neutral monitoring is required. The MCM will monitor up to 10,000 amps per service using standard 5 Amp CTs. All of the metered circuits must share a common voltage source. The MCM8364 is a great solution for monitoring critical power distribution equipment and provides 24 different electrical metering quantities plus an additional nine Modbus register alarms.

With one RS-485 connection, the multi-circuit meter provides Modbus RTU communications output that communicates to each individual metered circuit. Up to 30 multi-circuit meters can be addressed on the same Modbus network. The multi-circuit meter can provide warnings to the central monitoring computer via its Modbus output using the MNode software provided or can be integrated into PowerLogic SMS software. The MCM also works with the submeter display as shown below.

Electrical Data:

Energy Consumption (kWHr), Real Power (kW), Reactive Power (kVAR), Apparent Power (kVA), Power Factor Total, Voltage, L-L, avg. of 3 phases, Voltage, L-N, avg. of 3 phases, Current, average of 3 phases, Real Power (kW) phase A, B, & C, Power Factor, phase A, B,&C, Line to Line Voltage, phase A-B, B-C, A-C, Line to Neutral Voltage, phase A-N, B-N, C-N, Current, phase A, B, & C, Frequency (measured from phase A) (Hz).

Modbus Alarms:

Over Voltage, Under Voltage, Over Current, Under Current, Over kVA, Under kVA, Phase Loss A, Phase Loss B, Phase Loss C

Table 4.33:

Description	Catalog No.
Multi-Circuit Meter 8364	MCM8364

Submeter Display

PowerLogic Submeter Display

The PowerLogic Submeter Display (SMD) is a comprehensive electrical submetering display that provides a view of electrical parameters from multiple metering products with one networked LCD. In addition to viewing system data on the display itself, you can also view data on a remote PC via a network connection. Touch pad buttons provide a convenient way to view downstream devices on the power-monitoring network. The display is RS-485 Modbus RTU compatible. It has additional RS-485 and RS-232 Modbus ports for networking to additional displays or to a master PC. The submeter display is compatible with the following metering devices: BCM, BCPM, EM3500, MCM, & Enercept™ meters.

Table 4.34:

Description	Catalog No.
Submeter display mounted in enclosure	SMD
Open style submeter display, no enclosure	SMD OPN

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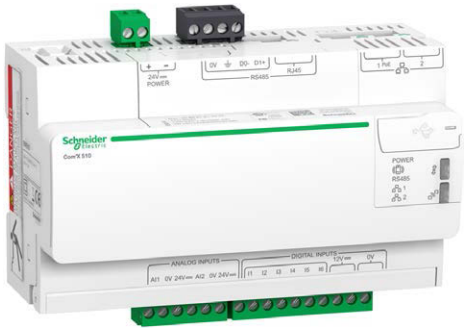


Com'X 510 Energy Sever

New!

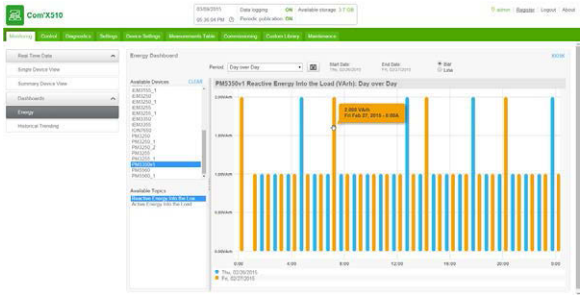
Com'X Data Loggers and Energy Servers

Powerful data logging with flexible communication options

Connect your entire power system with Com'X data loggers and energy servers. Com'X surpasses conventional gateways and data loggers by incorporating multiple capabilities into one compact device. In addition to being a real-time gateway to downstream devices, Com'x logs all essential WAGES and environmental readings through a broad range of downstream data feeds and local I/O. Logged data can be automatically pushed to a hosted platform or downloaded for report generation. Ethernet and Wi-Fi ready, Com'x leverages on the building's existing IT infrastructure to reduce cost. Its GPRS capability makes it ideal for sites with no access to IT networks.

Easy configuration and commissioning

Configuration and commissioning is made easy by automatic device detection, and IP address setting and allocation. No additional software is needed for the intuitive, web-based configuration pages. A device library enables quick configuration for more than 70 Modbus devices and also provides for custom configuration of additional devices. Configuration via Wi-Fi lets technicians use tablets or notebooks to work comfortably away from switchboard rooms.



Com'X 510 Energy Dashboard

Embedded energy management software

The Com'X 510 Energy Server further includes embedded web pages that display data in a meaningful way so you can make informed decisions about your energy usage. Web pages display real-time data in easy to understand tabular and summary formats. In addition, you can access simple analysis of historical data in bar graph or trending formats. Pages are accessible via any standard web browser without plug-ins or additional components.

Table 4.35: Com'X Data Loggers, Energy Services, and Accessories

Description	Catalog Number
Com'X200 Data logger with internal 100 to 230 VAC power supply	EBX200
Com'X210 Data logger, requires 24 VDC power supply	EBX210
Com'X510 Energy server, requires 24 VDC power supply	EXB510
Wi-Fi USB stick	EBXAUSBWIFI
Zigbee USB stick	EXBAUSBZIGBEE
GPRS modem with SIM card	EBXAGPRSSIM
GPRS modem without SIM card	EBXAGPRS
External GPRS antenna	EBXAANT5M

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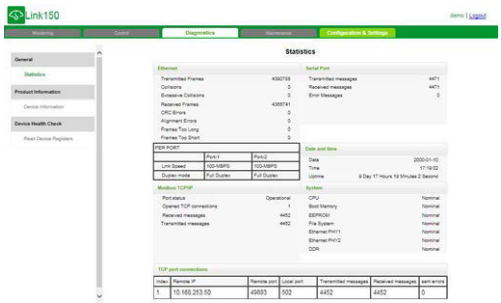
Link150 Ethernet Gateway



Link150 has embedded web pages for easy setup and maintenance

Modbus 3 m cable RJ–45 to free wires

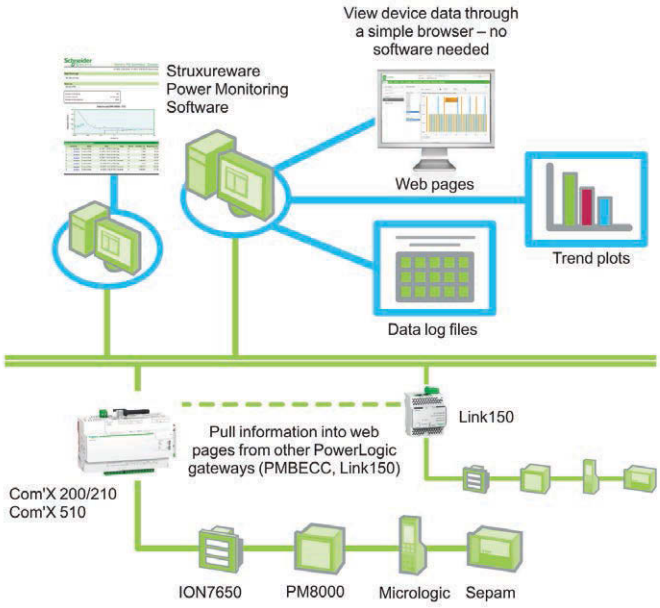
Link150 Ethernet Gateway

Communications for high-speed access to critical information

The Link150 gateway provides fast, reliable Ethernet connectivity in the most demanding applications, from a single building to a multi-site enterprise. This gateway supports meters, monitors, protective relays, trip units, motor controls and other devices that need to communicate data quickly and efficiently. It is your simple, cost-effective serial line to full Ethernet connectivity.

Applications

- Energy management
- Power distribution
- Building automation
- Factory automation



Security

- Secure user interface including user's name and password for login
- Advanced security features to allow users to specify which Modbus TCP/IP master devices may access attached serial slave devices
  - Modbus TCP/IP filtering feature
  - Allows user to specify the level of access for each master device as Read-only or Full access
- Web pages provide easy configuration and setup

Advantages

- Easy to install and setup
- Easy to maintain
- Compatible with Schneider Electric software offerings (StruxureWare Power Monitoring Expert, StruxureWare PowerSCADA Expert, etc.)
- Compatible with Com'X 200/210 and Com'X 510 Energy Servers
- Reliable Modbus to Ethernet protocol conversion

Table 4.36: Ethernet Gateway

Type	Catalog Number
Link150 Ethernet gateway	EGX150
Modbus 3 m cable RJ–45 to free wires	VW3A8306D30

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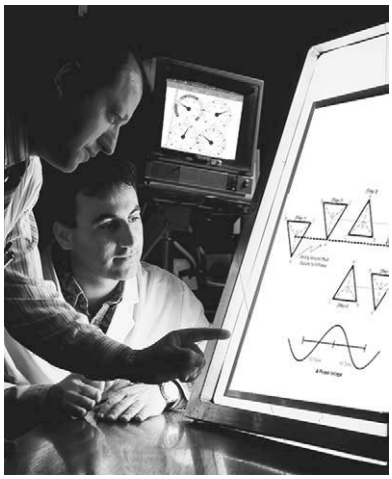

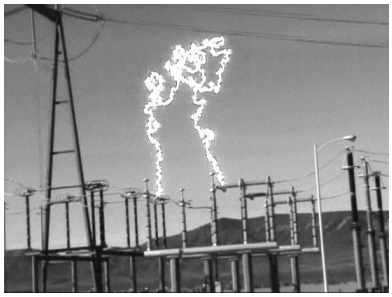

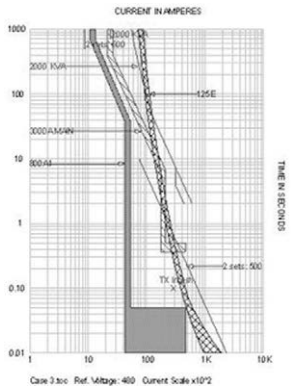

Consulting and Analysis

Power System Engineering

The Square D Power System Engineering team offers a wide range of engineering services to improve the safety, efficiency and reliability of your power distribution system. The team is comprised of registered professional engineers, safety trained and equipped, to perform a variety of engineering functions.

Power System Studies

The Square D Power System Engineering Team provides expertise for a variety of electrical power system studies. Some of the more common system studies include…

- Short-circuit analysis
- Time-current coordination
- Motor starting/voltage drop
- Motor starting/torque-speed
- Safe motor re-energization
- Harmonic analysis
- Transient analysis
- Power factor correction analysis
- Other system specific analysis

Arc Flash Analysis

Square D offers on-site services to perform arc flash analysis for a facility, complex, office, or campus. An Arc flash analysis is used to determine …

- Flash Protection Boundary
- Incident Energy Value
- Hazard/Risk Category
- Appropriate Personal Protective Equipment (PPE)
- Low cost arc flash reduction methods

Features of Square D arc flash analysis include…

- Time current coordination analysis showing both existing and recommended over/current device settings
- Short-circuit study to ensure adequacy of equipment
- Onsite verification and documentation of equipment
- Arc flash labels (populated with the results of the arc flash analysis)
- Arc flash label affixation
- NFPA 70E—Safe Workplace Practices Training provided by OSHA authorized outreach instructors
- Recommendations and solutions to reduce potential arc flash hazards

Power Quality Studies

Square D offers onsite power quality engineering studies and solutions to eliminate process disruptions, power system shutdowns, and equipment damage due to electrical power system disturbances. A power quality study is used to...

- Determine compliance with the IEEE 519-Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems guidelines
- Identify most cost-effective solution to power quality problems
- Solve process disruptions due to power disturbances
- Reduce economic effects of poor power quality
- Identify disturbances originating on electric utility system and improvements to reduce the number and severity

Power System Assessment

Square D offers engineering services to meet a variety of power system needs …

- Basic codes and standards compliance
- Protective coordination assessment
- Maintenance program review
- Recommendations for power system optimization
- Power quality troubleshooting and analysis
- Power factor and harmonics analysis
- Electrical safety hazards
- Short-circuit withstand overview
- Single-line documentation of power system
- Power monitoring recommendations
- Loading measurements

Power System Improvement Projects

Square D offers engineering services for …

- New equipment installation
- Existing equipment modification
- Ground Fault Schemes for multiple source distribution systems
- High Resistance Grounding (HRG) Conversion
- Automatic Transfer Control Schemes & Generator Operations

Square D professional engineers - safety trained and equipped - will listen to your concerns and goals, define the problem or enhancement, and engineer the solution that best satisfies your needs.

For additional information on power system engineering services and pricing, contact your nearest Square D/Schneider Electric office.

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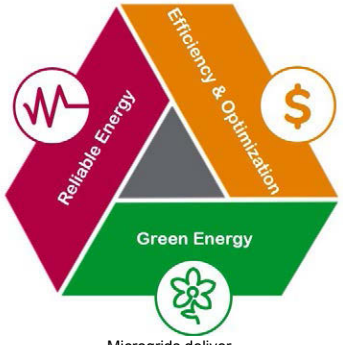


Microgrids deliver energy flexibility

Advanced Microgrid Solutions and Distributed Energy Resource Management

With our custom solutions and proven expertise, we deliver advanced microgrids that offer the advantages of grid independence – without forfeiting the benefits of being part of the central grid. Our flexible microgrid architecture features a scalable set of grid components designed to efficiently manage your entire energy infrastructure, including distributed generation, energy storage, and load demand, while giving you the ability to easily adapt the system to your changing needs. **Learn more at www.microgrids.schneider-electric.us**.

Industrial Energy Efficiency

Schneider Electric Certified Energy Managers (CEM's) work on-site with knowledgeable plant personnel to develop a long-term, comprehensive, "Energy Action Plan", that serves as the blueprint for energy savings. Unlike performance contracts or one-time energy audits, the Total Energy Control^{SM} program offers a strategic partnership for energy-intensive industrials who want to improve energy efficiency.

- Total Energy Control – Comprehensive integration of all three areas affecting energy efficiency
  — Procurement (electricity and gas)
  — Demand management
  — Optimization of process and plant utilities
- Program deliverables:
  — Long-term Energy Action Plan
  — Energy efficiency projects
  — Ongoing accountability for results

Engineered Solutions

Schneider Electric provides an engineered solution approach to your specific power system applications. Our total solutions for power monitoring and power system controls allow greater safety, reliability, and energy efficiency of your power systems. As a long standing industry leader in Power Monitoring and Control Systems, we understand your power system requirements and needs.

All of our Engineered Solutions are tailored to your specific system requirements. Schneider Electric is your total Solution provider.

Power Monitoring Applications

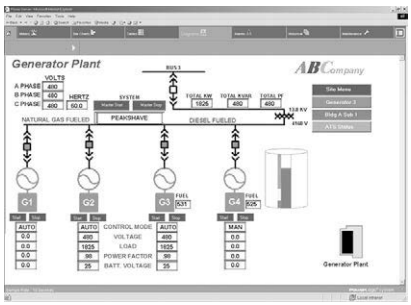
Increased Reliability and Energy Efficiency are key results produced from our Power Monitoring Applications. Schneider Electric power monitoring applications provide detailed reporting, testing and analysis capabilities for your systems and related components.

- ***EPSS Emergency Power Supply Systems***– The PowerLogic EPSS Test Report provides information regarding the health and status of the emergency power supply system, including automatic transfer switches and generators.
- ***SER Sequence of Events Recording***– The PowerLogic Sequence of Events Recorder (SER) Module is a root-cause analysis tool for rapid response for problem resolution that is ideal for pinpointing the cause of a service disruption in very large complex power systems.
- ***WAGES Water, Air Gas, Electric, Steam***– PowerLogic energy and power management systems can provide instantaneous readings, alarm notifications, and graphical diagrams for monitoring electrical and piped utilities (Water, Air, Gas, Electric, Steam).
- ***ENM Event Notification Module***– The PowerLogic Event Notification Module allows automatic paging to alphanumeric pagers, cell phones and PCs.

Power System Control Applications

Automated solutions for increased Reliability and Energy Efficiency: Schneider Electric engineers provide Power System Control Applications with automated solutions for addressing your system reliability and efficiency control needs. Our offer covers Automatic Throwover Schemes, Load Shedding/Peak Shaving, and Load Preservation and Mircrogrids.

- ***Automatic Throwover Systems*** – Automatic selection of available utility or generator sources to maintain service continuity to connected loads.
- ***Load Shedding/Peak Shaving*** – Control peak demand levels or ensure service continuity to critical load or operate breakers in accordance with user specified sequences and time delays such as bringing large motors online across several billing kw demand periods to avoid demand penalties.
- ***Load Preservation*** – Fast acting sophisticated control systems designed to stabilize critical power systems to the greatest extend possible by monitoring frequency and power sources from utility plus generator capacity versus total circuit load.



PowerLogic Engineers provide graphic solutions for realtime monitoring of power systems.

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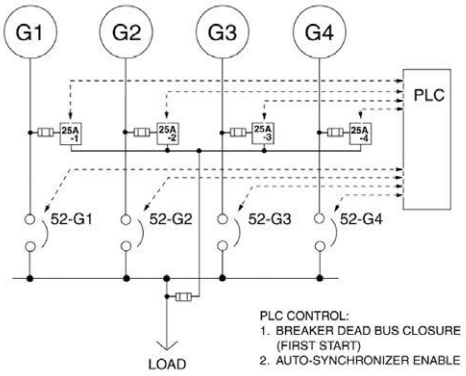

PowerLogic Engineers design power control systems that meet your operational requirements

System Integration

System Design and Engineering

Our Square D Engineering Services solution specialists can work with you to design or upgrade your existing system to best achieve your energy and power management objectives and informational needs. With expertise in electrical systems, communications, and automatic control systems, we can integrate, install, and commission your system for optimal performance.

- System Design and Bill of Material Recommendations
- Power Monitoring and Control
- WAGES (Water, Air, Gas, Electric, Steam)
- Enterprise web-based monitoring
- Specification development, drawings, documentation
- Enclosure panel design and build
- Metering Connection Verification/Testing
- Power distribution automation
- On-Site Installation Assistance, Component Configuration & Startup
- Turn-key project management
- Third Party Device and communication interfaces
- Configured Workstations, User Software Interfaces
- Interactive Graphic Design to mimic facility layout, one-lines, equipment status
- Custom Software, Reports & Applications – Billing and Event Notification

PowerLogic Engineers specialize in the design and setup of Emergency Power Supply Systems (EPSS).

For additional information, contact your nearest Square D / Schneider Electric office.

Factory Assembled Equipment

Square D™ PowerLogic™ Factory Assembled Equipment offers a wide range of designs for metering, communications, and control applications to simplify retrofit installations. Our equipment is designed to order as a free-standing or wallmounted system. With PowerLogic™ Factory Assembled Equipment, you'll receive professionally crafted, factory tested, pre-wired equipment that will greatly improve the speed of your system startup. All backed by the Square D™ quality standard of excellence.

- Assemblies include meters & devices wired to terminal blocks, disconnects, and shorting blocks or test switches
- Tailored to any system voltage :
  - 208/120 V, 480/277 V & 600/347 V Wye
  - 240 V, 480 V & 600 V Delta
  - Utilization of PT's required for higher voltage levels
- Wall mountable and easy to install using concealed holes in the back of the enclosure.
- Complete with necessary documentation and mounting hardware for quick and easy installation
- Carbon steel construction, with industry standard ANSI 61 gray powder coat finish
- Equipped with concealed hinged door, and universal pad-lockable latch.
- Custom engraved nameplates available for all units.

Table 4.37: Industrial Enclosure Types 12 & 4, UL & CUL 508A Listed

Available Meter Types	Digital Inputs	Digital Outputs	Analog Inputs	Analog Outputs
ION6200	N/A	Up to 2/ Meter	N/A	N/A
PM5563RD	Up to 4 / Meter	Up to 2 / Meter	N/A	N/A
PM8244	Up to 15 / Meter	Up to 5 / Meter	Up to 4 / Meter	Up to 2 / Meter
CM4000T	Up to 8 / Meter	Up to 7 / Meter	Up to 1 / Meter	Up to 1 / Meter
ION 7550 & 7560	Up to 16 / Meter	Up to 7 / Meter	Up to 4 / Meter	Up to 4 / Meter

- Supports Single or Multiple Voltage Sources for Indoor (Types 1 and 12) & Outdoor (Type 4) applications
- Available with 1–4 meters per panel. Serial & Ethernet Communications are options for all units
- EGX & ION RTU Communication Enclosures with 1–4 devices per panel also available

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Light Industrial Enclosure Type 1, UL & CUL 508A Listed

- Available for the following meter types: PM8244, PM5563RD, and ION6200
- Supports Single Voltage Source only for Indoor (Type 1) applications.
- Available with 1–12 meters per panel. Serial Communications are standard for all units.
- No Digital or Analog I/O is available for this option.

Service Entrance/Utility Socket Enclosure Type 3R, UL & CUL 508A Listed

- Available for ION8600 only, with up to 3 Digital Inputs and 4 Digital Outputs and E5600 2 Digital Inputs and 2 Digital Outputs.
- Supports Single Voltage Source only for Indoor & Outdoor (Type 3R) applications.
- Units are Ring Type with removable cover.
- Available with 1 meter per panel. Serial & Ethernet Communications options available.
- Supports Form 9S, 35S, 36S, 39S and 76S configurations for ION8600 and forms 9S and 36S for E5600.
- Options available for remote mounted CTs
- Options available for integrated, bar type CTs
- Optional Test Switch.

Additional engineered to order products are available for a wide variety of design solutions.

- Switchgear Transfer Control Panels
- Generator Control Panels
- Load Shed Control Panels
- Sequence of Events Recording (SER) Panels
- Control System Mimic Panels
- Lighting Control Interface Panels
- Programmable Logic Controller (PLC) Control Panels (Hot Standby, Relay Control, Data Concentration etc. ...)
- Emergency Power Supply Systems (EPSS) Control Panels
- Water, Air, Gas, Electrical, and Steam (WAGES) Monitoring Panels
- Input Status Monitoring & Alarming Panels
- Remote Annunciator Control Panels
- Remote Operator Control Panels
- Serial, Ethernet, and Cellular Wireless Systems
- Server Rack and Network Equipment (Servers, Switches, UPS's) for Energy Management Systems.
- Industrialized PC's, Touch Screens (Magelis), and Human Machine Interfaces (HMI's) with Custom System Graphics.
- Designed to fit any environment – Indoor (Type 1 & 12) & Outdoor (Type 3R & 4) applications

For additional information and pricing please contact your local PowerLogic sales specialist or PowerLogic Inside Sales Support at 615-287-3535. Equipment pricing and literature available for download on our website at www.powerlogic.com/products/enclosures.

To better serve you please have the following information on hand when calling.

- Enclosure type (Indoor or Outdoor) and Environment details (Corrosive or Non-Corrosive)
- Power System Voltage Level and Type (Direct Current (DC) or Alternating Current (AC))
- Digital & Analog Input and Output requirements
- Device Type and Quantity per enclosure
- Ethernet and Serial Communication Requirements
- For Drawout Retrofits, need existing cradle type (i.e. GE, Westinghouse, etc.)

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High Density Metering factory assembled enclosure for multi-tenant properties

PowerLogic High Density Metering

High Density Metering (HDM) is engineered to answer the metering and billing needs of multi-tenant properties:

Features and Benefits

- HDM comes standard with PowerLogic PM5000 series.
- Lockable, 16 gauge NEMA Type 1 enclosure provides tamper-resistant security.
- NEMA Type 3R also available. Please consult factory.
- Mounting channel and surface-mount flanges simplify installation.
- Factory installed cover plates are included to cover empty meter spaces.
- Factory installed wiring harness simplifies installation of additional meters and provides future system expansion.
- Each High Density Metering cabinet is provided with RS485 Modbus® or Modbus Ethernet TCP communications. For wireless communications, please consult factory.
- Supports 120/208V & 277/480V WYE, and 240V & 480V Delta System Types, 1Ph or 3Ph
- CTs required. Must select separately.

High Density Meter System Includes:

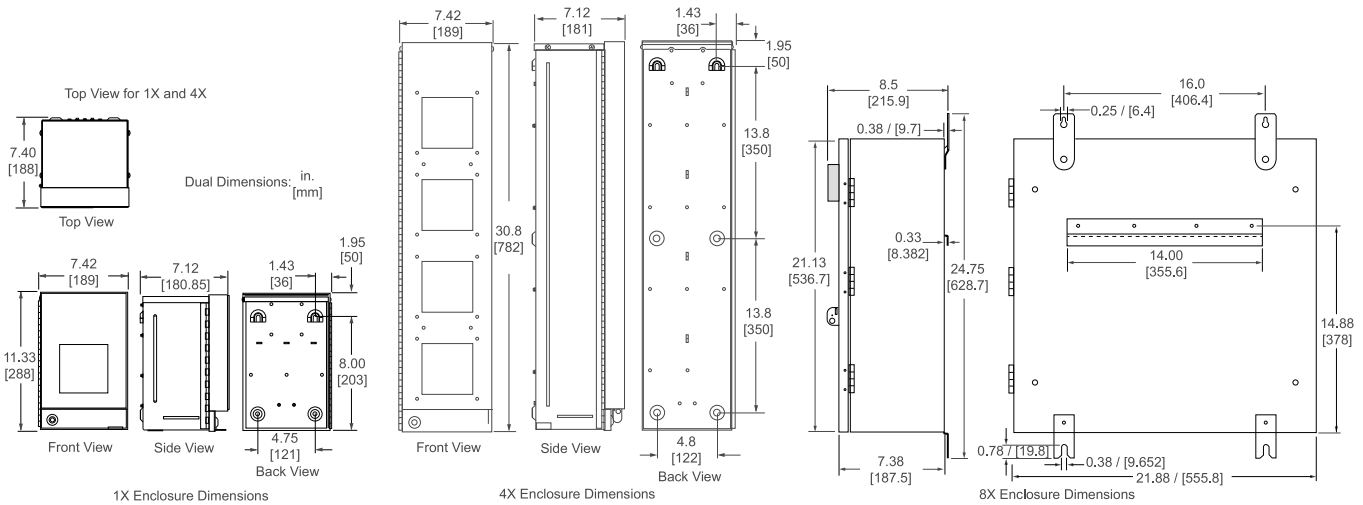
- Enclosure
- Power Meters, installed
- Installation bulletin for Enclosure
- Wall hanging bracket
- Installation bulletin for Meters

Table 4.38: High Density Metering Cabinet

Category	Meter	Enclosure Size	Number of Meters *[8]*	Enclosure Rating	Description
HDM	PM5110	1, 4 or 8	1–8	Type 1 or Type 3R	High Density Meter Enclosure with PM5110 meters; Modbus RTU serial communications; Ideal for single or three phase indoor commercial building applications
HDM	PM5330	1, 4 or 8	1–8	Type 1 or Type 3R	High Density Meter Enclosure with PM5330 meters; Modbus RTU serial communications; Ideal for single or three phase indoor commercial building applications
HDM	PM5340	1	1	Type 1 or Type 3R	High Density Meter Enclosure with PM5340 meters; Modbus TCP Ethernet Communications; Ideal for single or three phase indoor commercial building applications
HDM	PM5560	1, 4 or 8	1–8	Type 1 or Type 3R	High Density Meter Enclosure with PM5560 meters; Dual wiring for both Modbus RTU serial and Modbus TCP Ethernet communicaions; Ideal for single or three phase indoor commercial building applications

Table 4.39: Accessories

Description	Catalog No.
50 Amp HDM Solid Core Current Transformer, 1.13” window size	HDMCT050S1
100 Amp HDM Solid Core Current Transformer, 1.13” window size	HDMCT100S1
125 Amp HDM Solid Core Current Transformer, 1.13” window size	HDMCT125S1
150 Amp HDM Solid Core Current Transformer, 1.13” window size	HDMCT150S1
200 Amp HDM Solid Core Current Transformer, 1.13” window size	HDMCT200S1
250 Amp HDM Solid Core Current Transformer, 1.13” window size	HDMCT250S1
400 Amp HDM Solid Core Current Transformer, 1.13” window size	HDMCT400S1



[8] Meters Ordering Notes: Please indicate the number of meters to be pre-installed when placing your order. You may order any number of meters in the enclosure between one and the maximum number of meters each cabinet will hold.

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Technical Engineering Support Services

No power management system is complete without it. Technical support should go beyond basic troubleshooting. Continued optimization and maintenance extends the life of your system and ensures it's working efficiently and effectively. Our number one priority is to help you protect your investment and get the most out of it.

- Proactive diagnostics and maintenance
- Access to our self-help web portal and knowledge base
- Email, telephone, and remote VPN troubleshooting assistance
- On-demand and in-person training

A variety of service levels available based on your needs and budget, plus options add-ons such as onsite maintenance or 24x7 support, allows you to build the support that's right for your system.

Premium +

Our most comprehensive service level is ideal for large organizations with mission critical systems, multiple locations and/or in-house energy management expertise.

Premium

Great for the experienced manager with complex power management systems and/or multiple locations, you can choose Premium support and partner with a dedicated engineer to help you drive improved system performance.

Priority

Sign up for Priority support and benefit from the expertise of our senior technical engineers. They can remotely connect to your system and resolve issues while you observe or work on other tasks.

Standard

We stand behind our products. If you have the time and knowledge to do-it-yourself, then we're happy to assist you with troubleshooting or answer your questions at no extra cost. Priority Support: Excellent Service, Free Software Upgrades, Training Discounts & More!

Energy Performance Services

Unleash Your System's True Potential with the Power of Partnership

Energy Performance Services helps you improve and sustain energy performance, reduce costs, and support compliance efforts. From facility insight to optimization solutions, let us customize an energy management program that's right for you. Contact your representative and ask them about power quality analysis or an energy health check.

Solutions to fit your needs:

- Facility Insight Solutions—These core energy health checks designed to evaluate your existing systems
- Optimization Solutions—Let our team of experts monitor or fine-tune your systems to maximize energy savings, efficiency and power quality.

Choose from remote or onsite solutions to ensure sustained results year over year. Various funding options available. Visit www.schneider-electric.com/eps or contact us at 615-287-3535.

Power Management University (PMU)

Attending a PMU sponsored course will enable attendees to better utilize their Schneider-Electric power monitoring solution thus enabling them to realize energy savings as quick as possible. PMU offers a variety of options with instructor led options being 80% hands-on, with each student having their own lab workstation. Below is a list of the different training options offered by PMU.

Course	Course No.	Length
Factory Courses: Software Solutions		
Power Monitoring Fundamentals Bundle (includes 12-mo. On-Demand Campus access)	3000PMUFUNDSPMCR	4 Days
Power Monitoring Fundamentals (without 12-mo. On-demand Campus access)	3000PMUFUNDSPM	4 Days
Power Monitoring Designer	3000PMUPROG	4 Days
Power Monitoring Administrator	3000PMUADMINSPM	4 Days
Other Software Courses		
Hardware Installation and Troubleshooting	3000PLUC100	4 Days
PowerSCADA Expert Administrator	3000PMUPLSADMIN	4 Days
Online Training Solutions		
On-Demand Campus (one-year subscription—online access)	3000PMUDEMAND12	12 months
SMSTrainer (one-year subscription—online access)	3000PMUSMSTRAINER	12 months
EEMTrainer (one-year subscription—online access)	3000PMUEEMTRAINER	12 months
webED, custom webinar training for up to five people (call or email for more information)	3000PLUCWEBCST	3–4 hours

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The Sepam Range

Sepam protection relays are time-tested, high-performance devices that ensure dependability. This range of products was designed with a simple idea in mind: All users should be able to find a solution corresponding exactly to their needs with the right balance between performance, simplicity and cost. With Series 10, 20, 40 and 80, the Sepam range does just this. This family of relays offers a solution for every application need, specifically targeting industrial installations. These multi-functional protection devices allow an easy and hassle-free startup with simple-to-use programming software. Sepam relays also comply with the latest communication protocols on the market, including IEC61850, DNP3 and Modbus. In addition, all relays within this range come with a standard 10 year warranty and conformal coating for protection against harsh environments.

Features and Benefits

- Compact devices with clearly defined connection terminals allowing for easy installation
- User-friendly software with built-in manuals for every relay and support for offline programming
- Application-specific design ensuring appropriate protection for any given application
- Low power CT options for the use of relays on new installations where the load is low
- Field-upgradable technology allows user to stay up-to-date on the latest hardware and software

Sepam Series 10

Sepam Series 10

The Sepam Series 10 relays are suitable for basic protection applications involving current metering.

Applications covered:

- Substation
- Transformer

Sepam Series 20 and 40

Sepam Series 20

The Series 20 consists of high-performing solutions suited for standard applications requiring current or voltage metering.

Applications covered:

- Substation
- Transformer
- Motor
- Busbar

Sepam Series 40

The Series 40 family of protection relays are designed for demanding applications requiring current, voltage and/or frequency metering.

Applications covered:

- Substation
- Transformer
- Motor
- Generator

Sepam Series 80

Sepam Series 80

The Series 80 relays are for custom applications requiring enhanced protection of electrical distribution networks.

Applications covered:

- Substation
- Transformer
- Motor
- Generator
- Busbar
- Capacitor

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Protection Configurations

Four relay series with increasing protection capabilities for six types of applications to provide all possible protection configurations

Table 4.40: Protection Configurations

	Series 10	Series 20	Series 40	Series 80
Protection Functions				
	49RMS, 50/51, 50G/51G, 50N/51N, 68, 86	26/63, 27/27S, 27D, 27R, 30, 37, 38/49T, 46, 48, 49RMS, 50/51, 50BF, 50G/51G, 50N/51N, 51LR, 59, 59N, 66, 68, 79, 81H, 81L, 81R, 86, 94/69, CPLU 50/51, CPLU 50N/51N	25, 26/63, 27/27S, 27D, 27R, 30, 32R, 32Q/40, 37, 38/49T, 46, 47, 48, 49RMS, 50/51, 50BF, 50G/51G, 50N/51N, 50V/51V, 51LR, 59, 59N, 60/60FL, 66, 67, 67N/67NC, 68, 79, 81H, 81L, 81R, 86, 94/69, 21FL, 46BC, CPLU 50/51, CPLU 50N/51N	12, 14, 21B, 24, 25, 26/63, 27/27S, 27D, 27R, 30, 32P, 32Q/40, 37, 37P, 38/49T, 40, 46, 47, 48, 49RMS, 50/27, 50/51, 50BF, 50G/51G, 50N/51N, 50V/51V, 51C, 51LR, 59, 59N, 60/60FL, 64G, 64REF, a 66, 67, 67N/67NC, 68, 74, 78PS, 79, 81H, 81L, 81R, 86, 87M, 87T, 94/96
Characteristics				
Logic input/outputs	Inputs 0-4	Inputs 0–10	Inputs 0–10	Inputs 0–42
	Outputs 3-7	Outputs 4–8	Outputs 4–8	Outputs 5–23
Temperature sensors	0	0–8	0–16	0–16
Channels	Current 3I + Io	Current 3I + Io	Current 3I + Io	Current 2x 3I + 2x Io
	—	Voltage 3 V + Vo	Voltage 3 V + Vo	Voltage 2x 3 V + Vo
	—	LPCT *[1]*	LPCT *[1]*	LPCT *[1]*
Communication Ports	0–1	1–2	1–2	2–4
	ModBus, IEC 103	ModBus, IEC 103, DNP3, IEC 61850	ModBus, IEC 103, DNP3, IEC 61850	ModBus, IEC 103, DNP3, IEC 61850
	—	—	Redundancy	Redundancy
	—	—	—	Goose Message
Control	Matrix *[2]*	Matrix *[2]*	Matrix *[2]*	Matrix *[2]*
			Logic equation editor	Logic equation editor
	—	—	—	Logipam *[3]*
Other	—	—	—	Front memory cartridge with settings
	—	—	Backup 48 hours (capacitor)	Backup lithium battery *[4]*

Table 4.41: ANSI Codes

Code	Definition	Code	Definition
12	Overspeed (2 set points)	50N/51N	Ground fault
14	Underspeed (2 set points)	50V/51V	Voltage restrained overcurrent
21B	Underimpedance	51C	Capacitor bank unbalance
21FL	Fault Locator	51LR	Locked rotor
24	Overfluxing (V/Hz)	59	Overvoltage (L-L or L-N)
25	Synch-check	59	Overvoltage (L-L)
26/63	Thermostat / Buchholz	59N	Neutral voltage displacement
27/27S	Undervoltage (L-L/L-N)	60/60FL	CT/VT supervision
27D	Positive-sequence undervoltage	64G	100% stator earth fault
27R	Remanent undervoltage	64REF	Restricted earth fault
30	Annunciation	66	Starts per hour
32P	Directional real overpower	67	Directional phase overcurrent
32Q/40	Directional reactive overpower	67N/67NC	Directonal ground fault
37	Phase undercurrent	68	Logic discrimination / zone selective interlocking
37P	Directional active underpower	74	Circuit connnection supervision
38/49T	Temperature mounting	78PS	Pole slip
40	Field loss (underimpedance)	79	Recloser (4 cycles)
46	Unbalance/negative sequence	81H	Overfrequency
46BC	Broken conductor detection	81L	Underfrequency
47	Negative sequence overvoltage	81R	Rate of change of frequency (df/dt)
48	Excessive starting time	86	Latching / acknowledgement
49RMS	Thermal overload	87M	Machine differential
50/27	Inadvertent energization	87T	Two-winding transformer differential
50/51	Phase overcurrent	94/69	Circuit breaker / contactor control
50BF	Breaker failure	CLPU 50/51	Cold load pick-up with phase overcurrent protection
50G/51G	Ground sensitive	CLPU 50N/51N	Cold load pick-up with earth fault protection

[1] LPCT: low-power current transducer complying with standard IEC 60044-8.
[2] Control matrix for simple assignment of information from the protection, control and monitoring functions.
[3] Logipam ladder language (PC programming environment) to make full use of Sepam Series 80 functions.
[4] Standard lithium battery 1/2 AA format 3,6 V front face exchangeable.

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VAMP V321 Arc Flash Mitigation System

New!

VAMP V321 Arc Flash Mitigation System

- VAMP V321 is the fastest and most advanced arc flash mitigation system on the market.
- As a fast-acting arc flash mitigation system, VAMP V321 reduces the level of incident energy within a switchgear, thereby reducing equipment damage.
- VAMP V321 is a modular system consisting of a central unit, input/ouput (I/O) units and arc flash sensors. Its modular design gives it the flexibility to expand and adapt to various applications in an electrical distribution system.

System Features

- Operates on light and/or overcurrent conditions
- Operating time of 2 ms or less
- Supports up to 16 I/O units and 170 arc flash sensors
- Four programmable arc protection zones per central unit
- Fully configurable using VAMPSet software
- Mimic bus display
- Supports nearly every communication protocol on the market
- Phase current measuring
- Ground fault current measuring
- Circuit breaker fail protection (50BF)

New!

VAMP V321 I/O Units

The I/O units are used to connect sensors to the central unit in the VAMP V321 system. These units are classified as either light sensor or current I/O units.

VAM 12LD I/O Unit

VAM 10LD I/O Unit

VAM 4CD I/O Unit

VAM 12L I/O Unit

VAM 10L I/O Unit

VAM 4C I/O Unit

VAM 3LX I/O Unit

VAM 3L I/O Unit

- VAM 12L, VAM 12LD: Light-sensing point sensor I/O units with connections for 10 arc sensors and 3 trip contacts
- VAM 10L, VAM 10LD: Light-sensing point sensor I/O units with connections for 10 arc sensors and 1 trip contact
- VAM 3L, VAM 3LX: Light-sensing fiber arc sensor I/O units with connections for 3 fiber loops and 1 trip contact
- VAM 4C, VAM 4CD: Dedicated I/O units used to measure current from alternative locations

All VAMP V321 I/O units provide active indication when appropriately placed inside the switchgear enclosure. They are connected to each other using intra-unit cabling supplied by Schneider Electric.

VAMP V321 Sensors and Accessories

- **Point sensor VA1EH-x (pipe)** Installed typically in the tube or next to the compartment window.
- **Point sensor VA1DA-x (surface)** Compartment wall or mounting plate installation.
- **Arc SLm-x** Used when a large number of compartments are to be monitored.
- **VX001 Modular Cable** Intra-unit cabling that is used to connect the I/O units to the central unit.

VAMP V321 is currently available in solution-based projects. Please contact a Schneider Electric representative for more information.

USEnergySalesSupport@Schneider-Electric.com

VA1EH-x

VA1DA-x

Arc SLm-x

VX001

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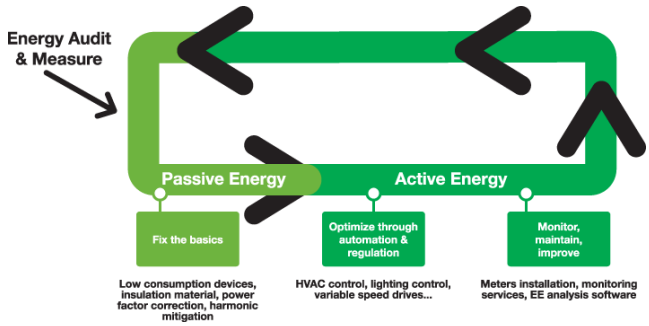
Reactive Power Compensation and Harmonic Mitigation Solutions

How can reactive power compensation and harmonic mitigation solutions be part of your energy efficiency programs?



Power factor is a measure of how efficiently you are using electricity. In an electric power system, a load with low power factor draws more current than a load with a high power factor for the same amount of real power transferred. Utility customers with a low power factor could realize an increase or penalty in their electric bill. Over time, these penalties may reach into thousands of dollars, depending upon the utility's rate structure.

Harmonics may disrupt normal operation of other devices and increase operating costs. Symptoms of problematic harmonic levels include overheating of transformers, motors and cables, thermal tripping of protective devices, logic faults of digital devices and drives.

Harmonics can cause vibrations and noise in electrical machines (motors, transformers, reactors).

The life span of many devices can be reduced by elevated operating temperature.

Schneider Electric provides different solutions to meet different application requirements.

Table 4.42: Descriptions, Applications, and Features

Product Description	LV	MV	Application	Product Features
ReactiVar Fixed Power Factor Capacitors	X	X	Power Factor correction	Suited for applications where the load does not change or where the capacitor is switched with the load, such as on the load side of a motor contactor.
ReactiVar Standard Automatic Power Factor Capacitor Banks (AV5000/MV5000)	X	X	Power Factor correction	Suited for centralized power factor correction in applications where plant loading is constantly changing, resulting in the need for varying amounts of reactive power. Designed for electrical networks with little or no harmonic content.
ReactiVar Anti-Resonant Automatic Power Factor Capacitor Banks (AV6000/MV6000)	X	X	Power Factor Correction and Harmonics Filtering	Suited for centralized power factor correction in applications containing harmonic energies that would otherwise damage standard fixed or automatic capacitor banks.
ReactiVar Harmonic Filtering Automatic Power Factor Capacitor Banks (AV7000/MV7000)	X	X	Power Factor Correction and Harmonics Filtering	Provides power factor correction as well as harmonic filtering with specific harmonic order (5th) in industrial networks.
ReactiVar Transient Free Reactive Compensation Systems (AT6000/AT7000)	X		Power Factor Correction and Harmonics Filtering	Enhanced technology utilizing solid state switching elements that replace standard electromechanical contactors. Provides quicker response to load fluctuations with transient free capacitor switching.
AccuSine™ (PCS) Active Harmonic Filter	X	X *[1]*	Active Harmonic Filtering	Monitors a distorted electrical signal and determines the frequency and magnitude of harmonics in the signal. Cancels the harmonic content with the dynamic injection of opposing phase current in the distribution system or individual load.
ReactiVar Hybrid VAR Compensator (HVC)	X	X *[1]*	Reactive Power Compensation (Real-time)	Provides real-time reactive power compensation, and voltage support in networks with highly cyclical load profiles.

[1] With transformer.

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Low Voltage Fixed Capacitors

ReactiVar low voltage fixed capacitors are ideally suited for power factor correction applications where the load does not change or where the capacitor is switched with the load, such as on the load side of a motor starter. ReactiVar fixed capacitors are best suited for applications where there are no harmonic currents or voltages present.

Application Note: Capacitors are low impedance path for the harmonic currents produced by variable frequency drives, motor soft starters, welders, computers, PLCs, robotics and other electronic equipment. These harmonic currents can cause the capacitor to overheat, and shorten its life. Furthermore, the resonant circuit formed by shunt capacitors coupled with system inductances (motors and transformers) can amplify harmonic currents and voltages in the electrical network. This amplification can cause nuisance fuse operation and/or damage to electrical equipment including capacitors and other electronic devices. If power factor correction is required in the network where harmonic is present, please contact your nearest Square D/Schneider Electric sales office for assistance.

Features:

- Heavy edge, slope metallizations and wave-cut profile to ensure high inrush current capabilities.
- Special resistivity and profile metallization for better self-healing and enhanced life (up to 130,000 hours).
- Unique safety feature which disconnects the capacitors at the end of their useful life electrically.
- Less than 0.5w/kVAR losses, including discharage resistors.
- Constructed with a dry type metalized polypropylene capacitor element with no liquid dielectrics.
- Can be easily mounted inside panels or in a stand alone configuration.

Table 4.43: Unfused 208 V 3 phase/ 60Hz unit *[2]*

kVAR rating	Regular duty Indoor NEMA 1 unit	Rated Current (A)	Recommended copper wire size*[3]*	Recommended circuit protection device rating*[4]*	
@ 208 V	Catalog Number	@ 208 V	AWG	Fuse	Circuit breaker
2	PFCD1002	6.3	14	15	15
5	PFCD1005	13.6	10	30	20
6	PFCD1006	17.7	10	40	25
7.5	PFCD1007	20.9	8	45	30
10	PFCD1010	27.1	8	60	40
13	PFCD1013	35.4	6	75	50
15	PFCD1015	41.7	4	90	60
17	PFCD1017	48	4	100	70
21	PFCD1021	59.4	3	125	90
25	PFCD1025	68.8	2	150	100
27	PFCD1027	75.1	2	150	110
30	PFCD1030	83.4	1	175	125
34	PFCD1033	93.8	1/0	200	150
37.5	PFCD1037	104.3	2/0	225	150
41	PFCD1040	114.7	2/0	250	175
45	PFCD1045	125.1	3/0	250	175
49	PFCD1048	135.5	4/0	300	200
53	PFCD1053	147	4/0	300	225
60	PFCD1060	168.9	300 kcmil	350	250
70	PFCD1070	198.1	350 kcmil	450	300
80	PFCD1080	222	500 kcmil	450	350

Table 4.44: Unfused 240 V 3 phase/ 60Hz unit *[2]*

kVAR rating	Regular duty Indoor NEMA 1 unit	Rated Current (A)	Recommended copper wire size*[3]*	Recommended circuit protection device rating*[4]*	
@ 240 V	Catalog Number	@ 240 V	AWG	Fuse	Circuit breaker
3	PFCD2003	7.2	14	15	15
6	PFCD2006	15.6	10	35	25
8	PFCD2008	20.5	8	45	30
10	PFCD2010	24.1	8	50	35
13	PFCD2013	31.3	6	70	45
15	PFCD2015	36.1	6	75	50
17.5	PFCD2017	40.9	6	90	60
20	PFCD2020	48.1	4	100	70
22.5	PFCD2023	55.3	3	125	80
25	PFCD2025	61.4	3	125	90
27.5	PFCD2028	68.6	2	150	100
30	PFCD2030	72.2	2	150	100
32.5	PFCD2033	79.4	1	175	110
37.5	PFCD2036	86.6	1	175	125
40	PFCD2040	96.2	1/0	200	150
45	PFCD2045	108.3	2/0	225	150
50	PFCD2050	120.3	2/0	250	175
60	PFCD2060	144.4	4/0	300	200
70	PFCD2070	169.6	300 kcmil	350	250
80	PFCD2080	194.9	350 kcmil	400	300
90	PFCD2090	218.9	400 kcmil	450	300
100	PFCD2100	239.4	500 kcmil	500	350

Table 4.45: Unfused 480V 3 phase/ 60Hz unit *[2]*

kVAR rating	Regular duty Indoor NEMA 1 unit	Rated Current (A)	Recommended copper wire size*[3]*	Recommended circuit protection device rating*[4]*	
@ 480 V	Catalog Number	@ 480 V	AWG	Fuse	Circuit breaker
6	PFCD4006	7.2	14	15	15
8	PFCD4008	10.2	12	20	15
10	PFCD4010	12	12	25	20
12.5	PFCD4012	15	10	30	25
15	PFCD4015	18	10	40	30
17	PFCD4017	19.8	8	40	30
20	PFCD4020	24	8	50	35
25	PFCD4025	30	6	60	45
27.5	PFCD4027	33	6	70	50
30	PFCD4030	36	6	75	50
33	PFCD4033	39.6	6	80	60
35	PFCD4035	42	4	90	60
40	PFCD4040	48	4	100	70
45	PFCD4045	54	4	110	75
50	PFCD4050	60	3	125	90
60	PFCD4060	72	2	150	100
65	PFCD4065	78	1	175	110
70	PFCD4070	84	1	175	125
75	PFCD4075	90	1/0	200	125
80	PFCD4080	96	1/0	200	150
90	PFCD4090	108	2/0	225	150
100	PFCD4100	120	2/0	250	175
125	PFCD4125	150	250	300	225
150	PFCD4150	180	300	400	250
175	PFCD4175	210	400	450	300
200	PFCD4200	240	500	500	350

Table 4.46: Unfused 600V 3 phase/ 60Hz unit *[2]*

kVAR rating	Regular duty Indoor NEMA 1 unit	Rated Current (A)	Recommended copper wire size*[3]*	Recommended circuit protection device rating*[4]*	
600 V	Catalog Number	@ 600 V	AWG	Fuse	Circuit Breaker
10	PFCD6010	9.6	12	20	15
15	PFCD6015	14.4	10	30	20
20	PFCD6020	19.2	10	40	30
23	PFCD6022	22.1	8	50	35
25	PFCD6025	24	8	50	35
27	PFCD6027	26	8	50	40
30	PFCD6030	28.8	8	60	45
35	PFCD6035	33.6	6	70	50
40	PFCD6040	38.4	6	80	60
45	PFCD6045	43.2	4	90	60
50	PFCD6050	48	4	100	70
60	PFCD6060	57.6	3	125	80
70	PFCD6070	67.2	3	150	100
75	PFCD6075	72	2	150	100
80	PFCD6080	76.8	1	150	110
90	PFCD6090	86.4	1	175	125
100	PFCD6100	96	1/0	200	150
125	PFCD6125	120	3/0	250	175
150	PFCD6150	144	4/0	300	200
175	PFCD6175	168	300 kcmil	350	250

[2] For fused unit, add suffix “F” to the existing part number. Consult Schneider Electric sales office for pricing.
[3] Conductor should be copper and rated 90 °C min. Refer to local electrical codes for proper wire size
[4] Consult local electrical codes for proper sizing of molded case circuit breaker frame or disconnect switch rating

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The AV5000 is suitable for use where harmonic generating loads are less than 15% of the total connected load (AV5000 shown here).

Low Voltage Standard Automatic Capacitor Banks

The AV5000 standard automatic power factor correction banks are designed for centralized power factor correction to supply varying amounts of reactive power required to compensate for changing load conditions. The AV5000 banks are ideally suited for facility electrical distribution systems with TDD (total harmonic current distortion) < = 5% and THD(V) (total harmonic voltage distortion) < = 5%. An advanced power factor controller measures plant power factor via a single remote CT. Plus, it switches capacitor modules in and out of service to maintain a user selected target power factor.

Main Features:

- Modular construction; free standing QED switchboard enclosures (30wx36dx90h) and allow for easy future expansion
- Rugged design — units are constructed with removable steel panels over heavy gauge steel frame
- Standard offering available up to 400 kVAR at 208 Vac, 1000 kVAR at 480 or 600 Vac
- Main lugs or main breaker section at your choice
- Dry capacitor element design eliminates risk of fluid leakage, environmental hazard and drip pans
- Capacitor rated contactors are designed specifically for the switching of capacitive currents and feature a patented capacitor precharge circuit that exceeds air-core reactor transient dampening
- Different power factor controller options provide a choice in functionality and control sophistication
- Backlit display on controller displays actual power factor (PF), alarms, number of steps energized and much more
- Available in NEMA 1 and NEMA 3R enclosures

AV 6000 Capacitor Bank

Low Voltage Anti-Resonant and Filtering Automatic Capacitor Banks

ReactiVar AV6000 anti-resonant and AV7000 harmonic filtering automatic switched capacitor banks are specifically designed for networks containing harmonic energies which would otherwise damage standard fixed or automatic capacitor banks.

The problem: Harmonics are caused by non-linear loads such as variable frequency drives, motor soft starters, welders, uninterruptable power supplies, robotics, PLCs and other electronic devices. Harmonics are higher-than-60 Hz current and voltage components in the electrical distribution system. Capacitors are a low impedance path for these higher frequency components and thus absorb the harmonic energies. Combinations of capacitors and system inductances (motors and transformers) can form series and parallel tuned circuits which can resonate at certain frequencies. The harmonics caused by non-linear loads can excite a standard capacitor bank into resonance. The resonance can magnify currents and voltages, causing system wide damage and equipment failure. This problem is growing in today's distribution systems.

The Solution: Anti-Resonant Automatic Capacitor Banks The AV6000 anti-resonance capacitor bank's primary function is power factor correction. Iron core reactors are added in series with the capacitor modules. The 3 phase reactors are custom designed and manufactured under tight tolerance specifically for the AV6000. The reactors tune the bank below the first dominant harmonic (usually the 5th, or 300 Hz). Below the tuning point, the system appears capacitive and thus corrects power factor. Above the tuning point, the system appears Inductive and thus resonance is minimized. The AV6000 design has the added advantage of removing up to 50% of the 5th harmonic to reduce overall voltage distortion.

Harmonic Filtering Automatic Capacitor Banks Although the AV7000 looks identical to the AV6000, its primary function is harmonic mitigation, with power factor correction being a secondary benefit. The distinction between an AV6000 and an AV7000 is the tuning point. By definition, if the tuning point of the capacitor/reactor combination is within ±10% of the target harmonic it is intended to absorb, it is referred to as a filter. If the tuning point is outside the ±10% limit, it is referred to as an anti-resonant system. Schneider Electric power quality solution experts should be consulted prior to recommending AV7000 to customers.

Main Features:

- Standard offering available up to 480 kVAR at 208 V, 1200 kVAR at 480 or 600 Vac
- Capacitor modules are designed with higher than standard voltage and current ratings to provide long life on systems with high harmonic energies. Reactors are designed to operate at 115 °C rise over a maximum 40 °C ambient temperature.
- In addition to the standard features provided in the AV5000 systems, the reactors in the AV6000 and AV7000 have an embedded thermistor temperature detector. The stage will shut down and annunciate if the reactor is overheated, usually a result of excessive harmonic energies

Application Assistance: Schneider Electric power quality experts can provide engineering assistance for the application of capacitors in harmonic rich environments. Specialists can assess the likelihood of application problems and arrange for more detailed study if required. Solutions can include computer modeling and system simulation. Our application engineers can arrange for systems studies, provide custom engineering proposal, perform installation and commissioning, as required by the application. Please contact Schneider Electric power quality experts or email us at pqc@squared.com.

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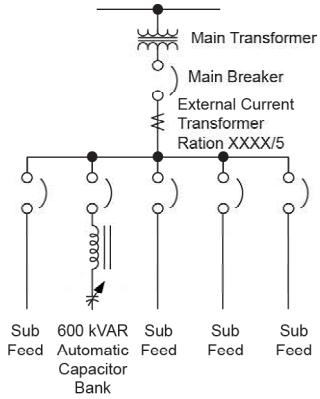

Single Line (Typical) Diagram 1

CT Selection

The current transformer is located on a phase A bus or cable at the main service entrance as illustrated in Diagram 1.

CT catalog number: TRAI• • • •SC ♦ ♦ where • • • • is current rate code of bus/cable and ♦ ♦ is window size code. Codes are listed in table 4.42. **e.g.** TRAI1000SC07 is a CT for 1000 A bus with 7"x4" window.

Table 4.47: CT Selection Table

Current Rating of Bus/Cable		Window Size	
Amperes	Rating Code • • • •	7" x 4" Size Code ♦ ♦	11" x 4" Size Code ♦ ♦
300	0300	07	11
400	0400	07	11
500	0500	07	11
600	0600	07	11
750	0750	07	11
800	0800	07	11
1000	1000	07	11
1200	1200	07	11
1500	1500	07	11
1600	1600	07	11
2000	2000	07	11
2500	2500	07	11
3000	3000	07	11
3500	3500	07	11
4000	4000	07	11
5000	5000	N/A	11
6000	6000	N/A	11

Low Voltage Transient Free Reactive Compensation Capacitor Banks

Square D™ ReactiVar Transient Free Reactive Compensation (TFRC) anti-resonant (AT/BT6000) systems and filtering system (AT/BT7000) are ideally suited for use on electrical systems where connected equipment is extremely sensitive to variations in the supply voltage.

The problem: Capacitor systems featuring electromechanical contactors could generate voltage transients on the electrical network when they switch capacitor stages on/off, even when current limiting or tuning reactors are employed. Transients can impair the operation of sensitive equipment, including programmable logic controllers, variable speed drives, computers and UPS systems. In sensitive networks such as hospitals, data processing centers, airports and many manufacturing environments, any transient, however slight, may not be acceptable.

The solution: TFRC systems feature an advanced controller to precisely activate electronic switching elements to connect capacitor stages and avoid the creation of transients. Transient free switching also reduces wear on capacitors due to switching and will result in longer life for the overall capacitor system. With a response time of less than ten seconds to load changes, TFRC systems can reduce the kVAR or kVA demand quickly.

Main Features:

- Standard offering up to 1350 kVAR at 480 Vac
- Transient free switching of capacitor steps
- Electronic switching elements yield an unlimited number of switching operations
- Different power factor controller options provide a choice in functionality and control sophistication
- Backlit display on controller displays actual PF, alarms, number of steps energized and much more
- Heavy duty dry capacitor element design provides no risk of fluid leakage, no environmental pollution and no need for drip pans
- The reactors have an embedded thermistor temperature detector. The stage will shut down and annunciate if the reactor is overheated which is usually a result of excessive harmonic energies
- Units are constructed with removable heavy duty steel panels over heavy gauge steel frame.
- Available in NEMA 1 and NEMA 3R enclosures.

AT6000 Transient Free Capacitor Bank

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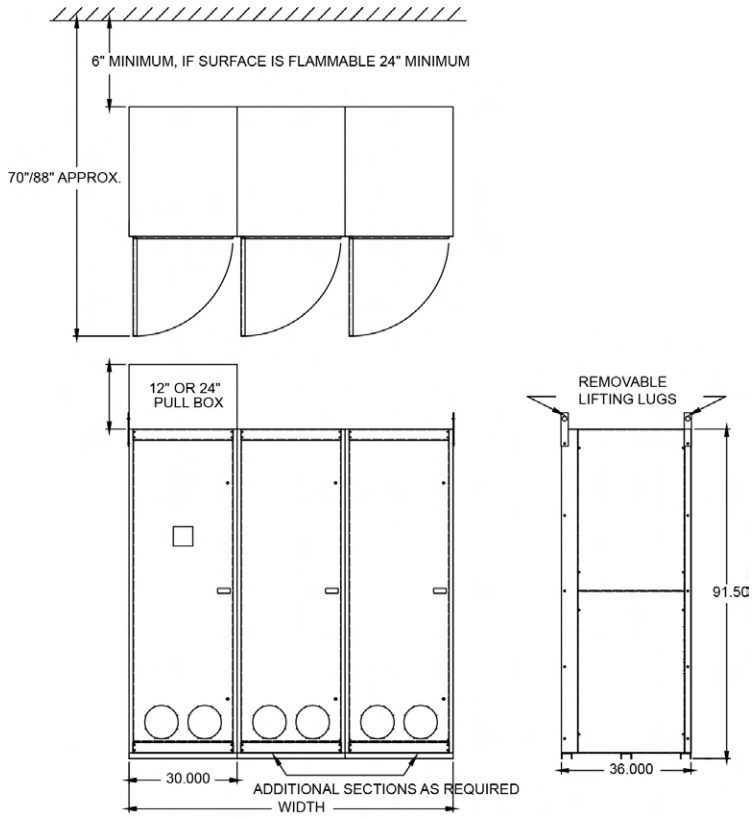
Low Voltage Capacitor Bank General Specifications	
Voltage:	208, 240, 480, 600 Vac standard, other voltages available
Ambient temperature:	-5 °C to 40 °C
Average temperature limit:	<=40 °C within 24 hours, <35 °C over 1 year
Elevation:	<=1800 meter (6000 feet)
Humidity:	0–95% non-condensing
Overvoltage limit:	110% maximum (continuously)
Dielectric withstand test level:	2.15 times rated voltage or 1000 V, whichever is higher for 10s
Overcurrent limit:	135% maximum (continuously)
Incoming:	Top (standard), bottom.
Main lug:	Copper mechanical standard, compression optional
Main breaker (BT):	PowerPact™ with Micrologic™ trip unit. LI standard, LSI available
Enclosure rating:	NEMA 1 standard, N3R available
Color:	ANSI 49 standard, ANSI 61, ANSI 70 optional
Standards:	CSA C22.2 No. 190, UL810



Typical low voltage capacitor bank dimension
(reference only, subject to change without notice)

MVC systems are suitable for power factor correction of steady and harmonic-free motor loads.

Medium Voltage Fixed Capacitors

The ReactiVar MVC fixed capacitors are ideally suited for power factor correction in applications where the load does not change or where the capacitor is switched with the load, such as the load side of a motor contactor. ReactiVar capacitor sizes are available up to 300 kVAR as individual units, and up to 900 kVAR in banks.

Main Features:

- Standard rating up to 900 kVAR, 4800 V (for specials, consult factory)
- Extra low dielectric loss (<0.15w/kVAR), including discharge resistors
- Internally mounted discharge resistors
- Internally delta connected capacitor elements
- Built to applicable NEMA, IEEE, and IEC standards
- Available in indoor (Type 1/12) and outdoor (Type 3R) enclosures
- Painted ASA 70 gray

Application Note:

Capacitors are low impedance path for the harmonic currents produced by variable frequency drives, motor soft starters, welders, computers, PLCs, robotics and other electronic equipment. These harmonic currents can cause the capacitor to overheat, and shorten its life. Furthermore, the resonant circuit formed by shunt capacitors coupled with system inductances (motors and transformers) can amplify harmonic currents and voltages in the electrical network. This amplification can cause nuisance fuse operation and/or damage to electrical equipment including capacitors and other electronic devices. If power factor correction is required in the network where harmonic is present, please contact your nearest Square D/Schneider Electric sales office for assistance.

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MV5000 systems are suitable for use where harmonic generating loads are less than 15% of the total connected load.
MV6000 systems are suitable for use where harmonic generating loads are less than 50% of the total connected load.
MV7000 systems are suitable for use where harmonic generating loads exceed 50% of the total connected load.
MVHVC High-Speed compensation systems are designed for reactive power compensation of rapidly fluctuating loads.

Medium Voltage Metal Enclosed Capacitor Systems

The medium voltage capacitor systems are ideally suited for centralized power factor correction and/or harmonic filtering in applications. Various equipment topologies are available, from fixed stage to fully automatic—to cover project specific application, load characteristic and installation needs. ReactiVar brand covers metal enclosed systems built in North America (5/15 kV class). Global =S= Brand can be used for expanded voltage range.

Main Features:

- Designed and built per applicable ANSI/NEMA/IEEE and/or IEC standards
- Standard metal enclosures available up to 20 mVAR, up to 34.5 kV, 50/60 Hz
- Steel or Aluminum based enclosure bays
- Externally or internally fused capacitors with excellent life due to high temperature withstand, small temperature rise, chemical stability, overvoltage and overcurrent withstand.
- Current limiting capacitor fuses with blown fuse pop-up indicators
- Inrush current limiting reactors or tuned (anti-resonant or filtered) iron core reactors
- Key interlocking system forces sequential operation of the controls,
- Fully rated three- or four-pole grounding switches
- Schneider Electric NRC12 Power factor controller provides user with friendly interface, superior performance, simplified installation and set-up procedure, and real time monitoring and protection features for the capacitor system.
- Available in Type 1 indoor and 3R outdoor enclosure types

High Voltage Reactive Power Compensation Systems

The high voltage reactive power compensation systems are ideally suited for installation at utility distribution and transmission grids. Various equipment topologies are available to cover project specific utility application, and installation needs. Typically these compensation systems are open style, rack mounted, installed in utility substation areas.

Main Features:

- Custom designed and built per requested applicable standards
- Systems rated up to 230 kV, 50/60 Hz
- Internally fused capacitors with excellent life due to high temperature withstand, small temperature rise, chemical stability, overvoltage and overcurrent withstand.
- Double wye ungrounded configuration with neutral CT protection
- Inrush current limiting or tuned (anti-resonant or filtered) air core, open style reactors

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New!

AccuSine PCS+ Active Harmonic Filter (AHF)

AccuSine PCS+ Active Harmonic Filter (AHF) injects harmonic current to cancel harmonic current in the electrical distribution system. This reduced harmonic level results in improved electrical network reliability and reduced operating cost. AccuSine PCS+ is simple to size, install, set up and operate. In addition, AccuSine PCS+ eliminates the complex harmonic compliance limit calculations and removes nuisance harmonics from the electrical network.

The Problem:

Power electronic devices that have rapid and frequent load variations have become abundant today due to their many process control related and energy saving benefits. However, they also bring a few major drawbacks to electrical distribution systems; harmonics and rapid change of reactive power requirement. Harmonics may disrupt normal operation of other devices and increase operating costs. Symptoms of problematic harmonic levels include overheating of transformers, motors, drives, cables, thermal tripping of protective devices and logic faults of digital devices. In addition, the life span of many devices can be reduced by elevated operating temperature.

The Solution:

The AccuSine PCS+ AHF provides the simplest and most effective means to mitigate harmonics, to reduce process related voltage fluctuations. The AccuSine PCS+ AHF actively injects opposite harmonics current on the source side of the load and it:

- Decreases harmonic related overheating of cables, switchgear and transformers
- Reduces downtime caused by nuisance thermal tripping of protective devices
- Increases electrical network reliability and reduces operating costs
- Corrects to the 51st harmonic, reduce harmonics level to meet IEEE 519, IEC 61000 3-4, and UK G5/4-1 standards.
- Compensates entire network or specific loads depending on installation point

Standard Features:

- Real-time dynamic current injection for harmonic cancellation and VAR compensation (lead or lag power factor)
- Load balancing capability
- Parallel connection allows for easy retrofit and installation of multiple units for large networks
- Response to load fluctuations within 2 cycles for harmonics, 1/4 cycle for power factor or load balancing
- Full color touch screen HMI (Human Machine Interface)
- UL Type 1, UL Type 2, UL Type 12, IP31, and IP54 enclosures
- Seismic rated per ICC IBC and ASCE 7
- UL, CE, ABS, and CSA certified

AccuSine PCS+ Sizing

For proper sizing of AccuSine units, contact the Schneider Electric sales office or e-mail powersolutions@schneider-electric.com. To expedite the product selection process, please have a single line diagram and/or details of the application including sizes of transformers, non-linear and linear loads, and any existing filters and capacitors.

Table 4.48: PCS+ Active Harmonic Filter Selection

Harmonic and PF Correction (380–480 V models, 50/60 Hz)							
Rated Current (A)	Frequency (Hz)	Catalog Number	Enclosure Information			Frame	Weight (kg)
			Rating	Style	Cable Entry		
60	50/60	PCSP060D5IP00	IP00 (UL Type Open)	Wall Mount	Bottom	1	88
		PCSP060D5N2	UL Type 2	Floor Standing	Top or Bottom	2	277
		PCSP060D5IP31	IP31				
		PCSP060D5N12	UL Type 12				280
		PCSP060D5IP54	IP54				
120	50/60	PCSP120D5IP00	IP00 (UL Type Open)	Wall Mount	Bottom	3	113
		PCSP120D5N2	UL Type 2	Floor Standing	Top or Bottom	4	287
		PCSP120D5IP31	IP31				
		PCSP120D5N12	UL Type 12				293
		PCSP120D5IP54	IP54				
200	50/60	PCSP200D5IP00	IP00 (UL Type Open)	Wall Mount	Bottom	5	171
		PCSP200D5N2	UL Type 2	Floor Standing	Top or Bottom	6	397
		PCSP200D5IP31	IP31				
		PCSP200D5N12	UL Type 12				402
		PCSP200D5IP54	IP54				
300	50/60	PCSP300D5IP00	IP00 (UL Type Open)	Wall Mount	Bottom	7	210
		PCSP300D5N2	UL Type 2	Floor Standing	Top or Bottom	8	422
		PCSP300D5IP31	IP31				
		PCSP300D5N12	UL Type 12				436
		PCSP300D5IP54	IP54				

NOTE: Contact Schneider Electric sales office for other voltage models.

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New!

AccuSine PFV+ Active Harmonic Filter (AHF)

AccuSine PFV+ is a very simple and effective means to eliminate leading or lagging power factor, reduce voltage fluctuations, enhance equipment operating life, and improve system power capacity. AccuSine PFV+ offers many features in one package that others require multiple models to accomplish.

AccuSine PFV+ can help you solve:

- Power factor
- Imbalance (specifically important for motor applications)
- Voltage stability (such as localized photovoltaic networks)
- Flicker

AccuSine PFV+ Sizing

For proper sizing of AccuSine units, contact the Schneider Electric sales office or e-mail powersolutions@schneider-electric.com. To expedite the product selection process, please have a single line diagram and/or details of the application including sizes of transformers, non-linear and linear loads, and any existing filters and capacitors.

Table 4.49: AccuSine PFV+ Selection

PF Correction and Load Balancing (380-480V models 50/60Hz)							
Rated Current (A)	Frequency (Hz)	Catalog Number	Enclosure Information			Frame	Weight (kg)
			Rating	Style	Cable Entry		
60	50/60	EVCP060D5IP00	IP00 (UL Type Open)	Wall Mount	Bottom	1	88
		EVCP060D5N2	UL Type 2	Floor Standing	Top or Bottom	2	277
		EVCP060D5IP31	IP31				
		EVCP060D5N12	UL Type 12				280
		EVCP060D5IP54	IP54				
120	50/60	EVCP120D5IP00	IP00 (UL Type Open)	Wall Mount	Bottom	3	113
		EVCP120D5N2	UL Type 2	Floor Standing	Top or Bottom	4	287
		EVCP120D5IP31	IP31				
		EVCP120D5N12	UL Type 12				293
		EVCP120D5IP54	IP54				
200	50/60	EVCP200D5IP00	IP00 (UL Type Open)	Wall Mount	Bottom	5	171
		EVCP200D5N2	UL Type 2	Floor Standing	Top or Bottom	6	397
		EVCP200D5IP31	IP31				
		EVCP200D5N12	UL Type 12				402
		EVCP200D5IP54	IP54				
300	50/60	EVCP300D5IP00	IP00 (UL Type Open)	Wall Mount	Bottom	7	210
		EVCP300D5N2	UL Type 2	Floor Standing	Top or Bottom	8	422
		EVCP300D5IP31	IP31				
		EVCP300D5N12	UL Type 12				436
		EVCP300D5IP54	IP54				

AccuSine+ Wall Mount Conversion Kit

- Converts IP00 (UL Type Open) to IP20 (UL Type 1) wall mounted enclosed assemblies.
- Includes HMI mounting plate and cable entry enclosure for mounting on the bottom of the IP00 assemblies.

Table 4.50: AccuSine PCS+ and AccuSine PFV+ Exterior Dimensions

Frame Size	Exterior Dimensions	
	Height (mm)	Width (mm)
1	1300	421
2	2092	800
3	1400	421
4	2089	800
5	1323	582
6	2089	900
7	1560	582
8	2092	900

Table 4.51: AccuSine+ Wall Mount Kits

Catalog Number	Assembled Dimensions — IP20				IP20 Assembly	Cable Entry Enclosure
	Unit Rating (A)	Height	Width	Depth	Weight (kg)	Weight (kg)
PCSPWMKIT60A	60	1530	421	349	97.3	8.7
PCSPWMKIT120A	120	1730	421	384	122.0	9.3
PCSPWMKIT300A	200	1642	575	435	180.0	8.6
PCSPWMKIT300A	300	1882	575	435	218.6	8.6

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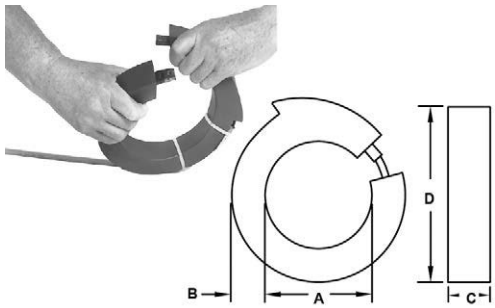

Round Split-Core Current Transformer (CT) Selection:

Two remote current transformers (CT) are required for three phase loads. Three CT's are required for networks with line to neutral loads. Depending on installation, additional CTs may be required. Additional sizes are available.

Table 4.52: Round Split-Core CT—UL Recognized

Ampacity	Catalog Number	Dimensions			Weight		Accuracy Class	Burden Capacity (VA)	Secondary Current
			in	mm	lbs	kg			
1000	CT1000SC	A	4	101	3.5	1.75	1	10	5
		B	1.25	32					
		C	1.5	38					
		D	6.5	165					
3000	CT3000SC	A	6	152	4.25	1.90	1	45	5
		B	1.25	32					
		C	1.5	38					
		D	8.5	216					
5000	CTFC-L500058	A	8	203	5.5	2.50	1	45	5
		B	1.25	32					
		C	1.5	38					
		D	10.5	267					

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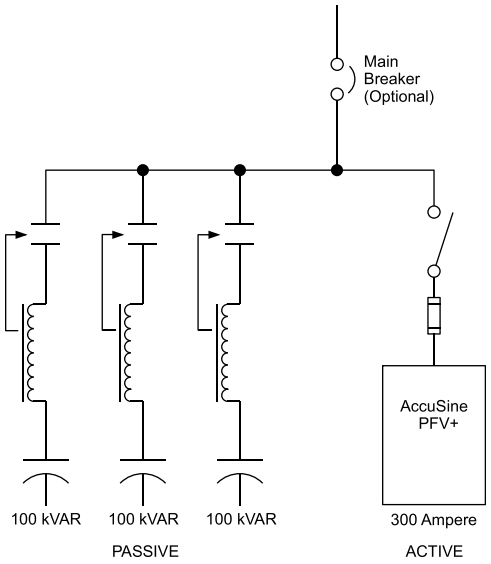

HVC Topology (Typical)

Main Features:

- Real-time reactive power compensation for transient or cyclical loads
- Infinite VAR resolution
- Transient free compensation
- Improves voltage stability, reduces flicker
- Constructed with 12 gauge steel frame

Hybrid VAR Compensator (HVC)

The Hybrid VAR Compensator (HVC) is ideally suited for industrial facilities with power quality or production problems caused by rapidly changing reactive power demands typically associating with highly cyclical loads such as welders, mining conveyors and heavy stamping machines.

The Problem: Rapid reactive power changes demand timely reactive power (VAR) compensation. Lack of timely and adequate VAR compensation can lead to voltage fluctuations in the electrical distribution system, impacting equipment operation, as well as product quality.

Traditional capacitor systems have a minimum response time of five to thirty seconds for load fluctuations. As a result of this limitation, uncompensated reactive power demand by cyclical loads can produce voltage instability, cause flicker, increase losses, and result poor power factor which reduces the electric supply capacity. Problems can include:

- Poor weld quality or reduced weld line productivity (due to restrikes or interlock weld controls)
- Failure to start motor loads (due to voltage sag on startup)
- Undervoltage tripping of sensitive loads (Robots, PLCs, VFDs)
- Lighting flicker and/or HID lighting shutdown
- Overloaded distribution equipment (cyclical current pulses may exceed the rated current of the distribution equipment)
- Poor power factor and associated utility demand charges

The Solution: The Hybrid VAR Compensator is ideally suited for ultra fast reactive power compensation in many low and medium voltage distribution networks containing highly transient loads where conventional systems are not suitable.

The HVC employs a fixed or automatic capacitor bank to provide reactive power at all times, while AccuSine PFV+ adjusts the output to meet system reactive power requirement in timely manner. AccuSine PFV+ provides dynamic VAR injection to meet reactive power requirement within 1/4 cycle, reduce voltage sags created by inductive load switching, welding operation, etc.

HVC systems can alleviate most of the problems created by cyclical loads that require large amount of reactive power for short duration. HVC system can be applied in the low voltage and medium voltage system from 480 V up to 33 kV.

Unique, cost-effective construction: The ReactiVar HVC is a custom engineered product designed for specific reactive power compensation requirements. It consists of both passive and active components. The passive component may consist of capacitors only or include tuned reactors. Depending on the application, the passive portion may include contactor or solid state switching device to permit some adjustment of the passive elements. The active component is provided by Schneider Electric's AccuSine PFV+ unit. HVC systems also can prevent resonance by including custom designed iron core reactors in series with each three phase capacitor module when required. The series reactor/capacitor combinations prevent resonance by turning the network below the first dominant harmonic (usually the 5th and 300 Hz). In doing so, HVC can also reduce harmonic voltage distortion, which further improves overall network conditions.

The HVC employs a fixed capacitor bank to inject leading reactive current (leading kVAR) into the network at all times, and an AccuSine PFV+ unit to precisely adjust the total output of the HVC according to the load reactive power demand profile. When load reactive demand is zero, the AccuSine PFV+ injects lagging reactive current to cancel the leading reactive current of the fixed capacitor bank such that the total output of the HVC is minimized. As the load kVAR demand increases, the AccuSine PFV+ adjusts its output such that the total output of the HVC precisely matches the load demand. If load demand increases above the fixed capacitor bank capability, then the AccuSine PFV+ injects leading reactive current. This continues until the full leading kVAR capacity of the AccuSine PFV+ is met. Thus, the HVC total output provides leading kVAR compensation to match load demand.

To optimize system design, Schneider Electric expert will normally need to take real-time measurements on the network site. Please contact Schneider Electric power quality experts or email us at powersolutions@schneider-electric.com.

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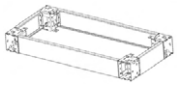

Plinth for Floor Mounting

VarSet Low Voltage Capacitor Banks

		Standard VLVAW2N	Standard VLVAW3N	Detuned VLVAF4P/ VLVFF4P
480 V 60 Hz	Lugs	25 to 100 KVAR	125 to 250 KVAR	75 to 200 KVAR
	Incoming Circuit Breaker		125 to 300 KVAR	
600 V 60 Hz	Lugs	25 to 100 KVAR	125 to 250 KVAR	75 to 200 KVAR
	Incoming Circuit Breaker			

Key Features

- Auxiliary transformer (120 V) included
- Top cable entry and connections
- NEMA 1

Options

- Incoming circuit breaker protection option with rotary handle
- Plinth accessory for floor mounting
  - Included for VLVAF4P and VLVFF4P version.
  - For VLVAW2N and VLVAW3N versions, order the following:
    for Enclosure VLVAW2N: order NSYSPF8100 and NSYSPS4100
    for Enclosure VLVAW3N: order NSYSPF10100 and NSYSPS4100
- Communication option: NRC12 controller + modbus communication module. Order your reference with addition of suffix C.
- Sprinkler proof: Included in 600 V offer

Table 4.53: General Characteristics

VarSet		
Environment		
Installation	Indoor	
Humidity	up to 95%	
Maximum altitude	2000 m	
Enclosure		
Degree of protection	NEMA 1	
Color	RAL 7035	
Degree of mechanical resistance	IK10	
Steps		
Step protection	With circuit breaker	
Electrical Characteristics		
Connection type	Three-phase	
Power losses	< 2.5 W/kVAR without detuned reactors	
	< 6 W/kVAR with detuned reactors	
Tuning order (VarSet Detuned)	4.2 p.u. (60 Hz ref)	
Maximum permissible over voltage	1.1 x Un, 8 h every 24 h	
Standards		
CSA 22.2 No. 190		
UL810, UL508a		
Incoming Connection Short Circuit Rating	With Incoming Circuit Breaker	With Lugs
From 25 to 100 KVAR/no reactors	65 kA (480 V)	25 kA
	50 kA (600 V)	
From 125 to 300 KVAR/no reactors	65 kA (480 V)	25 kA
	50 kA (600 V)	
With reactors	65 kA (480 V)	25 kA
	50 kA (600 V)	

NOTE: A Current Transformer is required for automatic Control. In order to have automatic control, a current transformer must be ordered in addition to the PFC bank. A current transformer (not included) is necessary to provide accurate network information to the VarSet's controller in order to apply the correct quantity of kVAR at any given time. It is recommended to choose a Split Core Current Transformer Model 270R from the following list of options.

NOTE: CT must be sized to your network and have a secondary rating of 5A. More details on the CT can be found in document 4210CT9701.

NOTE: When selecting a CT, be sure to use proper rating factors for ambient temperature conditions.

Table 4.54: Current Transformers

Catalog Number	Current Rating (Amperes)*[1]*
270R-501	500:5
270R-102	1000:5
270R-152	1500:5
270R-202	2000:5
270R-302 *[2]*	3000:5
270R-402 *[2]*	4000:5

[1] Rating Factor 30 °C/80 °F Ambient Temp. = 1.33
Rating Factor 55 °C/131 °F Ambient Temp. = 1.0

[2] Models -302 and -402
Rating Factor 30 °C/80 °F Ambient Temp. = 1.0
Rating Factor 55 °C/131 °F Ambient Temp. = 0.75

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VarSet Selection[3]

Table 4.55: 480 V/60 Hz, Low-Polluted Network

Standard	Catalog Numbers	
Power	Lugs	Incoming CB
25	VLVAW2N66025AA	VLVAW2N66025AB
50	VLVAW2N66050AA	VLVAW2N66050AB
75	VLVAW2N66075AA	VLVAW2N66075AB
100	VLVAW2N66100AA	VLVAW2N66100AB
125	VLVAW3N66125AA	VLVAW3N66125AB
150	VLVAW3N66150AA	VLVAW3N66150AB
175	VLVAW3N66175AA	VLVAW3N66175AB
200	VLVAW3N66200AA	VLVAW3N66200AB
225	VLVAW3N66225AA	VLVAW3N66225AB
250	VLVAW3N66250AA	VLVAW3N66250AB
275	VLVAW3N66275AB	VLVAW3N66275AB
300	VLVAW3N66300AB	VLVAW3N66300AB

Table 4.56: 600 V/60 Hz, Low-Polluted Network

Standard	Catalog Numbers	
Power	Lugs	Incoming CB
25	VLVAW2N76025AA	VLVAW2N76025AB
50	VLVAW2N76050AA	VLVAW2N76050AB
75	VLVAW2N76075AA	VLVAW2N76075AB
100	VLVAW2N76100AA	VLVAW2N76100AB
125	VLVAW3N76125AA	VLVAW3N76125AB
150	VLVAW3N76150AA	VLVAW3N76150AB
175	VLVAW3N76175AA	VLVAW3N76175AB
200	VLVAW3N76200AA	VLVAW3N76200AB
225	VLVAW3N76225AA	VLVAW3N76225AB
250	VLVAW3N76250AA	VLVAW3N76250AB

Table 4.57: 480 V/60 Hz, Polluted Network, Detuned Reactors

Automatic	Catalog Numbers	
Power	Lugs	Incoming CB
75	VLVAF4P66075AA	VLVAF4P66075AB
100	VLVAF4P66100AA	VLVAF4P66100AB
125	VLVAF4P66125AA	VLVAF4P66125AB
150	VLVAF4P66150AA	VLVAF4P66150AB
175	VLVAF4P66175AA	VLVAF4P66175AB
200	VLVAF4P66200AA	VLVAF4P66200AB
Fixed	**Catalog Numbers**	
Power	Lugs	Incoming CB
75	VLVFF4P66075AA	VLVFF4P66075AB
100	VLVFF4P66100AA	VLVFF4P66100AB
125	VLVFF4P66125AA	VLVFF4P66125AB
150	VLVFF4P66150AA	VLVFF4P66150AB
175	VLVFF4P66175AA	VLVFF4P66175AB
200	VLVFF4P66200AA	VLVFF4P66200AB

Table 4.58: 600 V/60 Hz, Polluted Network, Detuned Reactors

Automatic	Catalog Numbers	
Power	Lugs	Incoming CB
75	VLVAF4P76075AA	VLVAF4P76075AB
100	VLVAF4P76100AA	VLVAF4P76100AB
125	VLVAF4P76125AA	VLVAF4P76125AB
150	VLVAF4P76150AA	VLVAF4P76150AB
175	VLVAF4P76175AA	VLVAF4P76175AB
200	VLVAF4P76200AA	VLVAF4P76200AB
Fixed	**Catalog Numbers**	
Power	Lugs	Incoming CB
75	VLVFF4P76075AA	VLVFF4P76075AB
100	VLVFF4P76100AA	VLVFF4P76100AB
125	VLVFF4P76125AA	VLVFF4P76125AB
150	VLVFF4P76150AA	VLVFF4P76150AB
175	VLVFF4P76175AA	VLVFF4P76175AB
200	VLVFF4P76200AA	VLVFF4P76200AB

Table 4.59: Physical and Electrical Steps (480 V and 600 V/60 Hz)

Type	kVAR	Min Step	Resolution	Num Mechanical Steps (CBs)	Num Electrical Steps	Sequence	Electrical Steps (Resolution)
Standard	25	125	2x12,5	2	2	1,111	12,5/25,0
	50	125	2x12.5 + 1x25	3	4	1.1.2.2	12,5/25,0/37,5/50,0
	75	125	1x12,5 + 1x25 + 1x37,5	3	6	1,233	12,5/25,0/37,5/50,0/62,5/ 75,0
	100	25	2x25 + 50	3	4	1,122	25/50/75/100
	125	25	1x25 + 2x50	3	5	1.2.2.2	25/50/75/100/125
	150	25	2x25 + 2x50	4	6	1.1.2.2	25/50/75/100/125/150
	175	25	1x25 + 3x50	4	7	1,222	25/50/75/100/125/150/175
	200	25	2x25 + 3x50	5	5	11,222	25/50/75/100/125/150/ 175/200
	225	25	1x25 + 4x50	5	9	1.2.2.2	25/50/75/100/125/150/175/ 200/225
	250	50	5x50	5	5	1,111	50/100/150/200/250
	275	25	1x25 + 5x50	6	11	1,222	25/50/75/100/125/150/175/ 200/225/250/275
	300	50	6x50	6	6	1.1.1.1	50/100/150/200/250/300
Detuned	75	25	1x25 + 1x50	2	3	1,222	25/50/75
	100	25	2x25 + 1x50	3	4	1,122	25/50/75/100
	125	25	1x25 + 2x50	3	5	1.2.2.2	25/50/75/100/125
	150	25	2x25 + 2x50	4	6	1,122	25/50/75/100/125/150
	175	25	1x25 + 3x50	4	7	1.2.2.2	25/50/75/100/125/150/175
	200	50	4x50	4	4	1,111	50/100/150/200

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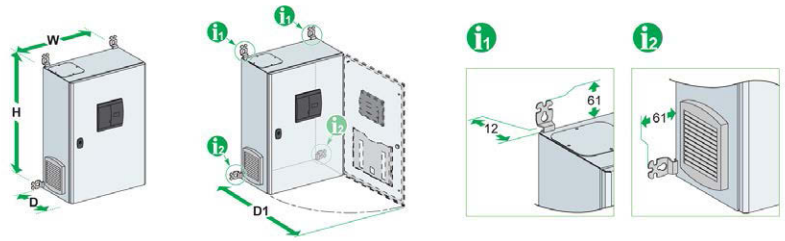
VarSet Dimensions and Weights

Table 4.60: VLVAW2N

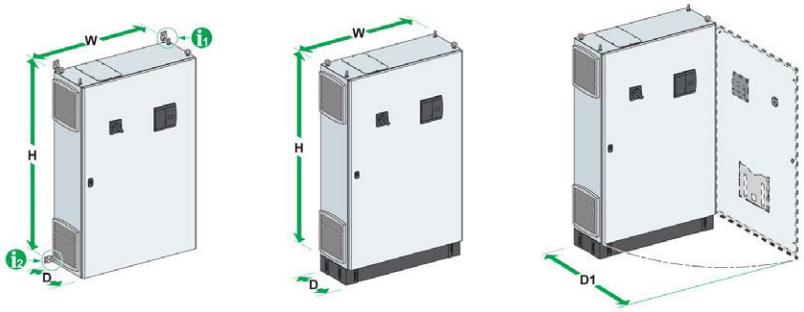
	VLVAW2N *[4]*
H	850 mm / 33.5 in.
W	800 mm / 31.5 in.
D	400 mm / 15.7 in.
D1	1200 mm / 47.2 in.
Weight	80 kg / 175 lbs.



VLVAW2N

Table 4.61: VLVAW3N

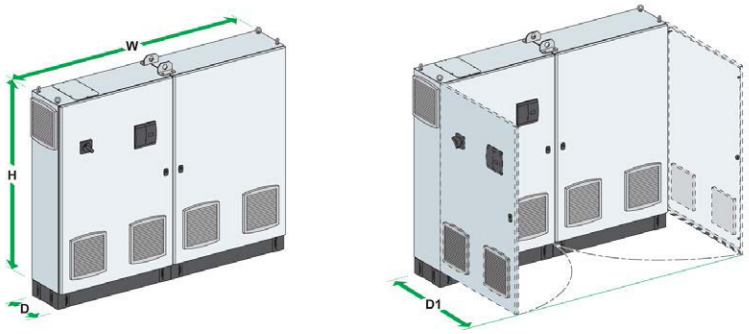
	VLVAW3N *[4]*
H	1200 mm / 47.2 in.
W	1000 mm / 39.4 in.
D	400 mm / 15.7 in.
D1	1400 mm / 55.1 in.
Weight	125 kg / 275 lbs.



VLVAW3N

Table 4.62: VLVAF4P and VLVFF4P

	VLVAF4P / VLVFF4P
H	1200 mm / 47.2 in.
W	1300 mm / 51.2 in.
D	400 mm / 15.7 in.
D1	1200 mm / 47.2 in.
Weight	265 kg / 585 lbs.



VLVAF4P and VLVFF4P

[4] Does not include plinth for VLVAW2N and VLVAW3N, optional, which adds 100 mm to height.

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Section 5

Advanced Products

EVlink™ Electric Vehicle Charging Stations

Indoor Wall-Mount | Outdoor Wall-Mount | Outdoor Pedestal (Dual Unit)

DC Quick Charging

Wiser™ Air

Solar Power Solutions

Conext™ CL

Conext™ XW+

Conext™ Solar Charge Controller

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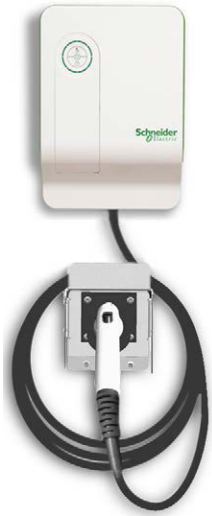
EVlink™ Electric Vehicle Charging Stations

Electric Vehicle Supply Equipment (EVSE) provides power to recharge the on-board vehicle batteries in Electric Vehicles (EV) and Plug-in Hybrid Electric Vehicles (PHEV). The EVSE units are Level 2 type which can charge the vehicle batteries in as little as 3–6 hours, depending on the vehicle type and level of battery charge. The EVSE will typically be fed from a 208 or 240 V source, two-pole 40 A circuit breaker or disconnect and will be able to provide 30 A of current to the vehicle's on-board charger. All units meet or exceed SAE J1772 *[1]* and UL standards for electric vehicle supply equipment.

Schneider Electric EVSE features include:

- Integral Ground Fault Protection at 20 mA
- User friendly interface to indicate power on/off, charging, system detected faults etc.
- Heavy duty cord and connector which meet SAE J1772 standards
- Automatic reset and restart after ground fault or main power loss
- Radio Frequency Identification (RFID) authentication available for outdoor units *[2]*
- Available in indoor/outdoor, wall and pedestal mount, single and dual charger models
- Optional advanced metering functionality available to collect and monitor energy and demand profile data *[3]*



EV2430WS

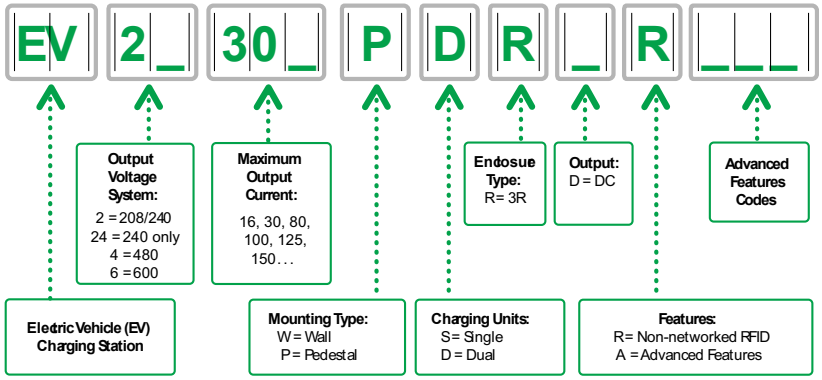
EV230WSR

EV230PSRR

EV230PDRR

- Charging Station with advanced communications and networking
- DC fast charging station which can charge 80% of EV in less than 30 minutes

Please stay tuned at *www.schneider-electric.us/go/evlink*



NOTE: Special order for twenty-five foot cables available with extended lead time.

[1] SAE J1772—standard for Electric Vehicles that defines common connectors and interfaces at various power levels for PHEV and EV established by Society of Automotive Engineers for North America.

[2] RFID—localized RFID in which the programming for the addition or removal of subscribers is done at the EVSE location.

[3] Energy monitoring and metering options are available and can be added to provide networking and communication through an optional power meter enclosure. Please consult your local Schneider Electric sales representative for selection information or call 1-888-778-2733.

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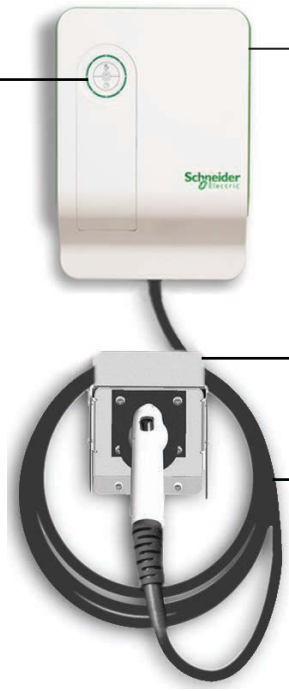
Indoor Charging Stations (Residential Applications)

Interface:

- Segmented charge and delay charge progress indicator
- Stop button and indicator
- Power status and system detected fault indicator
- Delay button and indicator

Protection:

- Integral Ground Fault Protection at 20 mA
- Ground fault function tested before each charge cycle begins
- Auto restart after ground fault or main power loss



Enclosure:

- Non-metallic
- Indoor wall-mount (stud, drywall, or masonry wall)

Cable Holder:

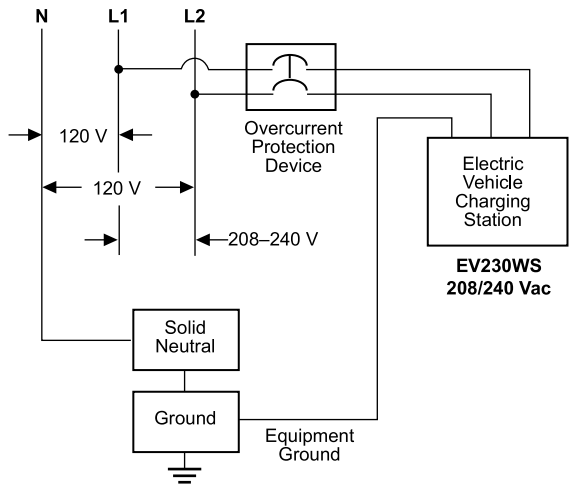
- Supports and helps organize the cable
- Mounted independently from the enclosure

Connector and Cord:

- Complies with SAE J1772
- Cable length: 18 ft. (5.5 m)

Table 5.1: Indoor Charging Station—Wall-mount

Output Voltage System	Output Current	Mounting	Enclosure Type	Number of Charging Units	Catalog Number
208–240 Vac	30 A *[4]*	Wall	1	1	EV230WS



[4] Feeder circuit breaker size = 40 A.

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Outdoor Charging Stations

Protection:
- Integral Ground Fault Protection at 20 mA
- Ground fault function tested before each charge cycle begins
- Auto restart after ground fault or main power loss

Authentication:
- Localized RFID solution (optional)

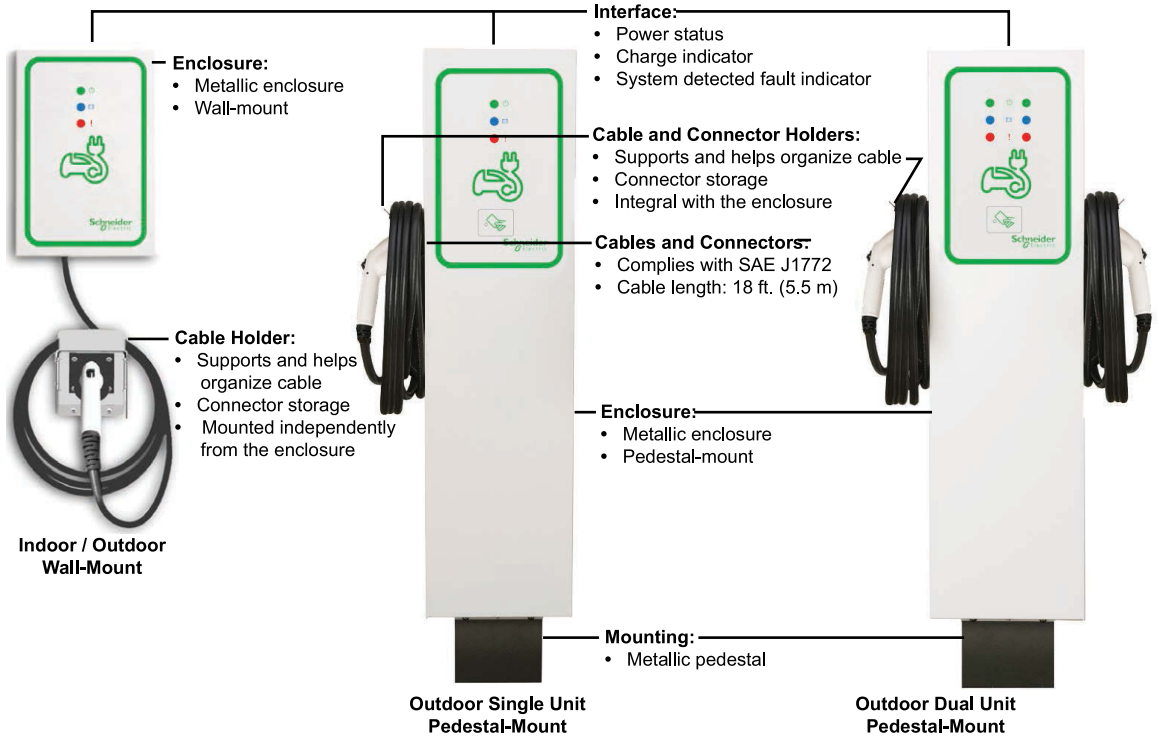

Table 5.2: Outdoor Charging Stations

Output Voltage System	Application	Output Current	Mounting	Enclosure Type	Number of Charging Units	Catalog Number
208–240 Vac	Indoor/Outdoor	30 A *[5]*	Wall	3R	Single	EV230WSR
208–240 Vac	Outdoor	30 A *[5]*	Pedestal	3R	Single	EV230PSR
208–240 Vac	Outdoor	30 A *[5]*	Pedestal	3R	Dual *[6]*	EV230PDR

Table 5.3: Outdoor Charging Stations with RFID Accessories

Output Voltage System	Application	Output Current	Mounting	Enclosure Type	Number of Charging Units	Catalog Number
208–240 Vac	Indoor/Outdoor	30 A *[5]*	Wall	3R	Single	EV230WSRR
208–240 Vac	Outdoor	30 A *[5]*	Pedestal	3R	Single	EV230PSRR
208–240 Vac	Outdoor	30 A *[5]*	Pedestal	3R	Dual *[7]*	EV230PDRR

Table 5.4: RFID Authentication Cards (for Applicable Level 2 Charging Stations only)*[8]*

Description	Catalog Number
RFID Handheld Programmer	EVRFIDHP
RFID Authentication Cards (Quantity of 10)	EVRFIDKF10

EVRFIDHP

EVRFIDKF10

[5] Feeder circuit breaker size = 40 A.
[6] Output current per charge unit.
[7] Output current per charge unit.
[8] Required for charging stations with RFID Accessories.

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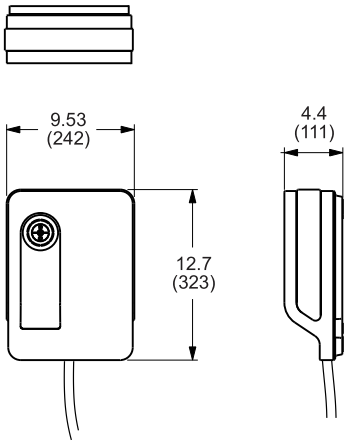
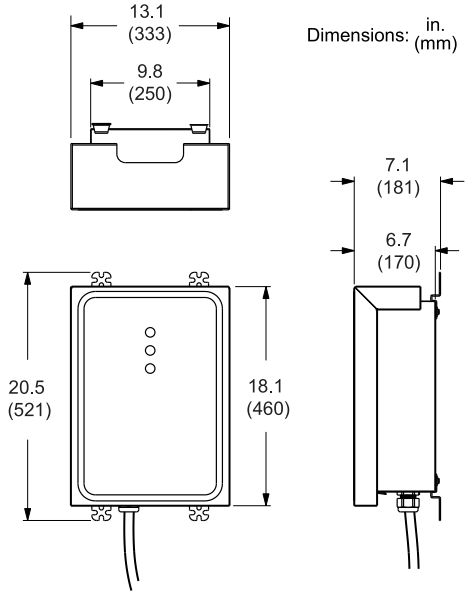
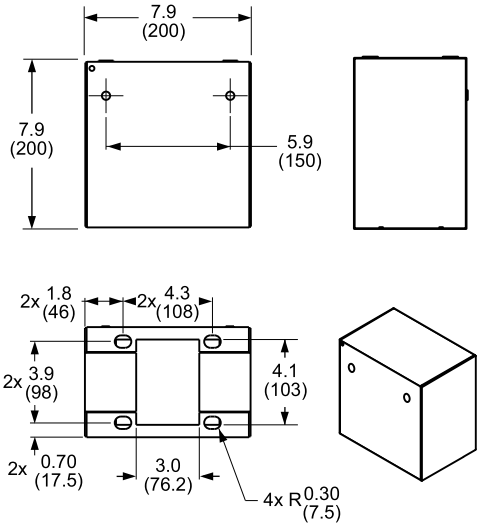
Dimensions



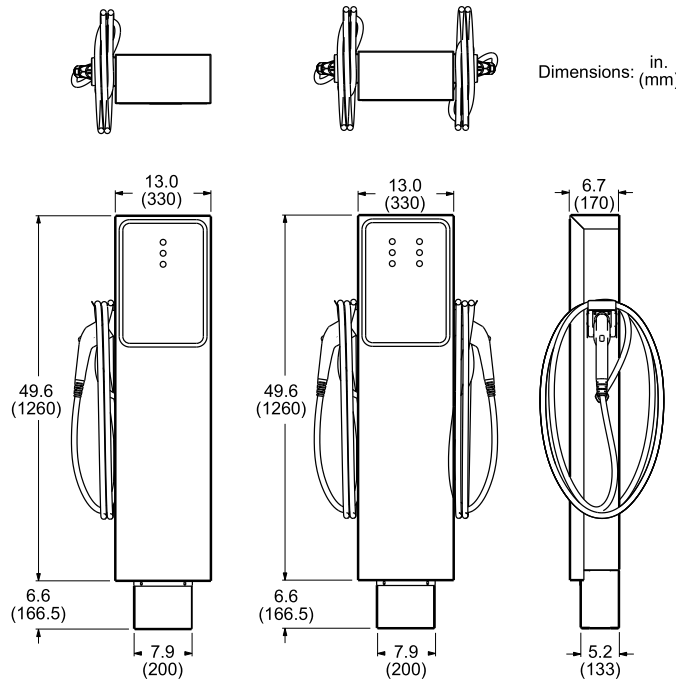
Indoor Wall-mount



Indoor/Outdoor Wall-mount



(bottom view)
Pedestal Base



Single Unit Dual Unit
Pedestal-Mounted Charging Stations

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Outdoor Cloud Connected

Features

Network Connectivity (gateway unit, two antennae):

- Wireless communication to server via cellular network
- IEEE 802.15.4 wireless communication with non-gateway units
- Station location and occupancy status via network
- Remote monitoring of status and power usage
- Enables remote maintenance services

NOTE: At least one gateway unit is required for each cluster of Cloud Connected charging stations within a 150 ft. line of sight. A gateway unit establishes a cellular connection for each non-gateway (Cloud Connected) unit on a cluster. A gateway unit is required for a single-unit installation.

Interface:

- Backlit color LCD screen displays charging instructions, charging status, and usage fees
- Red indicator lights on front panel for system detected faults

Authentication:

- ChargePoint® card or Contactless credit card
- Track customer usage history
- Optional payment by time/energy usage

NOTE: Service plan required.

Network Connectivity (non-gateway units, single antenna):

- IEEE 802.15.4 wireless communication with gateway unit
- 150 ft (45 m) near line of sight communication range

Holders for Connector and Cable:

- Support and help organize cables
- Connector storage dock
- Integral with the enclosure

Connector and Cable:

- Complies with SAE J1772
- Cable length: 18 ft. (5.5 meter)

Enclosure and Mounting:

- Metallic enclosure
- Metallic mounting pedestal

Protection:

- Integral Ground Fault Protection at 20 mA
- Ground fault function tested before each charge cycle begins
- Auto restart after ground fault or main power loss

NOTE: Use on vehicles with an SAE J1772 compliant connector with silver plated contacts only. Go to www.schneiderelectric.us/sites/us/en/support/ documents-downloads.page or call 1-888-778-2733 for a list of compatible vehicles.

NOTE: Dual gateway charging unit shown.

Commercial Applications

Table 5.5: Outdoor Cloud Connected Charging Stations (service plan required)

Catalog Number	Unit Type	Input Voltage System	Output Current	Mounting Type	Charging Units
EV230PSRACG	Gateway	208–240 Vac	30 A *[9]*	Pedestal	Single
EV230PSRANG	Non-Gateway	208–240 Vac	30 A *[9]*	Pedestal	Single
EV230PDRACG	Gateway	208–240 Vac	30 A *[9]*	Pedestal	Dual
EV230PDRACNG	Non-Gateway	208–240 Vac	30 A *[9]*	Pedestal	Dual
EV230WDRACG	Gateway	208–240 Vac	30 A *[9]*	Wall	Dual
EV230WDRACNG	Non-Gateway	208–240 Vac	30 A *[9]*	Wall	Dual

Service Plans

Service plans provide Cloud Connected (Networked) station owners the ability to remotely manage their EV charging stations with features including flexible management tools, in-depth data analysis, payment processing, and 24/7 driver support. **Service plans are required with purchase of a Cloud Connected EVlink unit.**

Table 5.6: Outdoor Charging Stations

Catalog Number	Type	Service Length	Features
EVNETCOMM1	Commercial	1 year	• Set pricing flexibility • Provide multiple payment options • Collect payment automatically • Offer reservations • Advertise • Report revenue
EVNETCOMM2		2 year	
EVNETCOMM3		3 year	
EVNETSP1	Service Provider	1 year	**All capabilities of Commercial, plus:** • Create driver-branded website • Manage energy load • Analyze driver use patterns
EVNETSP2		2 year	
EVNETSP3		3 year	

Table 5.7: Accessories *[10]*

Catalog Number	Description
EVNETKF50	ChargePoint cards

[9] Feeder circuit breaker size = 40 A.
[10] Required for charging stations with RFID Accessories.

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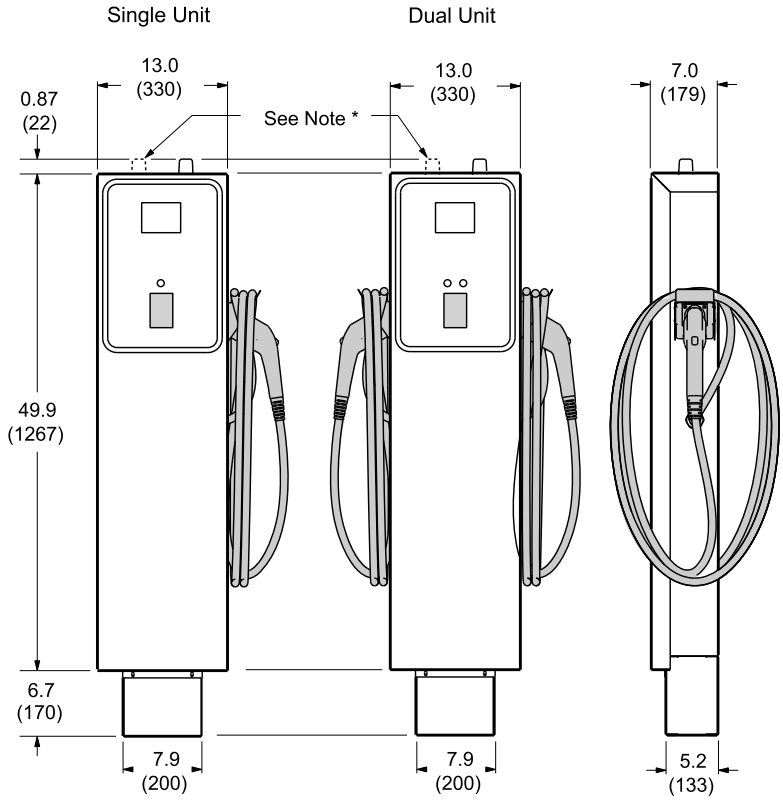
Dimensions - Outdoor Cloud Connected

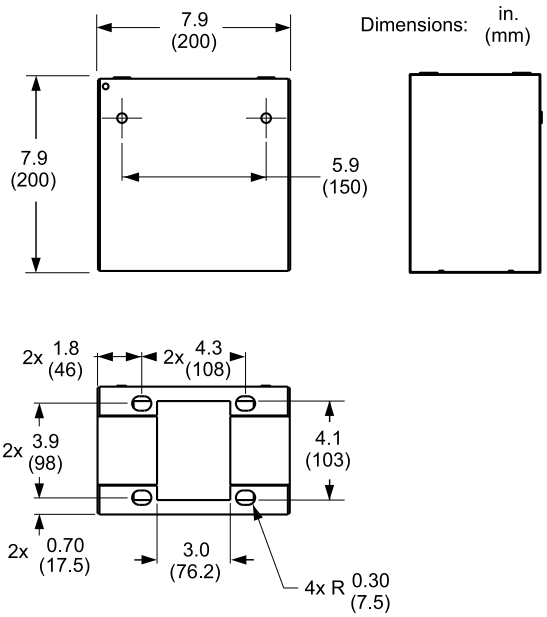
Cloud Connected Pedestal-Mount Charging Stations



* NOTE: Left antenna is present on gateway units only.

Dimensions: in. (mm)

Pedestal Base for Outdoor Charging Stations



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New!

EVlink DC Quick Charging

The EVlink DC Quick Charger is a top choice to power battery electric vehicles (BEV) today. It is designed for quick charging in retail and commercial parking spaces, fleet charging stations, highway rest areas, etc. The DC Quick Charger utilizes a CHAdeMO power connector and SAE Combination Charging System (CCS) connector with 50 kW DC output. It also has a 3G and Ethernet network interface.

The EVlink DC Quick Charger is compatible with OCPP 1.5 network interface commands for monitoring and control and has both 3G modem and Ethernet connection available, but only one may be connected at a time. Under both connection scenarios recommended, IP address configuration is with a Public Static IP. It is also possible to set up and utilize a Virtual Private Network (VPN) for communications.

Table 5.8: DC Quick Charging Stations

Catalog Number	Authentication	Input Voltage	Input Current	Output Voltage	Output Current	Mounting Type	Charging Units	Application
EVDC48050CHA	RFID	480 V	79 A	50–500 Vdc	125 A max	Pedestal	Single CHAdeMO	Outdoor
EVDC48050CHACCS	RFID	480 V	79 A	50–500 Vdc	125 A max	Pedestal	1 CHAdeMO, 1 SAE	Outdoor

Table 5.9: Accessories

Catalog Number	Description
EVDCRFIDKF	DC Quick Authentication Cards (Qty. of 10)

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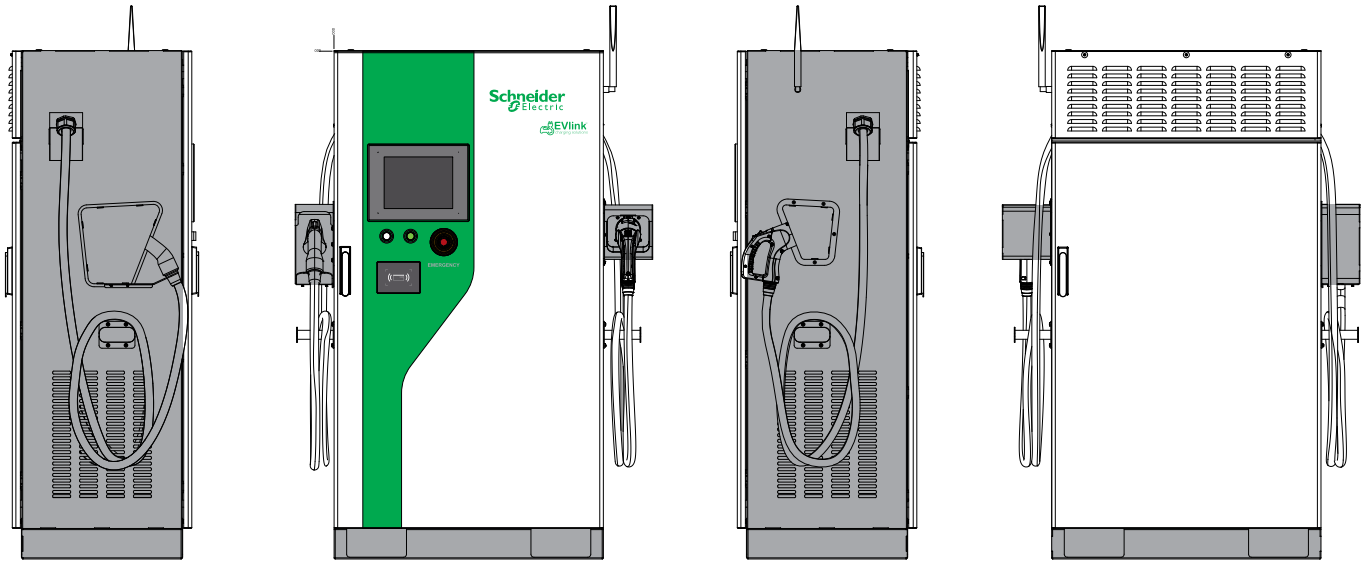

Table 5.10: Weight and Dimensions

Weight	Height	Width	Depth
1,617 lbs. (734 kg)	66.9 in. (1700 mm)	35.4 in. (900 mm)	23.6 in. (600 mm)

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Wiser™ Energy Efficiency Solutions

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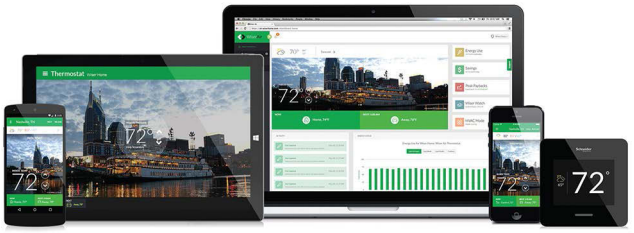
New!

Wiser Air



Wiser Air is a complete home energy management solution that gives you peace of mind through effortless control of comfort and savings. Wiser Air works with most heating and cooling low voltage systems and connects to your home Wi-Fi to allow you to see your energy use remotely, using a smart phone, tablet, or laptop.

- **Simplicity –** Wiser Air is easy to install and has a sleek, intuitive design with familiar touch screen display to keep you informed.
- **Comfort –** Enjoy features like Comfort Boost that quickly delivers comfort at the touch of a button and helps you use energy more efficiently.
- **Insight –** See how your system is running from a distance, with Wiser Pulse that glows a different color depending on different modes.
- **Control –** Control and manage your home energy use from anywhere with your smart phone, tablet or laptop. Wiser Air is a stand-alone, Wi-Fi thermostat.

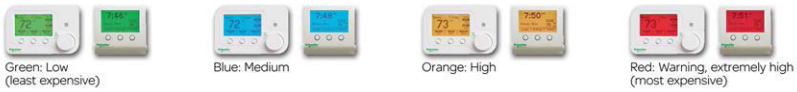
Energy Efficiency Solutions Overview

Wiser Energy Efficiency products can give you information about your home's energy consumption and provide ways to conveniently automate energy use. Information displays can be conveniently located and easily integrated with Smart Grid energy programs. In addition, these devices provide useful information displays such as time and temperature.

HVAC thermostats, an in-home display, and load controls are designed to integrate into a seamless energy control system, allowing you to easily **Make the Most of Your Energy**SM.

Schneider Electric Energy Efficiency Products:

- Use industry standard radio interfaces. Products are certified to the ZigBee® Smart Energy protocol
- Provide easy to use, conveniently located controls
- Signal energy with vivid color display screens
- Are designed to be integrated into Smart Grid energy efficiency programs
- Are certified to UL916, and UL489 (as applicable)
- Incorporate convenience features, such as remote thermostat control, time-of-day display, remote load control, and load scheduling
- Load controls are available in outdoor configurations



Color Based Energy Signaling

Wiser In-Home Display (IHD)

EER20100

- Internal rechargable battery for power outages and convenience
- Integrates with remote measurement devices, and graphically displays energy use and signals based on demand
- Schedules Wiser components, such as load controls, load relays, and smart plugs
- Controls Wiser thermostats from remote locations
- Automatically sets time from the network
- Displays time
- Displays outdoor temperature (optional components required)

Table 5.11: Wiser In-Home Display (IHD)

Model	Industry Specifications	Power
EER20100	• UL Standard 916 • Canadian Standard CAN/CSA C22.2, No. 205 • ZigBee® Smart Energy	100–240 Vac 50–60 Hz

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Wiser Programmable Communicating Thermostats (PCT)

EER56000
EER56100

- Offers four programmable temperature changes per day for up to seven days
- Supports demand response through ZigBee® Smart Energy Profile
- Integrates with remote measurement devices, and graphically displays energy use and signals based on demand
- Schedules Wiser components, such as load controls, load relays, and smart plugs
- Automatically sets time from the network
- Displays outdoor temperature (optional components required)
- No batteries required, operates in four wire installations

Table 5.12: Wiser Programmable Communicating Thermostats (PCT)

Model	Industry Specifications	Power
EER56000	• UL Standard 916 • Canadian Standard CAN/CSA C22.2, No. 205-M1983 • ZigBee® Smart Energy • Single stage conventional heat/cool • Heat pump (two stage heat / single stage cool) • Dual fuel heat pump (two stage heat / single stage cool)	100–240 Vac 50–60 Hz
EER56100	• UL Standard 916 • Canadian Standard CAN/CSA C22.2, No. 205-M1983 • ZigBee® Smart Energy • Single stage conventional heat/cool • Two stage conventional (two stage heat / two stage cool) • Heat pump and geothermal heat pump (two stage heat / single stage cool) • Two-speed heat pump and two-speed geothermal heat pump (three stage heat / two stage cool) • Dual fuel heat pump and geothermal dual fuel heat pump • Humidifier and dehumidifier control	100–240 Vac 50–60 Hz

Wiser Smart Plug

EER41200

- Supports demand response through ZigBee® Smart Energy Profile
- Plugs into 120 V electrical outlets
- Measures power used by electrical outlet loads
- Provides scheduling and remote control when used with the EER20100 Wiser In-Home Display or the EER56000/EER56100 Wiser Programmable Communicating Thermostats

Table 5.13: Wiser Smart Plug

Model	Industry Specifications	Power
EER41200	• UL Standard 508 and UL 244A • Canadian Standard CAN/CSA C22.2, No. 14-05 • ZigBee® Smart Energy	100–240 Vac 50–60 Hz

Wiser Load Control Relays

EER42200
EER42300

- Supports demand response through ZigBee® Smart Energy Profile
- Low voltage 120 and 240 V relays
- Measures power used by electrical outlet loads
- Provides scheduling and remote control when used with the EER20100 Wiser In-Home Display or the EER56000/EER56100 Wiser Programmable Communicating Thermostats
- EER42300 provides isolated contact outputs

Table 5.14: Wiser Load Control Relays

Model	Industry Specifications	Power
EER42200	• UL Standard 916 • Canadian Standard CAN/CSA C22.2, No. 205-M1983 • ZigBee® Smart Energy • Supply voltage: 100–250 Vac, 50/60 Hz	30 A, 240 Vac 30 A, 28 Vdc 2 hp, 240 Vac 1 hp, 120 Vac
EER42300	• UL Standard 916 • Canadian Standard CAN/CSA C22.2, No. 205-M1983 • ZigBee® Smart Energy • Supply voltage: 100–250 Vac, 50/60 Hz	5 A, 240 Vac 5 A, 28 Vdc 240 VA, 240 Vac

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Wiser™ Energy Efficiency Solutions

Wiser Large Load Control

- Supports demand response through ZigBee® Smart Energy Profile
- Used with Square D™ QOPL-ILC circuit breaker devices, ordered separately
- Measures branch circuit loading (current transformer required, ordered separately)
- Provides remote control when used with the EER20100 In-Home Display or the EER56000/EER56100 Wiser Programmable Communicating Thermostats
- Provides remote disconnect switch functions

EER260LLCR

EER260LLCCT1
EER260LLCCT2

Table 5.15: Wiser Large Load Control

Model	Industry Specifications	Load Contacts
EER260LLCR	• UL489 • ZigBee® Smart Energy • 120 / 240 Vac, 1P/2P, 50/60 Hz	See Table 5.16
EER260LLCCT1	• 1P 60 A current transformer	—
EER260LLCCT2	• 2P 60 A current transformer	—

Table 5.16: QOPL-ILC Circuit Breakers

Catalog Number	Rating (A)	No. of Poles	AIC Rating (kA)
QO115PLILC	15	1	10
QO120PLILC	20	1	10
QO230PLILC	30	2	10
QO240PLILC	40	2	10
QO250PLILC	50	2	10
QO260PLILC	60	2	10

Wiser Ethernet Gateway

- Allows for software monitoring, programming, and control of Wiser Energy Efficiency products via the internet
- Used with the Wiser Head End Server system

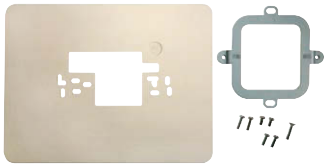
EER21100
EER21200

Table 5.17: Wiser Ethernet Gateway

Model	Industry Specifications
EER21100	• ZigBee® router-type device • UL power adapter • ZigBee® Smart Energy • Supply voltage: 100–240 Vac, 50/60 Hz
EER21200	• ZigBee® coordinator-type device • UL power adapter • ZigBee® Smart Energy • Supply voltage: 100–240 Vac, 50/60 Hz

Wiser Accessories

- Trim ring can be used to conceal mounting imperfections, such as holes and paint lines from previous installations
- External temperature sensor provides temperature measurements when used with the EER56100 Wiser thermostat
- The Wiser Wire Extender is used when a common wire is not present to power Wiser thermostats



EER57000

EER57100

EER57200

Table 5.18: Wiser Accessories

Model	Name	Industry Specifications
EER57000	Trim Ring	—
EER57100	Auxiliary Power Supply	• UL Standard 916 • Canadian Standard CAN/CSA C22.2, No. 205-M1983
EER57200	External Temperature Sensor	—

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Schneider Electric Conext
CL 18 / 25 / 40 kW
String Inverter with Wiring Box

Conext™ CL-NA Three-Phase Grid-Tie Inverter

The Conext™ CL Series is a new line of three-phase string inverters designed for high efficiency, maximum flexibility, and easy installation and service. Electrolyte-free design with Schneider Electric's rigorous reliability test procedures improve the long-term reliability. Integrated wiring box with multiple options allow for flexible and low-cost installations. Remote asset management and troubleshooting are easier than ever with Schneider Electric Conext SmartBox and Conext Insight portal. Decentralized architecture and system capability together with a broad range of medium voltage products make Conext CL the ideal choice for commercial buildings and decentralized power plants. Backed by global service infrastructure, leading manufacturing facilities, and expertise in energy management, the Conext CL Series is the inverter trusted for quality and reliability.

Features

- High conversion efficiency: 98.4% peak efficiency, 98.0% CEC efficiency
- Large heatsink offers excellent heat dispersion without the need for a cooling fan
- Integrated wiring box saves customer the cost of external DC combiner box *[1]*
- Built-in Cloud Connect feature to allow direct connection to Conext Insight portal for free remote monitoring
- Robust design through rigorous Multiple Environmental Over Stress Testing (MEOST), Highly Accelerated Life Test (HALT) and Temperature Humidity and Bias Testing (THB)
- Electrolyte-free design to guard against dried cap issue and help to improve long-term reliability
- Designed and qualified for applications in tropical environments through salt fog testing and use of conformal coating
- SunSpect Alliance profile, wire line and wireless (optional) communication
- Easy installation and service, including pre-wired wiring box, detachable inverter, and EasyConfig tool to allow for fast commissioning.

Table 5.19: Conext™ CL-NA Series

Electrical Specifications	CL18000 NA	CL25000 NA	CL40000 NA *[2]*
Input (DC)			
Full Power MPPT Voltage Range	300–800 V	500–800 V	540–800 V
Operating Voltage Range	250–1000 V	250–1000 V	250–1000 V
Max. Input Voltage, open circuit	1000 V	1000 V	1000 V
Number of MPPT / Strings per MPPT *[3]*	2 / 4	2 / 4	1 / 10
Absolute Max. Short Circuit Current per MPPT	36 A	36 A	108 A
Nominal DC Input Power	19 kW	26.5 kW	42 kW
Max. DC Input Power per MPPT *[4]*	11.4 kW	15.9 kW	42 kW
DC Connection (in wiring box)	Base model: spring cage clamp connector; Essential and Optimum models: fuse holder		Screw type fuse holder
Output (AC)			
Rated Output Power (PF=1)	18 kW	25 kW	40 kW
Max. Apparent Power	18 kW	25 kW	40 kW
Nominal Output Voltage	277 / 480 V	277 / 480 V	277 / 480 V
AC Voltage Range	244–305 V / 422–528 V	244–305 V / 422–528 V	244–305 V / 422–528 V
Frequency	60 Hz	60 Hz	60 Hz
Frequency Range (adjustable)	60 +/- 3 Hz	60 +/- 3 Hz	60 +/- 3 Hz
Max. Output Current	25 A	33 A	50 A
Nominal Continuous Output Current	21.7 A	30.1 A	48.1 A
Total Harmonic Distortion	< 3%	< 3%	< 3%
Power Factor (adjustable)	0.8 lead to 0.8 lag	0.8 lead to 0.8 lag	0.8 lead to 0.8 lag
AC Connection (in wiring box)	Bottom and side conduit / cable entry, spring cage clamp connector.		
Efficiency			
Peak	98.0%	98.4%	98.4%
CEC	97.5%	98.0%	98.0%
General Specifications			
Power Consumption at Night Time	< 3 W	< 3 W	< 3 W
Enclosure Rating	Type 4 (electronics)	Type 4 (electronics)	Type 4 (electronics)
Cooling	Fan cooled	Fan cooled	Fan cooled
Inverter Weight	119 lb. (54 kg)	119 lb. (54 kg)	137 lb. (62 kg)
Wiring Box Weight	33 lb. (15 kg)	33 lb. (15 kg)	51 lb. (23 kg)
Inverter Dimensions (H x W x D)	28.1 x 26.5 x 10.5 in. (71.4 x 67.4 x 26.8 cm)	28.1 x 26.5 x 10.5 in. (71.4 x 67.4 x 26.8 cm)	28.1 x 26.7 x 12.0 in. (71.4 x 67.8 x 30.7 cm)
Wiring Box Dimensions (H x W x D)	14.2 x 26.5 x 10.5 in. (36.1 x 67.4 x 26.8 cm)	14.2 x 26.5 x 10.5 in. (36.1 x 67.4 x 26.8 cm)	15.6 x 26.7 x 12.0 in. (39.6 x 67.8 x 30.7 cm)
Ambient Air Temp. for Operation	-13 to 140°F (-20 to 60°C)	-13 to 140°F (-20 to 60°C)	-13 to 140°F (-20 to 60°C)
Max Operating Altitude w/o Derating	6560 ft. (2000 m)	6560 ft. (2000 m)	6560 ft. (2000 m)
Relative Humidity %	4...100 condensing	4...100 condensing	4...100 condensing
Noise Emission (at 1 m distance)	< 55 dBA	< 55 dBA	< 58 dBA

[1] An external fuse protection shall be installed if base model from available product variants is chosen.
[2] Preliminary specification. Specifications are subject to change without notice.
[3] Base model 2/1.
[4] Under unbalanced condition.

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Conext™ XW+NA Hybrid Inverter / Charger

One solution for global power needs

Conext XW+ is an adapatable single- and three-phase inverter / charger system with grid-tie functionality and dual AC power inputs. Available solar charge controllers, monitoring, and automated generator control modules enable further adaptability. From a single Conext XW+ unit to clusters up to 102 kW, the Conext XW+ is a scalable system that allows for the integration of solar capacity as required. Adaptable and scalable, the Schneider Electric Conext XW+ system is the one solution for grid-interactive and off-grid, residential and commercial, solar and backup power applications.

Conext XW+NA
Hybrid Inverter / Charger

Features

- Excellent load starting with high 30-minute and 5-second power
- Performs in hot environments up to 158°F (70°C)
- Intelligent functionality enables solar prioritization, load shifting, peak shaving, and assists small generators with heavy loads
- Backup power with grid-tie functionality converts external DC power to AC power for export to the utility grid
- Single or three-phase systems from 7.0 to 102 kW
- Supports DC coupled and AC coupled off-grid and grid-tie architectures
- Supports charging of Lithium Ion battery packs
- Field serviceable with replacement boards and spare parts
- Monitor, troubleshoot, or upgrade firmware with Conext ComBox
- Extensive quality and reliability testing
- Highly Accelerated Life Testing (HALT)
- Globally proven and recognized field performance
- System configures quickly into compact wall-mounted system
- Integrates both grid and generator power with dual AC inputs
- Balance-of-system components integrates battery bank, solar charger controllers and generators
- Commission the entire system with PC software tool and Conext ComBox

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Table 5.20: Conext™ XW+ Series (120/240 V)

Electrical Specifications	XW+ 5548 NA	XW+ 6848 NA
Inverter AC Output		
Output Power (continuous) at 77°F (25°C)	5500 W	6800 W
Overload 30 min / 60 sec at 77°F (25°C)	7000 W / 9500 W	8500 W / 12000 W
Output Power (continuous) at 104°F (40°C)	4500 W	6000 W
Maximum Output Current 60 sec (rms)	82 A (120 V); 41 A (240 V)	102 A (120 V); 52 A (240 V)
Output Frequency (selectable)	50 / 60 Hz	50 / 60 Hz
Output Voltage	L-N: 120 V +/- 3%; L-L: 240 V +/- 3%	
Total Harmonic Distortion (THD) at Rated Power	< 5%	< 5%
Idle Consumption Search Mode	< 8 W	< 8 W
Input DC Voltage Range	42–60 V (48 V nominal)	42–60 V (48 V nominal)
Max Input DC Current	150 A	180 A
Charger DC Output		
Max. Output Charge Current	110 A	140 A
Output Voltage Range	40–64 V (48 V Nominal)	40–64 V (48 V Nominal)
Charge Control	Three stage, two stage, boost, custom	
Charge Temperature Compensation	Battery temperature sensor included	
Power Factor Corrected Charging	0.98	0.98
Compatible Battery Types	Flooded (default), GEL, AGM, LiON, Custom *[5]*	
Battery Bank Range (scaled to PV array size)	440–10000 Ah	440–10000 Ah
AC Input		
AC 1 (grid) Input Current (selectable limit)	30–60 A (60 A default)	30–60 A (60 A default)
AC 2 (generator) Input Current (selectable limit)	30–60 A (60 A default)	30–60 A (60 A default)
Automatic Transfer Relay Rating/Typical Transfer Time	60 A / 8 ms	60 A / 8 ms
AC Input Voltage Limits (bypass/charge mode)	L-N: 78–140 V (120 V nominal) L-L: 160–270 V (240 V nominal)	
AC Input Frequency Range (bypass/charge mode)	55–65 Hz (default); 52–68 Hz (allowable)	
AC Grid-Tie Output		
Grid Sell Current Range on AC1 (selectable limit)	0–40 A (120 V) 0–20 A (240 V)	0–48 A (120 V) 0–27 A (240 V)
Grid Sell Voltage Range on AC1	L-N: 105.5–132 V +/-1.5 V; L-L: 211–264 V +/- 3 V	
Grid Sell Frequency Range on AC1 (auto adjust entering sell mode)	59.4–60.4 +/-0.5 Hz	
Efficiency		
Peak	95.7%	95.7%
CEC Weighted Efficiency	93.0%	92.5%
General Specifications		
Part Number	865–5548–01	865–6848–01
Product / Shipping Weight	118 lb. (53.5 kg)/165 lb. (75 kg)	121.7 lb. (55.2 kg)/169 lb. (76.7 kg)
Product Dimensions (H x W x D)	23 x 16 x 9 in. (58 x 41 x 23 cm)	23 x 16 x 9 in. (58 x 41 x 23 cm)
Shipping Dimensions (H x W x D)	28.0 x 22.5 x 15.5 in. (71.1 x 57.2 x 39.4 cm)	28.0 x 22.5 x 15.5 in. (71.1 x 57.2 x 39.4 cm)
IP Degree of Protection	NEMA Type 1 Indoor	
Operating Air Temperature Range	–13–158°F (–25–70°C) power derated above 77°F (25°C)	
Warranty (depending on the country of installation)	2 or 5 years	2 or 5 years
Features		
System Monitoring and Network Communications	Available	Available
Intelligent Features	Grid sell, peak load shave, generator support, prioritized consumption of battery or external DC energy	
Auxiliary Port	0–12 V, maximum 250 mA DC output, selectable triggers	
Off-grid AC Coupling	Frequency Control	
Multi-unit Operation	Single and split phase: up to four units in parallel, three phase: up to 12 units in multi-cluster configuration with external AC contractor	
Regulatory Approval		
Safety	UL1741, CSA 107.1	
EMC Directive	FCC and Industry Canada Class B	
Interconnect	IEEE 1547 and CSA 107.1	
Compatible Products		
Conext XW+ Power Distribution Panel	865–1014–01	
Conext System Control Panel	865–1050	
Conext Automation Generator Start	865–1060	
Conext MPPT 60 150	865–1030–1	
Conext MPPT 80 600	865–1032	
Conext ComBox	865–1058	
Conext Battery Monitor	865–1080–01	
Conext Battery Fuse Combiner Box	865–1031–01	
Conext Portable Installation / Configuration Tool	865–1155–01	

[5] Specifications subject to change without notice.

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Conext™ SW-NA Hybrid Inverter / Charger

Conext SW delivers new value and price point to installers and system owners globally. Perfect for off-grid, backup power and self-consumption applications, it's a pure sine wave, inverter/charger system with switchable 50/60 Hz frequencies, providing power for every need.

North American Conext SW units feature 120/240 V ac output, and is capable of producing 120/240 Vac output from a 120 Vac input, without the need for an external transformer.

For expanded off-grid capacity, the Conext SW is integrated with fuel-based generators as required to support loads larger than the generator's output. It's also self consumption ready, able to prioritize solar consumption over the grid, while maintaining zero grid export. The Conext SW works with the grid to avoid peak utility charges and support the grid when utility supply is limited. Accessories include pre-wired universal DC and AC distribution panels. Stacking two Conext SW units will double the system's total output power and available solar charge controllers allow for the integration of solar capacity as required.

Conext SW-NA Inverter / Charger

Features

- Higher return on investment
- Excellent load start capabilities with high 30-minute and 5-second surge power
- Harness the continuously declining production cost of solar power
- Robust design through rigorous reliability testing (HALT)
- Available in 24 and 48 Vdc models. All models support both 50 and 60 Hz output
- Stack two units to double output power up to 8 kW
- Supports AC and DC coupled off-grid and grid-tie architectures
- Intelligent functionality enables self-consumption with solar prioritization, peak shaving, and assisting small generators with heavy loads
- Monitor, troubleshoot or upgrade firmware with Conext ComBox
- Global support and training
- Replaceable boards and spare parts
- Configures quickly into compact wall-mounted system
- Companion circuit breaker panels integrate inverter with battery bank and solar charge controllers
- Mounting bracket design makes hanging inverter on the wall easy

Table 5.21: Conext SW Inverter/Charger

Electrical Specifications	SW 2524 NA	SW 4024 NA	SW 4048 NA
Inverter			
Output Power (continuous) at 77°F (25°C)	2400 W	3400 W	3800 W
Output Power 30 min. at 77°F (25°C)	2700 W	4000 W	4400 W
Output Power (5 sec) at 77°F (25°C)	5000 W	7000 W	7000 W
Peak Current	24.3 A	41 A	41 A
Output Frequency (selectable)	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Output Voltage	120 / 240 Vac	120 / 240 Vac	120 / 240 Vac
Output Wave Form	True Sine Wave	True Sine Wave	True Sine Wave
Optimal Efficiency	91.5%	92%	92%
Idle Consumption Search Mode	< 11 W	< 11 W	< 11 W
Input DC Voltage Range	20–34 Vdc	20–34 Vdc	4–68 Vdc
AC Connections	Single / Split Phase	Single / Split Phase	Single / Split Phase
Charger			
Output Current	65 A	90 A	45 A
Nominal Output Voltage	24 Vdc	24 Vdc	48 Vdc
Output Voltage Range	12–32 Vdc	12–32 Vdc	24–64 Vdc
Charge Control	3 stage	3 stage	3 stage
Charge Temperature Compensation	Yes-BTS Included	Yes-BTS Included	Yes-BTS Included
Optimal Efficiency	90%	90%	90%
AC Input Power Factor	> 0.98	> 0.98	> 0.98
Input Current	9 A	13 A	13 A
Input AC Voltage	120 / 240 Vac Split Phase		
Input AC Voltage Range Line to Neutral	95–135 Vac Single Phase 135–270 Vac Single Phase		
Dead Battery Charge	Yes *[6]*	Yes *[6]*	Yes *[6]*
General Specifications			
Compatible Battery Types	FLA, Gel, AGM, Custom		
Transfer Relay Rating	30 A	30 A	30 A
Transfer Time (AC to Inverter to AC)	< 1 cycle (16.7 ms)		
Optimal Operating Temperature Range	-4–140°F (-20–60°C)		
Storage Ambient Temperature Range	-40–185°F (-40–85°C)		
Humidity Operation / Storage	< =95% RH, non-condensing		
Ingress Protection Rating	Indoor Only, IP20		
Altitude (operating)	6562 ft. (2000 m)		
Product Weight	49.0 lb. (22.3 kg)	62.0 lb. (28.1 kg)	62.0 lb. (28.1 kg)
Shipping Weight	60.0 lb. (27.2 kg)	77.1 lb. (35.0 kg)	77.1 lb. (35.0 kg)
Product Dimensions (H x W x D)	16.5 x 13.4 x 7.6 in. (41.8 x 34.1 x 19.7 cm)		
Shipping Dimensions (H x W x D)	22.0 x 17.3 x 12.6 in. (56.0 x 44.0 x 32.0 cm)		
System Network and Remote Monitoring	Available	Available	Available
Warranty (Depending on the Country of Installation)	2 or 5 years	2 or 5 years	2 or 5 years
Part Number	865–2524	865–4024	865–4048
Regulatory Approvals			
Safety	c(CSA) us mark, CSA C22.2 No. 107.1–01, UL1741 Ed. 2		
Compatible Products			
Universal DC Distribution Panel	865–5548–01		
AC Distribution Panel (120/240 V)	865–1017		
AC Distribution Panel (230 V)	865–1017–61		
Conext System Control Panel	865–1050		
Conext Automation Generator Start	865–1060		
Conext ComBox	865–1058		
Conext MPPT 60 150 Solar Charge Controller	865–1030–1		
Conext SW On/Off Remote Switch	865–1052		
Conext SW Stacking Kit	865–1019–61 for 230 V ac, 865–1019 for 120/240 Vac		
Conext Portable Installation and Configuration Tool	865–1155–01		

[6] Specifications to change without notice.

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Conext™ MPPT 80 600 Solar Charge Controller

The Conext MPPT 80 600 solar charge controller offers an industry-first set of integration features and top performance that allows for large photovoltaic (PV) array systems to be easily installed and connected to the battery bank at the lowest overall cost. Installing one MPPT 80 600 is faster than installing multiple smaller charge controller and lowers overall costs further by utilizing fewer PV strings, smaller wiring and conduit, and by eliminating the need for PV combiner boxes and DC circuit breakers. Longer distances from array site to battery bank are also easier to accommodate than with smaller charge controllers. Advanced Fast Sweep Maximum Power Point Tracking (MPPT) charging technology helps harvest the most energy available from the PV array, even in partial shade conditions. 80 A of battery charge current allows for the connection of PV arrays rated up to 600 V STC (2560 W for 24 V systems, 4800 W for 48 V systems).

MPPT Solar Charge Controller

Features

- Installs faster with fewer costly components
- Improve battery life with selectable multi-stage temperature compensated charging
- Harvest more energy with shade tolerant fast sweep MPPT algorithm
- Robust design through rigorous Multiple Environmental Over Stress Testing (MEOST)
- Available remote monitoring and configuration
- Compatible with any brand of PV module, any grounding method
- Stand-alone application or full integration with Context XW inverter charger system
- Fewer string wires
- Smaller AWG wire
- No need for combiner box or GFI circuit breaker

Table 5.22: Conext MPPT 80 600 Solar Charge Controller

Electrical Specifications *[7]*	MPPT 80 600
Inverter	
Nominal Battery Voltage	24 and 48 (default is 48 V)
PV Array Operating Voltage	195–550 V
Max. PV Array Open Circuit Voltage	600 V (including temperature correction factor)
Battery Voltage Operating Range	16 to 67 V dc
Array Short-circuit Current	35 A (28 A at STC)
Max. Charge Current	80 A
Max. and Min. Wire Size in Conduit	#6 to #14 AWG
Max. Output Power	2560 W (nominal 24 V), 4800 W (nominal 48 V)
Charger Regulation Method	Three-stage *[8]*
	Two-stage *[9]*
Supported Battery Types	Flooded, GEL, AGM, Custom
Efficiency	
Max. Power Conversion Efficiency	94% (nominal 24 V), 96% (nominal 48 V)
General Specifications	
Power Consumption (night time)	< 1 W
Battery Temperature Sensor	Included
Auxiliary Output	Dry Contact Switching up to 60 V dc, 30 V ac, 8 A
Enclosure Material	Indoor, ventilated, sheet metal chassis with 2.2 and 2.8 cm knockouts and aluminum heat sink
IP Degree of Protection	IP 20
Product Weight	29.8 lb. (13.5 kg)
Shipping Weight	38.3 lb. (17.4 kg)
Product Dimensions (H x W x D)	30.0 x 8.6 x 8.6 in. (76.0 x 22.0 x 22.0 cm)
Shipping Dimensions (H x W x D)	34.3 x 13.0 x 10.6 in. (87.0 x 33.0 x 27.0 cm)
Device Mounting	Vertical wall-mount
Ambient Air Temperature for Operation	-4–149°F (-20–65°C)
Storage Temperature Range	-40–185°F (-40–85°C)
Operating Altitude	Sea level to 6562 ft. (2000 m)
System Network and Remote Monitoring	Available
Warranty	5 year standard
Part Number	865–1032
Regulatory Approval	
Safety	CSA Certified (UL1741, CSA 107.1) and CE Marked for Low Voltage Directive (EN50178)
EMC	FCC and Industry Canada (Class B), CE Marked for the EMC Directive (EN61000-6-1, -6-3), C-Tick Compliant
Compatible Products	
Conext XW+ Interver/Charger (230 V)	XW 7048 E product no. 865-7048-61 XW 8548 E product no. 865-8548-61
Conext XW+ Interver/Charger (120/240 V)	XW 5548 NA product no. 865-5548-01 XW 6848 NA product no. 865-6848-01
Conext SW (230 V)	SW 2524 product no. 865-2524-61 SW 4024 product no. 865-4024-61 SW 4048 product no. 865-4048-61
Conext SW (120 V)	SW 2524 product no. 865-2524 SW 4024 product no. 865-4024 SW 4048 product no. 865-4048
Conext System Control Panel	865–1050
Conext Automatic Generator Start	865–1060
Conext ComBox	865–1058
Conext Portable Installation and Configuration Tool	865–1155–01

[7] Specifications are subject to change without notice.
[8] Bulk, absorption, float, plus manual equalization.
[9] Bulk, absorption, plus manual equalization.

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Conext™ MPPT 60 150 Solar Charge Controller

The Conext MPPT 60 150 is a photovoltaic (PV) charge controller that tracks the maximum power point of a PV array to deliver the maximum available current for charging batteries. When charging, the MPPT 60 150 regulates battery voltage and output current based on the amount of energy available from the PV array and state-of-charge of the battery.

MPPT Multi-Stage Charging

Features

- Maximum Power Point Tracking (MPPT) algorithm continually seeks the maximum power available from the PV array
- Improve battery life with selectable multi-stage temperature compensated charging
- Five year standard warranty
- Stand-alone application or full integration with Context XW and Conext SW inverter charger system
- Compatible with any brand of PV Module
- Available remote monitoring and configuration
- LCD screen with face plate buttons for configuration and system monitoring
- Integrated PV ground fault protection for negative grounded arrays

Table 5.23: Conext MPPT 60 150 Solar Charge Controller

Electrical Specifications *[10]*	MPPT 60 150
Inverter	
Nominal Battery Voltage	12, 24, 36, 48, 60 V
Battery Voltage Operating Range	0–80 V dc
PV Array Operating Voltage	140 V
Max. PV Array Open Circuit Voltage	150 V (including temperature correction factor)
Max. Array Short-circuit Current	60 A *[11]*
Max. Charge Current	60 A *[12]*
Max. and Min. Wire Size in Conduit	#6 to #14 AWG
Max. Output Power	3500 W
Charger Regulation Method	Three-stage *[13]*
	Two-stage *[14]*
Supported Battery Types	Flooded, GEL, AGM, Custom
Efficiency	
Max. Power Conversion Efficiency	93% (nominal 12 V), 96% (nominal 24 V), 97% (nominal 36 V), 98% (nominal 48 V), 99% (nominal 60 V)
General Specifications	
Power Consumption (night time)	2.5 W
Battery Temperature Sensor	Included
Auxiliary Output	5–13 V, up to 200 mA
Enclosure Material	Indoor, ventilated, sheet metal chassis with 2.2 and 2.8 cm knockouts and aluminum heat sink
IP Degree of Protection	IP 20
Product Weight	10.8 lb. (4.8 kg)
Shipping Weight	17.6 lb. (8.0 kg)
Product Dimensions (H x W x D)	14.5 x 5.8 x 5.5 in. (36.8 x 14.6 x 13.8 cm)
Shipping Dimensions (H x W x D)	19.0 x 9.0 x 9.8 in. (48.3 x 22.9 x 35.0 cm)
Device Mounting	Vertical wall-mount
Ambient Air Temperature for Operation	-4–113°F (-20–45°C)
Storage Temperature Range	-40–185°F (-40–85°C)
Operating Altitude	Sea level to 6562 ft. (2000 m)
System Network and Remote Monitoring	Available
Warranty	5 year standard
Part Number	865–1030–1
Features	
Display Type	LCD, 2 lines, 16 digits
Regulatory Approval	
Safety	CSA Certified (UL1741, CSA 107.1) and CE Marked for Low Voltage Directive (EN50178)
EMC	FCC and Industry Canada (Class B), CE Marked for the EMC Directive (EN61000-6-1, -6-3), C-Tick Compliant
Compatible Products	
Conext XW+ interver/charger (230 V)	XW 7048 E product no. 865-7048-61 XW 8548 E product no. 865-8548-61
Conext XW+interver/charger (120/240 V)	XW 5548 NA product no. 865-5548-01 XW 6848 NA product no. 865-6848-01
Conext SW (230 V)	SW 2524 product no. 865-2524-61 SW 4024 product no. 865-4024-61 SW 4048 product no. 865-4048-61
Conext SW (120 V)	SW 2524 product no. 865-2524 SW 4024 product no. 865-4024 SW 4048 product no. 865-4048
Conext System Control Panel	865–1050
Conext Automatic Generator Start	865–1060
Conext ComBox	865–1058
Conext Portable Installation and Configuration Tool	865–1155–01

[10] Specifications are subject to change without notice.
[11] 48 A at STC.
[12] For all battery voltages except 60 V.
[13] Bulk, absorption, float, plus manual equalization.
[14] Bulk, absorption, plus manual equalization.

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Section 6

Surge Protective Devices (SPDs)

Commercial Applications

EMA Series SPDs

Retrofit

EBA Series SPDs

Surgelogic™ SurgeLoc

Residential & Light Commercial Applications

SDSA 3-Phase

HEPD80

QO/HOM SPDs

Whole House SPDs

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EMA Series SPDs

Externally Mounted Surge Protective Devices

Surgelogic™ EMA and EBA series SPDs offer a full range of externally mounted surge suppression solutions. These units are designed to provide surge suppression from service entrance panels to point-of-use equipment.
US and Canadian UL® Listed to the UL 1449 standard. Complies with requirements of NEC® Article 285 and CSA 22.2 No. 8-M1986 as appropriate. Complies with UL 96A 12th Edition Master Label requirements for Lightning Protection Systems.

- 10 year product warranty
- 10 modes of protection
- 200 kA SCCR
- EMI/RFI filtering
- Audible alarm with enable/disable switch, dry contacts and surge counter standard
- Indicator LEDs; normal (green) and fault condition (red) for each phase
- UL 1449 Type 1 to be used in both Type 1 and Type 2 applications

- **Standard**. UL 1449 Type 1 SPDs can be located at any point in the electrical system, on the line or load side of the equipment overcurrent device.
- **Remote Monitor**. This option displays the alarm status of the surge protective device up to 1000 feet from the unit.

New!

EMA Series SPDs

EMA SPD products feature a design based on individual phase modules for a flexible, cost effective way to achieve superior surge suppression at every level of the electrical distribution system. Modularity results in lower life cycle costs and fast, easy service or replacement.

EMA SPD Options:

- **Enhanced Filtering Module**. Sine wave tracking circuitry provides enhanced EMI/RFI filtering of -54 dB at 100 kHz and establishes the power surge clamping window relative to the sine wave voltage to increase performance at distribution and branch panel applications.
- **Disconnect Switch**. The integral switch provides a mechanical means to electrically isolate the entire surge suppressor before opening the enclosure door to facilitate servicing of the unit's components.

Table 6.1: EMA SPDs

Service Voltage	Peak Surge Current Rating per Phase (kA)	NEMA 1 Cat. No.	NEMA 4X Stainless Steel Cat. No.
120/240 V, 1-phase, 3-wire + ground *[1]*	120 160 240 320 480	SSP01EMA12( ) SSP01EMA16( ) SSP01EMA24( ) SSP01EMA32( ) SSP01EMA48( )	SSP01EMA12S( ) SSP01EMA16S( ) SSP01EMA24S( ) SSP01EMA32S( ) SSP01EMA48S( )
208Y/120 V, 3-phase, 4-wire + ground *[2] [3] [1]* Wye	120 160 240 320 480	SSP02EMA12( ) SSP02EMA16( ) SSP02EMA24( ) SSP02EMA32( ) SSP02EMA48( )	SSP02EMA12S( ) SSP02EMA16S( ) SSP02EMA24S( ) SSP02EMA32S( ) SSP02EMA48S( )
240/120 V, 3-phase, 4-wire + ground *[1]* High-leg Delta	120 160 240 320 480	SSP03EMA12( ) SSP03EMA16( ) SSP03EMA24( ) SSP03EMA32( ) SSP03EMA48( )	SSP03EMA12S( ) SSP03EMA16S( ) SSP03EMA24S( ) — —
240 V, 3-phase, 3-wire + ground Delta	100 120 160 200 240 320 480	SSP06EMA10( ) SSP06EMA12( ) SSP06EMA16( ) SSP06EMA20( ) SSP06EMA24( ) SSP06EMA32( ) SSP06EMA48( )	SSP06EMA10S( ) SSP06EMA12S( ) SSP06EMA16S( ) SSP06EMA20S( ) SSP06EMA24S( ) SSP06EMA32S( ) SSP06EMA48S( )
480Y/277 V, 3-phase, 4-wire + ground *[3] [4] [1]* Wye	120 160 240 320 480	SSP04EMA12( ) SSP04EMA16( ) SSP04EMA24( ) SSP04EMA32( ) SSP04EMA48( )	SSP04EMA12S( ) SSP04EMA16S( ) SSP04EMA24S( ) SSP04EMA32S( ) SSP04EMA48S( )
480 V, 3-phase, 3-wire + ground *[5]* Delta	100 120 160 200 240 320 480	SSP05EMA10( ) SSP05EMA12( ) SSP05EMA16( ) SSP05EMA20( ) SSP05EMA24( ) SSP05EMA32( ) SSP05EMA48( )	SSP05EMA10S( ) SSP05EMA12S( ) SSP05EMA16S( ) SSP05EMA20S( ) SSP05EMA24S( ) SSP05EMA32S( ) SSP05EMA48S( )

[1] Do not use on ungrounded systems. Systems must be solidly grounded.
[2] 208Y/120 series also applies to the following voltage 220Y/127.
[3] Can be used on 4-wire or 3-wire grounded wye systems with or without neutral.
[4] 480Y/277 series applies to the following voltages 380Y/220, 400Y/230, and 415Y/240.
[5] 480 V Delta series also applies to the following voltage 480Y/277V HRG.

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Table 6.1 EMA SPDs (cont'd.)

Service Voltage	Peak Surge Current Rating per Phase (kA)	NEMA 1 Cat. No.	NEMA 4X Stainless Steel Cat. No.
600Y/347 V, 3-phase, 4-wire + ground *[6] [7]* WYE	120	SSP08EMA12( )	SSP08EMA12S( )
	160	SSP08EMA16( )	SSP08EMA16S( )
	240	SSP08EMA24( )	SSP08EMA24S( )
	320	SSP08EMA32( )	SSP08EMA32S( )
	480	SSP08EMA48( )	SSP08EMA48S( )
600 V, 3-phase, 3-wire + ground *[8]* Delta	100	SSP09EMA10( )	SSP09EMA10S( )
	120	SSP09EMA12( )	SSP09EMA12S( )
	160	SSP09EMA16( )	SSP09EMA16S( )
	180	SSP09EMA18( )	SSP09EMA18S( )
	240	SSP09EMA20( )	SSP09EMA20S( )
	320	SSP09EMA24( )	SSP09EMA24S( )
		SSP09EMA32( )	SSP09EMA32S( )

External Modular Options ( )	
(D) *[9]*	Disconnect Switch
(F)	Enhanced Filtering Module (not applicable for Delta, HRG or HLD)
(DF) *[9]*	Disconnect Switch and Enhanced Filtering Module (not applicable for Delta, HRG or HLD)

Accessory Description	Cat. No.
Remote Monitor	TVS12RMU

Wye Replacement Module

Delta/HRG Replacement Module

Replacement Modules

All module assemblies are US and Canadian UL® Recognized to UL 1449 standards.

Complies with requirements of NEC® Article 285 and CSA C22.2 No. 8-M1986 as appropriate.

Table 6.2: EMA Replacement Modules

System Voltage	Peak Surge Current Rating (kA)	Catalog Numbers *[10]*		
		Phase A	Phase B	Phase C
120/240 V, 1-phase, 3-wire + ground	120	MA1IMA12	—	MA1IMA12
	160	MA1IMA16	—	MA1IMA16
	240	MA1IMA24	—	MA1IMA24
208Y/120 V, 3-phase, 4-wire + ground *[11]* Wye	120	MA1IMA12	MA1IMA12	MA1IMA12
	160	MA1IMA16	MA1IMA16	MA1IMA16
	240	MA1IMA24	MA1IMA24	MA1IMA24
240/120 V, 3-phase, 4-wire + ground *[12]* High-Leg Delta	120	MA1IMA12	MA3IMA12	MA1IMA12
	160	MA1IMA16	MA3IMA16	MA1IMA16
	240	MA1IMA24	MA3IMA24	MA1IMA24
240 V, 3-phase, 3-wire + ground Delta	100	MA6IMA10	MA6IMA10	MA6IMA10
	120	MA6IMA12	MA6IMA12	MA6IMA12
	160	MA6IMA16	MA6IMA16	MA6IMA16
	200	MA6IMA20	MA6IMA20	MA6IMA20
	240	MA6IMA24	MA6IMA24	MA6IMA24
480Y/277 V, 3-phase, 4-wire + ground *[13]* Wye	120	MA4IMA12	MA4IMA12	MA4IMA12
	160	MA4IMA16	MA4IMA16	MA4IMA16
	240	MA4IMA24	MA4IMA24	MA4IMA24
480 V, 3-phase, 3-wire + ground *[14]* Delta	100	MA5IMA10	MA5IMA10	MA5IMA10
	120	MA5IMA12	MA5IMA12	MA5IMA12
	160	MA5IMA16	MA5IMA16	MA5IMA16
	200	MA5IMA20	MA5IMA20	MA5IMA20
	240	MA5IMA24	MA5IMA24	MA5IMA24
600Y/347 V, 3-phase, 4-wire + ground Wye	120	MA8IMA12	MA8IMA12	MA8IMA12
	160	MA8IMA16	MA8IMA16	MA8IMA16
	240	MA8IMA24	MA8IMA24	MA8IMA24
600 V, 3-phase, 3-wire + ground *[8]* Delta	100	MA9IMA10	MA9IMA10	MA9IMA10
	120	MA9IMA12	MA9IMA12	MA9IMA12
	160	MA9IMA16	MA9IMA16	MA9IMA16
	180	MA9IMA18	MA9IMA18	MA9IMA18

[6] Do not use on ungrounded systems. Systems must be solidly grounded.
[7] Can be used on 4-wire or 3-wire grounded wye systems with or without neutral.
[8] 600 V Delta series also applies to the following voltage 600Y/347V HRG.
[9] Not available in stainless steel for 320 and 480 kA.
[10] For UL 1449 Type 1 Modules, add suffix (1). Example: MA1IMA121
[11] 208Y/120 series also applies to the following voltage 220Y/127.
[12] High-leg delta (Phase B modules are different than Phase A and Phase C modules).
[13] 480Y/277 series applies to the following voltages 380Y/220, 400Y/230, and 415Y/240.
[14] 480 V Delta series also applies to the following voltage 480Y/277V HRG.

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EBA Series SPD

Remote Monitor

New!

EBA Series SPDs

EBA SPD products consist of a consolidation of phase modules into one solid brick casting and offered at a competitive price for those who want superior surge suppression on a limited budget. EBA series are nipple-mounted SPDs that allow installation flexibility and retain superior performance.

- 10 year product warranty
- 10 modes of protection
- 200 kA SCCR
- -45 dB EMI/RFI Filtering
- Audible alarm with enable/disable switch, dry contacts and surge counter standard
- Indicator LEDs; normal (green) and fault condition (red) for each phase
- NEMA 1 rated enclosure

Table 6.3: EBA SPDs

Service Voltage	Peak Surge Current Rating per Phase (kA)	NEMA 1 Cat. No.
120/240 V,1-phase, 3-wire + ground *[15]*	80	SSP01EBA08
	100	SSP01EBA10
	120	SSP01EBA12
	160	SSP01EBA16
	200	SSP01EBA20
	240	SSP01EBA24
208Y/120 V, 3-phase, 4-wire + ground *[16] [17] [15]* Wye	80	SSP02EBA08
	100	SSP02EBA10
	120	SSP02EBA12
	160	SSP02EBA16
	200	SSP02EBA20
	240	SSP02EBA24

Accessory Description	Cat. No.
Remote Monitor	TVS12RMU

Internally Mounted Surge Protective Devices

Internally mounted surge protective devices are installed integrally to systems for service entrance and branch panel surge suppression. Internally mounted SPDs installed next to the supply bus provides maximum performance inside Square D™ systems. Built-in performance is the best way to ensure cost effective power quality (especially important for critical power facilities).

US and Canadian UL® Recognized as a Type 2 (or 1 with optional suffix in catalog number) SPD Component Assembly to UL 1449 and UL 1283 standards. Complies with requirements of NEC® Article 285 and CSA C22.2 No. 8-M1986 as appropriate. Complies with UL 96A 12th Edition Master Label requirements for Lightning Protection Systems.

Internally Mounted—New Construction / Factory Assembled

Factory installed integral/internal Surgelogic™ SPD products make adding surge suppression to new construction projects easy. Refer to the sections listed below to identify the correct product for your application or contact Surgelogic™ TAG at 1-800-577-7353 for assistance.

Panelboards
Refer to Section 9

NF

NQ

Switchboards and Switchgear
Refer to Section 11

PZ4

QED

Motor Control Centers
Refer to Section 17

MCC

Integrated Power and Control Centers
Refer to Section 10

IPAC2

[15] Do not use on ungrounded systems. Systems must be solidly grounded.
[16] 208Y/120 series also applies to the following voltage 220Y/127.
[17] Can be used on 3-wire or 4-wire grounded wye systems with or without neutral.

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I-Line™ Surgelogic™ SPD Unit

QMB Surgelogic™ SPD Unit

Busway Surgelogic™ SPD Unit

MCC Surgelogic™ SPD Unit

Surgelogic™ SurgeLoc

Internally Mounted—Retrofit/Ready to Install

To ensure high-performance surge suppression at critical power locations, a variety of Surgelogic™ products have been designed specifically for retrofitting into commonly used Square D™ systems. The QMB fusible switch, 6 in. MCC bucket, I-Line & Busway plug-on units and the new SurgeLoc for the NQ panelboards come read to install. Retrofitting SPD units into I-Line, QMB, MCC, Busway and NQ Panelborad applications is simple.

- Audible alarm with enable/disable switch, dry contacts and surge counter standard
- 200 kA SCCR
- Indicator LEDs
- EMI/RFI filtering

Table 6.4: Internally Mounted—Retrofit / Ready To Install

Voltage	Surge Current Rating	I-Line Branch Units *[1]*		QMB Branch Units *[2]*	Busway Units	Model 6 MCC Units *[3]*
		Cat. No.	Cat. No.	Cat. No.	Cat. No. *[4]*	Cat. No. *[4]*
120/240 V, 1-phase, 3-wire + ground	120 kA	HL1IMA12C( )	HR1IMA12C	QMB1IMA12	—	—
	160 kA	HL1IMA16C( )	HR1IMA16C	QMB1IMA16	—	—
	240 kA	HL1IMA24C( )	HR1IMA24C	QMB1IMA24	—	—
208Y/120 V, 3-phase, 4-wire + ground *[5]* *[6]* Wye	120 kA	HL2IMA12C( )	HR2IMA12C	QMB2IMA12	—	MCC2IMA12
	160 kA	HL2IMA16C( )	HR2IMA16C	QMB2IMA16	PIU2IMA16	MCC2IMA16
	240 kA	HL2IMA24C( )	HR2IMA24C	QMB2IMA24	PIU2IMA24	MCC2IMA24
240/120 V, 3-phase, 4-wire + ground High-leg Delta	120 kA	HL3IMA12C( )	HR3IMA12C	QMB3IMA12	—	MCC3IMA12
	160 kA	HL3IMA16C( )	HR3IMA16C	QMB3IMA16	PIU3IMA16	MCC3IMA16
	240 kA	HL3IMA24C( )	HR3IMA24C	QMB3IMA24	PIU3IMA24	MCC3IMA24
240 V, 3-phase, 3-wire + ground, Delta	120 kA	HL6IMA12C( )	HR6IMA12C	—	—	—
	160 kA	HL6IMA16C( )	HR6IMA16C	—	—	—
	240 kA	HL6IMA24C( )	HR6IMA24C	—	—	—
480Y/277 V, 3-phase, 4-wire + ground *[5]* *[7]* Wye	120 kA	HL4IMA12C( )	HR4IMA12C	QMB4IMA12	—	MCC4IMA12
	160 kA	HL4IMA16C( )	HR4IMA16C	QMB4IMA16	PIU4IMA16	MCC4IMA16
	240 kA	HL4IMA24C( )	HR4IMA24C	QMB4IMA24	PIU4IMA24	MCC4IMA24
480 V, 3-phase, 3-wire + ground, Delta *[8]*	120 kA	HL5IMA12C( )	HR5IMA12C	—	—	—
	160 kA	HL5IMA16C( )	HR5IMA16C	—	—	—
	240 kA	HL5IMA24C( )	HR5IMA24C	—	—	—
600Y/347 V, 3-phase, 4-wire + ground *[5]* Wye	120 kA	—	HR8IMA12C	QMB8IMA12	—	MCC8IMA12
	160 kA	—	HR8IMA16C	QMB8IMA16	PIU8IMA16	MCC8IMA16
	240 kA	—	HR8IMA24C	QMB8IMA24	PIU8IMA24	MCC8IMA24
600V, 3-phase, 3-wire + ground, *[9]* Delta	120 kA	—	HR9IMA12C	—	—	—
	160 kA	—	HR9IMA16C	—	—	—
	180 kA	—	HR9IMA18C	—	—	—

( ) For a Type 1 SPD, add a “1” suffix to the catalog number.

New! Surgelogic™ SurgeLoc for NQ Panelboards

Surgelogic™ SurgeLoc is the industries first Field Installable Internally Mounted SPD in NQ panelboards - fully installed in aprox. 2 minutes. Surgelogic (TM) SurgeLoc can be ordered as factory assembled in NQ Panelboards or can be ordered from your local Schneider Electric distributor for retrofit opportunities for NQ panelboards.

US and Canadian UL® Recognized to UL 1449 and UL 1283 standards. Complies with requirements of NEC® Article 285 and CSA 22.2 No. 8-M1986 as appropriate. Complies with UL 96A 12th Edition Master Label requirements for Lightning Protection Systems.

- Retrofit into existing NQ Panelboards
- 10 year product warranty
- 10 modes of protection
- 200 kA SCCR
- Audible alarm with enable/disable switch, dry contacts and surge counter standard
- Indicator LEDs; normal (green) and fault condition (red) for each phase

**** FOR SURGELOC PART NUMBERS, PLEASE REFERENCE Table 6.5 Internally Mounted—Retrofit / Ready to Install, page 6-6.**

[1] Requires 13.5-inch mounting height.
[2] Requires 9-inch mounting height.
[3] Requires 6-inch mounting height.
[4] PE7 Discount Schedule.
[5] Can be used on 4-wire or 3-wire grounded wye systems with or without neutral.
[6] 208Y/120 series also applies to the following voltage 220Y/127.
[7] 480Y/277 series applies to the following voltages 380Y/220, 400Y/230, and 415Y/240.
[8] 480 V Delta series also applies to the following voltage: 480Y/277V HRG.
[9] 600 V Delta series also applies to the following voltage: 600Y/347V HRG.

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Table 6.5: Internally Mounted—Retrofit / Ready to Install

Voltage	Surge Current Rating	NQ Panelboard Units—SurgLoc *[10]*
		Cat. No.
120/240 V, 1-phase, 3-wire + ground	80 kA	SSP01BIA08PBQ1
	100 kA	SSP01BIA10PBQ1
	120 kA	SSP01BIA12PBQ1
	160 kA	SSP01BIA16PBQ1
	200 kA	SSP01BIA20PBQ1
	240 kA	SSP01BIA24PBQ1
208Y/120 V, 3-phase, 4-wire + ground *[11] [12]* Wye	80 kA	SSP02BIA08PBQ1
	100 kA	SSP02BIA10PBQ1
	120 kA	SSP02BIA12PBQ1
	160 kA	SSP02BIA16PBQ1
	200 kA	SSP02BIA20PBQ1
	240 kA	SSP02BIA24PBQ1
240Y/120 V, 3-phase, 4-wire + ground High-leg Delta	80 kA	SSP03BIA08PBQ1
	100 kA	SSP03BIA10PBQ1
	120 kA	SSP03BIA12PBQ1
	160 kA	SSP03BIA16PBQ1
	200 kA	SSP03BIA20PBQ1
	240 kA	SSP03BIA24PBQ1

OEM/Assembler Kits

Surgelogic™ OEM/assembler kits allow manufacturers to add industry-leading surge suppression directly to customized equipment. Manufacturers benefit from shorter wire lengths that optimize the clamping voltage of the SPD. Products come with a backplane-mounted SPD, mounting hardware and diagnostic display with 36-inch cables. Audible alarm, silence switch, remote monitoring contacts, and surge counter are standard. Available as UL 1449 Type 2 (or 1 with optional suffix in catalog number).

US and Canadian UL® Recognized to UL 1449 and UL 1283 standards. Complies with requirements of NEC® Article 285 and CSA 22.2 No. 8-M1986 as appropriate. Complies with UL 96A 12th Edition Master Label requirements for Lightning Protection Systems.

OEM Kit

Table 6.6: OEM/Assembler Kits

Service Voltage	Peak Surge Current Rating per Phase (kA)	Cat. No. *[13]*
120/240 V, 1-phase, 3-wire + ground	120	TVS1IMA12O( )
	160	TVS1IMA16O( )
	240	TVS1IMA24O( )
208Y/120 V, 3-phase, 4-wire + ground *[14] [15]* Wye	120	TVS2IMA12O( )
	160	TVS2IMA16O( )
	240	TVS2IMA24O( )
240/120 V, 3-phase, 4-wire + ground High-leg Delta	120	TVS3IMA12O( )
	160	TVS3IMA16O( )
	240	TVS3IMA24O( )
240 V, 3-phase, 3-wire + ground *[14] [16]* Delta	120	TVS6IMA12O( )
	160	TVS6IMA16O( )
	240	TVS6IMA24O( )
480Y/277 V, 3-phase, 4-wire + ground *[14] [16]* Wye	120	TVS4IMA12O( )
	160	TVS4IMA16O( )
	240	TVS4IMA24O( )
480 V, 3-phase, 3-wire + ground *[17]* Delta	120	TVS5IMA12O( )
	160	TVS5IMA16O( )
	240	TVS5IMA24O( )
600Y/347 V, 3-phase, 4-wire + ground *[14]* Wye	120	TVS8IMA12O( )
	160	TVS8IMA16O( )
	240	TVS8IMA24O( )
600 V, 3-phase, 3-wire + ground *[18]* Delta	120	TVS9IMA12O( )
	160	TVS9IMA16O( )
	180	TVS9IMA18O( )

( ) For a Type 1 SPD, add a “1” suffix to the catalog number.

[10] Requires 12 circuit positions (6 adjacent mounting spaces per side).
[11] Can be used on 4-wire or 3-wire grounded neutral system.
[12] 208/120 series also applies to the following voltage 220Y/127.
[13] Note the last character of the catalog number is the letter “O”, not a zero.
[14] Can be used on 4-wire or 3-wire grounded wye systems with or without neutral.
[15] 208Y/120 series also applies to the following voltage 220Y/127.
[16] 480Y/277 series applies to the following voltages 380Y/220, 400Y/230, and 415Y/240.
[17] 480 V Delta series also applies to the following voltage: 480Y/277V HRG.
[18] 600 V Delta series also applies to the following voltage: 600Y/347V HRG.

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HWA Series

HWA Surge Protective Devices

Surgelogic™ HWA surge protective devices are compact, nipple-mounted parallel-connected surge suppressors that come in a variety of voltage configurations, including Delta. A surge suppression path is provided for each mode, and the product is rated NEMA Type 4X. Internal diagnostics continuously monitor the device status.

US and Canadian UL® Listed as a Type 2 SPD to UL 1449 and UL 1283 standards. Complies with requirements of NEC® Article 285 and CSA C22.2 No. 8-M1986 as appropriate. Complies with UL 96A 12th Edition Master Label requirements for Lightning Protection Systems.

- LEDs indicate operational status
- Short circuit current rating 200 kA
- Suitable for indoor and outdoor applications (NEMA Type 4X rated)
- Convenient side-nipple mounting
- Compact design provides easy mounting inside or outside the equipment cabinets
- -54 dB EMI/RFI filtering
- Sine wave tracking
- Audible alarm indicates loss of suppression (does not contain alarm enable/disable switch)
- Dry contacts
- Optional flush-mount kit TVSHWAFMK

Table 6.7: HWA Surge Protective Devices

Service Voltage	Peak Surge Current Rating per Phase (kA)	NEMA 4X Cat. No.
120/240 V, 1-phase, 3-wire + ground *[1]*	50	TVS1HWA50X
	80	TVS1HWA80X
	100	TVS1HWA10X
208Y/120 V, 3-phase, 4-wire + ground *[2] [3] [1]*	50	TVS2HWA50X
	80	TVS2HWA80X
	100	TVS2HWA10X
240/120 V, 3-phase, 4-wire + ground *[1]* High-leg Delta	50	TVS3HWA50X
	80	TVS3HWA80X
	100	TVS3HWA10X
240 V, 3-phase, 3-wire + ground Delta	50	TVS6HWA50X
	80	TVS6HWA80X
	100	TVS6HWA10X
480Y/277 V, 3-phase, 4-wire + ground *[2] [4] [1]*	50	TVS4HWA50X
	80	TVS4HWA80X
	100	TVS4HWA10X
480 V, 3-phase, 3-wire + ground Delta	50	TVS5HWA50X
	80	TVS5HWA80X
	100	TVS5HWA10X
600Y/347 V, 3-phase, 4-wire + ground *[1]*	50	TVS8HWA50X
	80	TVS8HWA80X
	100	TVS8HWA10X
600 V, 3-phase, 3-wire + ground Delta	50	TVS9HWA50X
	80	TVS9HWA80X
	100	TVS9HWA10X

XR Series

XR Surge Protective Devices

The XR SPD provides high-quality surge suppression in a compact and versatile package. This product is ideal for panel builders as well as manufacturers and integrators of instrumentation cabinets for industrial, commercial, and residential applications for single-phase power systems.

US and Canadian UL® Listed as Type 1 SPD to the UL 1449 standard. Complies with requirements of NEC® Article 285, CSA 233.1-87, and CSA C22.2 No. 8-M1986 as appropriate.

- LEDs indicate operational status
- Short circuit current rating 25 kA
- Convenient side nipple mounting
- Suitable for indoor and outdoor applications (NEMA Type 4X rated)
- Optional flush mount kit TVSXRFMK

Table 6.8: XR Nipple-Mounted Surge Protective Devices

System Voltage	Peak Surge Current Rating per Phase (kA)	Cat. No.
120/240 V, 1-phase, 3-wire + ground	50	TVS120XR50S
	80	TVS120XR80S

[1] Do not use on ungrounded systems. Systems must be solidly grounded.
[2] Can be used on 4-wire or 3-wire grounded wye systems with or without neutral.
[3] 208Y/120 series also applies to the following voltage 220Y/127.
[4] 480Y/277 series applies to the following voltages 380Y/220, 400Y/230, and 415Y/240.

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QOSAMK

SDSA1175

SDSA 3-Phase

Mounting Brackets and Flush Mount Kits

The nipple products shown in this catalog provide a convenient means of incorporating surge suppression within a new or existing cabinet. The mounting bracket and flush-mount kits are designed for easy mounting of nipple products.

Table 6.9: Mounting Bracket for Enclosures

Description	Cat. No.
Mounting bracket for SDSA1175 or SDSA1175T	QOSAMK
Flush-mount kif for HWA SPDs	TVSHWAFMK

New!

SDSA1175 and SDSA 3-Phase Surge Protective Devices

SDSA1175 are designed and listed for indoor or outdoor installation and surge suppression for single-phase three-wire 120/240 Vac or two-wire 120 Vac 60 Hz electrical services. This product is ideal for panel builders as well as manufacturers and integrators of instrumentation cabinets for industrial, commercial, and residential applications for single-phase power systems. Two SDSA1175 surge protection devices can be installed to provide suppression for 208Y/120 Vac three-phase four-wire services.

SDSA 3-Phase SPDs are designed and listed for indoor or outdoor installation and surge suppression for three-phase electrical services up to 600 Vac. The SDSA 3-Phase series is used extensively in service entrance panels to provide an efficient and economical means of surge suppression and also ideal for point of use applications for that added level of protection.

US and Canadian UL® Listed as Type 1 SPD to the UL 1449 standard. Complies with requirements of NEC® Article 285, CSA 233.1-87, and CSA C22.2 No. 8-M1986 as appropriate.

- LED indicates operational status
- Short circuit current rating 25 kA (SDSA1175), 200 kA (SDSA 3-Phase)
- Suitable for indoor and outdoor applications (NEMA Type 4X rated)
- Convenient back-nipple mounting

Table 6.10: SDSA1175 and SDSA 3-Phase Surge Protective Devices

System Voltage	Peak Surge Current Rating per Phase (kA)	Cat. No.	
SDSA1175			
120/240 V, 1-phase, 3-wire	36	SDSA1175	
120 V, 1-phase, 2-wire	36	SDSA1175T	
SDSA 3-Phase			
208Y/120 V, 3-phase, 4-wire *[5] [6]*	40	New!	SDSA2040
240 V Delta, 3-phase, 3-wire *[7]*	40	New!	SDSA2040D
480Y/277 V, 3-phase, 4-wire *[8] [5]*	40	New!	SDSA4040
480 V Delta, 3-phase, 3-wire	40	New!	SDSA4040D
600Y/347 V, 3-phase, 4-wire *[5]*	40	SDSA3650	
600 V Delta, 3-phase, 3-wire	40	SDSA3650D	

[5] Do not use on ungrounded systems. Systems must be solidly grounded.
[6] Applicable voltages: 220Y/127V, 208Y/120V.
[7] Applicable voltages: 240V Delta, 240/120V High-Leg Delta.
[8] Applicable voltages: 480Y/277V, 415Y/240V, 400Y/230V, 380Y/220V.

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SDSB80111

Surgebreaker Plus Whole House Surge Protective Device

The Surgebreaker Plus Whole House device is designed to deliver surge suppression that addresses the entire home. AC modules are connected to the circuit breaker load center and provide suppression for all equipment connected to the power system. This Whole House system incorporates AC modules as well as modules for other metallic lines coming into the home including telephone/DSL and coaxial video/data.

US and Canadian UL® Listed as Type 2 SPD to the UL 1449 standard. Complies with requirements of NEC® Article 285, CSA 233.1-87, and CSA C22.2 No. 8-M1986 as appropriate. Telephone and coaxial video modules US and Canadian UL® Recognized to UL 497A 4th Edition and UL 497B 4th Edition.

- 120/240 Vac, 80 kA/phase AC surge suppression
- LED status indicators for AC surge suppression
- Telephone surge suppression module supports one RJ45 cable up to four lines.
- Coaxial surge suppression module supports one line of video/data
- Network suppression module supports one RJ45 modem/fax/DSL

Table 6.11: Whole House Surge Protective Devices

Description	Included Modules	Cat. No.
Whole House NEMA 1	AC, Telephone, Coax, Network	SDSB80111

Table 6.12: SDSB80111 Replacement Modules

Description	Cat. No.
Telephone Suppression Module	PTEL2R
Video Suppression Module	PVR
Network Suppression Module	PNETR6
Home Electronics Protective Device	HEPD80

** To purchase Telephone, Video or Network Replacement Modules - go online to: http://www.apc.com/products/family/index.cfm?id=219

Surgebreaker Plus Whole House Accessories

Add additional surge suppression or replace existing modules in Whole House products.

Coaxial, telephone and network modules: US and Canadian UL® Recognized to UL 497A 4th Edition and UL 497B 4th Edition.

HEPD50

HEPD80

HEPD80MKF

HEPD80MKF

HEPD Whole House Surge Protective Device

HEPD Whole House devices are designed to deliver superior AC surge protection for the entire AC power system in a home. HEPDs are compact in size and are designed to protect AC wires in the home from surges that could affect home electronics and appliances not connected to surge strips.

cULus Listed to the latest UL 1449 standard, UL Type 1 SPD, CSA C22.2 No. *-M1986, C233.1-87.

- 120/240 Vac
- Max surge current ratings avaliable: 50, 80 and 108 kA
- NEMA 4X rate for indoor or outdoor applications
- LED status indicators
- Compatible with all brands of load centers
- Flush Mount Kits sold separately - see table below
- HEPD50: 3 year/$50,000 connected equipment warranty
- HEPD80: 5 year/$75,000 connected equipment warranty
- HEPD108: 7 year/$100,000 connected equipment warranty

Table 6.13: HEPD Whole House Surge Protective Devices

Description	Surge Current Rating	Cat. No.
50kA Home Electronic Protective Device	50 kA	HEPD50
80kA Home Electronic Protective Device	80 kA	HEPD80
108kA Home Electronic Protective Device	108 kA	HEPD108
Flush Mount Kit for HEPD80		HEPD80MKF

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QO250PSPD

HOM250PSPD

Plug-on Neutral QO™ and Homeline™ Load Center Surge Protective Devices

The industry's first exclusive Plug on Neutral (PoN) Surge Protective Device (SPD). Square D™ load center PoN SPDs are a simple and quick installation. It's as easy as snap, click, done! PoN SPDs are easier to install than a standard circuit breaker. No wires are needed for installation. The PoN SPD simply plugs on to the bus and neutral bar. The surge suppressors use two-pole spaces in a QO™ or Homeline™ load center.

US and Canadian UL® Listed as Type 2 SPD to the UL 1449 standard. Complies with requirements of NEC® Article 285, CSA 233.1-87, and CSA C22.2 No. 8-M1986 as appropriate.

- Industry First: No wires or tools required for installation
- Installation Flexibility: Works on Plug-on Neutral design QO or HOM loadcenters using two-pole spaces
- Whole House Protection: 50 kA surge current capacity per phase
- LED indicates operational status
- Peace of mind: 5 year/ $50,000 connected equipment warranty

Table 6.14: QO™, NQ, and Homeline™ Load Center Surge Protective Device

Description	Cat. No.
Plug on Neutral QO™ Surgebreaker	QO250PSPD
Plug on Neutral Homeline™ Surgebreaker	HOM250PSPD

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QO217SB

HOM217SB

QO™, NQ, and Homeline™ Load Center Surge Protective Devices

Square D™ load center surge protective devices are easy to install plug-in units that install as quickly as a standard circuit breaker. The surge suppressors use two pole spaces in a QO™ or Homeline™ load center, or NQ panelboard.

US and Canadian UL® Listed as Type 2 SPD to the UL 1449 standard. Complies with requirements of NEC® Article 285, CSA 233.1-87, and CSA C22.2 No. 8-M1986 as appropriate.

- QO2175SB for QO™ load centers, combination devices, and NQ panelboards
- HOM2175SB for Homeline™ load centers and combination devices
- Plug-on design requires two pole spaces
- LED indicates operational status
- 22.5 kA per phase

Table 6.15: QO™, NQ, and Homeline™ Load Center Surge Protective Devices

Description	Cat. No.
QO™ Surgebreaker for QO and NQ	QO2175SB
Homeline™ Surgebreaker	HOM2175SB

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Section 7

Miniature and Molded Case Circuit Breakers

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B-Frame

H-Frame

J-Frame

L-Frame

M-Frame

P-Frame

R-Frame

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QO Miniature Circuit Breakers

QO™ Circuit Breakers

Circuit Breaker Type	Plug-on	QO			QO-H	QO-VH					QH		QOT	QO-CAFI	QO-VHCAFI	QO-DF	QOVH-DF
	Bolt-on	QOB			QOB-H	—	—	—	QOB-VH		QHB		—	QOB-CAFI	QOB-VHCAFI	QOB-DF	QOB-VHDF
	Unit Mount	—			—	—	—	—	—	—	—	—	—	—	—	—	—
Number of Poles		1	2	3	2	1	2	3	1	2, 3 *[1]*	1,2	3	1	1, 2	1, 2	1	1
Current Range (A)		10–70	10–200 *[2]*	10–100	15–100	15–70	15–125	15–100	15–70	15–150	15–30	15–30	15–30	15–20	15–20	15–20	15–20
Interrupting Ratings																	
UL/CSA Rating (kA) (50/60 Hz)	120 Vac	10	10	10	10	22	22	22	22	22	65	65	10	10	22	10	22
	120/240 Vac	10	10	10	10	22	22	22	22	22	65	65	10	10	22	—	—
	208Y/120	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	240 Vac *[3]*	—	—	10	10	—	—	22	—	22 *[4]*	—	65	—	—	—	—	—
	277 Vac	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	480Y/277 Vac	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DC Ratings	48 Vdc	5 *[5]*	5 *[5]*	5 *[5]*	—	—	—	—	—	—	—	—	—	—	—	—	—
	60 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	65 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	125 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	250 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
IEC 60947-2 (50/60 Hz) *[6]*	IEC (Icu)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Special Ratings																	
CCC		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fed. Specs W-C-375B/GEN		X	—	—	—	X	—	—	—	—	X	—	X	X	—	X	X
Other Standard		HACR *[7]* NOM			HACR *[7]*						—	—	—	HACR *[7]*	—	HACR *[7]*	HACR *[7]*
Accessories and Modifications																	
Shunt Trip *[8]*		X	X	X	X	X	X	X	X	X *[9]*	X	X	X	—	—	—	—
Undervoltage Trip		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Auxiliary Switches *[8]*		X	X	X	X	X	X	X	X	X *[9]*	X	X	X	—	X	—	—
Alarm Switch *[8]*		X	X	X	X	X	X	X	X	X *[9]*	X	X	X	—	X	—	—
Handle Operators		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Handle Padlock Attachment		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Trip System Type																	
Thermal-magnetic		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Molded Case Switch		X	X	X	—	—	—	—	—	—	—	—	—	—	—	—	—
Dimensions (1P Unit Mount)																	
Dimensions (1P Unit Mount) in. (mm)	Height	3.5 (89) *[1]*												4.75 (121)			
	Width	0.75 (19) *[1]*															
	Depth	2.92 (74) *[1]*															
Pages		page 7-11															

[1] For dimensions for QOB2150VH, QOB3110VH, QOB3125VH and QOB3150VH, see page 7-73
[2] 2P 150–200 A requires 4P width.
[3] See the Supplemental Digest, Section 3 for 3Ø corner grounded systems.
[4] 22 kA @ 240 Vac for 3P only.
[5] 1P and 2P, 10–70 A and 3P 10–60 A only.
[6] See the Supplemental Digest Section 10 for circuit breakers with IEC ratings.
[7] HACR on QO, QOB 1P 10–70 A, 2P 15–100 A, 3P 10–100 A; QOB-VH 1P 15–70 A, 2P 15–125 A, 3P 15–100 A.
[8] Factory-installed option only.
[9] Factory-installed accessories are not available on QOB-VH 2P150 A and 3P 110–150 A.

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QO-GFI, QO-EPD, QOU, QOM Miniature Circuit Breakers

		QO Circuit Breakers							QOU Circuit Breakers				QOM1 and QOM2 Main Circuit Breakers	
Circuit Breaker Type	Plug-on	QO-GFI			QO-VHGFI	QO-EPD QO-EPE			—			—	—	—
	Bolt-on	QOB-GFI			QOB-VHGFI	QOB-EPD QOB-EPE			—			—	QOM1-VH	QOM2-VH
	Unit Mount	—	—	—	—	—	—	—	QOU			QYU *[10]*	—	—
Number of Poles		1	2	3	1	1	2	3	1	2	3	1	2	2
Current Range (A)		15–30	15–60	15–50	15–30	15–30	15–60	15–50	10–100	10–125	10–100	10–30	50–125	100–225
Interrupting Ratings														
UL/CSA Rating (kA RMS) (50/60 Hz)	120 Vac	10	10	—	22	10	10	—	10	10	10	—	22	22
	120/240 Vac	—	10	—	—	—	10	—	10	10	10	—	22	22
	208Y/120	—	—	10	—	—	—	—						
	240 Vac *[11]*	—	—	—	—	—	—	10	—	—	10	—	—	—
	277 Vac	—	—	—	—	—	—	—	—	—	—	5	—	—
	480Y/277 Vac	—	—	—	—	—	—	—	—	—	—	—	—	—
DC Ratings	48 Vdc	—	—	—	—	—	—	—	5 *[12]*	5 *[12]*	5 *[12]*	—	—	—
	60 Vdc	—	—	—	—	—	—	—	5 *[13]*	5 *[13]*	5 *[13]*	—	—	—
	65 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—
	125 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—
	250 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—
IEC 60947-2 (50/60 Hz) Icu	240 Vac	—	—	—	—	—	—	—	—	—	—	—	—	—
	415 Vac	—	—	—	—	—	—	—	—	—	—	—	—	—
Special Ratings														
CCC		—	—	—	—	—	—	—	X *[14]*	X *[14]*	X *[14]*	—	—	—
Fed. Specs W-C-375B/GEN		X	—		—	X	—		X	X	X	X	X	X
Other Standard		NOM			—	NOM			HACR *[15]*			—	—	—
Accessories and Modifications														
Shunt Trip		—	—	—	—	—	—	—	X *[16]*	X *[16]*	X *[16]*	X *[16]*	—	X *[16]*
Undervoltage Trip		—	—	—	—	—	—	—	—	—	—	—	—	—
Auxiliary Switches		X	X	X	X	X	X	X	X *[16]*	X *[16]*	X *[16]*	X*[16]*	—	—
Alarm Switch		X	X	X	X	X	X	X	X *[16]*	X *[16]*	X *[16]*	X *[16]*	—	—
Handle Operators		—	—	—	—	—	—	—	—	—	—	—	—	—
Handle Padlock Attachment		X	X	X	X	X	X	X	X	X	X	X	X	X
Trip System Type														
Thermal-magnetic		X	X	X	X	X	X	X	X	X	X	X	X	X
Molded Case Switch		—	—	—	—	—	—	—	—	X	X	—	—	—
Dimensions (1P Unit Mount)														
Dimensions (1P Unit Mount) in. (mm)	Height	4.12 (103)							4.05 (103)				5.09 (129) *[17]*	5.60 (142) *[17]*
	Width	0.75 (19)							0.75 (19)				5.00 (127) *[17]*	5.07 (129) *[17]*
	Depth	2.92 (74)							2.92 (74)				3.47 (88) *[17]*	3.60 (91) *[17]*
Pages		page 7-11							page 7-18				See Section 1	

NOTE: All circuit breakers on this chart are UL Listed and CSA Certified unless otherwise noted.

[10] QYU is a UL 1077 supplementary protector.
[11] For information regarding 3Ø corner grounded systems see the Supplemental Digest, Section 3.
[12] 1P and 2P, 10–70 A and 3P 10–60 A only.
[13] QOU is UL Listed for 60 Vdc per pole 80–100 A, 1P; 80–125 A, 2P; and 70–100 A, 3P.
[14] 15–70 A 1P and 2P, 15–60 A 3P
[15] HACR on QOU 1P and 3P 15–100 A, 2P 15–125 A;
[16] Factory-installed option only.
[17] QOM1 and QOM2 dimensions are for 2-pole unit.

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HOM Circuit Breakers

HOM Circuit Breakers

Circuit Breaker Type	Plug-on	HOM		HOM-CAFI	HOM-DF	HOM-GFI		HOM-EPD		HOMT
	Bolt-on	—	—	—	—	—	—	—	—	—
	Unit Mount	—	—	—	—	—	—	—	—	—
Number of Poles		1	2	1, 2	1	1	2	1	2	1
Current Range (A)		15–50	15–200 *[18]*	15–20	15–20	15–20	15–50	15–20	15–50	15–50 *[19]*
Interrupting Ratings										
UL/CSA Rating (kA) (50/60 Hz)	120 Vac	10	10	10	10	10	10	10	10	10
	120/240 Vac	10	10	10	—	—	10	—	10	10
	208Y/120	—	—	—	—	—	—	—	—	—
	240 Vac *[20]*	—	—	—	—	—	—	—	—	—
	277 Vac	—	—	—	—	—	—	—	—	—
	480Y/277 Vac	—	—	—	—	—	—	—	—	—
DC Ratings	48 Vdc	—	—	—	—	—	—	—	—	—
	60 Vdc	—	—	—	—	—	—	—	—	—
	65 Vdc	—	—	—	—	—	—	—	—	—
	125 Vdc	—	—	—	—	—	—	—	—	—
	250 Vdc	—	—	—	—	—	—	—	—	—
IEC 60947-2 (50/60 Hz) *[21]*	IEC	—	—	—	—	—	—	—	—	—
	(Icu)	—	—	—	—	—	—	—	—	—
Special Ratings										
CCC		—	—	—	—	—	—	—	—	—
Fed. Specs W-C-375B/GEN		X	X	X	X	X	X	X	X	X
Other Standard		HACR *[22]* NOM		HACR *[22]*						
Accessories and Modifications										
Shunt Trip *[23]*		—	—	—	—	—	—	—	—	—
Undervoltage Trip		—	—	—	—	—	—	—	—	—
Auxiliary Switches *[23]*		—	—	—	—	—	—	—	—	—
Alarm Switch *[23]*		—	—	—	—	—	—	—	—	—
Handle Operators		—	—	—	—	—	—	—	—	—
Handle Padlock Attachment		X	X	X	X	—	—	—	—	X *[24]*
Trip System Type										
Thermal-magnetic		X	X	X	X	X	X	X	X	X
Molded Case Switch		—	—	—	—	—	—	—	—	—
Dimensions (1P Unit Mount)										
Dimensions (1P Unit Mount) in. (mm)	Height	3.13 (79)								
	Width	1.00 (25)								
	Depth	2.98 (76)								
Pages		page 1-20								

[18] 2P 150–200 A requires 4P width.
[19] HOMT tandem is 30 A maximum. HOMT quad tandem has 20 A maximum on outside poles, and 50 A maximum on the inside poles.
[20] See the Supplemental Digest, Section 3 for 3Ø corner grounded systems.
[21] See the Supplemental Digest Section 10 for circuit breakers with IEC ratings.
[22] HACR on HOM 1P 15–50 A and 2P 15–100 A.
[23] Factory-installed option only.
[24] Handle padlock attachment available for HOMT quad tandem only.

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Multi 9, EDB Miniature Circuit Breakers

		Multi 9™ Circuit Breakers and Supplementary Protectors								EDB Circuit Breakers					
Circuit Breaker Type	Plug-on	—			—					—		—		—	
	Bolt-on	—			—					EDB		EGB		EJB	
	Unit Mount	UL 489 C60			UL1077 C60 *[25]*			C60H-DC		—		—		—	
Number of Poles		1	2	3	1	2	3,4	1	2	1	2, 3	1	2, 3	1	2, 3
Current Range (A)		0.5–35	0.5–35	0.5–35	0.5–63	1–63	1–63	0.5–40	0.5–40	15–70	15–125	15–70	15–125	15–70	15–125
Interrupting Ratings															
UL/CSA Rating (kA RMS) (50/60 Hz)	120 Vac	10	—	—	10	10	10	—	—	25	25	65	65	100	100
	120/240 Vac	5	10	10	10	10	10	—	—	18	25	35	65	65	100
	240 Vac *[26]*	5	10	10	10	10	10	—	—	18	25	35	65	65	100
	277 Vac	—	—	—	5	5	5	—	—	18	18	35	35	65	65
	480Y/277 Vac	10	10	10	—	5	5	—	—	—	18	—	35	—	65
DC Ratings	48 Vdc	—	—	—	10	10	—	5	5	—	—	—	—	—	—
	60 Vdc	10	10	—	—	—	—	5	5	—	—	—	—	—	—
	65 Vdc	—	—	—	10	10	—	5	5	—	—	—	—	—	—
	125 Vdc	—	10	—	—	10	—	5	5	—	—	—	—	—	—
	250 Vdc	—	—	—	—	—	—	5	5	—	—	—	—	—	—
	500 Vdc	—	—	—	—	—	—	—	5 *[27]*	—	—	—	—	—	—
IEC 60947-2 (50/60 Hz) Icu	240 Vac	20	20	20	10	10	10	20	10	20	—	—	—	—	—
	415 Vac	—	10	10	—	5	5	—	—	10	—	—	—	—	—
Special Ratings															
CCC		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fed. Specs W-C-375B/GEN		X	X	X	—	—	—	—	—	X	X	X	X	X	X
Other Standard		—	—	—	*[28]*	—	—	—	—	HACR					
Accessories and Modifications															
Shunt Trip		X	X	X	X	X	X	X	X	X *[29]*	X *[29]*	X *[29]*	X *[29]*	X *[29]*	X *[29]*
Undervoltage Trip		X	X	X	X	X	X	X	X	—	—	—	—	—	—
Auxiliary Switches		X	X	X	X	X	X	X	X	X *[29]*	X *[29]*	X *[29]*	X *[29]*	X *[29]*	X *[29]*
Alarm Switch		X	X	X	X	X	X	X	X	X *[29]*	X *[29]*	X *[29]*	X *[29]*	X *[29]*	X *[29]*
Handle Operators		X	X	X	X	X	X	X	X	—	—	—	—	—	—
Handle Padlock Attachment		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Trip System Type															
Thermal-magnetic		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Molded Case Switch		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dimensions (1P Unit Mount)															
Dimensions (1P Unit Mount) in. (mm)	Height	4.21 (107) *[30]*			3.19 (81)			3.19 (81)		5.66 (144)					
	Width	0.71 (18)			0.71 (18)			0.71 (18)	1.42 (36)	0.98 (25)					
	Depth	2.76 (70)			2.76 (70)			2.56 (65)		4.05 (103)					
Pages		page 7-24								See Section 9					

NOTE: All circuit breakers on this chart are UL Listed and CSA Certified unless otherwise noted.

[25] C60 are recognized components per UL 1077.
[26] For information regarding 3Ø corner grounded systems see the Supplemental Digest, Section 3.
[27] 2 poles must be wired in series for 500 Vdc.
[28] UL 489A for DC Telecom applications (1-pole only).
[29] Factory-installed option only.
[30] 480 V C60 height is 5.56 in. (141 mm).

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B-, H-, J-Frame Molded Case Circuit Breakers

		PowerPact™ 125 A B-Frame				PowerPact 150 A H-Frame Electronic Trip Version					PowerPact 250 A J-Frame Electronic Trip Version				
Circuit Breaker Type		BD	BG	BJ	BK	HD	HG	HJ	HL	HR	JD	JG	JJ	JL	JR
Number of Poles		1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	1, 2	2, 3	2, 3	2, 3 *[31]*	2, 3 *[31]*	3	2, 3 *[31]*	2, 3 *[31]*	2, 3 *[31]*	2, 3 *[31]*	3
Current Range (A)		15–125	15–125	15–125	15–30	15–150	15–150	15–150	15–150	15–150	70–250 *[32]*	70–250 *[32]*	70–250 *[32]*	70–250 *[32]*	70–250 *[32]*
Interrupting Ratings															
UL/CSA/ NOM AC Rating (kA RMS) (50/60 Hz)	240 Vac	25	65	100	100	25	65	100	125	200	25	65	100	125	200
	480Y/277 Vac	18	35	65	65	18	35	65	100	200	18	35	65	100	200
	480 Vac	18	35	65	65	18	35	65	100	200	18	35	65	100	200
	600Y/347 Vac	14	18	25	65	14	18	25	50	100	14	18	25	50	100
	600 Vac	—	—	—	—	14	18	25	50	100	14	18	25	50	100
UL/CSA/ NOM DC Ratings	250 Vdc *[33]*	—	—	—	—	20	20	20	20	—	20	20	20	20	—
	500 Vdc *[33]*	—	—	—	—	—	20	—	50	—	—	20	—	50	—
IEC AC Rating (kA RMS) (50/60 Hz) Icu/Ics *[34]*	220/240 Vac	25	65	100	100	25	65	100	125	150	25	65	100	125	150
	380/415 Vac	18	35	65	65	18	35	65	100	125	18	35	65	100	125
	440/480 Vac	18	35	65	65	18	35	65	100	125	18	18	25	50	125
	500/525 Vac	14	18	25	25	14	18	25	50	75	14	20	20	20	75
	690 Vac	—	—	—	—	—	—	—	—	20	—	—	—	—	20
IEC DC Ratings	250 Vdc	—	—	—	—	—	—	—	—	—	20	20	20	20	—
	500 Vdc	—	—	—	—	—	—	—	—	—	20	20	20	20	—
Special Ratings															
CCC		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fed. Specs W-C-375B/GEN		X	X	X	X	X	X	X	X	X	X	X	X	X	X
HACR		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Connections/Terminations															
Unit Mount		X	X	X	X	X	X	X	X	X	X	X	X	X	X
I-Line™		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Rear Connection		—	—	—	—	X *[35]*	X *[35]*	X	X	X	X	X	X	X	X
Drawout		—	—	—	—	X *[35]*	X *[35]*	X	X	X	X	X	X	X	X
Optional Lugs		X	X	X	X	X *[35]*	X *[35]*	X	X	X	X	X	X	X	X
Accessories and Modifications															
Shunt Trip		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Undervoltage Trip		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Auxiliary Switches		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Alarm Switch		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Motor Operator		—	—	—	—	X *[35]*	X *[35]*	X	X	X	X	X	X	X	X
Handle Operators		X	X	X	X	X *[35]*	X *[35]*	X	X	X	X	X	X	X	X
Mechanical Interlocks (3P)		X	X	X	—	X	X	X	X	X	X	X	X	X	X
Handle Padlock Attachment		X	X	X	X	X *[35]*	X *[35]*	X	X	X	X	X	X	X	X
Cylinder Lock (3P)		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Optional GF Protection		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Trip System Type															
Thermal-magnetic		X	X	X	X	X	X	X	X	—	X	X	X	X	X
Instantaneous-only (MCP)		—	—	—	—	—	X	X *[36]*	X *[36]*	X *[36]*	—	X *[36]*	X *[36]*	X	X
Molded Case Switch (Automatic)		X	X	X	X	—	X	—	X	—	—	X	—	X	X
Electronic		—	—	—	—	X *[36]*	X *[36]*	X *[36]*	X *[36]*	X *[36]*	X *[36]*	X *[36]*	X *[36]*	X *[36]*	X *[36]*
Enclosures (page 7-73–page 7-75)															
General Purpose (NEMA 1)		—	—	—	—	X	X	X	X	—	X	X	X	X	—
Raintight (NEMA 3R)		—	—	—	—	X	X	X	X	—	X	X	X	X	—
Dust-tight (NEMA 12)		—	—	—	—	X	X	X	X	—	X	X	X	X	—
Watertight (NEMA 4, 4X, 5)		—	—	—	—	X	X	X	X	—	X	X	X	X	—
Explosion Proof (NEMA 7, 9)		—	—	—	—	—	—	—	—	—	X *[37]*	X *[37]*	—	—	—
Dimensions (3P Unit Mount) in. (mm)	Height	5.4 (137)				6.4 (163)					7.5 (191)				
	Width	3.2 (81)				4.1 (104)					4.1 (104)				
	Depth	3.5 (89)				3.4 (86)					3.4 (86)				
Pages (Unit Mount)/(I-Line)		page 7-30/Section 9				page 7-31/Section 9					page 7-31/Section 9				

NOTE: All circuit breakers on this chart are UL Listed and CSA Certified unless otherwise noted.

[31] 2P in a 3P module.
[32] 70–250 A with electronic trip system
[33] Not available with electronic trip units
[34] Dual UL and IEC ratings and CE markings on circuit breakers. For additional IEC ratings, see the Supplemental Digest, Section 10.
[35] Not available in HD and HG 2P rating (2P module).
[36] 3P only.
[37] Not UL Listed due to wire bending space.

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PowerPact™ Q-, L-Frame Molded Case Circuit Breakers

		PowerPact 250 A Q-Frame				PowerPact 600 A L-Frame				
Circuit Breaker Type		QB	QD	QG	QJ	LD	LG	LJ	LL	LR
Number of Poles		2, 3	2, 3	2, 3	2, 3	3, 4	3, 4	3, 4	3, 4	3, 4
Current Range (A)		70–250 *[38]*	70–250 *[38]*	70–250 *[38]*	70–250 *[38]*	70–600	70–600	70–600	70–600	70–600
Interrupting Ratings										
UL/CSA/NOM AC Rating (kA RMS) (50/60 Hz)	240 Vac	10	25	65	100	25	65	100	125	200
	480Y/277 Vac	—	—	—	—	18	35	65	100	200
	480 Vac	—	—	—	—	18	35	65	100	200
	600Y/347 Vac	—	—	—	—	14	18	25	50	100
	600 Vac	—	—	—	—	14	18	25	50	100
UL/CSA/NOM DC Ratings	250 Vdc *[39]*	—	—	—	—	—	—	—	—	—
	500 Vdc *[40][39]*	—	—	—	—	—	20	—	50	—
IEC AC Rating (kA RMS) (50/60 Hz) Icu/Ics *[41]*	220/240 Vac	10/5	10/5	10/5	10/5	25	65	100	125	150
	380/415 Vac	10/5	10/5	10/5	10/5	18/18	18	65	100	125
	440/480 Vac	—	—	—	—	18/18	18	65	100	125
	500/525 Vac	—	—	—	—	18/18	14	25	50	75
	690 Vac	—	—	—	—	—	—	—	—	20
IEC DC Ratings	250 Vdc	—	—	—	—	—	—	—	—	—
	500 Vdc	—	—	—	—	—	—	—	—	—
Special Ratings										
CCC		—	—	—	—	X	X	X	X	X
Fed. Specs W-C-375B/GEN		X	X	X	X	X	X	X	X	X
HACR (2P, 3P)		X	X	X	—	X	X	X	X	X
Connections/Terminations										
Unit Mount		X	X	X	X	X	X	X	X	X
I-Line™		X	X	X	X	X	X	X	X	X
Rear Connection		—	—	—	—	X	X	X	X	X
Drawout		—	—	—	—	X	X	X	X	X
Optional Lugs		—	—	—	—	X	X	X	X	X
Accessories and Modifications										
Shunt Trip		—	—	—	—	X	X	X	X	X
Undervoltage Trip		—	—	—	—	X	X	X	X	X
Auxiliary Switches		—	—	—	—	X	X	X	X	X
Alarm Switch		—	—	—	—	X	X	X	X	X
Motor Operator		—	—	—	—	X	X	X	X	X
Handle Operators		—	—	—	—	X	X	X	X	X
Mechanical Interlocks (3P)		X	X	X	X	X	X	X	X	X
Handle Padlock Attachment		X	X	X	X	X	X	X	X	X
Cylinder Lock (3P*[42]*)		—	—	—	—	—	—	—	—	—
Optional GF Protection*[43]*		—	—	—	—	X	X	X	X	X
Trip System Type										
Thermal-magnetic		X	X	X	X	—	—	—	—	—
Instantaneous-only (MCP)		—	—	—	—	—	X	X	X	X
Molded Case Switch (Automatic)		X	—	—	—	—	X	—	X	X
Electronic		—	—	—	—	X	X	X	X	X
Enclosures (page 7-73–page 7-75)										
General Purpose (NEMA 1)		X	X	X	X	—	—	—	—	—
Raintight (NEMA 3R)		X	X	X	X	—	—	—	—	—
Dust-tight (NEMA 12)		—	—	—	—	X *[44]*	X *[44]*	X *[44]*	X *[44]*	X *[44]*
Watertight (NEMA 4, 4X, 5)		—	—	—	—	—	—	—	—	—
Explosion Proof (NEMA 7, 9)		—	—	—	—	—	—	—	—	—
Dimensions (3P Unit Mount) in. (mm)	Height	6.47 (164)				13.38 (340)				
	Width	4.5 (114)				5.51 (140)				
	Depth	3.93 (100)				4.33 (110)				
Pages (Unit Mount)/(I-Line)		page 7-35/Supplemental Section 9				page 7-36/Supplemental Section 9				

NOTE: All circuit breakers on this chart are UL Listed and CSA Certified unless otherwise noted.

[38] I-Line Q-frame circuit breakers are available 70–225 A only. 250 A Q-frame unit-mount circuit breakers are limited to Cu conductors only.
[39] Not available with electronic trip units
[40] Ungrounded UPS systems only. See page 7-49. Special DC J-Frame only.
[41] Dual UL and IEC ratings and CE markings on circuit breakers. For additional IEC ratings, see the Supplemental Digest, Section 10.
[42] Factory-installed option only.
[43] Requires factory-installed "G" shunt trip and 3P module.
[44] Enclosure rating 1, 3R, 5 and 12.,

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M-, P-, and R-Frame Molded Case Circuit Breakers

		PowerPact 800 A M-Frame		PowerPact 1200 A P-Frame				PowerPact 3000 A R-Frame			
Circuit Breaker Type		MG	MJ	PG	PJ	PK	PL	RG	RJ	RK	RL
Number of Poles		2, 3	2, 3	2, 3, 4	2, 3, 4	2, 3, 4	2, 3, 4	2, 3, 4	2, 3, 4	2, 3, 4	2, 3, 4
Current Range (A)		300–800	300–800	100–1200	100–1200	100–1200	100–1200	240–3000	240–3000	240–3000	240–3000
Interrupting Ratings											
UL/CSA/NOM Rating (kA RMS) (50/60 Hz)	240 Vac	65	100	65	100	65	125	65	100	65	125
	480Y/277 Vac	35	65	35	65	50	100	35	65	65	100
	480 Vac	35	65	35	65	50	100	35	65	65	100
	600Y/347 Vac	18	25	18	25	50	25	18	25	65	50
	600 Vac	18	25	18	25	50	25	18	25	65	50
DC Ratings	250 Vdc	—	—	—	—	—	—	—	—	—	—
	500 Vdc *[45]*	—	—	—	—	—	—	—	—	—	—
IEC (kA RMS) (50/60 Hz) Icu/Ics *[46]*	240 Vac	50/25	65/35	50/25	65/35	50/25	125/65	50/25	65/35	85/65	125/65
	415 Vac	35/20	50/25	35/20	50/25	50/25	85/45	35/20	50/25	70/55	85/45
Special Ratings											
CCC		X	X	X	X	X	X	X	X	X	X
Fed. Specs W-C-375B/GEN		X	X	X	X	X	X	X	X	X	X
HACR (2P, 3P)		X	X	X	X	X	X	X	X	X	X
Connections/Terminations											
Unit Mount		X	X	X	X	X	X	X	X	X	X
I-Line™		X	X	X	X	X	X	X *[47]*	X *[47]*	X *[47]*	X *[47]*
Rear Connection		—	—	—	—	—	—	—	—	—	—
Drawout		—	—	X *[48]*	X *[48]*	X *[48]*	X *[48]*	—	—	—	—
Optional Lugs		X	X	X	X	X	X	X	X	X	X
Accessories and Modifications											
Shunt Trip		X	X	X	X	X	X	X	X	X	X
Undervoltage Trip		X	X	X	X	X	X	X	X	X	X
Auxiliary Switches		X	X	X	X	X	X	X	X	X	X
Alarm Switch		X	X	X	X	X	X	X	X	X	X
Motor Operator		—	—	X *[48]*	X *[48]*	X *[48]*	X *[48]*	—	—	—	—
Handle Operators		—	—	X *[48]*	X *[48]*	X *[48]*	X *[48]*	—	—	—	—
Mechanical Interlocks (3P)		—	—	X	X	X	X	—	—	—	—
Handle Padlock Attachment		X	X	X	X	X	X	X	X	X	X
Cylinder Lock (3P)		—	—	—	—	—	—	—	—	—	—
Optional GF Protection		—	—	X	X	X	X	X	X	X	X
Trip System Type											
Thermal-magnetic		—	—	—	—	—	—	—	—	—	—
Instantaneous-only (MCP)		—	—	—	X	X	—	—	—	—	—
Molded Case Switch (Automatic)		—	—	X	X	X	X	X	X	X	X
Electronic		X	X	X	X	X	X	X	X	X	X
Enclosures (page 7-73–page 7-75)											
General Purpose (NEMA 1)		X	X	X	X	X	X	—	—	—	—
Raintight (NEMA 3R)		X	X	X	X	X	X	—	—	—	—
Dust-tight (NEMA 12)		X	X	X	X	X	X	—	—	—	—
Watertight (NEMA 4, 4X, 5)		X	X	—	—	—	—	—	—	—	—
Explosion Proof (NEMA 7, 9)		—	—	—	—	—	—	—	—	—	—
Dimensions (3P Unit Mount)	Height–in. (mm)	12.80 (325)		16.20 (413)				15 (381)			
	Width—in. (mm)	8.30 (210)		8.30 (210)				16.50 (420)			
	Depth—in. (mm)	8.10 (205)		8.10 (205)				14.40 (366)			
Pages (Unit Mount)/(I-Line)		page 7-37/Section 9		page 7-38, page 7-48/Section 9				page 7-39, page 7-48/Section 9			

NOTE: All circuit breakers on this chart are UL Listed and CSA Certified unless otherwise noted.

[45] Ungrounded UPS systems only. See page 7-49.
[46] Dual UL and IEC ratings and CE markings on circuit breakers. For additional IEC ratings, see the Supplemental Digest, Section 10.
[47] 1000 A and 1200 A only.
[48] 65/50 kA Icu/Ics for 450–600 A ratings.

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Masterpact NT, NW Molded Case Circuit Breakers

		Masterpact 1200 A					Masterpact 6000 A							
Circuit Breaker Type		NT-N	NT-H	NT-L1	NT-L	NT-LF *[49]*	NW-N	NW-H	NW-L	NW-LF *[49]*	NW-H	NW-L	NW-H	NW-L
Number of Poles		3 , 4	3, 4	3	3	3	3 , 4	3, 4	3	3	3 , 4	3	3 , 4	3
Current Range		100–1200	100–1200	100–1200	100–1200	100–1200	100–2000	100–2000	100–2000	100–2000	640–3000	640–3000	1200–6000	1200–6000
Interrupting Ratings														
UL/CSA/NOM Rating (kA RMS) (50/60 Hz)	240 Vac	50	65	100	200	200	65	100	200	200	100	200	100	200
	480Y/277 Vac	50	50	65	100	100	65	100	150	150	100	150	100	150
	480 Vac	50	50	65	100	100	65	100	150	150	100	150	100	150
	600Y/347 Vac	35	50	—	—	—	50	85	100	100	85	100	85	100
	600 Vac	35	50	—	—	—	50	85	100	100	85	100	85	100
DC Ratings	250 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc	—	—	—	—	—	—	—	—	—	—	—	—	—
IEC *[50]* (kA RMS) Icu/ Ics	240 Vac	—	—	—	—	—	—	—	—	—	—	—	—	—
	415 Vac	—	—	—	—	—	—	—	—	—	—	—	—	—
Special Ratings														
CCC		—	—	—	—	—	—	—	—	—	—	—	—	—
Fed. Specs W-C-375B/GEN		—	—	—	—	—	—	—	—	—	—	—	—	—
HACR (2P, 3P)		—	—	—	—	—	—	—	—	—	—	—	—	—
Connections/Terminations														
Unit Mount		X	X	X	X	X	X	X	X	X	X	X	X	X
I-Line™		—	—	—	—	—	—	—	—	—	—	—	—	—
Rear Connection		X	X	X	X	X	X	X	X	X	X	X	X	X
Drawout		X	X	X	X	X	X	X	X	X	X	X	X	X
Optional Lugs		—	—	—	—	—	—	—	—	—	—	—	—	—
Accessories and Modifications														
Shunt Trip		X	X	X	X	X	X	X	X	X	X	X	X	X
Undervoltage Trip		X	X	X	X	X	X	X	X	X	X	X	X	X
Auxiliary Switches		X	X	X	X	X	X	X	X	X	X	X	X	X
Alarm Switch		X	X	X	X	X	X	X	X	X	X	X	X	X
Motor Operator		X	X	X	X	X	X	X	X	X	X	X	X	X
Handle Operators		—	—	—	—	—	—	—	—	—	—	—	—	—
Mechanical Interlocks		X	X	X	X	X	X	X	X	X	X	X	X	X
Padlock Attachment		X	X	X	X	X	X	X	X	X	X	X	X	X
Cylinder Lock		—	—	—	—	—	—	—	—	—	—	—	—	—
Optional GF Protection		X	X	X	X	X	X	X	X	X	X	X	X	X
Trip System Type														
Thermal-magnetic		—	—	—	—	—	—	—	—	—	—	—	—	—
Instantaneous-only (MCP)		—	—	—	—	—	—	—	—	—	—	—	—	—
Molded Case Switch (Automatic)		X	X	X	X	X	X	X	X	X	X	X	X	X
Electronic		X	X	X	X	X	X	X	X	X	X	X	X	X
Enclosures														
General Purpose (NEMA 1)		—	—	—	—	—	—	—	—	—	—	—	—	—
Raintight (NEMA 3R)		—	—	—	—	—	—	—	—	—	—	—	—	—
Dust-tight (NEMA 12)		—	—	—	—	—	—	—	—	—	—	—	—	—
Watertight (NEMA 4, 4X, 5)		—	—	—	—	—	—	—	—	—	—	—	—	—
Explosion Proof (NEMA 7, 9)		—	—	—	—	—	—	—	—	—	—	—	—	—
Dimensions (3P Unit Mount) in. (mm)	Height	12.67 (322)					17.28 (439)				17.28 (439)		17.28 (439)	
	Width	11.25 (286)					17.74 (450)				17.74 (450)		30.94 (786)	
	Depth	13.00 (331)					18.38 (467)				18.38 (467)		18.38 (467)	
Pages		page 7-69 and Catalog 0613CT0001					page 7-69 and Catalog 0613CT0001							

NOTE: All circuit breakers on this chart are UL Listed and CSA Certified unless otherwise noted.

[49] Tested to show arc flash hazard risk category as reference by NFPA70E.
[50] See Catalog 0613CT0001 for additional ratings and other information.

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Q4 and L-Frame Molded Case Circuit Breakers

		400 A L-Frame		
Circuit Breaker Type		Q4	LA	LH
Number of Poles		2, 3	2, 3	2, 3
Current Range		250–400	125–400	125–400
Interrupting Ratings				
UL/CSA/NOM Rating (kA RMS) (50/60 Hz)	240 Vac	25	42	65
	480Y/277 Vac	—	30	35
	480 Vac	—	30	35
	600Y/347 Vac	—	22	25
	600 Vac	—	22	25
DC Ratings	250 Vdc *[51]*	—	10	50
	500 Vdc *[52][51]*	—	—	20
IEC Rating (kA RMS) Icu/Ics *[53]*	240 Vac	—	—	—
	415 Vac	—	20/5	20/5
IEC 50/60 Hz		For additional IEC ratings, see the Supplemental Digest Section 10.		
Special Ratings				
CCC		—	—	—
Fed. Specs W-C-375B/GEN		X	X	X
HACR (2P, 3P)		—	X	X
Connections/Terminations				
Unit Mount		X	X	X
I-Line™		X	X	X
Rear Connection		X	X	X
Drawout		—	—	—
Optional Lugs		X	X	X
Accessories and Modifications				
Shunt Trip		X	X	X
Undervoltage Trip		X	X	X
Auxiliary Switches		X	X	X
Alarm Switch		X	X	X
Motor Operator		X	X	X
Handle Operators		X	X	X
Mechanical Interlocks (3P)		—	X *[54]*	X *[54]*
Handle Padlock Attachment		X	X	X
Cylinder Lock (3P) *[51]*		X	X	X
Optional GF Protection *[55]*		—	—	—
Trip System Type				
Thermal-magnetic		X	X	X
Instantaneous-only (MCP)		—	X	X
Molded Case Switch (Automatic)		—	—	X
Electronic		—	—	—
Enclosures (page 7-73–page 7-75)				
General Purpose (NEMA 1)		X	X	X
Raintight (NEMA 3R)		X	X	X
Dust-tight (NEMA 12)		X	X	X
Watertight (NEMA 4, 4X, 5)		X	X	X
Explosion Proof (NEMA 7, 9)		—	—	—
Dimensions (3P Unit Mount) in. (mm)	Height	11 (279)		
	Width	6 (152)		
	Depth	5.84 (148)		
Pages (Unit Mount)/(I-Line)		Supplemental Digest Section 3 / Digest Section 9		

NOTE: All circuit breakers on this chart are UL Listed and CSA Certified unless otherwise noted.

[51] Factory-installed option only.
[52] Ungrounded UPS systems only. See page 7-49.
[53] Dual UL and IEC ratings and CE markings on circuit breakers. For additional IEC ratings, see the Supplemental Digest, Section 10.
[54] Requires circuit breaker with WB suffix .
[55] Requires factory-installed “G” Shunt trip and 3P module.

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QO Plug-On Circuit Breakers

Square D brand QO miniature circuit breakers are plug-on products for use in QO load centers, NQOD and NQ panelboards, NQOD and NQ OEM interiors or Speed-D™ switchboard distribution panels. Bolt-on QOB circuit breakers are for use in NQOD and NQ panelboards or interiors. *[1]*

The Square D exclusive Qwik-Open™ mechanism, with a trip reaction within 1/60th of a second, is standard on all 1P 15 A and 20 A QO circuit breakers.

QO 1P
1 Space Required

QO 2P
2 Spaces Required

QO 3P
3 Spaces Required

QO2200 2P 200 A
4 Spaces Required

Table 7.1: Plug-On Circuit Breakers

Amperes Rating *[2]*	1P—120/240 Vac	2P—120/240 Vac Common Trip	2P—240 Vac *[3]* Common Trip	3P—240 Vac Common Trip
10 k AIR				
10 A	QO110	QO210	—	QO310
15 A	QO115 *[4] [5]*	QO215 *[4]*	QO215H	QO315 *[4]*
20 A	QO120 *[4] [5]*	QO220 *[4]*	QO220H	QO320 *[4]*
25 A	QO125 *[4]*	QO225 *[4]*	QO225H	QO325 *[4]*
30 A	QO130 *[4]*	QO230 *[4]*	QO230H	QO330 *[4]*
35 A	QO135 *[4]*	QO235 *[4]*	—	QO335 *[4]*
40 A	QO140 *[4]*	QO240 *[4]*	QO240H	QO340 *[4]*
45 A	QO145 *[4]*	QO245 *[4]*	—	QO345 *[4]*
50 A	QO150 *[4]*	QO250 *[4]*	QO250H	QO350 *[4]*
60 A	QO160 *[4]*	QO260 *[4]*	QO260H	QO360 *[4]*
70 A	QO170 *[4]*	QO270 *[4]*	QO270H	QO370 *[4]*
80 A	—	QO280 *[4]*	QO280H	QO380 *[4]*
90 A	—	QO290 *[4]*	QO290H	QO390 *[4]*
100 A	—	QO2100 *[4]*	QO2100H	QO3100 *[4]*
110 A	—	QO2110 *[4]*	—	—
125 A	—	QO2125 *[4]*	—	—
150 A	—	QO2150 *[4] [6] [7]*	—	—
175 A	—	QO2175 *[4] [6] [7]*	—	—
200 A	—	QO2200 *[4] [6] [7]*	—	—
Molded Case Switch 60 A max.–240 Vac		—	QO200	QO300
Molded Case Switch 100 A max.–240 Vac		—	QO2000 *[8]*	QO3000 *[8]*
22 k AIR *[4]*				
15 A	QO115VH *[5]*	QO215VH *[9]*	—	QO315VH *[9]*
20 A	QO120VH *[5]*	QO220VH *[9]*	—	QO320VH *[9]*
25 A	QO125VH	QO225VH *[9]*	—	QO325VH *[9]*
30 A	QO130VH	QO230VH *[9]*	—	QO330VH *[9]*
40 A	QO140VH	QO240VH *[9]*	—	QO340VH *[9]*
50 A	QO150VH	QO250VH *[9]*	—	QO350VH *[9]*
60 A	QO160VH	QO260VH *[9]*	—	QO360VH *[9]*
70 A	QO170VH	QO270VH *[9]*	—	QO370VH *[9]*
80 A	—	QO280VH *[9]*	—	QO380VH *[9]*
90 A	—	QO290VH *[9]*	—	QO390VH *[9]*
100 A	—	QO2100VH *[9] [10]*	—	QO3100VH *[9]*
110 A	—	QO2110VH *[9] [10]*	—	—
125 A	—	QO2125VH *[9] [10]*	—	—
150 A	—	QO2150VH *[6] [9] [7]*	—	—
175 A	—	QO2175VH *[6] [9] [7]*	—	—
200 A	—	QO2200VH *[6] [9] [7]*	—	—
42 k AIR *[4]*				
40 A	—	QOH240 *[8]*	—	—
45 A	—	QOH245 *[8]*	—	—
50 A	—	QOH250 *[8]*	—	—
60 A	—	QOH26 *[8]*	—	—
70 A	—	QOH270	—	—
80 A	—	QOH280	—	—
90 A	—	QOH290	—	—
100 A	—	QOH2100	—	—
110 A	—	QOH2110 *[8]*	—	—
125 A	—	QOH2125	—	—
65 k AIR *[4]*				
15 A	QH115 *[5]*	QH215	—	QH315 *[4]*
20 A	QH120 *[5]*	QH220	—	QH320
25 A	QH125 *[8]*	QH225 *[8]*	—	QH325 *[8]*
30 A	QH130	QH230	—	QH330

Refer to page 7-2 for Interrupting Ratings, Accessories, and Dimensions.

[1] See Digest Section 1 for load centers, and Section 9 for panelboards and interiors.
[2] 10–30 A circuit breakers are suitable for use with 60ºC or 75ºC conductors. 35–125 A circuit breakers are suitable for use with 75ºC conductors.
[3] UL Listed 5 k AIR on corner grounded Delta systems.
[4] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[5] UL Listed as SWD (switching duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.
[6] Requires four spaces (1 AWG–300 kcmil Al/Cu.) Suitable for switching 120 Vac fluorescent lighting loads.
[7] Not suitable for use in 3Ø panels. Use only in 1Ø panel rated 150 A or greater.
[8] Order only. Contact your local Field Office.
[9] UL Listed for use ahead of QO, QO-GFI, QO-EPD, QOT, QO-AFI, and QO-PL 10 k AIR circuit breakers to permit their application at 22 kA fault level.
[10] 100 A maximum branch mounted opposite.

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QO/QOB Ring Terminal

Table 7.2: QO/QOB Ring Terminal—Factory-installed only

Ampere Rating	Poles	Suffix
10–30 A	1, 2, 3	5237
35–60 A	1,2	5238
35–50 A	3	
70–110 A	2	5273
60–100 A	3	

Wire Sizes for QO/QOB Circuit Breakers

Table 7.3: Wire Sizes

Circuit Breaker Type	Ampere Rating *[11]*	Wire Size (AWG/kcmil)
QO 1P	10–30 A	14–8 Al/Cu
	10–30 A	(2) 14–10 Cu
	35–70 A	8–2 Al/Cu
QO 2P	10–30 A	14–8 Al/Cu
	10–30 A	(2) 14–10 Cu
	35–70 A	8–2 Al/Cu
	80–125 A	4–2/0 Al/Cu
	150–200 A	4–300 Al/Cu
QO 3P	10–30 A	14–8 Al/Cu, (2) 14-10 Cu
	35–70 A	8–2 Al/Cu
	80–125 A	4–2/0 Al/Cu
QOB-VH	110–150 A	4–300 Al/Cu
QOT	15–20 A	12–8 Al 14–8 Cu
QO-AFI, QO-GFI or QO-EPD	15–30 A	12–8 Al 14–8 Cu
	40, 50, 60 A	12–4 Al 14–6 Cu
QO-PL	10–60 A	12–2 Al 14–2 Cu

QOT Tandem Circuit Breakers

Circuit limiting QOT tandem circuit breakers have a mounting cam as shown. Installation into a QO load center can only be made in those positions having a mounting pan rail slot. Meets Paragraph 408.54 of the NEC®. UL Listed as Class CTL

QOT 1P Tandem
1 Space Required

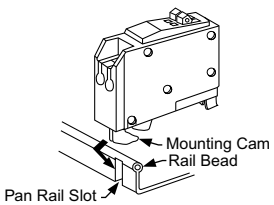

Table 7.4: QOT Tandem Circuit Breakers

Ampere Rating *[12]*	Cat. No. *[13]*
1P—120/240 Vac	
15 A and 15 A	QOT1515
15 A and 20 A	QOT1520
20 A and 20 A	QOT2020
2P—120/240 Vac Common Trip	
Order two QOT1515 or QOT2020 circuit breakers and handle tie QOTHT for common switching of center two poles.	

Replacement Tandem Circuit Breakers Includes two circuit breakers (one QO2030 and one QO3020) and handle tie QOTHT.

Table 7.5: Replacement Tandem Circuit Breakers

Ampere Rating *[12]*	Cat. No. *[13]*
1P—120/240 Vac—1 Space Required	
15 A and 15 A	QO1515
15 A and 20 A	QO1520
20 A and 20 A	QO2020
20 A and 30 A	QO2030
30 A and 20 A	QO3020
Two 1P Individual Trip—120/240 Vac—2 Spaces Required	
15 A and 15 A	Order Two QO1515 or QO2020 circuit breakers and handle tie QOTHT
15 A and 20 A	
20 A and 20 A	—
20 A and 30 A	QO20303020 *[14]*
30 A and 20 A	—

[11] 10–30 A circuit breakers are suitable for use with 60ºC or 75ºC conductors. 35–125 A circuit breakers are suitable for use with 75ºC conductors.
[12] 10–30 A circuit breakers are suitable for use with 60ºC or 75ºC conductors. 35–125 A circuit breakers are suitable for use with 75ºC conductors.
[13] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[14] Includes two circuit breakers (one QO2030 and one QO3020) and handle tie QOTHT.

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1P
QO-CAFI
Plug-On Neutral

1P
QO-CAFI
Pigtail

1P QO-DF
Plug-on Neutral

1P QO-DF
Pigtail

1P
QO-GFI

2P
QO-GFI

QO 1P
With Shunt Trip

QO Arc-Fault Circuit Breaker

QO arc-fault circuit breakers provide protection for Series and Parallel Type Arcing as required by the NEC and local code adoption, and comply with UL1699.

Table 7.6: QO Arc Fault Circuit Breakers (One-Pole)

Circuit Breaker Type *[15]*	Ampere Rating	One–Pole 120 Vac		Two–Pole 120/240 Vac	
		10 k AIR 1 Space Required	22 k AIR 1 Space Required	10 k AIR 2 Space Required	22 k AIR 2 Space Required
Combination Arc-fault Interrupter (Pigtail Neutral)	15 20	QO115CAFI QO120CAFI	QO115VHCAFI QO120VHCAFI	QO215CAFI *[16]* QO220CAFI *[16]*	QO215VHCAFI *[16]* QO220VHCAFI *[16]*
Plug-On Neutral Combination Arc-fault Interrupter	15 20	QO115PCAFI QO120PCAFI	QO115VHPCAFI QO120VHPCAFI		

QO-Dual Function Circuit Breaker

QO Combination Arc Fault and Ground Fault Circuit Interrupters (Dual Function) provide overload and short circuit protection, plus arc fault and ground fault protection in accordance with the NEC, UL1699 and UL943.

Table 7.7: QO-Dual Function Arc Fault Circuit Breakers

Circuit Breaker Type *[17]*	Ampere Rating	1P 120 Vac 10 k AIR 1 Space Required	1P 120 Vac 22 k AIR 1 Space Required
Combination Arc-fault and Ground Fault Circuit Interrupter (Pigtail Neutral)	15 20	QO115DF QO120DF	QO115VHDF QO120VHDF
Plug-On Neutral Combination Arc-fault and Ground Fault Circuit Interrupter	15 20	QO115PDF QO120PDF	QO115VHPDF QO120VHPDF

QO-GFI

Qwik-Gard™ circuit breakers provide overload and short circuit protection, combined with Class A ground fault protection. Class A denotes a ground fault circuit interrupter that will trip when a fault current to ground is 6 mA or more, for people protection. Do not connect to more than 250 feet of load conductor for the total one-way run to prevent nuisance tripping.

Table 7.8: QO-GFI Circuit Breakers

Ampere Rating *[18]*	Qwik-Gard Circuit Breakers With Ground Fault Circuit Interrupter			
	1P 120 Vac		2P Common Trip 120/240 Vac	3P Common Trip 208Y/120 Vac
	10 k AIR 1 Space Required	22 k AIR 1 Space Required	10 k AIR 2 Spaces Required	10 k AIR 3 Spaces Required
15	QO115GFI	QO115VHGFI	QO215GFI	QO315GFI
20	QO120GFI	QO120VHGFI	QO220GFI	QO320GFI
25	QO125GFI	QO125VHGFI	QO225GFI	—
30	QO130GFI	QO130VHGFI	QO230GFI	QO330GFI
40	—	—	QO240GFI	QO340GFI
50	—	—	QO250GFI	QO350GFI
60	—	—	QO260GFI *[19]*	—

QO-EPD/EPE

QO-EPD/EPE circuit breakers provide overload and short circuit protection combined with Class B ground fault protection. They are designed to provide ground fault protection of equipment at a 30 mA level (EPD) or 100 mA level (EPE). They are not designed to protect people from electrical shock.

Table 7.9: QO-EPD Circuit Breakers

Ampere Rating *[20]*	1P 120 Vac 10 k AIR 1 Space Required	2P Common Trip 120/240 Vac 10 k AIR 2 Spaces Required	3P Common Trip 240 Vac 10 k AIR 3 Spaces Required	
15	QO115EPD	QO215EPD	QO315EPD *[21]*	QO315EPE *[21]*
20	QO120EPD	QO220EPD	QO320EPD *[21]*	QO320EPE *[21]*
25	QO125EPD	QO225EPD	—	—
30	QO130EPD	QO230EPD	QO330EPD *[21]*	QO330EPE *[21]*
40	—	QO240EPD	QO340EPD *[21]*	QO340EPE *[21]*
50	—	QO250EPD	QO350EPD *[21]*	QO350EPE *[21]*
60	—	QO260EPD *[22]*	—	—

[15] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[16] For 120/240 V only, not for 208Y/120 V.
[17] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[18] 10–30 A circuit breakers are suitable for use with 60ºC or 75ºC conductors. 35–60 A circuit breakers are suitable for use with 75ºC conductors.
[19] Suitable only for feeding 240 Vac and 208 Vac two-wire loads. Does not contain load neutral connection.
[20] 10–30 A circuit breakers are suitable for use with 60ºC or 75ºC conductors. 35–60 A circuit breakers are suitable for use with 75ºC conductors.
[21] See note in Instruction Bulletin when using in an enclosure with a QO403 or QON prefix.
[22] Suitable only for feeding 240 Vac and 208 Vac two-wire loads. Does not contain load neutral connection.

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Two-wire
QO-SWN

Three-wire
QO-SWN

QO-SWN

Switch Neutral Common Trip 2008 NEC® 514.11

Table 7.10: QO-SWN Circuit Breakers

Ampere Rating *[23]*	2 Wire 120 Vac 10 k AIR 2 Spaces Required	3 Wire 120/240 Vac 10 k AIR 3 Spaces Required
10	QO210SWN	QO310SWN
15	QO215SWN	QO315SWN
20	QO220SWN	QO320SWN
25	QO225SWN	QO325SWN
30	QO230SWN	QO330SWN
40	QO240SWN	QO340SWN
50	QO250SWN	QO350SWN

QO-HID

HID circuit breakers are for use on circuits feeding fluorescent and high intensity discharge (HID) lighting systems such as mercury vapor, metal halide, or high pressure sodium. These circuit breakers are physically interchangeable with QO circuit breakers.

Table 7.11: QO-HID Circuit Breakers

Ampere Rating *[23]*	1P 120/240 Vac 10 k AIR 1 Space Required	2P Common Trip 120/240 Vac 10 k AIR 2 Spaces Required	3P Common Trip 240 Vac 10 k AIR 3 Spaces Required
15	QO115HID *[24]*	QO215HID	QO315HID
20		QO220HID	QO320HID
25	QO125HID	QO225HID	QO325HID
30	QO130HID	QO230HID	QO330HID
40	QO140HID	QO240HID	—
50	QO150HID	QO250HID	—

QO-K

Key operated QO circuit breakers are available in single-pole construction and can be mounted in any single-pole space which will accept a standard QO. These circuit breakers can be turned ON or OFF or to RESET with a special key (catalog number QOK10) included with the circuit breaker. These circuit breakers are UL Listed and available as shown in the table.

QO-K Key Operated

Table 7.12: QO-K Circuit Breakers

120 Vac—10 k AIR (1 Space Required)			
Ampere Rating *[23]*	Cat. No.	Ampere Rating *[23]*	Cat. No.
10 15 20	QO110K QO115K QO120K	25 30	QO125K QO130K

QO-HM

High magnetic trip circuit breakers are recommended for applications where high initial inrush may occur and for individual dimmer applications.

Table 7.13: QO-HM Circuit Breakers

120 Vac—10 k AIR	
Ampere Rating *[23]*	1P
15 A	QO115HM *[25] [26]*
20 A	QO120HM *[25] [26]*

Non-Automatic (Standard) Miniature Switches

Miniature non-automatic switches have the same physical packaging as miniature circuit breakers, but open only when the handle is switched to the OFF position.

Non-automatic switches provide no overcurrent protection or short circuit protection. They must not be used on systems that have an available fault current greater than the values listed in the table. Non-automatic switches are UL Listed per UL 1087 and are CSA certified.

Table 7.14: QO Non-Automatic Miniature Switches, 240 Vac 10 kA

Ampere Rating	2P	3P
60	QO200	QO300
100	QO2000	QO3000

[23] 10–30 A circuit breakers are suitable for use with 60oC or 75oC conductors. 35–60 A circuit breakers are suitable for use with 75oC conductors.
[24] UL Listed as SWD (switching duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.
[25] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[26] UL Listed as SWD (switching duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.

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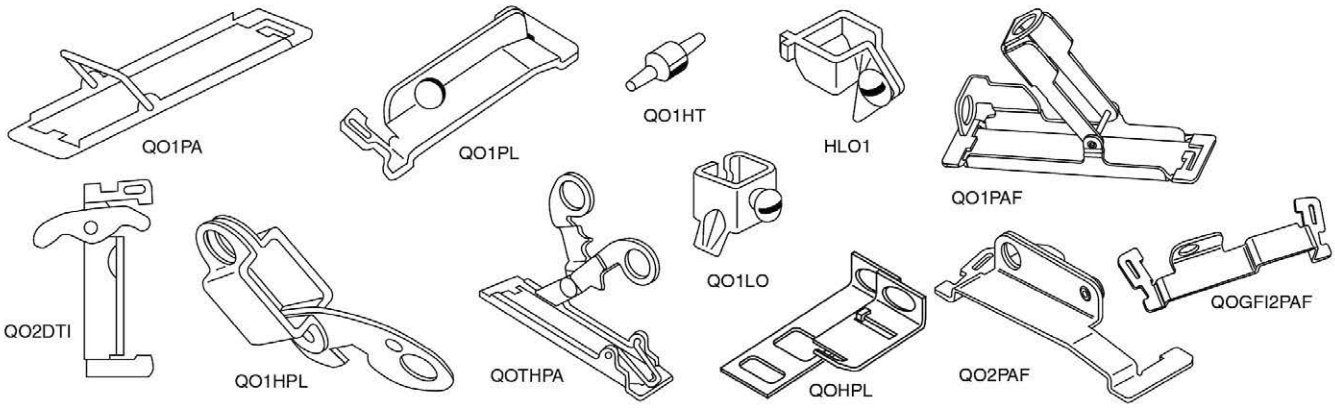
Accessories for QO/QOB Circuit Breakers

Table 7.15: Accessories for use with QO and QOB Miniature Circuit Breakers

Description		Cat. No.	Schedule
Handle Attachments			
Handle Tie	Converts any two adjacent 120/240 Vac 1P QO circuit breakers to independent trip 2P Converts any two adjacent 120/240 Vac1P side-by-side QOT circuit breakers to independent trip 2P	QO1HT QOTHT	DE2E DE2E
Handle Clamp	Clamp for holding QO 1P handle in ON or OFF position Clamp for holding QO or Q1 either 1P, 2P or 3P circuit breaker handles in ON or OFF position	QO1LO HLO1	DE2E DE2E
Handle Padlock Attachment for Padlocking in ON or OFF position	For padlocking 1P QO circuit breaker in ON or OFF position Loose attachment Fixed attachment	QOHPL QO1PA	DE2E DE2E
	For padlocking 1P side-by-side QOT circuit breaker in ON or OFF position	QOTHPA	DE2E
	For padlocking 2P QO-GFI circuit breakers in either ON or OFF position, fixed attachment.	GFI2PA	DE2A
	For 2P and 3P QO and Q1 standard circuit breakers which require padlocking in either ON or OFF position. Loose attachment Fixed attachment	QO1HPL QO1PL	DE2E DE2E
Handle Padlock Attachment for Padlocking in OFF position	For padlocking 1P QO circuit breaker in OFF position only, fixed attachment.	QO1PAF	DE2E
	For padlocking 2P and 3P QO circuit breakers in OFF position only, fixed attachment.	QO2PAF	DE2E
	For padlocking 1P QO-GFI, QO-CAFI, QO-DF and QO-EPD circuit breakers in OFF position only, fixed attachment.	QOGFI1PAF	DE2E
	For padlocking 2P QO-GFI, QO-CAFI and QO-EPD circuit breakers in OFF position only, fixed attachment.	QOGFI2PAF	DE2E
Ring Terminal	Ring terminals are available as a factory-installed option.	See page 7–10	DE2A
Sub-feed Lugs	60 A 2P plug-on – 2 spaces required (6–2 Al/Cu) 125 A 2P plug-on – 2 spaces required (12–2/0 Al/Cu) 225 A 2P plug-on – 4 spaces required (4–300 Al/Cu) 125 A 3P plug-on – 3 spaces required (12–2/0 Al/Cu)	QO60SL QO2125SL QO2225SL *[27]* QO3125SL	DE2A DE2A DE2A DE3
Mechanical Interlock Attachment	For interlocking the handles of two 2P or one 2P and one 1P QO and Q1 circuit breakers mounted side-by-side so that only one circuit breaker can be ON at a time (Not QOU)	QO2DTI	DE2E
With Retaining Kit	QO2DTI mechanical interlock attachment with retaining kits for securing two adjacent back-fed circuit breakers in dual power supply applications. Can be used with (2) 2Ps or (1) 2P and (1) 1P QO circuit breakers in QO816L100 load centers.	QO2DTIM	DE2E



Factory-Installed Accessories for use with QO and QOB Miniature Circuit Breakers

Factory-installed electrical accessories take up an additional pole space on QO, QO-GFI, QO-EPD, QO-SWN and QOU circuit breakers. All AC electrical accessories shown below are rated for 50/60 Hz. Accessories are not available for QOB-VH (2P 150 A and 3P 110–150 A) circuit breakers or QO, QOU molded case switches. QO circuit breakers will accept only one accessory per circuit breaker. Undervoltage trip is not available on miniature circuit breakers. Factory-installed accessories are not available for QO-AFI or QO-CAFI Arc Fault Circuit Breakers or on QO2150, QO2175, or QO2200 circuit breakers.

Table 7.16: Factory-Installed Accessories

Accessory	Description	Rated Voltage	Coil Burden	Cat. No. Suffix	Acces-sory	Description	Contact Comb.	Max. Voltage	Max.	Cat. No. Suffix
Shunt Trip	Trips the circuit breaker from a remote location by means of a trip coil energized from a separate circuit. A 120 Vac shunt trip will operate at 55% or more of rated voltage. All other shunt trips will operate at 75% or more of rated voltage. **Application** • For use with momentary or maintained push button. • Not available on QO-GFI, QO-EPD. • Shunt trip terminals accept (2) 0.14– 0.12 AWG Cu.	12 Vac/Vdc 24 Vac/Vdc	60 VA 168 VA	-1042	Auxiliary Switches	Monitors circuit breaker contact status and provides a remote signal indicating the circuit breaker contacts are OPEN or CLOSED. **Application** • Auxiliary switch terminals accept (2) 14–12 AWG Cu leads. • Leads (EH): Yellow for "A", Blue for "B", Striped common 18 AWG Cu.	1A 1B	120 Vac 120 Vac	5 A 5 A	-1200 -1201
		120 Vac 208 Vac 240 Vax	72 VA 228 VA 288 VA	-1021	Alarm Switches	Used with control circuits and is actuated only when the circuit breaker has tripped. Standard construction includes a normally-open contact. **Application** • Leads: Alarm switch terminals accept (2) 14–12 AWG Cu leads.	1A	120 Vac	5 A	-2100

[27] Not suitable for use in 3Ø panels. Use only in 1Ø panel rated 150 A or greater.

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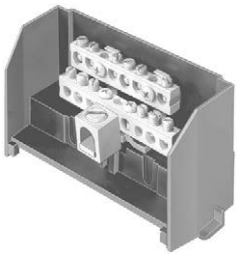

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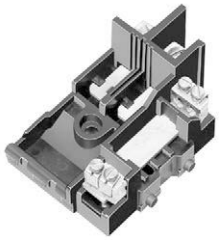

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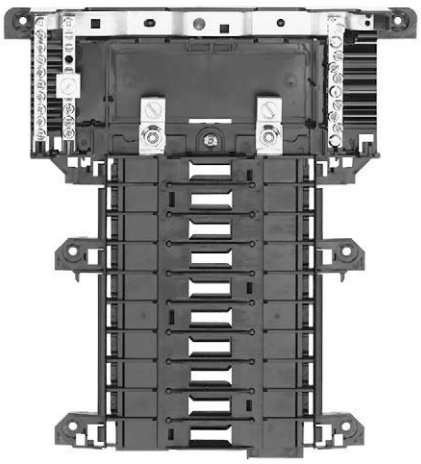

QON120L1251

QO Mounting Bases

Table 7.17: QO OEM Mounting Bases—UL Recognized Components

Voltage System	Main Lug Rating	1P Spaces	Max. No. 1P	Mounting Bases Cat. No.	Main Wire Size AWG/kcmil
QO Plug-On Mounting Bases—For unit mounting QO, QO-GFI, QO-AFI and QO-EPD circuit breakers					
1Ø2W 240 Vac Max. 10 k AIC (Without Neutral Assembly)	70 A	2	2	QON2L70	14–4 Cu, 12–3 Al
	125 A	4	4	SK9948BW	12–1/0 Cu/Al
	125 A	4	4	SK9842	12–1/0 Cu/Al
	125 A	6	6	SK9795	12–1/0 Cu/Al
	125 A	6	6	SK9801	12–1/0 Cu/Al
	150 A	6	6	SK9796BW	8–3/0 Cu/Al
	150 A	8	8	SK9797	8–3/0 Cu/Al
1Ø3W 240 Vac Max. 10 k AIC	40 A	2	2	QON2L40	14–6 Cu, 12–6 Al
	70 A	2	4	QON24L70	14–4 Cu, 12–3 Al
	100 A	6	12	QON612L100	8–1/0 Cu/Al
	100 A	8	16	QON816L100	8–1/0 Cu/Al
	100 A	12	12	QON12L100	12–2/0 Cu/Al
	100 A	12	12	QON12L100SF *[28]*	6–2/0 Cu/Al
	125 A	12	12	QON112L125I	4–2/0 Cu/Al
	125 A	12	24	QON11224L125I	4–2/0 Cu/Al
	125 A	16	16	QON116L125I	4–2/0 Cu/Al
	125 A	16	24	QON11624L125I	4–2/0 Cu/Al
	125 A	20	20	QON120L125I	4–2/0 Cu/Al
	125 A	24	24	QON124L125I	6–2/0 Cu/Al
	125 A	32	32	QON132L125I	4–2/0 Cu/Al
	125 A	20	24	QON12024L125I	4–2/0 Cu/Al
	150 A	24	24	QON124L150I	4–250 Cu/Al
	200 A	12	12	QON124L200I	4–250 Cu/Al
	200 A	12	12	QON12L200FTL *[28]*	4–250 Cu/Al
	200 A	24	24	QON124L200I	4–250 Cu/Al
	200 A	24	24	QON124L200DL *[28]*	(2) 4–300 Cu/Al
	200 A	30	30	QON130L200I	4–250 Cu/Al
	225 A	42	42	QON142L225I	4–300 Cu/Al
3Ø3W 240 Vac Max. 10 k AIC (Without Neutral Assy.)	125 A	12	12	QON312L125	4–2/0 Cu/Al
	125 A	20	20	QON320L125	4–2/0 Cu/Al
	125 A	24	24	QON324L125	4–2/0 Cu/Al
	200 A	18	18	QON318L200	4–300 Cu/Al
	200 A	24	24	QON324L200	4–300 Cu/Al
	200 A	30	30	QON330L200	4–300 Cu/Al
	225 A	42	42	QON342L225	4–300 Cu/Al
3Ø4W 240 Vac Max. 10 k AIC	60 A	3	3	QON403L60N	12–6 Cu/Al
	125 A	12	12	QON312L125I	4–2/0 Cu/Al
	125 A	20	20	QON320L125I *[29]*	4–2/0 Cu/Al
	125 A	24	24	QON324L125I	4–2/0 Cu/Al
	200 A	18	18	QON318L200I	4–300 Cu/Al
	200 A	24	24	QON324L200I	4–300 Cu/Al
	200 A	30	30	QON330L200I *[29]*	4–300 Cu/Al
	225 A	42	42	QON342L225I	4–300 Cu/Al
QO Plug-On Mounting Bases—For unit mounting QO, QO-GFI and QO-EPD circuit breakers					
1Ø2W 240 Vac Max. 10 k AIC (Without Neutral Assembly)	70 A 70 A 70 A	1 2 3	1 2 3	QOMB1 QOMB2 QOMB3	14–4 Cu 12–2 Al 14–4 Cu 12–2 Al 14–4 Cu 12–2 Al
QOB Bolt-On Mounting Bases—For unit mounting QOB, QOB-GFI, QOB-EPD circuit breakers					
3Ø3W 240 Vac Max.10 k AIC (Without Neutral Assembly)	100 A	3	3	QON3B	12–1 Cu/Al

Table 7.18: Solid Neutral Assemblies

Main Lug Rating	Number of Branch Neutral Terminals	Cat. No.	Main Neutral Lug Wire Size Cu/Al	Branch Neutral Terminal Wire Size	
				Cu	Al
125 A	12	SN12125	4–2/0 AWG	14–4 AWG	12–4 AWG
125 A	20	SN20	4–2/0 AWG	14–4 AWG	12–4 AWG
200 A	12	SN12200	4 AWG–300 kcmil	14–4 AWG	12–4 AWG
200 A	30	SN30	4 AWG–300 kcmil	14–4 AWG	12–4 AWG
225 A	42	SN42	4 AWG–300 kcmil	14–4 AWG	12–4 AWG

Table 7.19: Accessories for US Mounting Base for UL489 C60

Description	Cat. No.
Main lug kit for US mounting bases, 1 lug per kit, for 6 AWG to 300 kcmil cable	USMBLK
Terminal cover for US mounting base; provides IP20 ingress protection per IEC 60529; suitable for jumper bars or cable	USMBTC

[28] Device comes with factory-installed sub-feed lugs.
[29] Also IEC rated and CE marked for IEC 60439-1. Use only Square D brand Type QOXC, QOXD, QOHX and QOE circuit breakers for 415Y/240 Vac max. systems.

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US Mounting Base for UL489
(3 Conductor Shown)

Multi 9 Mounting Bases

Table 7.20: Multi-9 Mounting Bases for UL489 C60, 240 Vac max.

Description	Poles	Amperes	Length		Cat. No.
			in.	mm	
One-conductor Mounting Base	12	200 A	10.4	264	US11220018
	24		14.4	366	US12420018
	36		19	483	US13620018
	48		23	584	US14820018
	60		27.5	699	US16020018
Two-conductor Mounting Base	12	150 A	10.4	264	US21215018
	24	200 A	14.4	366	US22420018
	36		19	483	US23620018
	48		23	584	US24820018
	60		27.5	699	US26020018
Three-conductor Mounting Base	12	100 A	10.4	264	US31210018
	24	200 A	14.4	366	US32420018
	36		19	483	US33620018
	48		23	584	US34820018
	60		27.5	699	US36020018

Table 7.21: Accessories for US Mounting Base for UL489 C60

Description	Cat. No.
Main lug kit for US mounting bases, 1 lug per kit, for 6 AWG to 300 kcmil cable	USMBLK
Terminal cover for US mounting base; provides IP20 ingress protection per IEC 60529; suitable for jumper bars or cable	USMBTC

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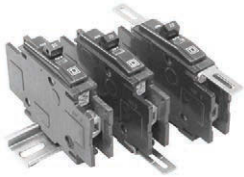

Low Ampere QOU

Low Ampere QOU Miniature Circuit Breakers

QOU unit mount miniature circuit breakers (cable-in/cable-out) are ideal for OEM applications. They have the Square D™ circuit breaker's unique Visi-Trip™ feature and can be DIN rail-mounted or surface- or flush-mounted using mounting feet. Mounting feet not provided *[30]*.

General Specifications Common to All Low Ampere QOU Circuit Breakers

- For convenient flush mount, surface mount or DIN mount (symmetrical rail 35 x 7.5 DIN/EN 50 022)
- Single handle with internal common trip
- Terminal lug wire size (1) 14–2 AWG Cu or Al
- Reversible line and load lugs
- Field-installable quick connectors
- UL Listed 48 Vdc (5 k AIR)
- UL Listed as HACR Type: 10–70 A
- High magnetic trip circuit breakers (QOU-HM) are recommended for applications where high initial inrush may occur and for individual dimmer applications.
- For DIN mounting rails, see IEC Starters and Relays, Section 18.

Table 7.22: QOU Low Ampere Miniature Circuit Breakers

Ampere Rating	Cat. No.			
	1P 120/240 Vac	2P 120/240 Vac	2P 240 Vac *[31]*	3P 240 Vac
10 k AIR				
10 A	QOU110	QOU210	—	QOU310
15 A	QOU115	QOU215	QOU215H	QOU315
20 A	QOU120	QOU220	QOU220H	QOU320
25 A	QOU125	QOU225	QOU225H	QOU325
30 A	QOU130	QOU230	QOU230H	QOU330
35 A	QOU135	QOU235	—	QOU335
40 A	QOU140	QOU240	—	QOU340
45 A	QOU145	QOU245	—	QOU345
50 A	QOU150	QOU250	—	QOU350
60 A	QOU160	QOU260	—	QOU360
70 A	QOU170	QOU270	—	QOU370
22 k AIR				
15 A	QOU115VH	QOU215VH	—	QOU315VH
20 A	QOU120VH	QOU220VH	—	QOU320VH
25 A	QOU125VH	QOU225VH	—	QOU325VH
30 A	QOU130VH	QOU230VH	—	QOU330VH
35 A	QOU135VH	QOU235VH	—	—
40 A	QOU140VH	QOU240VH	—	—
45 A	QOU145VH	QOU245VH	—	—
50 A	QOU150VH	QOU250VH	—	—
60 A	QOU160VH	QOU260VH	—	—

Table 7.23: QOU-HM Miniature Circuit Breakers (10 k AIR)

Ampere Rating	Cat. No.			
	1P 120/240 Vac	2P 120/240 Vac	2P 240 Vac	3P 240 Vac
15 A	QOU115HM	—	—	—
20 A	QOU120HM	—	—	—

Table 7.24: QYU UL1077 Recognized Supplementary Protectors (5 k AIR)

Ampere Rating	Cat. No.			
	1P 277 Vac	2P 120/240 Vac	2P 240 Vac	3P 240 Vac
10 A	QYU110	—	—	—
15 A	QYU115	—	—	—
20 A	QYU120	—	—	—
25 A	QYU125	—	—	—
30 A	QYU130	—	—	—

[30] See QOU Accessories, page 7-20.
[31] QOU-H interrupting rating is 10 kA at 240 Vac.

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High Ampere QOU

High Ampere QOU Circuit Breakers

General Specifications Common to All High Ampere QOU Circuit Breakers

- Flush mount, surface mount, and DIN rail mount.
- Internal common trip.
- Non-reversible line and load lugs.
- Terminal lug wire size (1) 12– 2/0 AWG Cu or Al.
- UL Listed 60 Vdc per pole (5 k AIR). (**Note:** except switches)
- UL Listed as HACR type, 80–125 A.
- Non-automatic switches have the same physical packaging as miniature circuit breakers, but provide no overcurrent or short circuit protection. They are UL Listed per UL1087 and are CSA certified.

Table 7.25: QOU High Ampere Miniature Circuit Breakers (10 k AIR)

Ampere Rating	Cat. No.			
	1P 120/240 Vac	2P 120/240 Vac	2P 240 Vac	3P 240 Vac
80 A	QOU180	QOU280	—	QOU380
90 A	QOU190	QOU290	—	QOU390
100 A	QOU1100	QOU2100	—	QOU3100
125 A	—	QOU2125	—	—

Table 7.26: QOU Non-Automatic Switches

Ampere Rating	Cat. No.			
	1P 120 Vac	2P 120/240 Vac	2P 240 Vac	3P 240 Vac
60 A	—	—	QOU200	QOU300
100 A	—	—	QOU2000	QOU3000
125 A	—	—	QOU20001	QOU30001

Interrupting ratings see page 7-3
Accessories see page 7-20
Dimensions see page 7-73

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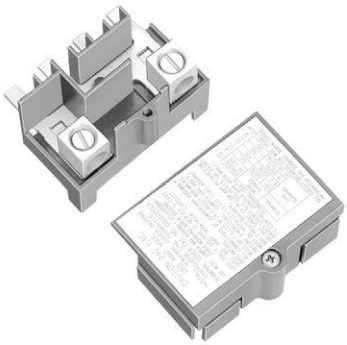

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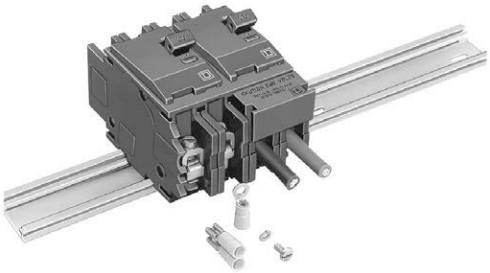
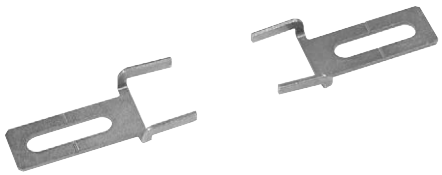


2P DIN-Mounted QOU Circuit Breaker



Mounting Foot
QOUMF1

QOU Accessories

Table 7.27: Accessories for QOU Low Ampere Circuit Breakers (Except as Noted)

Description	Order Qty.	Cat. No.
Factory-installed ring tongue terminal, 10–32 screw, for 1P, 2P, 3P QOU, 10–60 A	—	Suffix -5283
Hex drive 5/32 in. wire binding screw for QOU	—	Suffix -5280
For padlocking 1P low ampere QOU circuit breaker in OFF or ON position	—	QOU1PA
For padlocking 2P and 3P low ampere QOU circuit breaker in OFF or ON position	—	QOU1PL
For padlocking 1P low ampere QOU circuit breaker in OFF position only	—	QOU1PAFLA
For padlocking 2P and 3P low ampere QOU circuit breaker in OFF position only	—	QOU2PAFLA
For padlocking 2P and 3P high ampere QOU circuit breaker in OFF position only	—	Suffix -7100
Handle lock-out, ON or OFF position	—	HLO1
4P 100 A Jumper bar assy. w/front wiring with base, cover and screw	1	QOU14100JBAF
4P 100 A Jumper bar assy. w/right side wiring with base, cover and screw	1	QOU14100JBAR
4P 100 A Jumper bar assy. w/left side wiring with base, cover and screw	1	QOU14100JBAL
1Ø, 4P, 100 A Jumper bar base with front wiring	40	QOU14100BAFB
1Ø, 4P, 100 A Jumper bar base with left side wiring	40	QOU14100BALB
1Ø, 4P, 100 A Jumper bar base with right side wiring	40	QOU14100BARB
4P Jumper bar cover	40	QOU14100CAB
Mounting screw for jumper bar cover	40	QOU1CMSB
6P 150 A Jumper bar assy. w/front wiring with base, cover and screw	1	QOU16150JBAF
1Ø, 6P, 150 A Jumper bar base with front wiring	40	QOU16150BAFB
1Ø, 6P, 150 A Jumper bar base with left side wiring	40	QOU16150BALB
1Ø, 6P, 150 A Jumper bar base with right side wiring	40	QOU16150BARB
6P jumper bar cover	40	QOU16150CAB
Vertical rainproof cover 2P and 3P QO, QOU, FA and KA	1 10	BCV *[32]* BCVB *[32]*
Horizontal rainproof cover 2P QO, QOU, and 3P Q2, EH	1 10	BCH *[32]* BCHB *[32]*
1P Fingersafe™ cover for high ampere QOU circuit breaker	1 40	QOUHFSC1 QOUHFSC1B
1P Fingersafe cover for low ampere QOU circuit breaker	1 40	QOULFSC1 QOULFSC1B
Cover plate for one 2P QOU circuit breaker	1 40	QOUCP2 QOUCP2B
Cover plate for one 3P QOU circuit breaker	1 40	QOUCP3 QOUCP3B
Cover plate for two 2P QOU circuit breakers	1 40	QOUCP4 QOUCP4B
Cover plate for three 2P QOU circuit breakers	1 40	QOUCP6 QOUCP6B
Field-installable ring tongue terminal adaptor	1 80	QOURT QOURTB
Quick connector end connection wiring	1 40	QOUEC QOUECB
Quick connector forward or reverse wiring	1 40	QOUFR QOUFRB
1P QOU mounting foot	1 80	QOUMF1 *[32]* QOUMF1B *[32]*
2P QOU mounting foot	1 40	QOUMF2 *[32]* QOUMF2B *[32]*
3P QOU mounting foot	1 24	QOUMF3 *[32]* QOUMF3B *[32]*
Tapped mounting foot for QOU, 1P and 2P 10–70 A, 3P 10–60 A		
Packaged with circuit breaker		Suffix -3100
Individually packaged	1	QOUMFS1
Bulk packed	80	QOUMFS1B
Mechanical interlock attachment: Used to interlock two circuit breakers mounted side-by-side so that only one circuit breaker can be ON at a time. A 1P or 2P circuit breaker can be mounted on the left and interlocked with a 2P or 3P circuit breaker on the right.	1	QOU2DTILA *[33]*

QOUQ Low Ampere Circuit Breakers

QOUQ low ampere circuit breakers with four-point quick-connect terminals are provided with permanent factory-installed terminals which are affixed to the Load or OFF end of the circuit breaker. This special terminal will accommodate up to four 1/4-inch insulated female quick connect wire terminations. Total ampacity of these connections must not exceed the rating of the circuit breaker.

Table 7.28: QOUQ Four-Point Quick-Connect Terminals

	Poles	Order Qty.	Cat. No.
Four-Point Quick-Connect Terminals	1	1	Change QOU to QOUQ
	2	1	
	3	1	

The QOU uses the same electrical accessories as the QO. See the QO information for available electrical accessories.

[32] For use on low and high ampere QOU.
[33] 10–70 A 1P and 2P, 10–60 A 3P.

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HOM 1P
1 Space Required

HOM 2P
2 Spaces Required

HOM2200BB
Branch Circuit Breaker
4 Spaces Required

Homeline Plug-On Circuit Breakers

The Square D Homeline circuit breakers are in a 1 in. wide format for 1-pole circuit breakers. They are designed to plug into Homeline load centers.

Table 7.29: HOM

Ampere Rating	AIR	1P—120/240 Vac Cat. No.	2P—120/240 Vac Common Trip Cat. No.
15 A	10 kA	HOM115 *[1][2]*	HOM215 *[2]*
20 A	10 kA	HOM120 *[1][2]*	HOM220 *[2]*
25 A	10 kA	HOM125 *[2]*	HOM225 *[2]*
30 A	10 kA	HOM130 *[2]*	HOM230 *[2]*
35 A	10 kA	—	HOM235 *[2]*
40 A	10 kA	HOM140 *[2]*	HOM240 *[2]*
45 A	10 kA	—	HOM245 *[2]*
50 A	10 kA	HOM150 *[2]*	HOM250 *[2]*
60 A	10 kA	—	HOM260 *[2]*
70 A	10 kA	—	HOM270 *[2]*
80 A	10 kA	—	HOM280 *[2]*
90 A	10 kA	—	HOM290 *[2]*
100 A	10 kA	—	HOM2100 *[2]*
110 A	10 kA	—	HOM2110 *[2]*
125 A	10 kA	—	HOM2125 *[2]*
150 A	10 kA	—	HOM2150BB *[2][3]*
175 A	10 kA	—	HOM2175BB *[2][3]*
200 A	10 kA	—	HOM2200BB *[2][3]*

Homeline High Magnetic (HM) Circuit Breakers

High magnetic trip circuit breakers are recommended for applications where high initial inrush current may occur.

Table 7.30: HOM-HM

Amperes	1P—120/240 Vac	2Ps
15 A	HOM115HM *[4]*	—
20 A	HOM120HM *[4]*	—

Homeline Combination Arc Fault Circuit Interruptors (HOM-CAFI)

Homeline Combination Arc Fault Circuit Interrupters—Provide overload and short circuit protection, plus arc fault protection in accordance with the NEC and UL1699.

HOM 1P CAFI
Plug-on Neutral

HOM 1P CAFI
Pigtail

Table 7.31: HOM-CAFI

Circuit Breaker Type	Ampere Rating	Poles 120 Vac	Cat. No.
One-Pole			
Combination Arc-Fault Circuit Interrupter with Pigtail Neutral	15 A	1	HOM115CAFI *[4]*
	20 A	1	HOM120CAFI *[4]*
Plug-On Neutral Combination Arc-Fault Interrupter	15 A	1	HOM115PCAFI *[4]*
	20 A	1	HOM120PCAFI *[4]*
Two-Pole			
Combination Arc-Fault Circuit Interrupter with Pigtail Neutral	15 A	2	HOM215CAFI *[4] [5]*
	20 A	2	HOM220CAFI *[4] [5]*

Homeline Dual Function Circuit Breaker (HOM-DF)

Homeline Combination Arc Fault and Ground Fault Circuit Interrupters (Dual Function)—Provide overload and short circuit protection, plus arc fault and ground fault protection in a single device in accordance with the NEC, UL1699 and UL943.

HOM 1P DF
Plug-on Neutral

HOM 1P DF
Pigtail

Table 7.32: HOM-DF

Circuit Breaker Type	Ampere Rating	Poles 120 Vac	Cat. No.
Combination Arc-Fault and Ground Fault Circuit Interrupter with Pigtail Neutral	15 A	1	HOM115DF *[4]*
	20 A	1	HOM120DF *[4]*
Plug-On Neutral Combination Arc-Fault and Ground Fault Circuit Interrupter	15 A	1	HOM115PDF *[4]*
	20 A	1	HOM120PDF *[4]*

[1] UL Listed as SWD (switching duty) rated. Suitable for switching 120 Vac fluorescent lighting loads.
[2] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[3] Requires four spaces (1 AWG–300 kcmil Al/Cu). Use only in 1Ø panel rated 150 A or greater.
[4] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[5] For 120/240 V only, not for 208Y/120 V.

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HOM 1P GFI
(With Ground Fault Circuit Interrupter)
1 Space Required

HOM 2P GFI
(With Ground Fault Circuit Interrupter)
2 Spaces Required

Homeline GFI (HOM-GFI)

HOM-GFI circuit breakers provide overload and short circuit protection, combined with Class A ground fault protection. Class A denotes a ground fault circuit interrupter that will trip when a fault current to ground is 6 milliamperes or more.

Table 7.33: HOM-GFI

Ampere Rating	AIR	1P—120 Vac 1 Space Required	2P—120/240 Vac Common Trip 2 Spaces Required
15 A	10 kA	HOM115GFI	HOM215GFI
20 A	10 kA	HOM120GFI	HOM220GFI
30 A	10 kA	—	HOM230GFI
40 A	10 kA	—	HOM240GFI
50 A	10 kA	—	HOM250GFI

Homeline Equipment Protection Device (HOM-EPD)

Homeline Equipment Protection Device—Circuit Breakers with 30 mA Equipment Ground Fault Protection (UL Listed).

Table 7.34: HOM-EPD—10 k AIR

Amperes	1P—120 Vac	2P—120/240 Vac Common Trip
15 A	HOM115EPD	HOM215EPD
20 A	HOM120EPD	HOM220EPD
25 A	—	HOM225EPD
30 A	—	HOM230EPD
40 A	—	HOM240EPD
50 A	—	HOM250EPD

HOMT Tandem and HOMT Quad Tandem Circuit Breakers

Table 7.35: HOMT Tandem Circuit Breakers

Ampere Rating *[6]*	AIR	1P Tandem—120/240 Vac (One Space Required)
15 and 15 A	10 kA	HOMT1515 *[7]*
15 and 20 A	10 kA	HOMT1520 *[7]*
20 and 20 A	10 kA	HOMT2020 *[7]*
30 and 15 A	10 kA	HOMT3015 *[7]*
30 and 20 A	10 kA	HOMT3020 *[7]*

HOMT Quad
Circuit Breaker
2 Spaces Required

Table 7.36: HOMT Quad Tandem Circuit Breakers

Ampere Rating *[6]*		AIR	2P Tandem—120/240 Vac (Two Spaces Required)
1P	2P		
(2) 15 A	15 A	10 kA	HOMT1515215 *[7]*
(2) 15 A	20 A	10 kA	HOMT1515220 *[7]*
(2) 15 A	25 A	10 kA	HOMT1515225 *[7]*
(2) 15 A	30 A	10 kA	HOMT1515230 *[7]*
(2) 15 A	40 A	10 kA	HOMT1515240 *[7]*
(2) 15 A	50 A	10 kA	HOMT1515250 *[7]*
(2) 20 A	20 A	10 kA	HOMT2020220 *[7]*
(2) 20 A	25 A	10 kA	HOMT2020225 *[7]*
(2) 20 A	30 A	10 kA	HOMT2020230 *[7]*
(2) 20 A	40 A	10 kA	HOMT2020240 *[7]*
(2) 20 A	50 A	10 kA	HOMT2020250 *[7]*

NOTE: Typical catalog number (e.g. HOMT 1515230) represents two 1P, outer poles (two 15 A 1P CBs) and one 2P inner circuit breaker with common trip (one 30 A 2P CB).

Homeline Circuit Breaker Wire Sizes

Table 7.37: Circuit Breaker Wire Sizes

Breaker Type	Ampere Rating	Wire Size (AWG/kcmil) *[8]*	
		Aluminum	Copper
HOM 1P	15–30 A	14–8 AWG	14–8 AWG or (2) 14–10 AWG
	40–50 A	8–2 AWG	8–2 AWG
HOM 2P	15–30 A	14–8 AWG	14–8 AWG or (2) 14–10 AWG
	35–70 A	8–2 AWG	8–2 AWG
	80–125 A	4–2/0 AWG	4–2/0 AWG
	150–200 A	4 AWG–300 kcmil	4 AWG–300 kcmil
HOMT and Quad	15–30 A	14–8 AWG	14–8 AWG
Quad Only	40–50 A	6–12 AWG	6–14 AWG
HOM-GFI - 1P	15–20 A	14–10 AWG	14–10 AWG
HOM-GFI - 2P	15–50 A	12–4 AWG	14–6 AWG

[6] 15–20 A tandem or quad tandem circuit breakers are suitable for use with 60°C or 75°C conductors. 25–50 A tandem or quad tandem circuit breakers are suitable for use with 75°C conductors only.
[7] UL Listed as HACR type for use with air conditioning, heating and refrigeration equipment haing motor group combinations and marked for use with HACR type circuit breakers.
[8] 15–30 A circuit breakers are suitable for use with 60°C or 75°C conductors. 40–125 A circuit breakers are suitable for use with 75°C conductors.

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Accessories for Homeline Circuit Breakers

Table 7.38: Accessories

Description		Cat. No.
Handle Attachments		
Handle Tie: Converts any two adjacent 120/240 Vac single HOM circuit breakers to independent trip 2P		HOM1HT
Handle Tie: Converts any two adjacent 120/240 Vac 1P side-by-side HOMT circuit breakers to independent trip 2P		HOMTHT
Handle Clamp: Clamp for holding HOM 1P handle in the ON or OFF position		QO1LO
Handle Blocking Device: Attaches to standard HOM 2P circuit breakers for holding the handle in the OFF position		HOM2HBD
Handle Padlock Attachment: For padlocking 1P Standard HOM breakers in the ON or OFF position		HOM1PA
Handle Padlock Attachment: For padlocking 2P Standard HOM circuit breakers in ON or OFF position	15–70 A	HOM2PALA
	80–125 A	HOM2PAHA
	150–200 A	HOM2PAVHA
Handle Padlock Attachment: For padlocking 1P CAFI, DF, GFI, and EPD HOM breakers in ON or OFF position		HOMELEC1PA
Handle Padlock Attachment: For padlocking 2P CAFI, GFI, and EPD HOM breakers in ON or OFF position		HOMELEC2PALA
Handle Padlock Attachment: For padlocking center poles of Homeline Quad breakers in the OFF position		HOMQPA
Handle Padlock Attachment: For padlocking main circuit breakers in convertible load center in OFF position	50–125 A	QOM1PA *[9]*
	100–225 A	QOM2PA *[9]*
Sub-Feed Lugs		
125 A 2P plug-on—2 spaces required		HOML2125
225 A 2P plug-on—4 spaces required		HOML2225 *[10]*

[9] 50–125 A QOM1 frame size; 100–225 A QOM2 frame size.
[10] Requires four spaces (1 AWG–300 kcmil Al/Cu). Use only in 1Ø panel rated 150 A or greater.

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1P C60

2P C60

3P C60

Box Lug C60

Ring Tongue C60

Box/Ring C60

Multi 9 C60 UL 489 Listed 240 V Miniature Circuit Breakers

- UL 489 Listed and CSA 22.2 No. 5.1 for branch circuit protection
- Eliminates concerns and uncertainty of using a UL 1077 device where a UL 489 device is required
- Replaces fuses in low-ampere range; 17 ratings up to 35 A

Trip Curve	Use	Magnetic Release
C	For typical loads	7–10 x ampere rating (7–14 for DC)
D	For high inrush	10–14 x ampere rating

- 10 kAIR (1P @ 120 Vac; 2P and 3P @ 240 Vac)
- 60 Vdc for 1P and 125 Vdc for 2P (on C-curve circuit breakers only, see table below)
- Increased installation flexibility with standard box lugs or optional ring terminals
- Allows easy front-mounting and rear wiring when using ring terminals
- A wide range of electrical and mechanical accessories
- Suitable for reverse feeding
- Trip-free mechanism
- Positive indication of contact disconnect

Table 7.39: UL 489 Circuit Breakers (120/240 V)

Rating (A)	Cat. No.					
	C Curve 7–10 Times Ampere Rating (7–14 DC)			D Curve 10–14 Times Ampere Rating		
	1P*[1]*	2P*[2]*	3P	1P	2P	3P
Box Lug/Box Lug						
0.5	60100	60134	—	60117	60151	—
1	60101	60135	60168	60118	60152	60184
1.5	60102	60136	60169	60119	60153	60185
2	60103	60137	60170	60120	60154	60186
3	60104	60138	60171	60121	60155	60187
4	60105	60139	60172	60122	60156	60188
5	60106	60140	60173	60123	60157	60189
6	60107	60141	60174	60124	60158	60190
7	60108	60142	60175	60125	60159	60191
8	60109	60143	60176	60126	60160	60192
10	60110	60144	60177	60127	60161	60193
13	60111	60145	60178	60128	60162	60194
15	60112	60146	60179	60129	60163	60195
20	60113	60147	60180	60130	60164	60196
25	60114	60148	60181	60131	60165	60197
30	60115	60149	60182	60132	60166	60198
35	60116	60150	60183	60133	60167	60199
Ring Tongue/Ring Tongue						
0.5	60200	60234	—	60217	60251	—
1	60201	60235	60268	60218	60252	60284
1.5	60202	60236	60269	60219	60253	60285
2	60203	60237	60270	60220	60254	60286
3	60204	60238	60271	60221	60255	60287
4	60205	60239	60272	60222	60256	60288
5	60206	60240	60273	60223	60257	60289
6	60207	60241	60274	60224	60258	60290
7	60208	60242	60275	60225	60259	60291
8	60209	60243	60276	60226	60260	60292
10	60210	60244	60277	60227	60261	60293
13	60211	60245	60278	60228	60262	60294
15	60212	60246	60279	60229	60263	60295
20	60213	60247	60280	60230	60264	60296
25	60214	60248	60281	60231	60265	60297
30	60215	60249	60282	60232	60266	60298
35	60216	60250	60283	60233	60267	60299

Interrupting ratings see page 7-5
Accessories see page 7-28
Dimensions see page 7-73
Mounting Bases see page 7-16
DIN Mounting Rail see Section 18

[1] 1P dual rated 120 Vac/60 Vdc.
[2] 2P dual rated 240 Vac/125 Vdc.

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1P
UL489 C60

2P
UL489 C60

3P
UL489 C60

Multi 9 C60 UL 489 Listed 480V Miniature Circuit Breakers

- UL 489 Listed, CSA C22.2 No. 5.1; Also IEC 60947-2; CE marked
- 480Y/277 Vac @ 10 kA (2P and 3P), 277 Vac @ 10 kA (1P)
- 0.5 A through 20 A
- 1P, 2P, 3P, 18 mm wide per pole

Trip Curve	Use	Magnetic Release
C	For typical loads	7–10 x ampere rating (7–14 for DC)
D	For high inrush	10–14 x ampere rating

- UL 486B Listed single-barrel lug: (2) 18–10 AWG (1-25 mm²) cables, Cu only
- Optional ring tongue terminals
- A wide range of electrical and mechanical accessories
- Suitable for reverse feeding
- Trip-free mechanism
- Positive indication of contact disconnect

Table 7.40: UL 489 Circuit Breakers (480Y/277 Vac)

Rating (A)	Cat. No.					
	C Curve 7–10 Times Ampere Rating (7–14 DC)			D Curve 10–14 Times Ampere Rating		
	1P	2P	3P	1P	2P	3P
Single-Barrel Wire Lug						
0.5	MGN61300	—	—	MGN61333	—	—
1	MGN61301	MGN61312	MGN61323	MGN61334	MGN61345	MGN61356
2	MGN61302	MGN61313	MGN61324	MGN61335	MGN61346	MGN61357
3	MGN61303	MGN61314	MGN61325	MGN61336	MGN61347	MGN61358
4	MGN61304	MGN61315	MGN61326	MGN61337	MGN61348	MGN61359
5	MGN61305	MGN61316	MGN61327	MGN61338	MGN61349	MGN61360
6	MGN61306	MGN61317	MGN61328	MGN61339	MGN61350	MGN61361
8	MGN61307	MGN61318	MGN61329	MGN61340	MGN61351	MGN61362
10	MGN61308	MGN61319	MGN61330	MGN61341	MGN61352	MGN61363
15	MGN61309	MGN61320	MGN61331	MGN61342	MGN61353	MGN61364
20	MGN61310	MGN61321	MGN61332	MGN61343	MGN61354	MGN61365
Ring Tongue Terminal						
0.5	MGN61366	—	—	MGN61399	—	—
1	MGN61367	MGN61378	MGN61389	MGN61400	MGN61411	MGN61422
2	MGN61368	MGN61379	MGN61390	MGN61401	MGN61412	MGN61423
3	MGN61369	MGN61380	MGN61391	MGN61402	MGN61413	MGN61424
4	MGN61370	MGN61381	MGN61392	MGN61403	MGN61414	MGN61425
5	MGN61371	MGN61382	MGN61393	MGN61404	MGN61415	MGN61426
6	MGN61372	MGN61383	MGN61394	MGN61405	MGN61416	MGN61427
8	MGN61373	MGN61384	MGN61395	MGN61406	MGN61417	MGN61428
10	MGN61374	MGN61385	MGN61396	MGN61407	MGN61418	MGN61429
15	MGN61375	MGN61386	MGN61397	MGN61408	MGN61419	MGN61430
20	MGN61376	MGN61387	MGN61398	MGN61409	MGN61420	MGN61431

Multi 9 C60 UL 489A Listed Miniature Circuit Breakers for DC Telecommunication Applications

A limited range of C60 products are UL Listed as UL 489A circuit breakers for protection of DC telecommunications circuits.

Table 7.41: UL 489A Circuit Breakers for DC Telecommunications Applications (1P, 2 Modules, C curve)

Rating (A)	Cat. No.	Rating (A)	Cat. No.
0.5	60406	10	60414
1	60407	13	60415
2	60408	15	60416
3	60409	20	60417
4	60410	30	60418
5	60411	40	60419
6	60412	50	60420
8	60413	60	60421

Interrupting ratings see page 7-5
Accessories see page 7-28
Dimensions see page 7-73

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Multi 9 C60H-DC UL 1077 Recognized Supplementary Protectors (250 and 500 Vdc)

The C60H-DC supplementary protectors are used in direct current circuits (industrial control and automation, transport, renewable energy, etc.). They provide overcurrent protection within appliances or electrical equipment.

1P C60H-DC

2P C60H-DC

- Range from 0.5 through 40 A
- 5 kAIR at 250 Vdc (1-pole) and 5 kAIR at 500 Vdc (2-pole, wired in series)
- Trip-free mechanism
- Positive indication of contact disconnect
- C-Curve: 7 to14 times ampere rating
- UL 1077, IEC 60947-2, EN 60947-2, GB 14048.2, CCC and CE mark.

Table 7.42: Multi 9 C60H-DC UL 1077 Recognized Supplementary Protectors

Current (A)*[3]*	Cat. No.	
	1-Pole 24–250 Vdc	2-Pole 24–500 Vdc
0.5	MGN61500	MGN61520
1	MGN61501	MGN61521
2	MGN61502	MGN61522
3	MGN61503	MGN61523
4	MGN61504	MGN61524
5	MGN61505	MGN61525
6	MGN61506	MGN61526
10	MGN61508	MGN61528
13	MGN61509	MGN61529
15	MGN61510	MGN61530
16	MGN61511	MGN61531
20	MGN61512	MGN61532
25	MGN61513	MGN61533
30	MGN61514	MGN61534
32	MGN61515	MGN61535
40	MGN61517	MGN61537

Multi 9 UL1053 Listed GFP Ground Fault Protectors

2P GFP

4P GFP (3– or 4–wire)

- Provides ground fault protection for electrical circuits.
- Available in 2P (2-wire) and 4P (3- or 4-wire) versions
- Provides no thermal or magnetic protection. The circuit must be protected by an upstream device.
- Contains Si Technology to increase immunity to noise and to minimize the potential for nuisance tripping in noisy electrical environments.
- Tripped condition due to a ground fault is displayed on the front face by a red mechanical indicator.
- DIN rail mounting for easy installation..

Table 7.43: Multi 9 UL 1053 Listed GFP Ground Fault Protectors

Current (A)	Maximum Sensitivity (mA)	Tripping Range	Family	Cat. No.		
				2P		4P
				UL1053 120/240 Vac, 240 Vac, 60 Hz IEC 61008 230 Vac, 240 Vac, 50 Hz	UL1053 277 Vac, 480Y/277 Vac, 60 Hz IEC 61008	UL1053 240 Vac, 480Y/277 Vac, 60 Hz IEC 61008 230/400 Vac, 240/415 Vac, 50 Hz
25	30	22.1 to 29.9 mA	GFP 30	60949	60969	60989
	100	73.1 to 98.9 mA	GFP 100	60950	60970	60990
	300	221 to 299 mA	GFP 300	60951	60971	60991
40	30	22.1 to 29.9 mA	GFP 30	60952	60972	60992
	100	73.1 to 98.9 mA	GFP 100	60953	60973	60993
	300	221 to 299 mA	GFP 300	60954	60974	60994
63	30	22.1 to 29.9 mA	GFP 30	60955	60975	60995
	100	73.1 to 98.9 mA	GFP 100	60956	60976	60996
	300	221 to 299 mA	GFP 300	60957	60977	60997
80	300	221 to 299 mA	GFP 300	60958	60978	60998
100	300	221 to 299 mA	GFP 300	60959	60979	60999

Interrupting Ratings see page 7-5
Accessories see page 7-28
Dimensions see page 7-73

[3] At 25°C/77°F, for other temperatures see temperature derating table in Multi 9 Catalog 0860CT0201R1/08

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Intended for use within equipment where branch circuit protection is already provided or not needed

- Range from 0.5 to 63 A
- 10 k AIR @ 120/240 Vac; 5 k AIR at 480Y/277; 10 k AIR @ 60 Vdc (1P) and 125 Vdc (2P)
- Suitable for reverse feeding
- DIN mounting for easy installation
- Suitable for reverse feeding
- A wide range of electrical and mechanical accessories
- Trip-free mechanism
- Positive indication of contact disconnect

Interrupting ratings see page 7-5
Accessories see page 7-28
Dimensions see page 7-73

1P
UL 1077 C60

2P
UL 1077 C60

2P
UL 1077 C60

4P
UL 1077 C60

UL 1077 Multi 9 C60 Miniature Circuit Breakers

Trip Curve	Use	Magnetic Release
B	For sensitive equipment	3.2–4.8 x ampere rating
C	For typical loads	7–10 x ampere rating (7–14 for DC)
D	For high inrush	10–14 x ampere rating

Table 7.44: UL 1077 Supplementary Protectors

Rating (A)	1P	2P	3P	4P
B Curve—Magnetic Setting Between 3.2 and 4.8 Times Ampere Rating				
1	MG24110	MG24125	MG24140	MG24155
1.2	MG17402	MG17432	—	—
1.5	MG17403	MG17433	—	—
2	MG24111	MG24126	MG24141	MG24156
3	MG24112	MG24127	MG24142	MG24157
4	MG24113	MG24128	MG24143	MG24158
5	MG17404	MG17434	—	—
6	MG24114	MG24129	MG24144	MG24159
7	MG17405	MG17435	—	—
8	MG24115	MG24130	MG24145	MG24160
10	MG24116	MG24131	MG24146	MG24161
13	MG24117	MG24132	MG24147	MG24162
15	MG17406	MG17436	MG17461	—
16	MG24118	MG24133	MG24148	MG24163
20	MG24119	MG24134	MG24149	MG24164
25	MG24120	MG24135	MG24150	MG24165
30	MG17407	MG17437	MG17462	—
32	MG24121	MG24136	MG24151	MG24166
35	MG17408	MG17438	MG17463	—
40	MG24122	MG24137	MG24152	MG24167
50	MG24123	MG24138	MG24153	MG24168
60	MG17409	MG17439	MG17464	—
63	MG24124	MG24139	MG24154	MG24169
C Curve—Magnetic Setting Between 7 and 10 Times Ampere Rating				
0.5	MG17411	—	—	—
1	MG24425	MG24442	MG24459	MG24476
1.2	MG17412	MG17442	—	—
1.5	MG17413	MG17443	—	—
2	MG24426	MG24443	MG24460	MG24477
3	MG24427	MG24444	MG24461	MG24478
4	MG24428	MG24445	MG24462	MG24479
5	MG17414	MG17444	—	—
6	MG24430	MG24447	MG24464	MG24481
7	MG17415	MG17445	—	—
8	MG24431	MG24448	MG24465	MG24482
10	MG24432	MG24449	MG24466	MG24483
13	MG24433	MG24450	MG24467	MG24484
15	MG17416	MG17446	MG17466	—
16	MG24434	MG24451	MG24468	MG24485
20	MG24435	MG24452	MG24469	MG24486
25	MG24436	MG24453	MG24470	MG24487
30	MG17417	MG17447	MG17467	—
32	MG24437	MG24454	MG24471	MG24488
35	MG17418	MG17448	MG17468	—
40	MG24438	MG24455	MG24472	MG24489
50	MG24439	MG24456	MG24473	MG24490
60	MG17419	MG17449	MG17469	—
63	MG24440	MG24457	MG24474	MG24491
D Curve — Magnetic Setting Between 10 and 14 Times Ampere Rating				
0.5	MG17421	—	—	—
1	MG24500	MG24516	MG24532	MG24548
1.2	MG17422	MG17452	—	—
1.5	MG17423	MG17453	—	—
2	MG24501	MG24517	MG24533	MG24549
3	MG24502	MG24518	MG24534	MG24550
4	MG24503	MG24519	MG24535	MG24551
5	MG17424	MG17454	—	—
6	MG24504	MG24520	MG24536	MG24552
7	MG17425	MG17455	—	—
8	MG24505	MG24521	MG24537	MG24553
10	MG24506	MG24522	MG24538	MG24554
13	MG24507	MG24523	MG24539	MG24555
15	MG17426	MG17456	MG17471	—
16	MG24508	MG24524	MG24540	MG24556
20	MG24509	MG24525	MG24541	MG24557
25	MG24510	MG24526	MG24542	MG24558
30	MG17427	MG17457	MG17472	—
32	MG24511	MG24527	MG24543	MG24559
35	MG17428	MG17458	MG17473	—
40	MG24512	MG24528	MG24544	MG24560
50	MG24513	MG24529	MG24545	MG24561
60	MG17429	MG17459	MG17474	—
63	MG24514	MG24530	MG24546	MG24562

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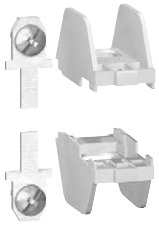
Multi 9 C60 Accessories

Electrical Accessories for C60 Circuit Breakers and Supplementary Protectors



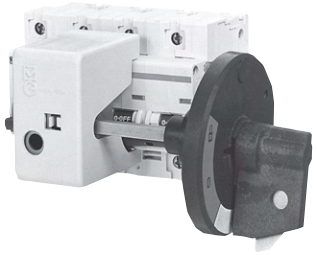
Ring Tongue Terminal Kit

Spacer

Terminal Screw Shield

C60 Padlock Attachment

Heavy-Duty Padlock Attachment



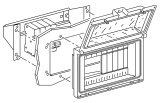
Rotary Handle

Label Holders for 2, 3, or 4P C60

Front Mounting Kit for C60
1P, 2P, 3P, 4P
(! per circuit breaker)

MGN26380 Locking Device Left Side Mount

MGN26380 Locking Device Right Side Mount



Multi-Pole Front Mounting Kit

Comb Bus Bar

Possible Combinations
Mounted to the left of the circuit breaker with a maximum width of 54 mm.

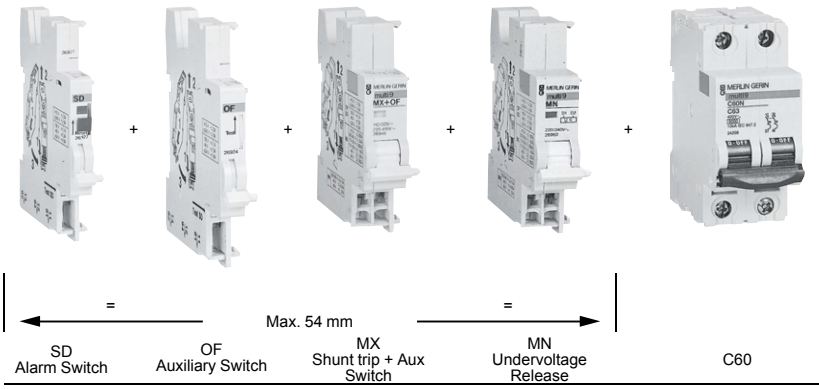


Table 7.45: Multi 9 C60 Electrical Accessories

Descriptions	Control Voltage		Width in 9 mm Modules	C60 UL/IEC Cat. No.
	Vac	Vdc		
OF Auxiliary Switch (1a1b)	12–277	12–125	1	MG26925
SD Alarm Switch (1a1b)	12–277	12–125	1	MG26928
MX Shunt Trip + OF Auxiliary Switch (1a1b)	24	24	2	27118
	48	48	2	27110
	110–240–277	125	2	27109
MN Undervoltage Release	24	24	2	27108
	48	48	2	27106
	120	—	2	27107
	240	—	2	27105
Multi-9 GFP UL 1053 Listed Ground Fault Protectors	120 to 480Y/277 Vac; 30, 100, and 300 mA; 2P and 4Ps. See page 7-26, Handout **0860HO0602** or Catalog **0860CT0201**			

Table 7.46: Multi 9 C60 Mechanical Accessories

Descriptions		C60 Cat. No.
Ring tongue terminal kit for UL1077 C60	For one pole	17400
Spacer for DIN rail, Not UL Recognized	9 mm wide	MG27062
Padlock Attachment (1 per for 1P, 2P, 3P or 4P)	2 per pack	MG26970
Heavy-duty Padlock Attachment for C60, Locks OFF only	2 per pack	M9PAF
Padlocking Device Left Side Mount, Locks OFF only *[4]*	1 per pack	MGN26380
Padlocking Device Right Side Mount, Locks OFF only *[5]*		MGN26381
Front Mounting Kit	1P	MG26983
	2P	MG26984
	3P	MG26985
	4P	MG26989
Label holders for 2, 3 or 4P C60 (Not UL Recognized)	Bag of 10	MG27150
Terminal Screw Shield (Not UL Recognized)	Bag of two 4P shields	MG26981
Terminal cover (Not UL Recognized)	1P	MG26975
	2P	MG26976
	3P	MG26975 + MG26976
	4P	MG26978
Comb Bus Bar Kit for UL1077 C60, 12 poles, Fixed Length	1Ø	MG10285
	2Ø	MG10286
	3 Ø	MG10287
Tooth Caps for UL Comb Bus Bar, Bag of 20		60488
Rotary Handle for C60 (Non UL Recognized)		
Operating Subassembly	2P/3P/4P	MG27046
Door Interlock Handle		MG27047
Fixed Handle (Front or Lateral)		MG27048
Multi-pole Front Mounting Kit		
Rail Support (20 of 9 mm modules)		14211
Hinged Transparent Cover		14210

[4] Left-side mounted padlocking device cannot be used in conjunction with accessories SD, OF, MX or MN. Use right-side mounted padlocking device when accessories are required.
[5] Right-side mounted padlocking device cannot be used in conjunction with VIGI module. Use left-side mounted padlocking device when VIGI Module is required.

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The PowerPact Advantage

- **Proven Performance:** Industry-leading circuit breaker innovation and protection for heavy-duty commercial and industrial applications.
- **Smart**: Integrated metering options provide a cost-effective solution to reduce energy consumption, optimize energy costs, and improve energy availablility for your facilities.
- **Flexible:** Full range of thermal-magnetic and electronic trip molded case circuit breakers from 15 A to 3000 A, delivering the ratings, configurations, and operators for your unique applications.
- **Simple:** Common catalog numbers, standardized ratings, and a full range of field-installable accessories make product selection, installation and maintenance easier than ever.
- **Common Design Features:** Mounting holes, door trim, and handle accessories

B-Frame 125 A	H-Frame 150 A	J-Frame 250 A	Q-Frame 250 A	L-Frame 600 A	M-Frame 800 A	P-Frame 1200 A	R-Frame 3000 A
	Electronic Trip Version	Electronic Trip Version					

Table 7.47: PowerPact Interrupting Ratings

Voltage	Interrupting Rating						
	B	D	G	J	K	L	R
240 Vac	10 kA	25 kA	65 kA	100 kA	65 kA *[1]*	125 kA	200 kA
480 Vac		18 kA	35 kA	65 kA	65 kA*[2]*	100 kA	200 kA
600 Vac		14 kA	18 kA	25 kA	65 kA*[2]*	50 kA *[3]*	100 kA

Table 7.48: Common Catalog Numbering System

Frame	Rating	Termination	Poles	Voltage	Amperage*[4]*			Suffix Code		Suffix Code	
H	G	L	3	6	1	5	0	A	B	S	A

- Poles: 1 1Pole, 2 2Pole, 3 3Pole, 4 4Pole
- Voltage: 4 480 V, 6 600 V
- Suffix Code (A B): 2A/2B Auxiliary Switch
- Suffix Code (S A): 110 Vac Shunt Trip

Frame Designation

B 125 A Frame
H 150 A Frame
J 250 A Frame
Q 250 A Frame
L 600 A Frame
M 800 A Frame
P 1200 A Frame
R 3000 A Frame

Interrupting Rating

	240 Vac	480 Vac	600Vac
B	10 kA	—	—
D	25 kA	18 kA	14 kA
G	65 kA	35 kA	18 kA
J	100 kA	65 kA	25 kA
K	100 kA	65 kA	65 kA
L	125 kA	100 kA	50 kA
R	200 kA	200 kA	100 kA

Terminations

A I-Line
L Lugs on Both Ends
F Bus Bar (No Lugs)
M Lugs Line Side Only
P Lugs Load End Only
N Plug-in
D Drawout
S Rear Connected Studs

Description

B-Frame Circuit Breakers, page 7-30
H- and J-Frame Circuit Breakers, page 7-31
Q-Frame Circuit Breakers, page 7-35
L-Frame Circuit Breakers, page 7-36
P-Frame Circuit Breakers, page 7-38
R-Frame Circuit Breakers, page 7-39
PowerPact™ H- and J-Frame Electronic Motor Circuit Protectors, page 7-41
Motor Circuit Protectors and Motor Protector Circuit Breakers, page 7-44
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Micrologic™ Electronic Trip Units, page 7-63
Micrologic™ Trip Unit Accessories, page 7-67

[1] B-Frame K interrupting rating is 100 kA at 240 Vac
[2] P-frame K interrupting is 50 kA at 480 and 600 Vac.
[3] P-frame L interrupting is 25 kA at 600 Vac.
[4] For amperage of M,-, P- or R-frame circuit breakers, add a zero to the three amperage digits; for example, 120 = 1200 A.

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New! PowerPact B-Frame Circuit Breakers

B-Frame
Thermal-Magnetic Trip Unit

Table 7.49: PowerPact B-Frame 125 A Thermal-Magnetic Circuit Breakers (600Y/347 Vac) with EverLink Lugs

Current Rating @ 40° C	Interrupting Rating													
	D				G				J				K	
	1 Pole 347 Vac	2 Pole 600Y/347 Vac	3 Pole 600Y/347 Vac	4 Pole 600Y/347 Vac	1 Pole 347 Vac	2 Pole 600Y/347 Vac	3 Pole 600Y/347 Vac	4 Pole 600Y/347 Vac	1 Pole 347 Vac	2 Pole 600Y/347 Vac	3 Pole 600Y/347 Vac	4 Pole 600Y/347 Vac	1 Pole 347 Vac	2 Pole 600Y/347 Vac
15 A	BDL16015	BDL26015	BDL36015	BDL46015	BGL16015	BGL26015	BGL36015	BGL46015	BJL16015	BJL26015	BJL36015	BJL46015	BKL16015	BKL26015
20 A	BDL16020	BDL26020	BDL36020	BDL46020	BGL16020	BGL26020	BGL36020	BGL46020	BJL16020	BJL26020	BJL36020	BJL46020	BKL16020	BKL26020
25 A	BDL16025	BDL26025	BDL36025	BDL46025	BGL16025	BGL26025	BGL36025	BGL46025	BJL16025	BJL26025	BJL36025	BJL46025	BKL16025	BKL26025
30 A	BDL16030	BDL26030	BDL36030	BDL46030	BGL16030	BGL26030	BGL36030	BGL46030	BJL16030	BJL26030	BJL36030	BJL46030	BKL16030	BKL26030
35 A	BDL16035	BDL26035	BDL36035	BDL46035	BGL16035	BGL26035	BGL36035	BGL46035	BJL16035	BJL26035	BJL36035	BJL46035	—	—
40 A	BDL16040	BDL26040	BDL36040	BDL46040	BGL16040	BGL26040	BGL36040	BGL46040	BJL16040	BJL26040	BJL36040	BJL46040	—	—
45 A	BDL16045	BDL16045	BDL36045	BDL46045	BGL16045	BGL26045	BGL36045	BGL46045	BJL16045	BJL26045	BJL36045	BJL46045	—	—
50 A	BDL16050	BDL26050	BDL36050	BDL46050	BGL16050	BGL26050	BGL36050	BGL46050	BJL16050	BJL26050	BJL36050	BJL46050	—	—
60 A	BDL16060	BDL26060	BDL36060	BDL46060	BGL16060	BGL26060	BGL36060	BGL46060	BJL16060	BJL26060	BJL36060	BJL46060	—	—
70 A	BDL16070	BDL26070	BDL36070	BDL46070	BGL16070	BGL26070	BGL36070	BGL46070	BJL16070	BJL26070	BJL36070	BJL46070	—	—
80 A	BDL16080	BDL26080	BDL36080	BDL46080	BGL16080	BGL26080	BGL36080	BGL46080	BJL16080	BJL26080	BJL36080	BJL46080	—	—
90 A	BDL16090	BDL26090	BDL36090	BDL46090	BGL16090	BGL26090	BGL36090	BGL46090	BJL16090	BJL26090	BJL36090	BJL46090	—	—
100 A	BDL16100	BDL26100	BDL36100	BDL46100	BGL16100	BGL26100	BGL36100	BGL46100	BJL16100	BJL26100	BJL36100	BJL46100	—	—
110 A	BDL16110	BDL26110	BDL36110	BDL46110	BGL16110	BGL26110	BGL36110	BGL46110	BJL16110	BJL26110	BJL36110	BJL46110	—	—
125 A	BDL16125	BDL26125	BDL36125	BDL46125	BGL16125	BGL26125	BGL36125	BGL46125	BJL16125	BJL26125	BJL36125	BJL46125	—	—

Table 7.50: B-Frame Termination Options

Termination Letter	
A = I-Line (See Section 9)	B D **L** 3 6 1 0 0 For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number.
F = No Lugs (includes terminal nut kit on both ends)	
L =EverLink Lugs both ends	
M = Lugs ON end Terminal Nut Kit OFF end	
P = Lugs OFF end Terminal Nut Kit ON end	

Table 7.51: B-Frame Interrupting Ratings

Voltage	Interrupting Rating			
	D	G	J	K
240 Vac	25 kA	65 kA	100 kA	100 kA
480/277 Vac	18 kA	35 kA	65 kA	65 kA
480 Vac	18 kA	35 kA	65 kA	65 kA
600Y/347 Vac	14 kA	18 kA	25 kA	65 kA

Table 7.52: B-Frame Lug Options

Lug Option Suffix	
No Suffix = EverLink Lugs both ends	B D **L** 3 6 1 0 0 **LU** For factory-installed lug option, place suffix after the amperage in the circuit breaker catalog number.
LU = EverLink Lug with Control Wire Terminal ON end; EverLink Lug OFF end	
LV = EverLink Lug ON end; EverLink Lug with Control Wire Terminal OFF end	
LW = EverLink Lug with Control Wire Terminal both ends	
LC = Copper Mechanical Lugs both ends	
LH = Aluminum Mechanical Lugs both ends	

Table 7.53: PowerPact B-Frame 125 A Magnetic Trip Values

Current Rating @ 40° C	Fixed AC Magnetic Trip	
	Hold	Trip
15 A	400 A	600 A
20 A	400 A	600 A
25 A	400 A	600 A
30 A	400 A	600 A
35 A	400 A	600 A
40 A	400 A	600 A
45 A	400 A	600 A
50 A	480 A	720 A
60 A	640 A	960 A
70 A	640 A	960 A
80 A	800 A	1200 A
90 A	1000 A	1500 A
100 A	1000 A	1500 A
110 A	1000 A	1500 A
125 A	1000 A	1500 A

Accessories see page 7-53
Optional Lugs see page 7-58
Dimensions see page 7-74

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PowerPact H- and J-Frame Circuit Breakers

HD and HG 2P
Thermal-Magnetic Trip Unit
(2P HJ, HL in 3P module)

H-Frame
Thermal-Magnetic Trip Unit

Table 7.54: H-Frame 150 A Thermal-Magnetic UL Current-Limiting *[5]* Circuit Breakers (600 Vac, 250 Vdc) *[6]* With Factory Sealed Trip Unit Suitable for Reverse Connection *[7]*

Current Rating @ 40° C	Fixed AC Magnetic Trip		Interrupting Rating							
			D		G		J *[6]*		L *[6]*	
	Hold	Trip	Standard (80% Rated)	100% Rated	Standard (80% Rated)	100% Rated	Standard (80% Rated)	100% Rated	Standard (80% Rated)	100% Rated
H-Frame, 150A 2P, 600 Vac 50/60 Hz, 250 Vdc *[8]*										
15 A	350 A	750 A	HDL26015	HDL26015C	HGL26015	HGL26015C	HJL26015	HJL26015C	HLL26015	HLL26015C
20 A	350 A	750 A	HDL26020	HDL26020C	HGL26020	HGL26020C	HJL26020	HJL26020C	HLL26020	HLL26020C
25 A	350 A	750 A	HDL26025	HDL26025C	HGL26025	HGL26025C	HJL26025	HJL26025C	HLL26025	HLL26025C
30 A	350 A	750 A	HDL26030	HDL26030C	HGL26030	HGL26030C	HJL26030	HJL26030C	HLL26030	HLL26030C
35 A	400 A	850 A	HDL26035	HDL26035C	HGL26035	HGL26035C	HJL26035	HJL26035C	HLL26035	HLL26035C
40 A	400 A	850 A	HDL26040	HDL26040C	HGL26040	HGL26040C	HJL26040	HJL26040C	HLL26040	HLL26040C
45 A	400 A	850 A	HDL26045	HDL26045C	HGL26045	HGL26045C	HJL26045	HJL26045C	HLL26045	HLL26045C
50 A	400 A	850 A	HDL26050	HDL26050C	HGL26050	HGL26050C	HJL26050	HJL26050C	HLL26050	HLL26050C
60 A	800 A	1450 A	HDL26060	HDL26060C	HGL26060	HGL26060C	HJL26060	HJL26060C	HLL26060	HLL26060C
70 A	800 A	1450 A	HDL26070	HDL26070C	HGL26070	HGL26070C	HJL26070	HJL26070C	HLL26070	HLL26070C
80 A	800 A	1450 A	HDL26080	HDL26080C	HGL26080	HGL26080C	HJL26080	HJL26080C	HLL26080	HLL26080C
90 A	800 A	1450 A	HDL26090	HDL26090C	HGL26090	HGL26090C	HJL26090	HJL26090C	HLL26090	HLL26090C
100 A	800 A	1700 A	HDL26100	HDL26100C	HGL26100	HGL26100C	HJL26100	HJL26100C	HLL26100	HLL26100C
110 A	900 A	1700 A	HDL26110	HDL26110C	HGL26110	HGL26110C	HJL26110	HJL26110C	HLL26110	HLL26110C
125 A	900 A	1700 A	HDL26125	HDL26125C	HGL26125	HGL26125C	HJL26125	HJL26125C	HLL26125	HLL26125C
150 A	900 A	1700 A	HDL26150	HDL26150C	HGL26150	HGL26150C	HJL26150	HJL26150C	HLL26150	HLL26150C
H-Frame 150A 3P, 600 Vac 50/60 Hz, 250 Vdc										
15 A	350 A	750 A	HDL36015	HDL36015C	HGL36015	HGL36015C	HJL36015	HJL36015C	HLL36015	HLL36015C
20 A	350 A	750 A	HDL36020	HDL36020C	HGL36020	HGL36020C	HJL36020	HJL36020C	HLL36020	HLL36020C
25 A	350 A	750 A	HDL36025	HDL36025C	HGL36025	HGL36025C	HJL36025	HJL36025C	HLL36025	HLL36025C
30 A	350 A	750 A	HDL36030	HDL36030C	HGL36030	HGL36030C	HJL36030	HJL36030C	HLL36030	HLL36030C
35 A	400 A	850 A	HDL36035	HDL36035C	HGL36035	HGL36035C	HJL36035	HJL36035C	HLL36035	HLL36035C
40 A	400 A	850 A	HDL36040	HDL36040C	HGL36040	HGL36040C	HJL36040	HJL36040C	HLL36040	HLL36040C
45 A	400 A	850 A	HDL36045	HDL36045C	HGL36045	HGL36045C	HJL36045	HJL36045C	HLL36045	HLL36045C
50 A	400 A	850 A	HDL36050	HDL36050C	HGL36050	HGL36050C	HJL36050	HJL36050C	HLL36050	HLL36050C
60 A	800 A	1450 A	HDL36060	HDL36060C	HGL36060	HGL36060C	HJL36060	HJL36060C	HLL36060	HLL36060C
70 A	800 A	1450 A	HDL36070	HDL36070C	HGL36070	HGL36070C	HJL36070	HJL36070C	HLL36070	HLL36070C
80 A	800 A	1450 A	HDL36080	HDL36080C	HGL36080	HGL36080C	HJL36080	HJL36080C	HLL36080	HLL36080C
90 A	800 A	1450 A	HDL36090	HDL36090C	HGL36090	HGL36090C	HJL36090	HJL36090C	HLL36090	HLL36090C
100 A	800 A	1700 A	HDL36100	HDL36100C	HGL36100	HGL36100C	HJL36100	HJL36100C	HLL36100	HLL36100C
110 A	900 A	1700 A	HDL36110	HDL36110C	HGL36110	HGL36110C	HJL36110	HJL36110C	HLL36110	HLL36110C
125 A	900 A	1700 A	HDL36125	HDL36125C	HGL36125	HGL36125C	HJL36125	HJL36125C	HLL36125	HLL36125C
150 A	900 A	1700 A	HDL36150	HDL36150C	HGL36150	HGL36150C	HJL36150	HJL36150C	HLL36150	HLL36150C

[5] Circuit breakers with J and L interrupting ratings are UL certified as current limiting.
[6] Standard lug kit: AL150HD. Terminal wire range: 14–3/0 AWG Al or Cu.
[7] See Supplemental Digest Section 3 for circuit breakers with field interchangeable trip units.
[8] HD and HG circuit breakers are true two-pole construction.

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Table 7.55: J-Frame 250 A Thermal-Magnetic UL Current-Limiting *[9]* Circuit Breakers (600 Vac, 250 Vdc) With Factory Sealed Trip Unit Suitable for Reverse Connection *[10]*

Current Rating @ 40°C	Adjustable AC Magnetic Trip		Interrupting Rating									
			D		G		J *[9]*		L *[9]*		R *[9]*	
	Low	High	Standard (80% Rated)	100% Rated	Standard (80% Rated)	100% Rated	Standard (80% Rated)	100% Rated	Standard (80% Rated)	100% Rated	Standard (80% Rated)	100% Rated
J-Frame 250A 2P, 600 Vac 50/60 Hz, 250 Vdc												
150 A *[11]*	750 A	1500 A	JDL26150	JDL26150C	JGL26150	JGL26150C	JLL26150	JLL26150C	JLL26150	JLL26150C	—	—
175 A *[11]*	875 A	1750 A	JDL26175	JDL26175C	JGL26175	JGL26175C	JLL26175	JLL26175C	JLL26175	JLL26175C	—	—
200 A *[12]*	1000 A	2000 A	JDL26200	JDL26200C	JGL26200	JGL26200C	JLL26200	JLL26200C	JLL26200	JLL26200C	—	—
225 A *[12]*	1125 A	2250 A	JDL26225	JDL26225C	JGL26225	JGL26225C	JLL26225	JLL26225C	JLL26225	JLL26225C	—	—
250 A *[12]*	1250 A	2500 A	JDL26250	JDL26250C	JGL26250	JGL26250C	JLL26250	JLL26250C	JLL26250	JLL26250C	—	—
J-Frame 250A 3P, 600 Vac 50/60 Hz, 250 Vdc												
150 A *[11]*	750 A	1500 A	JDL36150	JDL36150C	JGL36150	JGL36150C	JJL36150	JJL36150C	JLL36150	JLL36150C	JRL36150	JRL36150C
175 A *[11]*	875 A	1750 A	JDL36175	JDL36175C	JGL36175	JGL36175C	JJL36175	JJL36175C	JLL36175	JLL36175C	JRL36175	JRL36175C
200 A *[12]*	1000 A	2000 A	JDL36200	JDL36200C	JGL36200	JGL36200C	JJL36200	JJL36200C	JLL36200	JLL36200C	JRL36200	JRL36200C
225 A *[12]*	1125 A	2250 A	JDL36225	JDL36225C	JGL36225	JGL36225C	JJL36225	JJL36225C	JLL36225	JLL36225C	JRL36225	JRL36225C
250 A *[12]*	1250 A	2500 A	JDL36250	JDL36250C	JGL36250	JGL36250C	JJL36250	JJL36250C	JLL36250	JLL36250C	JRL36250	JRL36250C

Plug-in

Drawout

Rear Connected

Table 7.56: H- and J-Frame Interrupting Ratings

Voltage	Interrupting Rating				
	D	G	J	L	R
240 Vac	25 kA	65 kA	100 kA	125 kA	200 kA
480 Vac	18 kA	35 kA	65 kA	100 kA	200 kA
600 Vac	14 kA	18 kA	25 kA	50 kA	100 kA

Table 7.57: H- and J-Frame Termination Options

Termination Letter	
A = I-Line (See Section 9)	H G L 3 6 1 0 0 For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number.
F = No Lugs (includes terminal nut kit on both ends)	
L = Lugs both ends	
M = Lugs ON end Terminal Nut Kit OFF end	
P = Lugs OFF end Terminal Nut Kit ON end	
N = Plug-in	
D = Drawout	
S = Rear Connected	

Accessories see page 7-53
Optional Lugs see page 7-58
Dimensions see page 7-74
Enclosures see page 7-75

[9] Circuit breakers with J, L, and R interrupting ratings are UL certified as current limiting.
[10] See Supplemental Digest Section 3 for circuit breakers with field interchangeable trip units.
[11] Standard lug kit: AL175JD. Terminal wire range: 4–4/0 AWG Al or Cu.
[12] Standard lug kit: AL250JD. Terminal wire range: 3/0 AWG–350 kcmil Al or Cu.

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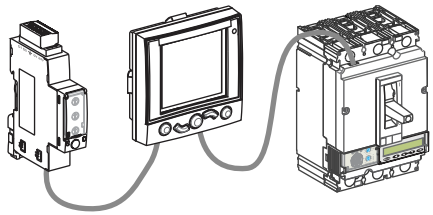
H-Frame
Micrologic™ Trip Unit

J-Frame
Micrologic Trip Unit



H-Frame Circuit Breaker
Optional FDM and IFM Module

Table 7.58: H-Frame 150 A and J-Frame 250 A Electronic Trip UL Current-Limiting *[13]* Standard (80% Rated) Circuit Breakers (600 Vac) With Factory Sealed Trip Unit *[14]* Suitable for Reverse Connection *[15]*

Electronic Trip Unit			Sensor Rating	Interrupting Rating (80% Rated)				
Type	Function	Trip Unit		D	G	J *[13]*	L *[13]*	R *[13]*
600 Vac, 50/60 Hz, 3P								
Micrologic Standard	LI	3.2 *[16]*	60 A *[17]*	HDL36060U31X	HGL36060U31X	HJL36060U31X	HLL36060U31X	HRL36060U31X
			100 A *[17]*	HDL36100U31X	HGL36100U31X	HJL36100U31X	HLL36100U31X	HRL36100U31X
			150 A *[17]*	HDL36150U31X	HGL36150U31X	HJL36150U31X	HLL36150U31X	HRL36150U31X
			250 A *[18]*	JDL36250U31X	JGL36250U31X	JJL36250U31X	JLL36250U31X	JRL36250U31X
Micrologic Standard	LSI	3.2S *[16]* *[19]*	60 A *[17]*	HDL36060U33X	HGL36060U33X	HJL36060U33X	HLL36060U33X	HRL36060U33X
			100 A *[17]*	HDL36100U33X	HGL36100U33X	HJL36100U33X	HLL36100U33X	HRL36100U33X
			150 A *[17]*	HDL36150U33X	HGL36150U33X	HJL36150U33X	HLL36150U33X	HRL36150U33X
			250 A *[18]*	JDL36250U33X	JGL36250U33X	JJL36250U33X	JLL36250U33X	JRL36250U33X
Micrologic Ammeter	LSI	5.2A	60 A *[17]*	HDL36060U43X	HGL36060U43X	HJL36060U43X	HLL36060U43X	HRL36060U43X
			100 A *[17]*	HDL36100U43X	HGL36100U43X	HJL36100U43X	HLL36100U43X	HRL36100U43X
			150 A *[17]*	HDL36150U43X	HGL36150U43X	HJL36150U43X	HLL36150U43X	HRL36150U43X
			250 A *[18]*	JDL36250U43X	JGL36250U43X	JJL36250U43X	JLL36250U43X	JRL36250U43X
Micrologic Energy	LSI	5.2E	60 A *[17]*	HDL36060U53X	HGL36060U53X	HJL36060U53X	HLL36060U53X	HRL36060U53X
			100 A *[17]*	HDL36100U53X	HGL36100U53X	HJL36100U53X	HLL36100U53X	HRL36100U53X
			150 A *[17]*	HDL36150U53X	HGL36150U53X	HJL36150U53X	HLL36150U53X	HRL36150U53X
			250 A *[18]*	JDL36250U53X	JGL36250U53X	JJL36250U53X	JLL36250U53X	JRL36250U53X
Micrologic Ammeter	LSIG	6.2A *[20]*	60 A *[17]*	HDL36060U44X	HGL36060U44X	HJL36060U44X	HLL36060U44X	HRL36060U44X
			100 A *[17]*	HDL36100U44X	HGL36100U44X	HJL36100U44X	HLL36100U44X	HRL36100U44X
			150 A *[17]*	HDL36150U44X	HGL36150U44X	HJL36150U44X	HLL36150U44X	HRL36150U44X
			250 A *[18]*	JDL36250U44X	JGL36250U44X	JJL36250U44X	JLL36250U44X	JRL36250U44X
Micrologic Energy	LSIG	6.2E	60 A *[17]*	HDL36060U54X	HGL36060U54X	HJL36060U54X	HLL36060U54X	HRL36060U54X
			100 A *[17]*	HDL36100U54X	HGL36100U54X	HJL36100U54X	HLL36100U54X	HRL36100U54X
			150 A *[17]*	HDL36150U54X	HGL36150U54X	HJL36150U54X	HJL36150U54X	HRL36150U54X
			250 A *[18]*	JDL36250U54X	JGL36250U54X	JJL36250U54X	JLL36250U54X	JRL36250U54X

Table 7.59: H-Frame 150 A and J-Frame 250 A Electronic Trip UL Current-Limiting *[13]* 100% Rated Circuit Breakers (600 Vac) With Factory Sealed Trip Unit *[14]* Suitable for Reverse Connection *[15]*

Electronic Trip Unit			Sensor Rating	Interrupting Rating (100% Rated)				
Type	Function	Trip Unit		D	G	J *[13]*	L *[13]*	R *[13]*
600 Vac, 50/60 Hz, 3P								
Micrologic Standard	LI	3.2 *[16]*	60 A *[17]*	HDL36060CU31X	HGL36060CU31X	HJL36060CU31X	HLL36060CU31X	HRL36060CU31X
			100 A *[17]*	HDL36100CU31X	HGL36100CU31X	HJL36100CU31X	HLL36100CU31X	HRL36100CU31X
			150 A *[17]*	HDL36150CU31X	HGL36150CU31X	HJL36150CU31X	HLL36150CU31X	HRL36150CU31X
			250 A *[18]*	JDL36250CU31X	JGL36250CU31X	JJL36250CU31X	JLL36250CU31X	JRL36250CU31X
Micrologic Standard	LSI	3.2S *[16]* *[19]*	60 A *[17]*	HDL36060CU33X	HGL36060CU33X	HJL36060CU33X	HLL36060CU33X	HRL36060CU33X
			100 A *[17]*	HDL36100CU33X	HGL36100CU33X	HJL36100CU33X	HLL36100CU33X	HRL36100CU33X
			150 A *[17]*	HDL36150CU33X	HGL36150CU33X	HJL36150CU33X	HLL36150CU33X	HRL36150CU33X
			250 A *[18]*	JDL36250CU33X	JGL36250CU33X	JJL36250CU33X	JLL36250CU33X	JRL36250CU33X
Micrologic Ammeter	LSI	5.2A	60 A *[17]*	HDL36060CU43X	HGL36060CU43X	HJL36060CU43X	HLL36060CU43X	HRL36060CU43X
			100 A *[17]*	HDL36100CU43X	HGL36100CU43X	HJL36100CU43X	HLL36100CU43X	HRL36100CU43X
			150 A *[17]*	HDL36150CU43X	HGL36150CU43X	HJL36150CU43X	HLL36150CU43X	HRL36150CU43X
			250 A *[18]*	JDL36250CU43X	JGL36250CU43X	JJL36250CU43X	JLL36250CU43X	JRL36250CU43X
Micrologic Energy	LSI	5.2E	60 A *[17]*	HDL36060CU53X	HGL36060CU53X	HJL36060CU53X	HLL36060CU53X	HRL36060CU53X
			100 A *[17]*	HDL36100CU53X	HGL36100CU53X	HJL36100CU53X	HLL36100CU53X	HRL36100CU53X
			150 A *[17]*	HDL36150CU53X	HGL36150CU53X	HJL36150CU53X	HLL36150CU53X	HRL36150CU53X
			250 A *[18]*	JDL36250CU53X	JGL36250CU53X	JJL36250CU53X	JLL36250CU53X	JRL36250CU53X
Micrologic Ammeter	LSIG	6.2A *[20]*	60 A *[17]*	HDL36060CU44X	HGL36060CU44X	HJL36060CU44X	HLL36060CU44X	HRL36060CU44X
			100 A *[17]*	HDL36100CU44X	HGL36100CU44X	HJL36100CU44X	HLL36100CU44X	HRL36100CU44X
			150 A *[17]*	HDL36150CU44X	HGL36150CU44X	HJL36150CU44X	HLL36150CU44X	HRL36150CU44X
			250 A *[18]*	JDL36250CU44X	JGL36250CU44X	JJL36250CU44X	JLL36250CU44X	JRL36250CU44X
Micrologic Energy	LSIG	6.2E	60 A *[17]*	HDL36060CU54X	HGL36060CU54X	HJL36060CU54X	HLL36060CU54X	HRL36060CU54X
			100 A *[17]*	HDL36100CU54X	HGL36100CU54X	HJL36100CU54X	HLL36100CU54X	HRL36100CU54X
			150 A *[17]*	HDL36150CU54X	HGL36150CU54X	HJL36150CU54X	HLL36150CU54X	HRL36150CU54X
			250 A *[18]*	JDL36250CU54X	JGL36250CU54X	JJL36250CU54X	JLL36250CU54X	JRL36250CU54X

[13] Circuit breakers with J, L, and R interrupting ratings are UL certified as current limiting.
[14] See Supplemental Digest Section 3 for circuit breakers with field interchangeable trip units.
[15] For applications requiring communications see page 7-67.
[16] 3P circuit breakers with this trip unit can be used for 2P applications.
[17] Standard lug kit: AL150HD. Terminal wire range: 14–3/0 AWG Al or Cu.
[18] Standard lug kit: AL250JD. Terminal wire range: 3/0 AWG–350 kcmil Al or Cu.
[19] Fixed ST and LT delays.
[20] 3P circuit breakers with this trip unit can be used for 2P applications in order to have ground fault protection. Additional metering capabilities will not work properly on the unconnected phase.

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Table 7.60: H- and J-Frame Termination Options

Termination Letter	
A - I-Line (See Section 9)	H D **L** 3 6 0 1 5 T For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number.
F = No Lugs (includes terminal nut kit on both ends)	
L = Lugs both ends	
M = Lugs ON end Terminal Nut Kit OFF end	
P = Lugs OFF end Terminal Nut Kit ON end	
N = Plug-in	
D = Drawout	
S = Rear Connected	

Table 7.61: H- and J-Frame Interrupting Ratings

Voltage	Interrupting Rating				
	D	G	J	L	R
240 Vac	25 KA	65 kA	100 kA	125 kA	200 kA
480 Vac	18 kA	35 kA	65 kA	100 kA	200 kA
600 Vac	14 kA	18 kA	25 kA	50 kA	100 kA

Accessories see page 7-53
Optional Lugs see page 7-58
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QBL 2P
70–250

QBL 3P
70–250 A

Q-Frame Molded Case Circuit Breakers

Table 7.62: PowerPact Q-Frame 250 A Thermal-Magnetic Circuit Breaker (240 Vac)

[21]

Ampere Rating	Fixed AC Magnetic Trip		Interrupting Rating				Terminal Wire Range
	Hold	Trip	B	D	G	J	
2P, 240 Vac							
70 A	1000 A	1800 A	QBL22070	QDL22070	QGL22070	QJL22070	#4 AWG - 300 kcmil Al/Cu
80 A	1000 A	1800 A	QBL22080	QDL22080	QGL22080	QJL22080	
90 A	1000 A	1800 A	QBL22090	QDL22090	QGL22090	QJL22090	
100 A	1200 A	2400 A	QBL22100	QDL22100	QGL22100	QJL22100	
110 A	1200 A	2400 A	QBL22110	QDL22110	QGL22110	QJL22110	
125 A	1200 A	2400 A	QBL22125	QDL22125	QGL22125	QJL22125	
150 A	1200 A	2400 A	QBL22150	QDL22150	QGL22150	QJL22150	
175 A	1200 A	2400 A	QBL22175	QDL22175	QGL22175	QJL22175	
200 A	1200 A	2400 A	QBL22200	QDL22200	QGL22200	QJL22200	
225 A	1200 A	2400 A	QBL22225	QDL22225	QGL22225	QJL22225	
250 A *[22]*	1200 A	2400 A	QBL22250	QDL22250	QGL22250	QJL22250	
3P, 240 Vac							
70 A	1000 A	1800 A	QBL32070	QDL32070	QGL32070	QJL32070	#4 AWG - 300 kcmil Al/Cu
80 A	1000 A	1800 A	QBL32080	QDL32080	QGL32080	QJL32080	
90 A	1000 A	1800 A	QBL32090	QDL32090	QGL32090	QJL32090	
100 A	1200 A	2400 A	QBL32100	QDL32100	QGL32100	QJL32100	
110 A	1200 A	2400 A	QBL32110	QDL32110	QGL32110	QJL32110	
125 A	1200 A	2400 A	QBL32125	QDL32125	QGL32125	QJL32125	
150 A	1200 A	2400 A	QBL32150	QDL32150	QGL32150	QJL32150	
175 A	1200 A	2400 A	QBL32175	QDL32175	QGL32175	QJL32175	
200 A	1200 A	2400 A	QBL32200	QDL32200	QGL32200	QJL32200	
225 A	1200 A	2400 A	QBL32225	QDL32225	QGL32225	QJL32225	
250 A *[22]*	1200 A	2400 A	QBL32250	QDL32250	QGL32250	QJL32250	

Table 7.63: Q-Frame Termination Options

Termination Letter	
A = I-Line (See Section 9)	Q G **L** 3 2 2 0 0 For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number.
E = Bolt-on I-Line (See Section 9)	
F = No lugs	
L = Lugs both ends	
M = Lugs ON end, studs on OFF end	
P = Lugs OFF end, studs on ON end	

Table 7.64: Q-Frame Interrupting Ratings

Voltage	Interrupting Rating			
	B	D	G	J
240 Vac *[23]*	10 kA	25 kA	65 kA	100 kA*[24]*

Dimension see page 7-74
Enclosures see page 7-75

[21] Replacement lugs and electrical accessories are not available for PowerPact Q-frame circuit breakers.
[22] 250 A lugs are suitable for copper conductors only.
[23] Q-frame circuit breakers are 240 Vac only.
[24] 3P QJ circuit breakers are rated at 208Y/120 Vac only.

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PowerPact L-Frame Molded Case Circuit Breakers

Table 7.65: L-Frame 600 A Standard (80% Rated) UL Current-Limiting *[25]* Circuit Breakers with Lugs and Factory-Sealed Electronic Trip Units Suitable for Reverse Connection *[26][27]*

Electronic Trip Unit			Sensor Rating	Interrupting Rating (80% Rated)					
Type	Function	Trip Unit		D	G	J *[25]*	L *[25]*	R *[25]*	Terminal
600 Vac, 50/60 Hz, 3P									
Micrologic Standard	LI	3.3 *[28]*	250 A	LDL36250U31X	LGL36250U31X	LJL36250U31X	LLL36250U31X	LRL36250U31X	AL400L61K3 *[29]*
			400 A	LDL36400U31X	LGL36400U31X	LJL36400U31X	LLL36400U31X	LRL36400U31X	AL600LS52K3 *[30]*
			600 A	LDL36600U31X	LGL36600U31X	LJL36600U31X	LLL36600U31X	LRL36600U31X	
Micrologic Standard	LSI	3.3S *[28]* *[31]*	250 A	LDL36250U33X	LGL36250U33X	LJL36250U33X	LLL36250U33X	LRL36250U33X	AL400L61K3 *[29]*
			400 A	LDL36400U33X	LGL36400U33X	LJL36400U33X	LLL36400U33X	LRL36400U33X	
			600 A	LDL36600U33X	LGL36600U33X	LJL36600U33X	LLL36600U33X	LRL36600U33X	AL600LS52K3 *[30]*
Micrologic Ammeter	LSI	5.3A	400 A	LDL36400U43X	LGL36400U43X	LJL36400U43X	LLL36400U43X	LRL36400U43X	AL600LS52K3 *[30]*
			600 A	LDL36600U43X	LGL36600U43X	LJL36600U43X	LLL36600U43X	LRL36600U43X	
Micrologic Energy	LSI	5.3E	400 A	LDL36400U53X	LGL36400U53X	LJL36400U53X	LLL36400U53X	LRL36400U53X	
			600 A	LDL36600U53X	LGL36600U53X	LJL36600U53X	LLL36600U53X	LRL36600U53X	
Micrologic Ammeter	LSIG	6.3A	400 A	LDL36400U44X	LGL36400U44X	LJL36400U44X	LLL36400U44X	LRL36400U44X	
			600 A	LDL36600U44X	LGL36600U44X	LJL36600U44X	LLL36600U44X	LRL36600U44X	
Micrologic Energy	LSIG	6.3E *[32]*	400 A	LDL36400U54X	LGL36400U54X	LJL36400U54X	LLL36400U54X	LRL36400U54X	
			600 A	LDL36600U54X	LGL36600U54X	LJL36600U54X	LLL36600U54X	LRL36600U54X	
600 Vac, 50/60 Hz, 4P									
Micrologic Standard	LI	3.3	250 A	LDL46250U31X	LGL46250U31X	LJL46250U31X	LLL46250U31X	LRL46250U31X	AL400L61K4 *[29]*
			400 A	LDL46400U31X	LGL46400U31X	LJL46400U31X	LLL46400U31X	LRL46400U31X	AL600LS52K4 *[30]*
			600 A	LDL46600U31X	LGL46600U31X	LJL46600U31X	LLL46600U31X	LRL46600U31X	
Micrologic Standard	LSI	3.3S*[31]*	250 A	LDL46250U33X	LGL46250U33X	LJL46250U33X	LLL46250U33X	LRL46250U33X	AL400L61K4 *[29]*
			400 A	LDL46400U33X	LGL46400U33X	LJL46400U33X	LLL46400U33X	LRL46400U33X	AL600LS52K4 *[30]*
			600 A	LDL46600U33X	LGL46600U33X	LJL46600U33X	LLL46600U33X	LRL46600U33X	
Micrologic Ammeter	LSI	5.3A	400 A	LDL46400U43X	LGL46400U43X	LJL46400U43X	LLL46400U43X	LRL46400U43X	AL600LS52K4 *[30]*
			600 A	LDL46600U43X	LGL46600U43X	LJL46600U43X	LLL46600U43X	LRL46600U43X	
Micrologic Energy	LSI	5.3E	400 A	LDL46400U53X	LGL46400U53X	LJL46400U53X	LLL46400U53X	LRL46400U53X	
			600 A	LDL46600U53X	LGL46600U53X	LJL46600U53X	LLL46600U53X	LRL46600U53X	
Micrologic Ammeter	LSIG	6.3A	400 A	LDL46400U44X	LGL46400U44X	LJL46400U44X	LLL46400U44X	LRL46400U44X	
			600 A	LDL46600U44X	LGL46600U44X	LJL46600U44X	LLL46600U44X	LRL46600U44X	
Micrologic Energy	LSIG	6.3E	400 A	LDL46400U54X	LGL46400U54X	LJL46400U54X	LLL46400U54X	LRL46400U54X	
			600 A	LDL46600U54X	LGL46600U54X	LJL46600U54X	LLL46600U54X	LRL46600U54X	

Table 7.66: L-Frame 600 A 100% Rated UL Current-Limiting *[25]* Circuit Breakers with Lugs and Factory-Sealed Electronic Trip Units Suitable for Reverse Connection *[26][27]*

Electronic Trip Unit			Sensor Rating	Interrupting Rating (100% Rated)					Terminal
Type	Function	Trip Unit		D	G	J *[25]*	L *[25]*	R *[25]*	
600 Vac, 50/60 Hz, 3P									
Micrologic Standard	LI	3.3 *[28]*	250 A	LDL36250CU31X	LGL36250CU31X	LJL36250CU31X	LLL36250CU31X	LRL36250CU31X	AL400L61K3 *[29]*
			400 A	LDL36400CU31X	LGL36400CU31X	LJL36400CU31X	LLL36400CU31X	LRL36400CU31X	AL600LS52K3 *[30]*
Micrologic Standard	LSI	3.3S *[28]* *[31]*	250 A	LDL36250CU33X	LGL36250CU33X	LJL36250CU33X	LLL36250CU33X	LRL36250CU33X	AL400L61K3 *[29]*
			400 A	LDL36400CU33X	LGL36400CU33X	LJL36400CU33X	LLL36400CU33X	LRL36400CU33X	AL600LS52K3 *[30]*
Micrologic Ammeter	LSI	5.3A	400 A	LDL36400CU43X	LGL36400CU43X	LJL36400CU43X	LLL36400CU43X	LRL36400CU43X	AL600LS52K3 *[30]*
Micrologic Energy	LSI	5.3E	400 A	LDL36400CU53X	LGL36400CU53X	LJL36400CU53X	LLL36400CU53X	LRL36400CU53X	
Micrologic Ammeter	LSIG	6.3A	400 A	LDL36400CU44X	LGL36400CU44X	LJL36400CU44X	LLL36400CU44X	LRL36400CU44X	
Micrologic Energy	LSIG	6.3E *[32]*	400 A	LDL36400CU54X	LGL36400CU54X	LJL36400CU54X	LLL36400CU54X	LRL36400CU54X	
600 Vac, 50/60 Hz, 4P									
Micrologic Standard	LI	3.3	250 A	LDL46250CU31X	LGL46250CU31X	LJL46250CU31X	LLL46250CU31X	LRL46250CU31X	AL400L61K4 *[29]*
			400 A	LDL46400CU31X	LGL46400CU31X	LJL46400CU31X	LLL46400CU31X	LRL46400CU31X	AL600LS52K4 *[30]*
Micrologic Standard	LSI	3.3S	250 A	LDL46250CU33X	LGL46250CU33X	LJL46250CU33X	LLL46250CU33X	LRL46250CU33X	AL400L61K4 *[29]*
			400 A	LDL46400CU33X	LGL46400CU33X	LJL46400CU33X	LLL46400CU33X	LRL46400CU33X	AL600LS52K4 *[30]*
Micrologic Ammeter	LSI	5.3A	400 A	LDL46400CU43X	LGL46400CU43X	LJL46400CU43X	LLL46400CU43X	LRL46400CU43X	AL600LS52K4 *[30]*
Micrologic Energy	LSI	5.3E	400 A	LDL46400CU53X	LGL46400CU53X	LJL46400CU53X	LLL46400CU53X	LRL46400CU53X	
Micrologic Ammeter	LSIG	6.3A	400 A	LDL46400CU44X	LGL46400CU44X	LJL46400CU44X	LLL46400CU44X	LRL46400CU44X	
Micrologic Energy	LSIG	6.3E	400 A	LDL46400CU54X	LGL46400CU54X	LJL46400CU54X	LLL46400CU54X	LRL46400CU54X	

L-Frame Circuit Breaker

Table 7.67: Termination Options

Termination Letter	Termination Option	
A	I-Line (See Section 9)	For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number. Termination Letter L G L 3 6 6 0 0 U 4 4 X
F	No lugs	
L	Lugs both ends	
M	Lugs ON end, terminal nut kit OFF end	
P	Lugs OFF end, terminal nut kit ON end	
N	Plug In	
D	Drawout	
S	Rear Connected	

[25] Circuit breakers with J, L, and R interrupting ratings are UL certified as current limiting.
[26] See Supplemental Digest Section 3 for circuit breakers with field interchangeable trip units.
[27] For applications requiring communications see page 7-67.
[28] 3P circuit breakers with this trip unit can be used for 2P applications.
[29] AL400L61K3 terminal wire ranges are (1) 2 AWG–600 kcmil Cu or 1) 2 AWG–500 kcmil Al.
[30] AL600LS52K3 terminal wire range is (2) 2/0 AWG–500 kcmil Al/Cu.
[31] Fixed ST and LT delays.
[32] 3P circuit breakers with this trip unit can be used for 2P applications in order to have ground fault protection. Additional metering capabilities will not work properly on the unconnected phase.

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Accessories see page 7-53
Optional Lugs see page 7-58
Dimensions see page 7-74
Enclosures see page 7-75

M-Frame Circuit Breaker

Table 7.68: Interrupting Ratings

Voltage	Interrupting Rating				
	D	G	J	L	R
240 Vac	25 kA	65 kA	100 kA	125 kA	200 kA
480 Vac	18 kA	35 kA	65 kA	100 kA	200 kA
600 Vac	14 kA	18 kA	25 kA	50 kA	100 kA

PowerPact M-Frame Molded Case Circuit Breakers

Table 7.69: M-Frame 800 A, Basic Electronic Trip System Type ET 1.0 *[33]* Factory-Sealed Trip Unit

Electronic Trip Unit		Sensor Rating	Interrupting Rating		Terminal Wire Range (AWG/kcmil)
Type	Function		G	J	
2P, 600 Vac 50/60 Hz					
Basic	Fixed Long-time, Adjustable Instantaneous Trip	300 A	MGL26300	MJL26300	AL800M23K (3) 3/0–500 Al/Cu
		350 A	MGL26350	MJL26350	
		400 A	MGL26400	MJL26400	
		450 A	MGL26450	MJL26450	
		500 A	MGL26500	MJL26500	
		600 A	MGL26600	MJL26600	
		700 A	MGL26700	MJL26700	
		800 A	MGL26800	MJL26800	
3P, 600 Vac 50/60 Hz					
Basic	Fixed Long-time, Adjustable Instantaneous Trip	300 A	MGL36300	MJL36300	AL800M23K (3) 3/0–500 Al/Cu
		350 A	MGL36350	MJL36350	
		400 A	MGL36400	MJL36400	
		450 A	MGL36450	MJL36450	
		500 A	MGL36500	MJL36500	
		600 A	MGL36600	MJL36600	
		700 A	MGL36700	MJL36700	
		800 A	MGL36800	MJL36800	

Table 7.70: Termination Options

Termination Letter	Termination Option
A	I-Line (See Section 9)
F	No lugs
L	Lugs both ends
M	Lugs ON end, terminal nut kit OFF end
P	Lugs OFF end, terminal nut kit ON end

M G **L** 3 6 4 0 0
For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number.

Table 7.71: Frame Interrupting Ratings

Voltage	Interrupting Rating			
	D	G	J	L
240 Vac	25 kA	65 kA	100 kA	125 kA
480 Vac	18 kA	35 kA	65 kA	100 kA
600 Vac	14 kA	18 kA	25 kA	50 kA

Accessories see page 7-53
Optional Lugs see page 7-58
Dimensions see page 7-74
Enclosures see page 7-75

[33] The ET 1.0 trip unit cannot be field replaced or have the long-time trip point setting adjusted. It is considered an electronic equivalent of a thermal-magnetic circuit breaker.

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Table 7.72: P-Frame Interrupting Ratings

Voltage	P-Frame Interrupting Rating			
	G	J	K	L
240 Vac	65 kA	100 kA	65 kA	125 kA
480 Vac	35 kA	65 kA	50 kA	100 kA
600 Vac	18 kA	25 kA	50 kA	25 kA

Table 7.73: P-Frame Termination Options

Termination Letter
F = No Lugs (Includes terminal nut kit on both ends)
L = Lugs both ends
M = Lugs ON end, terminal nut kit OFF end
P = Lugs OFF end, terminal nut kit ON end
D = Drawout
A = I-Line (See Section 9)
P G **L** 3 6 0 4 0 U 4 1 A For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number.

Dimensions see page 7-74
Trip Unit Options see page 7-65
Optional Lugs see page 7-58
Alternate Rating Plugs see page 7-67
Enclosures see page 7-75
Accessories see page 7-53

PowerPact P-Frame Molded Case Circuit Breakers

Table 7.74: P-Frame 1200 A (600 Vac, 50/60 Hz) 3P *[34]* Circuit Breaker with Electronic Trip Unit

Electronic Trip Unit			Sensor Rating	Cat. No.*[35]*	Terminal Wire Range
Type	Function	Trip Unit			
Basic Electronic Trip Unit (Not Interchangeable)	Fixed long-time, Adjustable Instantaneous	E-T1.01	600 A	P■L36060	AL800M23K (3) 3/0 AWG–500 kcmil Al or Cu
			800 A	P■L36080	
			1000 A	P■L36100	AL1200P25K (4) 3/0 AWG–500 kcmil Al or Cu
			1200 A	P■L36120	
Micrologic Interchangeable Standard Trip Unit	LI	3.0	250 A	P■L36025(C)U31A	AL800M23K (3) 3/0 AWG–500 kcmil Al or Cu
			400 A	P■L36040(C)U31A	
			600 A	P■L36060(C)U31A	
			800 A	P■L36080(C)U31A	
			1000 A	P■L36100(C)U31A	AL1200P25K (4) 3/0 AWG–500 kcmil Al or Cu
			1200 A	P■L36120(C)U31A	
	LSI	5.0	250 A	P■L36025(C)U33A	AL800M23K (3) 3/0 AWG–500 kcmil Al or Cu
			400 A	P■L36040(C)U33A	
			600 A	P■L36060(C)U33A	
			800 A	P■L36080(C)U33A	
			1000 A	P■L36100(C)U33A	AL1200P25K (4) 3/0 AWG–500 kcmil Al or Cu
			1200 A	P■L36120(C)U33A	
Micrologic Interchangeable Ammeter Trip Unit	LI	3.0A	250 A	P■L36025(C)U41A	AL800M23K (3) 3/0 AWG–500 kcmil Al or Cu
			400 A	P■L36040(C)U41A	
			600 A	P■L36060(C)U41A	
			800 A	P■L36080(C)U41A	
			1000 A	P■L36100(C)U41A	AL1200P25K (4) 3/0 AWG–500 kcmil Al or Cu
			1200 A	P■L36120(C)U41A	
	LSI	5.0A	250 A	P■L36025(C)U43A	AL800M23K (3) 3/0 AWG–500 kcmil Al or Cu
			400 A	P■L36040(C)U43A	
			600 A	P■L36060(C)U43A	
			800 A	P■L36080(C)U43A	
			1000 A	P■L36100(C)U43A	AL1200P25K (4) 3/0 AWG–500 kcmil Al or Cu
			1200 A	P■L36120(C)U43A	
	LSIG	6.0A	250 A	P■L36025(C)U44A	AL800M23K (3) 3/0 AWG–500 kcmil Al or Cu
			400 A	P■L36040(C)U44A	
			600 A	P■L36060(C)U44A	
			800 A	P■L36080(C)U44A	
			1000 A	P■L36100(C)U44A	AL1200P25K (4) 3/0 AWG–500 kcmil Al or Cu
			1200 A	P■L36120(C)U44A	
Micrologic Interchangeable Power Trip Unit	LSI	5.0P	250 A	P■L36025(C)U63AE1	AL800M23K (3) 3/0 AWG–500 kcmil Al or Cu
			400 A	P■L36040(C)U63AE1	
			600 A	P■L36060(C)U63AE1	
			800 A	P■L36080(C)U63AE1	
			1000 A	P■L36100(C)U63AE1	AL1200P25K (4) 3/0 AWG–500 kcmil Al or Cu
			1200 A	P■L36120(C)U63AE1	
	LSIG	6.0P	250 A	P■L36025(C)U64AE1	AL800M23K (3) 3/0 AWG–500 kcmil Al or Cu
			400 A	P■L36040(C)U64AE1	
			600 A	P■L36060(C)U64AE1	
			800 A	P■L36080(C)U64AE1	
			1000 A	P■L36100(C)U64AE1	AL1200P25K (4) 3/0 AWG–500 kcmil Al or Cu
			1200 A	P■L36120(C)U64AE1	
Micrologic Interchangeable Harmonic Trip Unit	LSI	5.0H	250 A	P■L36025(C)U73AE1	AL800M23K (3) 3/0 AWG–500 kcmil Al or Cu
			400 A	P■L36040(C)U73AE1	
			600 A	P■L36060(C)U73AE1	
			800 A	P■L36080(C)U73AE1	
			1000 A	P■L36100(C)U73AE1	AL1200P25K (4) 3/0 AWG–500 kcmil Al or Cu
			1200 A	P■L36120(C)U73AE1	
	LSIG	6.0H	250 A	P■L36025(C)U74AE1	AL800M23K (3) 3/0 AWG–500 kcmil Al or Cu
			400 A	P■L36040(C)U74AE1	
			600 A	P■L36060(C)U74AE1	
			800 A	P■L36080(C)U74AE1	
			1000 A	P■L36100(C)U74AE1	AL1200P25K (4) 3/0 AWG–500 kcmil Al or Cu
			1200 A	P■L36120(C)U74AE1	

[34] For 2P and 4P information see Catalog 0612CT0101.
[35] To complete the catalog number:
Replact the ■ with the appropriate interrupting rating (G, J, K or L).
For all L interrupting ratings, change the 5th character (voltage rating) from a 6 (600 V) to a 4 (480V). The 480 V AIR is standard 100 kA.
For 100% rated circuit breakers, add a “C” in the 9th character place. For example, the catalog number for a 100% rated trip unit with LI trip functions at 250 A would be PBL36025CU31A.

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Table 7.75: R-Frame Interrupting Ratings

Voltage	R-Frame Interrupting Rating			
	G	J	K	L
240 Vac	65 kA	100 kA	65 kA	125 kA
480 Vac	35 kA	65 kA	65 kA	100 kA
600 Vac	18 kA	25 kA	65 kA	50 kA

PowerPact R-Frame Molded Case Circuit Breakers

R-frame circuit breakers can be bus- or cable-connected. For cable connections, optional terminal pad kit RLTB or equivalent bus structure is required. Each RLTB kit contains terminal pads for one end of the circuit breaker only and has provisions for mounting a maximum of 8 lugs per phase (9 lugs for 3000 A). RLTB kits are included with 2500 A 100% rated circuit breakers. The RL3TB kits are included with the 3000 A, 80% and 100% rated circuit breakers. For other circuit breakers, order terminal pad kit (RLTB) and optional lugs separately. See page 7-58–page 7-60.

Table 7.76: R-Frame 3000 A (600 Vac, 50/60 Hz) 3P Circuit Breaker with Electronic Trip Unit

Electronic Trip Unit*[36]*			Sensor Rating	Cat. No. *[37]*
Type	Function	Trip Unit		
Basic Electronic Trip Unit (Not Interchangeable)	Fixed long-time, Adjustable Instantaneous	ET1.0I	1200 A	R■F36120
			1600 A	R■F36160
			2000 A	R■F36200
			2500 A	R■F36250
Micrologic Interchangeable Standard Trip Unit	LI	3.0	600 A	R■F36060(C)U31A
			800 A	R■F36080(C)U31A
			1000 A	R■F36100(C)U31A
			1200 A	R■F36120(C)U31A
			1600 A	R■F36160(C)U31A
			2000 A	R■F36200(C)U31A
			2500 A	R■F36250(C)U31A
			3000 A	R■F36300(C)U31A
	LSI	5.0	600 A	R■F36060(C)U33A
			800 A	R■F36080(C)U33A
			1000 A	R■F36100(C)U33A
			1200 A	R■F36120(C)U33A
			1600 A	R■F36160(C)U33A
			2000 A	R■F36200(C)U33A
			2500 A	R■F36250(C)U33A
			3000 A	R■F36300(C)U33A
Micrologic Interchangeable Ammeter Trip Unit	LI	3.0A	600 A	R■F36060(C)U41A
			800 A	R■F36080(C)U41A
			1000 A	R■F36100(C)U41A
			1200 A	R■F36120(C)U41A
			1600 A	R■F36160(C)U41A
			2000 A	R■F36200(C)U41A
			2500 A	R■F36250(C)U41A
			3000 A	R■F36300(C)U41A
	LSI	5.0A	600 A	R■F36060(C)U43A
			800 A	R■F36080(C)U43A
			1000 A	R■F36100(C)U43A
			1200 A	R■F36120(C)U43A
			1600 A	R■F36160(C)U43A
			2000 A	R■F36200(C)U43A
			2500 A	R■F36250(C)U43A
			3000 A	R■F36300(C)U43A
	LSIG	6.0A	600 A	■F36060(C)U44A
			800 A	R■F36080(C)U44A
			1000 A	R■F36100(C)U44A
			1200 A	R■F36120(C)U44A
			1600 A	R■F36160(C)U44A
			2000 A	R■F36200(C)U44A
			2500 A	R■F36250(C)U44A
			3000 A	R■F36300(C)U44A
Micrologic Interchangeable Power Trip Unit	LSI	5.0P	600 A	R■F36060(C)U63AE1
			800 A	R■F36080(C)U63AE1
			1000 A	R■F36100(C)U63AE1
			1200 A	R■F36120(C)U63AE1
			1600 A	R■F36160(C)U63AE1
			2000 A	R■F36200(C)U63AE1
			2500 A	R■F36250(C)U63AE1
			3000 A	R■F36300(C)U63AE1
	LSIG	6.0P	600 A	R■F36060(C)U64AE1
			800 A	R■F36080(C)U64AE1
			1000 A	R■F36100(C)U64AE1
			1200 A	R■F36120(C)U64AE1
			1600 A	R■F36160(C)U64AE1
			2000 A	R■F36200(C)U64AE1
			2500 A	R■F36250(C)U64AE1
			3000 A	R■F36300(C)U64AE1
Micrologic	LSI	5.0H	600 A	R■F36060(C)U73AE1

[36] For 2P and 4P information see Catalog **0612CT0101**.

[37] To complete the catalog number: Replact the ■ with the appropriate interrupting rating (G, J, K or L).; For 100% rated circuit breakers, add a “C” in the 9th character place. For example, the catalog number for a 100% rated trip unit with LI trip functions at 2500 A would be GF36025CU31A.

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Table 7.76 R-Frame 3000 A (600 Vac, 50/60 Hz) 3P Circuit Breaker with Electronic Trip Unit (cont'd.)

Electronic Trip Unit*[36]*			Sensor Rating	Cat. No. *[37]*
Type	Function	Trip Unit		
Interchangeable Harmonic Trip Unit			800 A	R■F36080(C)U73AE1
			1000 A	R■F36100(C)U73AE1
			1200 A	R■F36120(C)U73AE1
			1600 A	R■F36160(C)U73AE1
			2000 A	R■F36200(C)U73AE1
			2500 A	R■F36250(C)U73AE1
			3000 A	R■F36300(C)U73AE1
	LSIG	6.0H	600 A	R■F36060(C)U74AE1
			800 A	R■F36080(C)U74AE1
			1000 A	R■F36100(C)U74AE1
			1200 A	R■F36120(C)U74AE1
			1600 A	R■F36160(C)U74AE1
			2000 A	R■F36200(C)U74AE1
			2500 A	R■F36250(C)U74AE1
			3000 A	R■F36300(C)U74AE1

[36] For 2P and 4P information see Catalog **0612CT0101**.

[37] To complete the catalog number: Replact the ■ with the appropriate interrupting rating (G, J, K or L).; For 100% rated circuit breakers, add a “C” in the 9th character place. For example, the catalog number for a 100% rated trip unit with LI trip functions at 2500 A would be GF36025CU31A.

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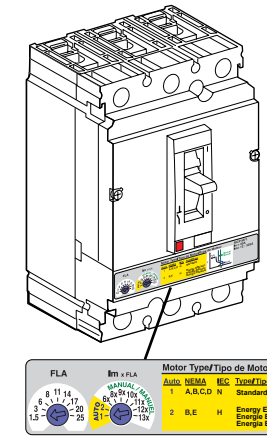

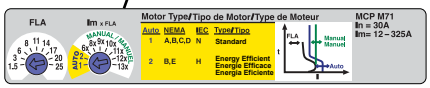

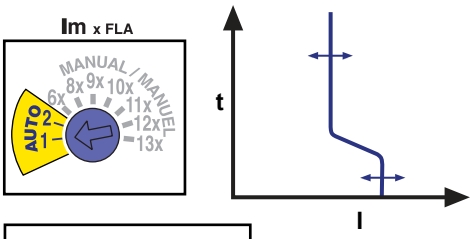

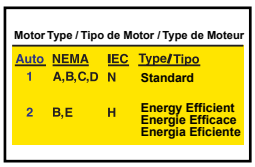

Motor Circuit Protection Selection

PowerPact H- and J-frame electronic Motor Circuit Protectors (MCP) are magnetic-only instantaneous-trip circuit breakers. They are designed to offer short circuit protection and are National Electrical Code (NEC) compliant when installed as part of a combination controller having motor overload protection. MCP circuit breakers accept the same accessories and terminals as the equivalent thermal-magnetic circuit breakers.

Determine the hp rating from the nameplate of the motor. Select a MCP with an ampere rating recommended for the hp and voltage involved. When using the automatic settings the MCP microprocessor automatically adjusts the trip settings for both current and time to align with the start-up characteristic for the motor type, whether it is a standard or energy-efficient motor. This includes a dampening means to accommodate a transient motor in-rush current without nuisance tripping of the circuit breaker.

Table 7.77: H- and J-Frame Electronic Motor Circuit Protectors (MCP)

Frame	Sensor Rating	Full Load Amperes Range	Adjustable Instantaneous Trip Range	Suffix	Interrupting Rating		
					J (See SCCR Table Below) Cat. No.	L (See SCCR Table Below) Cat. No.	R (See SCCR Table Below) Cat. No.
H-Frame	30 A	1.5–25 A	9–325 A	M71	HJL36030M71	HLL36030M71	HRL36030M71
	50 A	14–42 A	84–546 A	M72	HJL36050M72	HLL36050M72	HRL36050M72
	100 A	30–80 A	180–1040 A	M73	HJL36100M73	HLL36100M73	HRL36100M73
	150 A	58–130 A	348–1690 A	M74	HJL36150M74	HLL36150M74	HRL36150M74
J-Frame	250 A	114–217 A	684–2500 A	M75	JJL36250M75	JLL36250M75	JRL36250M75

Table 7.78: Maximum Rating or Setting of Motor Protective Devices *[1]*

Type of Motor		Percentage of Full-load Current	
		Setting	Not to Exceed*[2]*
A, B, C, D	Standard	800%	1300%
B, E	Energy Efficient	1100%	1700%

Table 7.79: MCP Selection by HP Ratings *[3]* **of Induction-type Squirrel-Cage and Wound-Rotor Motors** *[4]*

3Ø 60 Hz Voltages*[5]*				Full-Load Amperes	Suffix
200 Vac	230 Vac	460 Vac	575 Vac		
.5–5	.5–7.5	.75–15	1–20	1.5–25	M71
5–10	5–15	10–30	15–40	14–42	M72
10–25	15–30	25–60	30–75	30–80	M73
20–40	25–50	50–100	60–125	58–130	M74
40–60	50–75	100–150	125–200	114–217	M75

Short Circuit Current Rating (SCCR)

Tested to meet NEC and UL508A requirements for short circuit current ratings as part of an approved combination controller.

Table 7.80: Short Circuit Current Ratings (SCCR)

Contactor/Starter	Interrupting Rating					
	J			L		
	200–240 Vac	480 Vac	600 Vac	200–240 Vac	480 Vac	600 Vac
Tesys D-line and F-line	100 kA	65 kA	25 kA	125 kA	100 kA	50 kA
NEMA Type S	100 kA	65 kA	25 kA	125 kA	100 kA	50 kA

See www.us.schneider-electric.us for specific ratings and combination ID numbers.

To select combination starters and motor controllers using MCP's Meeting NEC Article 430, refer to Section 16.

Accessories see page 7-53
Lugs see page 7-58
Dimensions see page 7-74
Enclosures see page 7-75

[1] Based on 2005 NEC Table 430.52.
[2] See NEC Exception No. 1 to Table 430.52. The NEC 1300% maximum setting may be inadequate for instantaneous trip circuit breakers to withstand current surges typical of the magnetization current of autotransformer type reduced voltage starters, or open transition wye-delta starters during transfer from "start" to "run," constant hp multi-speed motors, and motors labeled "high efficiency."
[3] Based on 2005 NEC Table 430.250.
[4] Per NEC 430.3, part-winding motors should select two circuit breakers, each at not more than one-half the allowable trip setting for the horsepower rating. The two circuit breakers should operate simultaneously as a disconnecting means per NEC 430.103.
[5] Listed voltages are rated motor voltages. Corresponding system voltages are 200 Vac, 220–240 Vac, 440–480 Vac and 550–600 Vac. Select wire and circuit breakers based on horsepower rather than nameplate full-load current per NEC 430.6 (A) for general motor applications.

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H-, J-Frame Motor Circuit Protectors

Table 7.81: Application of PowerPact™ H-Frame and J-Frame Electronic Motor Circuit Protectors (MCP)

Horsepower Rating of Induction-Type Squirrel-Cage and Wound-Rotor Motors 3Ø 60 Hz					NEC Full Load Amperes	PowerPact H-Frame and J-Frame Electronic MCP	
Starter Size	200 Vac	230 Vac	480 Vac	575 Vac			
				1/2	0.9 A	HJL36030M71 and HLL36030M71 1/2–10 hp	
			1/2		1.1 A		
				3/4	1.3 A		
			3/4	1	1.7 A		
			1		2.1 A		
		1/2			2.2 A		
				1-1/2	2.4 A		
	1/2				2.5 A		
				2	2.7 A		
			1-1/2		3 A		
00		3/4			3.2 A		
			2		3.4 A		
	3/4				3.7 A		
				3	3.9 A		
		1			4.2 A		
	1				4.8 A		
			3		4.8 A		
		1-1/2			6 A		
				5	6.1 A		
		2			6.8 A		
	1-1/2				6.9 A		
			5		7.6 A		
	2				7.8 A		
0				7-1/2	9 A		
		3			9.6 A		
	3		7-1/2	10	11 A		
			10		14 A		HJL36050M72 and HLL36050M72 10–25 hp
		5			15.2 A		
				15	17 A		
1	5				17.5 A		
			15		21 A		
		7-1/2		20	22 A		
	7-1/2				25.3 A		
			20	25	27 A		
2		10			28 A		
				30	32 A	HJL36100M73 and HLL36100M73 15–50 hp	
	10				32.2 A		
			25		34 A		
			30		40 A		
				40	41 A		
		15			42 A		
	15				48.3 A		HJL36150M74 and HLL36150M74 30–100 hp
3			40	50	52 A		
		20			54 A		
	20			60	62 A		
			50		65 A		
		25			68 A		
			60	75	77 A		
	25				78.2 A		
		30			80 A		
	30				92 A		
4			75		96 A		
				100	99 A		
		40			104 A		
	40				120 A	JJL36250M75 and JLL36250M75 50–150 hp	
			100		124 A		
				125	125 A		
		50			130 A		
				150	144 A		
	50				150 A		
5		60			154 A		
			125		156 A		
	60				177.1 A		
			150		180 A		
		75		200	192 A		
	75				221 A		
			200		240 A		
		100			248 A		

Shaded area is not covered by J-frame electronic motor circuit protector.

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Instantaneous Trip Circuit Breakers

Adjustable instantaneous-trip circuit breakers are intended for use in combination with motor starters with overload relays for the protection of motor circuits from short circuits. Other specific applications include rectifiers and resistance welders. These circuit breakers contain a magnetic trip element in each pole with the trip point adjustable from the front. Interrupting ratings are determined by testing the instantaneous-trip circuit breakers in combination with a contactor and overload relay.

Select instantaneous-trip circuit breakers as follows:

This selection table is suitable for motors, other than NEMA Design E, with locked-rotor indicating code letters per NEC® Table 430.7 (b) as follows:

Table 7.82: Locked-Rotor Indicating Codes

Horsepower	Motor Code Letter
1/2 or less	A–L
3/4 to 1-1/2	A–K
2 to 3	A–J
5 to 25	A–H
30 to 125	A–G
150 or more	A–F

- For other motors order a special thermal-magnetic circuit breaker with magnetic trip settings for the specific motor— specify motor horsepower, voltage, frequency, full-load current and code letter or locked rotor current.
- Determine motor hp rating from the motor nameplate.
- Refer to the tables and select an instantaneous-trip circuit breaker with an ampere rating recommended for the hp and voltage involved.
- Select an adjustable trip setting of at least 800%, not to exceed 1300%, of the motor full-load amperes (FLA) for other than Design E motors. For Design E motors, select an adjustable trip setting of at least 1100% not to exceed 1700% of FLA.
- The NEC 1300% maximum setting may be inadequate for instantaneous-trip circuit breakers to withstand current surges typical of the magnetization current of autotransformer type reduced voltage starters, or open transition wye-delta starters during transfer from “start” to “run,” constant hp multi-speed motors, and motors labeled “high efficiency.” Select thermal-magnetic circuit breakers from page 7-46 for those applications.
- Part-winding motors, per NEC 430.3, should have two circuit breakers selected from the above at not more than one half the allowable trip setting for the horsepower rating. The two circuit breakers should operate simultaneously as a disconnecting means per NEC 430.103.
- Based on NEC 430.52 and NEC Table 430.150. See page 7-44 for available Adjustable Instantaneous-Trip Circuit Breakers.

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Motor Circuit Protector

Motor Protector Circuit Breaker

Motor Circuit Protectors

Mag-Gard™ Motor Circuit Protectors (MCP) are instantaneous-trip magnetic-only circuit breakers. They have a single adjustment which simultaneously sets the magnetic trip level of each individual pole. Mag-Gard™ circuit breakers comply with NEC requirements for providing motor circuit protection when installed as part of a UL Listed combination controller having motor overload protection. Interrupting ratings are established for these UL Recognized Components only when they are used in combination with motor starters with properly sized overload relays and contactors.

All Mag-Gard circuit breakers will accept the same lugs and accessories as equivalent circuit breakers. Mag-Gard circuit breakers are available with I-Line construction *[6]*. High-interruption (H) construction Mag-Gard circuit breakers (LHL) are also available.

Table 7.83: Magnetic Only 3 Pole, 600 Vac, 50/60 Hz *[6]*—Three Device Solutions *[7]*

Ampere Rating		Trip Unit	Adjustable *[8]* Trip Range (A)	250 Vdc Multiplier	Cat. No.
LAL	400	—	500–1000 A 750–1600 A 1000–2000 A 1125–2250 A 1250–2500 A 1500–3000 A 1750–3500 A 2000–4000 A	High = 1.2 Low = 1.4	LAL3640022M LAL3640028M LAL3640030M LAL3640031M LAL3640032M LAL3640033M LAL3640035M LAL3640036M

For PowerPact L- and P-Frames, an instantaneous-only version of the electronic trip circuti breaker is also available for motor circuit protection. These MCPs comply with NEC® requirements for providing short-circuit protection when installed as part of a Listed combination controller having motor overload protection.

Table 7.84: Magnetic Only 3 Pole, 600 Vac, 50/60 Hz *[6]*—Three Device Solutions *[7]*

Sensor Rating		Trip Unit	Adjustable *[8]* Trip Range (A)	Interrupting Rating			
				G	J	L	R
PowerPact L-Frame *[6]*	400	1.3 M	500–1200%	LGL36400M37X	LJL36400M37X	LLL36400M37X	LRL36400M37X
	600		500–1200%	LGL36600M37X	LJL36600M37X	LLL36600M37X	LRL36600M37X
PowerPact PJL, PLL *[6]*	600	—	1200–10000 A	—	PJL36060M68	PLL34060M68	—
	800	—	1200–10000 A	—	PJL36080M68	PLL34080M68	—
	1000	—	1500–10000 A	—	PJL36100M69	PLL34100M69	—
	1200	—	1800–10000 A	—	PJL36120M70	PLL34120M70	—

Motor Protector Circuit Breakers

Motor protection circuit breakers provide built-in thermal and magnetic protection. They are used in two-device motor feeder solutions to provide protection against short-circuits, overloads, and phase unbalance.

Table 7.85: H-Frame (150 A), J-Frame (250 A) and L-Frame (600 A) Electronic Motor Protector Circuit Breakers (UL Ratings)—Two Device Solutions *[9]*

Electronic Trip Unit Type	Frame	Sensor Rating	Trip Unit	Full Load Amperes Range (FLA)	Isd (x FLA)	Interrupting Rating			
						G	J	L	R
Standard *[10]*	H-Frame	30	2.2 M	14–25	5-13 x FLA	HGL36030M38X	HJL36030M38X	HLL36030M38X	HRL36030M38X
		50		14–42	5-13 x FLA	HGL36050M38X	HJL36050M38X	HLL36050M38X	HRL36050M38X
		100		30–80	5-13 x FLA	HGL36100M38X	HJL36100M38X	HLL36100M38X	HRL36100M38X
		150		58–130	5-13 x FLA	HGL36150M38X	HJL36150M38X	HLL36150M38X	HRL36150M38X
	J-Frame	250		114–217	5-13 x FLA	JGL36250M38X	JJL36250M38X	JLL36250M38X	JRL36250M38X
	L-Frame	400	2.3 M	190–348	5-13 x FLA	LGL36400M38X	LJL36400M38X	LLL36400M38X	LRL36400M38X
		600		312–520	5-13 x FLA	LGL36600M38X	LJL36600M38X	LLL36600M38X	LRL36600M38X

Accessories see page 7-53 and Supplemental Digest Section 3
Optional Lugs see page 7-58 and Supplemental Digest Section 3
Dimensions see page 7-74
Enclosures see page 7-75

To select combination starters and motor controllers using MCP's meeting NEC Article 430, refer to Section 16.

[6] These electronic magnetic-only motor circuit protectors are available with I-Line constructions. Consult the factory.
[7] Three-device solutions are the traditional solutionss: motor circuit protector plus motor starter plus overload relay.
[8] UL magnetic trip tolerances are -20%/+30% from the nominal values shown.
[9] Two-device solutions (these electronic motor protector circuit breakers include short circuit and overload protection)
—1 electronic motor circuit protector with a Micrologic 2.2 M plus
—1 contactor
[10] The standard trip unit offers Class 5, 10 and 20 and phase unbalance or phase loss protection.

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Table 7.86: PowerPact H- and L-Frame Motor Protector Circuit Breaker

Hp Ratings of Induction Type Squirrel-Cage and Wound Rotor Motors 3Ø 60 Hz				Full Load Amperes[11]	PowerPact Family Motor Protector Circuit Breaker Cat. No. [12]	Magnetic Trip Settings[13]	
200 Vac	230 Vac	460 Vac	575 Vac			MIN	MAX
		10		14	H( )L36030M38X	500%	1300%
	5			15.2	H( )L36030M38X		
			15	17	H( )L36030M38X		
5				17.5	H( )L36030M38X		
		15		21	H( )L36030M38X	500%	1300%
	7-1/2		20	22	H( )L36030M38X		
7-1/2				25.3	H( )L36030M38X		
		20	25	27	H( )L36050M38X		
	10			28	H( )L36050M38X	500%	1300%
			30	32	H( )L36050M38X		
10				32.2	H( )L36050M38X		
		25		34	H( )L36050M38X		
		30		40	H( )L36050M38X	500%	1300%
			40	41	H( )L36050M38X		
	15			42	H( )L36050M38X		
15				48.3	H( )L36100M38X		
		40	50	52	H( )L36100M38X	500%	1300%
	20			54	H( )L36100M38X		
20			60	62	H( )L36100M38X		
		50		65	H( )L36100M38X		
75				221	L( )L36400M38X	500%	1300%
		200		240	L( )L36400M38X		
			250	242	L( )L36400M38X		
	100			248	L( )L36400M38X		
100				285	L( )L36400M38X	500%	1300%
			300	289	L( )L36400M38X		
		250		302	L( )L36400M38X		
	125			312	L( )L36400M38X		
			350	336	L( )L36400M38X	500%	1300%
125				359	L( )L36600M38X		
	150			360	L( )L36600M38X		
		300		361	L( )L36600M38X		
			400	382	L( )L36600M38X	500%	1300%
150		350		414	L( )L36600M38X		
			500	472	L( )L36600M38X		
		400		477	L( )L36600M38X		
	200			480	L( )L36600M38X		

Table 7.87: LAL Adjustable Instantaneous-Trip Circuit Breakers for Single Motor Circuit Protection

Hp Ratings of Induction Type Squirrel-Cage and Wound Rotor Motors 3Ø 60 Hz				Full Load Amperes[11]	Mag-Gard Circuit Breaker Cat. No.	Magnetic Trip Settings[13]	
200 Vac	230 Vac	460 Vac	575 Vac			MIN	MAX
75				221	LAL3640033M	700%	1400%
		200		240	LAL3640035M	700%	1500%
			250	242	LAL3640035M	700%	1400%
	100			248	LAL3640035M	700%	1400%
100				285	LAL3640036M	700%	1400%
			300	289	LAL3640036M	700%	1400%
		250		302	LAL3640036M	700%	1300%
	125			312	LAL3640036M	600%	1300%

[11] Motor full-load currents are taken from NEC Table 430.150. Select wire and circuit breakers on basis of horsepower rather than nameplate full-load current per NEC 430.6 (A) for general motor applications. Do not use these values to select overload relay thermal units. See Digest Secti0on 14 for selection of thermal units when actual full load current is not known. The voltages listed are rated motor voltages. Corresponding nominal system voltages are 200–208, 220–240, 440–480 and 550–600 V.

[12] To complete catalog number, replace the blank with the appropriate rating (G, J, L or R).

[13] Only MIN and MAX settings are shown, intermediate settings are available on all circuit breakers.

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Motor Circuit Protection Selection

Table 7.88: Selection Tables for Conductors, Safety Switches and Thermal-Magnetic Circuit Breakers Based on 2005 NEC® Tables 430.147, 430.148 & 430.150

Horsepower Ratings									Full Load Amperage [14]	Amperage of Thermal-Magnetic [15][16] Inverse Time Circuit Breaker			QMB and Heavy Duty Switch with Time Delay Fuses [17]	Minimum Size metallic Conduit 75° C, C Wire Field-Installed Sized for 125% FLA [18]		
Squirrel-Cage and Wound-Rotor Motors with Norm. Torque Characteristics Operating at Usual Speeds				1Ø 10 Hz ac			Average Direct Current Motors Operating at Base Speed			For Motor Code Letter B to E		For Motor Code Letter F to V [19]		AWG kcmil	Conduit 3 W	
3Ø 60 Hz										Ordinary Service [20]	Heavy Service and Energy Efficient [21]				THHN THWN XHHW	THW
200 Vac [22]	230 Vac	460 Vac	575 Vac	115 Vac	200 Vac [22]	230 Vac	120 Vdc	240 Vdc								
						3/4			6.9 A	15 A	15 A	20 A	30 A	14	1/2 in.	N/A
				1/3					7.2 A							
		5					3.4		7.6 A		20 A					
2									7.8 A							
					3/4				7.9 A							
						1			8.0 A							
								2	8.5 A							
			7-1/2						9.0 A			25 A				
					1				9.2 A							
							1		9.5 A							
	3								9.6 A							
				1/2					9.8 A							
						1-1/2			10.0 A	20 A						
3		7-1/2	10						11.0 A		25 A	30 A				
					1-1/2				11.5 A							
						2			12.0 A							
								3	12.2 A	25 A		35 A				
							1-1/2		13.2 A							
				3/4	2				13.8 A							
		10							14.0 A							
	5								15.2 A	30 A	35 A	40 A				
				1					16.0 A							
			15			3	2		17.0 A			45 A		12	1/2 in.	N/A
5									17.5 A	35 A						
					3				19.6 A		40 A	50 A				
				1-1/2				5	20.0 A	40 A						
		15							21.0 A		45 A	60 A				
	7-1/2								22.0 A							
				2					24.0 A	45 A	50 A					
							3		25.0 A	50 A		70 A		10	1/2 in.	N/A
7-1/2									25.3 A		60 A					
		20	25						27.0 A							
	10				5				28.0 A							
								7-1/2	29.0 A	60 A		80 A				
			30						32.0 A		70 A					
10									32.2 A			90 A	60 A			
		25		3					34.0 A					8	1/2 in. [23]	N/A
								10	38.0 A	80 A	80 A	100 A				
						7-1/2	5		40.0 A							
									41.0 A		90 A	110 A				
	15								42.0 A							
					7–1/2				46.0 A	90 A	110 A	125 A		6	3/4 in.	1 in.
15									48.3 A							
						10			50.0 A							
		40	50						52.0 A							
	20								54.0 A			150 A				
								15	55.0 A							
				5					56.0 A							
					10				57.5 A		125 A					
							7-1/2		58.0 A					4	1 in.	1 in.
			60						62.0 A	100 A		175 A	100 A			
20									62.1 A							
		50							65.0 A		150 A					
	25								68.0 A							
								20	72.0 A	110 A		200 A				
							10		76.0 A	125 A	175 A			3	1 in.	1-1/4 in.
		60	75						77.0 A	110 A						

[14] Motor full load currents thru 200 hp are taken from NEC Tables 430.147, 148 and 150. Above 200 hp from UL 98. Select wire size, circuit breakers, or fuses on basis of hp rather than nameplate full load current per NEC 430.6. Do not use these values to select overload relay thermal units. See Digest pages 16-129—16152 for selection of thermal units when actual full load current is not known. Voltages listed are rated motor voltages. Corresponding nominal system voltages are 110–120 V, 200–208 V, 220–240 V, 440–480 V and 550–600 V

[15] Thermal-magnetic circuit breaker ampere ratings recommended are approximate for average conditions, based on trip characteristics of Square D circuit breakers and NEC Table 430.52. Under some conditions, the next size larger switch or circuit breaker rating may be necessary to accommodate the motor starting current and is permitted by NEC 430.52(C)(1) Exception 2. High starting currents are anticipated with Design E and other energy efficient motors. For explanation of Code letter markings, see NEC 430.7(B). For Busway Plug-in units, see page 9-7.

[16] Type LC, LI, LX, LXI, and LE circuit breakers are NOT recommended for use on single motor branch circuits.

[17] Switch size only is shown in table. Selected fuses should not exceed maximum percent of full-load current as given in NEC Table 430.52. Above 50 hp dc switches are not hp rated by UL as Motor Circuit Switches, but as General Use Switches only and are not necessarily capable of interrupting the max. operating overload current of a motor. See NEC 100 for definition of General Use Switch. When protecting a 3Ø, Design E energy efficient motor, the switch is required by NEC 430.109 to have a hp rating of not less than 1.4 times that of a motor rated 3–100 hp, or not less than 1.3 times that of a motor rated over 100 hp. Switches shown in this table do not necessarily comply with that requirement.

[18] NEC 430.22 for Single Motor, Smaller conductors may be permitted for light duty-cycle service per 430.22 (B) Exception No. 1. DC motors operating from rectified 1Ø power supply will require larger conductors per 430.22 (A) Exception No. 1. For motor-generator arc welders, see 630.11

[19] Thermal-magnetic breaker ampere ratings recommended are approximate for average conditions and based on trip characteristics of Square D circuit breakers and NEC Tables 430.7(B) and 430.52.

[20] Ordinary service for normal starting duty only, acceleration time of 10 sec. or less.

[21] Heavy service is jogging or plugging duty or cycling load with over 25 starts per hour or over 5 starts per minute. Energy efficient motors are polyphase motors defined in NEMA Standard MG1 and exhibit high starting current.

[22] 200 V motors are commonly used on 208 V services.

[23] 8 XHHW requires 3/4 in. conduit for 3W.

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Table 7.88 Selection Tables for Conductors, Safety Switches and Thermal-Magnetic Circuit BreakersBased on 2005 NEC® Tables 430.147, 430.148 & 430.150 (cont'd.)

Horsepower Ratings									Full Load Amperage *[14]*	Amperage of Thermal-Magnetic *[15][16]* Inverse Time Circuit Breaker			QMB and Heavy Duty Switch with Time Delay Fuses *[17]*	Minimum Size metallic Conduit 75° C, C Wire Field-Installed Sized for 125% FLA *[18]*		
Squirrel-Cage and Wound-Rotor Motors with Norm. Torque Characteristics Operating at Usual Speeds				1Ø 10 Hz ac			Average Direct Current Motors Operating at Base Speed			For Motor Code Letter B to E		For Motor Code Letter F to V *[19]*		AWG kcmil	Conduit 3 W	
3Ø 60 Hz										Ordinary Service *[20]*	Heavy Service and Energy Efficient *[21]*				THHN THWN XHHW	THW
200 Vac *[22]*	230 Vac	460 Vac	575 Vac	115 Vac	200 Vac *[22]*	230 Vac	120 Vdc	240 Vdc								
25									78.2 A							
	30			7-1/2					80.0 A							
								25	89.0 A	125 A		225 A	200 A	2	1 in.	1-1/4 in.
30									92.0 A		200 A	250 A				
		75							96.0 A					1	1-1/4 in.	1-1/2 in.
			100						99.0 A	150 A						
				10					100.0 A							
	40								104.0 A		225 A	300 A				
								30	106.0 A	175 A				1/0	1-1/4 in.	1-1/2 in.
40									120.0 A		250 A					
		100							124.0 A	200 A		350 A		2/0	1-1/2 in.	1-1/2 in.
			125						125.0 A		250 A					
	50								130.0 A		300 A					
								40	140.0 A							
			150						144.0 A			400 A		3/0	1-1/2 in.	2 in.
50									150.0 A							
	60								154.0 A	225 A	350 A					
		125							156.0 A							
								50	173.0 A	250 A			400 A	4/0	2 in.	2 in.
60									177.0 A		400 A	500 A				
		150							180.0 A							
	75		200						192.0 A					250	2 in.	2 in.
75									221.0 A	300 A	450 A	600 A		300	2 in.	2-1/2 in.
		200							240.0 A							
			250						242.0 A	350 A	500 A	700 A		350	2-1/2 in.	2-1/2 in.
	100								248.0 A							
100									285.0 A		600 A					
			300						289.0 A	400 A		800 A		500	3 in.	3 in.
		250							302.0 A		700 A					
	125								312.0 A	450 A				(2) 3/0	(2) 2-1/2 in.	(2) 2 in.
			350						336.0 A	500 A		900 A		(2) 4/0	(2) 2 in.	(2) 2 in.
125									359.0 A							
	150								360.0 A	600 A	800 A					
		300							361.0 A			1000 A				
			400						382.0 A				600 A	(2)300	(2) 2 in.	(2) 2-1/2 in.
150		350							414.0 A		900 A					
				500					472.0 A			1200 A				
			400						477.0 A	800 A	1000 A			(2) 350	(2) 2-1/2 in.	(2) 2-1/2 in.
		200							480.0 A							
200									552.0 A							
		500							590.0 A		1200 A	1600 A	—	(3) 300	(3) 2 in.	(3) 2-1/2 in.
	250								602.0 A	900 A						

Contact your local Field Office for circuit breaker selection on constant horsepower multi-speed motors.

[14] Motor full load currents thru 200 hp are taken from NEC Tables 430.147, 148 and 150. Above 200 hp from UL 98. Select wire size, circuit breakers, or fuses on basis of hp rather than nameplate full load current per NEC 430.6. Do not use these values to select overload relay thermal units. See Digest pages 16-129—16152 for selection of thermal units when actual full load current is not known. Voltages listed are rated motor voltages. Corresponding nominal system voltages are 110–120 V, 200–208 V, 220–240 V, 440–480 V and 550–600 V

[15] Thermal-magnetic circuit breaker ampere ratings recommended are approximate for average conditions, based on trip characteristics of Square D circuit breakers and NEC Table 430.52. Under some conditions, the next size larger switch or circuit breaker rating may be necessary to accommodate the motor starting current and is permitted by NEC 430.52(C)(1) Exception 2. High starting currents are anticipated with Design E and other energy efficient motors. For explanation of Code letter markings, see NEC 430.7(B). For Busway Plug-in units, see page 9-7.

[16] Type LC, LI, LX, LXI, and LE circuit breakers are NOT recommended for use on single motor branch circuits.

[17] Switch size only is shown in table. Selected fuses should not exceed maximum percent of full-load current as given in NEC Table 430.52. Above 50 hp dc switches are not hp rated by UL as Motor Circuit Switches, but as General Use Switches only and are not necessarily capable of interrupting the max. operating overload current of a motor. See NEC 100 for definition of General Use Switch. When protecting a 3Ø, Design E energy efficient motor, the switch is required by NEC 430.109 to have a hp rating of not less than 1.4 times that of a motor rated 3–100 hp, or not less than 1.3 times that of a motor rated over 100 hp. Switches shown in this table do not necessarily comply with that requirement.

[18] NEC 430.22 for Single Motor, Smaller conductors may be permitted for light duty-cycle service per 430.22 (B) Exception No. 1. DC motors operating from rectified 1Ø power supply will require larger conductors per 430.22 (A) Exception No. 1. For motor-generator arc welders, see 630.11

[19] Thermal-magnetic breaker ampere ratings recommended are approximate for average conditions and based on trip characteristics of Square D circuit breakers and NEC Tables 430.7(B) and 430.52.

[20] Ordinary service for normal starting duty only, acceleration time of 10 sec. or less.

[21] Heavy service is jogging or plugging duty or cycling load with over 25 starts per hour or over 5 starts per minute. Energy efficient motors are polyphase motors defined in NEMA Standard MG1 and exhibit high starting current.

[22] 200 V motors are commonly used on 208 V services.

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J-Frame Switch

L-Frame Switch

PowerPact Automatic Switches

Automatic molded case switches open instantaneously at a factory preset magnetic trip point, calibrated to protect only the molded case switch itself, when it is subjected to high fault currents. The trip point is nonadjustable and provides no overload or low level fault protection.

Molded case switches open when the handle is switched to the OFF position or in response to an auxiliary tripping device such as a shunt trip.

All molded case switches will accept the same lugs and accessories as equivalent thermal-magnetic circuit breakers, with the exception of Q-frame switches which do not have electrical accessories available.

Automatic molded case switches are UL Listed per UL 489 and are CSA Certified.

Table 7.89: PowerPact™ B-Frame Automatic Molded Case Switches, 600 Vac

Circuit Breaker	Poles	Ampere Rating	D Withstand		G Withstand		J Withstand		Terminal	Wire Range
			Cat. No.	Trip Point	Cat. No.	Trip Point	Cat. No.	Trip Point		
B-Frame	2 *[1]*	125 A	BDL26000S12	1625 A	BGL26000S12	1625 A	BJL26000S12	1625 A	LV426973	14–2/0 AWG Cu
	3	125 A	BDL36000S12	1625 A	BGL36000S12	1625 A	BJL36000S12	1625 A	LV426974	14–2/0 AWG Cu

Table 7.90: H-, J-, and L-Frame PowerPact™ Automatic Molded Case Switches, 600 Vac

Circuit Breaker	Poles	Ampere Rating	G Withstand		L Withstand		R Withstand		Terminal	Wire Range
			Cat. No.	Trip Point	Cat. No.	Trip Point	Cat. No.	Trip Point		
H-Frame J-Frame	2	150 A	HGL26000S15 *[1]*	2250 A	HLL26000S15	2250 A	—	—	AL150HD	14 AWG–3/0 AWG Al/Cu
		175 A	JGL26000S17	3125 A	JLL26000S17	3125 A	—	—	AL175JD	4–4/0 AWG Al/Cu
		250 A	JGL26000S25	3125 A	JLL26000S25	3125 A	—	—	AL250JD	3/0 AWG–350 kcmil Al/Cu
	3	150 A	HGL36000S15	2250 A	HLL36000S15	2250 A	—	—	AL150HD	14 AWG–3/0 AWG Al/Cu
		175 A	JGL36000S17	3125 A	JLL36000S17	3125 A	JRL36000S17	3125 A	AL175JD	4–4/0 AWG Al/Cu
		250 A	JGL36000S25	3125 A	JLL36000S25	3125 A	JRL36000S25	3125 A	AL250JD	3/0 AWG–350 kcmil Al/Cu
L-Frame	3	400 A	LGL36000S40X	4800 A	LLL36000S40X	4800 A	LRL36000S40X	4800 A	AL150HD	AL600LS52K3 (2) 2/0 AWG–500 kcmil Al/Cu
		600 A	LGL36000S60X	6600A	LLL36000S60X	6600 A	LRL36000S60X	6600 A	AL250JD	
	4	400 A	LGL46000S40X	4800 A	LLL46000S40X	4800 A	LRL46000S40X	4800 A	AL150HD	AL600LS52K4 (2) 2/0 AWG–500 kcmil Al/Cu
		600 A	LGL46000S60X	6600A	LLL46000S60X	6600 A	LRL46000S60X	6600 A	AL250JD	

Table 7.91: P-Frame and R-Frame PowerPact™ Automatic Molded Case Switches *[2]*, 600 Vac

Frame	Poles	Ampere Rating	J Withstand		K Withstand		L Withstand		Terminal	Wire Range
			Cat. No.	Trip Point	Cat. No.	Trip Point	Cat. No.	Trip Point		
P	2	600 A	PJL26000S60	10 kA	PKL26000S60	24 kA	PLL24000S60 *[3]*	10 kA	AL800M23K	(3) 3/0 AWG–500 kcmil Al or Cu
		800 A	PJL26000S80	10 kA	PKL26000S80	24 kA	PLL24000S80 *[3]*	10 kA		
		1000 A	PJL26000S10	10 kA	PKL26000S10	24 kA	PLL24000S10 *[3]*	10 kA	AL1200P25K	(4) 3/0 AWG–500 kcmil Al or Cu
		1200 A	PJL26000S12	10 kA	PKL26000S12	24 kA	PLL24000S12 *[3]*	10 kA		
	3	600 A	PJL36000S60	10 kA	PKL36000S60	24 kA	PLL34000S60 *[3]*	10 kA	AL800M23K	(3) 3/0 AWG–500 kcmil Al or Cu
		800 A	PJL36000S80	10 kA	PKL36000S80	24 kA	PLL34000S80 *[3]*	10 kA		
		1000 A	PJL36000S10	10 kA	PKL36000S10	24 kA	PLL34000S10 *[3]*	10 kA	AL1200P25K	(4) 3/0 AWG–500 kcmil Al or Cu
		1200 A	PJL36000S12	10 kA	PKL36000S12	24 kA	PLL34000S12 *[3]*	10 kA		
R	2	1200 A	—	—	RKF26000S12	57 kA	RLF26000S12	48 kA	R-frame circuit breakers can be bus-connected or cable-connected. For cable connections, RLTB kit or equivalent bus structure is required. Kit is included with 3000 A switches. For all others, see page 7-61.	
		1600 A	—	—	RKF26000S16	57 kA	RLF26000S16	48 kA		
		2000 A	—	—	RKF26000S20	57 kA	RLF26000S20	48 kA		
		2500 A	—	—	RKF26000S25	57 kA	RLF26000S25	48 kA		
	3	1200 A	—	—	RKF36000S12	57 kA	RLF36000S12	48 kA		
		1600 A	—	—	RKF36000S16	57 kA	RLF36000S16	48 kA		
		2000 A	—	—	RKF36000S20	57 kA	RLF36000S20	48 kA		
		2500 A	—	—	RKF36000S25	57 kA	RLF36000S25	48 kA		
		3000 A	—	—	RKF36000S30	57 kA	RLF36000S30	48 kA		

Accessories see page 7-53 and Supplemental Digest Section 3
Optional Lugs see page 7-58 and Supplemental Digest Section 3
Dimensions see page 7-73 and page 7-74
Enclosures see page 7-75

Table 7.92: Q-Frame (240 Vac) PowerPact™ Automatic Molded Case Switches

Circuit Breaker	Poles	Ampere Rating	J Withstand		Wire Range
			Cat. No.	Trip Point	
Q-Frame *[4]*	2	225 A	QBL22000S22	4500 A	4 AWG–300 kcmil
	3	225 A	QBL32000S22	4500 A	

Table 7.93: B-, H-, J-, L- P-, and R-Frame Withstand Ratings *[5]*

Voltage	Withstand					
	D	G	J	K	L	R
240 Vac	25 kA	65 kA	100 kA	65 kA	125 kA	200 kA
480 Vac	18 kA	35 kA	65 kA	50 kA *[6]*	100 kA	200 kA
600 Vac	14 kA	18 kA	25 kA	50 kA *[6]*	50 kA	100 kA

[1] True 2P device. Others are a 2P in a 3P module.
[2] UL magnetic trip tolerances are -20% / +30% from the nominal values shown.
[3] P-frame L-interrupting is available in 480 Vac only.
[4] Withstand rating of 10 kA at 240 Vac.
[5] The withstand rating is the fault current at rated voltage that the molded case switch will withstand without damage when protected by a circuit breaker with an equal continuous current rating.
[6] B- and R-frame withstand is 65 kA.

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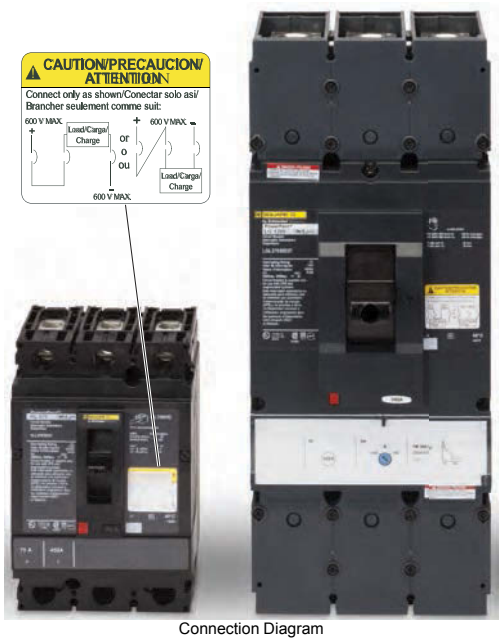

Connection Diagram

Table 7.94: Termination Options

Termination Letter	Termination Option
L	Lugs Both Ends
F	No Lugs (bus bar connection)
S	Rear Connection

JGL37125D81–Place termination letter in third block of circuit breaker catalog number.

New!

500 Vdc Circuit Breakers

The UL Listed thermal-magnetic molded case circuit breakers shown below are specifically designed for use on ungrounded dc systems having a maximum short-circuit voltage of 500 Vdc or a maximum floating (unloaded) voltage of 600 Vdc. The circuit breakers are suitable for use only with UPS (ungrounded uninterruptable power supplies systems).

This two-level voltage rating allows these circuit breakers to be applied to battery sources having a short-circuit availability of 20,000 amperes or 50,000 amperes for PowerPact H-, J-, and L-frame DC circuit breakers at 500 Vdc.

PowerPact H-frame DC circuit breakers have a fixed magnetic trip system. PowerPact J- and L-frame DC circuit breakers are provided with an adjustable magnetic trip that is readily accessible by means of a single adjustment on the face of the circuit breaker.

PowerPact H- and J-frame circuit breakers are UL Listed for the interrupting ratings shown only if applied with three poles connected in series (series connection is external to circuit breaker). (See figure for example of diagram.)

PowerPact L-frame circuit breakers are UL Listed for the interrupting ratings shown with two or three poles connected in series (series connection is external to circuit breaker).

NOTE: Due to external series connection, I-Line™ circuit breakers are not available for this application.

Table 7.95: DC Molded Case Circuit Breakers

Ampere Rating	Circuit Breaker Cat. No.	Fixed Magnetic Trip —DC Amperes	Adjustable Magnetic Trip Range—DC Amperes *[1]*		Interrupting Rating @ 500 Vdc
			Low	High	
30 A	HGL37030D87	450	—	—	20 k AIR
50 A	HGL37050D87	450	—	—	
70 A	HGL37070D87	450	—	—	
100 A	JGL37100D81	—	400	600	20 k AIR
125 A	JGL37125D81	—	400	600	
150 A	JGL37150D81	—	400	600	
175 A	JGL37175D81	—	400	600	
200 A	JGL37200D82	—	500	850	
225 A	JGL37225D82	—	500	850	
250 A	JGL37250D82	—	500	850	20 k AIR
300 A	LGL37030D27	—	750	1500	20 k AIR
350 A	LGL37035D29	—	875	1750	
400 A	LGL37040D30	—	1000	2000	
450 A	LGL37045D31	—	1125	2250	
500 A	LGL37050D32	—	1250	2500	
600 A	LGL37060D33	—	1500	3000	
700 A	LGL47070D35	—	1750	3500	
800 A	LGL47080D36	—	2000	4000	
900 A	LGL47090D86	—	2250	4500	
1000 A	LGL47100D40	—	2500	5000	
1200 A	LGL47120D42	—	3000	6000	
30A	HLL37030D87	450	—	—	50 k AIR
50A	HLL37050D87	450	—	—	
70A	HLL37070D87	450	—	—	
100A	JLL37100D82	—	400	600	50 k AIR
125A	JLL37125D82	—	400	600	
150A	JLL37150D81	—	400	600	
175A	JLL37175D81	—	400	600	
200A	JLL37200D82	—	500	850	
225A	JLL37225D82	—	500	850	
250A	JLL37250D82	—	500	850	
300A	LLL37030D27	—	750	1500	50 k AIR
350A	LLL37035D29	—	875	1750	
400A	LLL37040D30	—	1000	200	
450 A	LLL36045D31	—	1125	2250	
500 A	LLL37050D32	—	1250	2500	
600 A	LLL37060D33	—	1500	3000	
700 A	LLL47070D35	—	1750	3500	
800 A	LLL47080D36	—	2000	4000	
900 A	LLL47090D86	—	2250	4500	
1000 A	LLL47100D40	—	2500	5000	
1200 A	LLL47120D42	—	3000	6000	

Accessories see page 7-53 and Supplemental Digest Section 3
Optional Lugs see page 7-58 and Supplemental Digest Section 3
Dimensions see page 7-74 and Supplemental Digest Section 3
Enclosures see page 7-79

[1] Magnetic trip tolerances are -20%/+30% from the nominal values shown.

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Masterpact NW DC Circuit Breaker

500 Vdc Masterpact NW Circuit Breakers

Table 7.96: Masterpact NW DC Circuit Breakers

Ampere Rating	Circuit Breaker Reference No.	Interrupting Rating 500 Vdc (max 600 Vdc unloaded)
800 A	NW08NDC	35 kA
1000 A	NW10NDC	35 kA
1200 A	NW12NDC	35 kA
1400 A	NW14NDC	35 kA
1600 A	NW16NDC	35 kA
2000A	NW20NDC	35 kA
2500 A	NW25NDC	35 kA
3000 A	NW30NDC	35 kA
4000 A	NW40NDC	35 kA
800 A	NW08HDC	85 kA
1000 A	NW10HDC	85 kA
1200 A	NW12HDC	85 kA
1400 A	NW14HDC	85 kA
1600 A	NW16HDC	85 kA
2000A	NW20HDC	85 kA
2500 A	NW25HDC	85 kA
3000 A	NW30HDC	85 kA
4000 A	NW40HDC	85 kA

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Plug-in

Drawout

Rear Connected

Mission Critical Circuit Breakers

Designed for selectively coordinated systems, mission critical circuit breakers maximize continuity of the electrical service by allowing the branch circuit breaker to clear the fault.

Mission critical circuit breakers are engineered with technology that optimizes current, time and energy selectivity so the fault is cleared by the circuit breaker immediately upstream of the occurrence. This technology (see figure below) allows the remaining areas of the electrical system to continue operation without disruption. In addition to unique design attributes, Square D mission critical circuit breakers have also undergone rigorous testing procedures to certify the coordination with downstream circuit breakers —combining innovative engineering with validated test results.

Apply Square D mission critical circuit breakers in emergency power distribution systems, data centers, hospitals or anywhere continuity of service is desired.

The PowerPact™ J- and L-Frame Mission Critical circuit breakers deliver high levels of selective coordination in a flexible design that can be easily configured for a variety of applications. Tested to be selectively coordinated with the QO™ family of miniature circuit breakers and the ED, EG, and EJ circuit breakers, this solution provides peace of mind when power availability is critical.

An electronic trip unit provides adjustable long-time settings in four sensor sizes, allowing coverage from 70 A through 600 A on a 120–240, 208Y/120, 240, 480Y/277, and 480 V systems.

PowerPact Circuit Breakers with Micrologic Electronic Trip Units

The advantages of being able to adjust the trip curve of a circuit breaker equipped with an electronic trip system are obvious. There are other advantages, such as being able to adjust or turn off the instantaneous trip function on some circuit beakers and models of trip units.

Table 7.97: PowerPact J- and L-Frame Mission Critical Circuit Breakers

Ratings	Available Configurations
UL 489 Listed CSA Certified Voltage: 480 V	I-Line mounting Main circuit breaker in NQ and NF panelboards Unit mount for OEM users Plug-in base for OEM users Drawout base ofr OEM users

Table 7.98: J-Frame 250 A Electronic Trip Mission Critical 100% Rated Circuit Breakers (480/277 Vac) with Factory Sealed Trip Units Suitable for Reverse Connection

Electronic Trip Unit Type	Trip Function	Trip Unit	Continuous Current	Cat. No.				Terminal
				D Interrupting	G Interrupting	J Interrupting	L Interrupting	
Standard	LI	3.2 W	250 A	JDL34250WU31X	JGL34250WU31X	JJL34250WU31X	JLL34250WU31X	AL250JD *[1]*
Standard	LSI	3.2S-W	250 A	JDL34250WU33X	JGL34250WU33X	JJL34250WU33X	JLL34250WU33X	AL250JD *[1]*
High Perf. Ammeter	LSI	5.2A-W	250 A	JDL34250WU43X	JGL34250WU43X	JJL34250WU43X	JLL34250WU43X	AL250JD *[1]*
High Perf. Energy	LSI	5.2E-W	250 A	JDL34250WU53X	JGL34250WU53X	JJL34250WU53X	JLL34250WU53X	AL250JD *[1]*
High Perf. Ammeter	LSIG	6.2A-W	250 A	JDL34250WU44X	JGL34250WU44X	JJL34250WU44X	JLL34250WU44X	AL250JD *[1]*
High Perf. Energy	LSIG	6.2E-W	250 A	JDL34250WU54X	JGL34250WU54X	JJL34250WU54X	JLL34250WU54X	AL250JD *[1]*

Table 7.99: J-Frame Termination Options

Termination Letter	
A = I-Line (See Section 9)	J G **L** 3 6 1 0 0 For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number. Termination Letter
F = No Lugs (includes terminal nut kit on both ends)*[2]*	
L = Lugs both ends	
M = Lugs ON end Terminal Nut Kit OFF end	
P = Lugs OFF end Terminal Nut Kit ON end	
N = Plug-in	
D = Drawout	
S = Rear Connected	

Table 7.100: J-Frame Interrupting Ratings

Voltage	Interrupting Rating			
	D	G	J	L
240 Vac	25 kA	65 kA	100 kA	125 kA
480 Vac	18 kA	35 kA	65 kA	100 kA

[1] AL250JD terminal wire range is (1) 3/0 AWG–350 kcmil Al or Cu.
[2] Add TS suffix for circuit breaker without terminal nut kit.

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Table 7.101: L-Frame 600 A Electronic Trip Mission Critical Circuit Breakers (480/277 Vac) with Factory Sealed Trip Units Suitable for Reverse Connection *[3]*

Electronic Trip Unit Type	Trip Function	Trip Unit	Continuous Current	Cat. No.				Terminal
				D Interrupting	G Interrupting	J Interrupting	L Interrupting.	
480/277 Vac, 50/60 Hz, 3P								
Standard	LI	3.3 W	250 A	LDL34250WU31X	LGL34250WU31X	LJL34250WU31X	LLL34250WU31X	AL400L61K3 *[4]*
			400 A	LDL34400WU31X	LGL34400WU31X	LJL34400WU31X	LLL34400WU31X	AL600LS52K3 *[5]*
			600 A	LDL34600WU31X	LGL34600WU31X	LJL34600WU31X	LLL34300WU31X	
Standard	LSI	3.3S-W	250 A	LDL34250WU33X	LGL34250WU33X	LJL34250WU33X	LLL34250WU33X	AL400L61K3 *[4]*
			400 A	LDL34400WU33X	LGL34400WU33X	LJL34400WU33X	LLL34400WU33X	AL600LS52K3 *[5]*
			600 A	LDL34600WU33X	LGL34600WU33X	LJL34600WU33X	LLL34300WU33X	
High Perf. Ammeter	LSI	5.3A-W	400 A	LDL34400WU43X	LGL34400WU43X	LJL34400WU43X	LLL34400WU43X	AL600LS52K3 *[5]*
			600 A	LDL34600WU43X	LGL34600WU43X	LJL34600WU43X	LLL34300WU43X	
High Perf. Energy	LSI	5.3E-W	400 A	LDL34400WU53X	LGL34400WU53X	LJL34400WU53X	LLL34400WU53X	AL600LS52K3 *[5]*
			600 A	LDL34600WU53X	LGL34600WU53X	LJL34600WU53X	LLL34300WU53X	
High Perf. Ammeter	LSIG	6.3A-W	400 A	LDL34400WU44X	LGL34400WU44X	LJL34400WU44X	LLL34400WU44X	AL600LS52K3 *[5]*
			600 A	LDL34600WU44X	LGL34600WU44X	LJL34600WU44X	LLL34300WU44X	
High Perf. Energy	LSIG	6.3E-W	400 A	LDL34400WU54X	LGL34400WU54X	LJL34400WU54X	LLL34400WU54X	AL600LS52K3 *[5]*
			600 A	LDL34600WU54X	LGL34600WU54X	LJL34600WU54X	LLL34300WU54X	
480/277 Vac, 50/60 Hz, 4P								
Standard	LI	3.3 W	250 A	LDL44250WU31X	LGL44250WU31X	LJL44250WU31X	LLL44250WU31X	AL400L61K4 *[4]*
			400 A	LDL44400WU31X	LGL44400WU31X	LJL44400WU31X	LLL44400WU31X	AL600LS52K4 *[5]*
			600 A	LDL44600WU31X	LGL44600WU31X	LJL44600WU31X	LLL44300WU31X	
Standard	LSI	3.3S-W	250 A	LDL44250WU33X	LGL44250WU33X	LJL44250WU33X	LLL44250WU33X	AL400L61K4 *[4]*
			400 A	LDL44400WU33X	LGL44400WU33X	LJL44400WU33X	LLL44400WU33X	AL600LS52K4 *[5]*
			600 A	LDL44600WU33X	LGL44600WU33X	LJL44600WU33X	LLL44300WU33X	
High Perf. Ammeter	LSI	5.3A-W	400 A	LDL44400WU43X	LGL44400WU43X	LJL44400WU43X	LLL44400WU43X	AL600LS52K4 *[5]*
			600 A	LDL44600WU43X	LGL44600WU43X	LJL44600WU43X	LLL44300WU43X	
High Perf. Energy	LSI	5.3E-W	400 A	LDL44400WU53X	LGL44400WU53X	LJL44400WU53X	LLL44400WU53X	AL600LS52K3 *[5]*
			600 A	LDL44600WU53X	LGL44600WU53X	LJL44600WU53X	LLL44300WU53X	
High Perf. Ammeter	LSIG	6.3A-W	400 A	LDL44400WU44X	LGL44400WU44X	LJL44400WU44X	LLL44400WU44X	AL600LS52K4 *[5]*
			600 A	LDL44600WU44X	LGL44600WU44X	LJL44600WU44X	LLL44300WU44X	
High Perf. Energy	LSIG	6.3E-W	400 A	LDL44400WU54X	LGL44400WU54X	LJL44400WU54X	LLL44400WU54X	AL600LS52K4 *[5]*
			600 A	LDL44600WU54X	LGL44600WU54X	LJL44600WU54X	LLL44300WU54X	

Accessories see page 7-53
Optional Lugs see page 7-58
Compression and PDC Lugs see Supplemental Digest, Section 3
Dimensions see page 7-74
Enclosures see page 7-75

[3] Standard rating (100%) for 250 A and 400 A only. Standard rating 80% for 600 A.
[4] AL400L61K3 terminal wire ranges are (1) #2 AWG–500 kcmil Al or (1) #2 AWG–600 kcmil Cu.
[5] AL600LS52K3 terminal wire ranges are (2) 2/0 AWG–500 kcmil Al or Cu.

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PowerPact Accessories

Table 7.102: Electrical Accessories

Accessory	Description		Rated Voltage		B-, H-, J-, and L-Frame					M-, P-, and R-Frame	
					Factory Installed Cat. Suffix	B-Frame Field-Installable Cat. No.	B-Frame Field-Installable Pre-Wired Cat. No.	H- and J-Frame Field-Installable Cat. No.	L-Frame Field-Installable Cat. No.	Factory Installed Cat. Suffix	Field-Installable Cat. No.
Auxiliary and Alarm Switches (OF, SD, SDE) B-Frame H-, J-, L-, M-, P, and R-Frame	Provides circuit breaker contact status. Note: The location of the accessory in the circuit breaker determines its function.	Standard Min Load = 10mA with 24V	1 auxiliary switch (OF) 1a1b		AA	LV426950	LV426951	S29450	S29450	AA	S29450
			2 auxiliary switch (OF) 2a2b		AB	—	—	2x S29450	2x S29450	AB	2x S29450
			3 auxiliary switch (OF) 3a3b		AC	—	—	—	3x S29450	AC	3x S29450
			Alarm Switch (SD) 1a1b		BC	LV426950	LV426952	S29450	S29450	BC	S29450
			Overcurrent trip switch (SDE) 1a1b		BD	—	—	—	S29450	BD	S29450
			Consisting of:	OF Switch	—	—	—	S29450	—	—	—
				SDE Adapter	—	—	—	S29451	—	—	—
			Alarm switch and Overcurrent trip switch		BE	—	—	—	2x S29450	BE	2x S29450
			Consisting of:	OF Switch	—	—	—	2x S29450	—	—	—
				SDE Adapter	—	—	—	S29451	—	—	—
			Auxiliary Switch/Alarm Switch/ Adapter (OF/SD/SDE) Kit		—	—	—	—	—	—	S33801 *[1]*
		Low Level Min Load = 1mA with 24V	One auxiliary switch (OF) 1a1b		AE	—	—	S29452	S29452	AE	S29452
			Two auxiliary switches (OF) 2a2b		AF	—	—	2x S29452	2x S29452	AF	2x S29452
			3 auxiliary switches (OF) 3a3b		AG	—	—	—	3x S29452	AG	3x S29452
			Alarm Switch (SD) 1a1b		BH	—	—	S29452	S29452	BH	S29452
			Overcurrent trip switch (SDE) 1a1b		BJ	—	—	—	S29452	BJ *[2]*	S29452
			Consisting of:	OF Switch	—	—	—	S29452	—	—	—
				SDE Adapter	—	—	—	S29451	—	—	—
			Alarm switch and Overcurrent trip switch		BK	—	—	—	2x S29452	BK *[2]*	2x S29452
			Consisting of:	OF Switch	—	—	—	2x S29452	—	—	—
				SDE Adapter *[3]*	—	—	—	S29451	—	—	—
Shunt Trip (MX) B-Frame H-, J-, and L-Frame	Trips the circuit breaker from a remote location by means of a trip coil energized from a separate supply voltage circuit.		AC	24	SK	LV426841	LV426861	S29384	S29384	SK	S33659
				48	SL	LV426842	LV426862	S29385	S29385	SL	S33660
				110–130	SA	LV426843	LV426863	S29386	S29386	SA	S33661
				220–240	SD, SF	—	—	—	—	SC	S33662
				208–277	SD	LV426844	LV426864	S29387	S29387	SD	S33663
				380–480	SH	LV426846	LV426866	S29388	S29388	SH	S33664
				525–600	SJ	—	—	S29389	S29389	—	—
			DC	12	SN	—	—	S29382	S29382	SN	S33658
				24	SO	LV426841	LV426861	S29390	S29390	SK	S33659
				30	SU	—	—	S29391	S29391	SK	S33659
				48	SP	LV426842	LV426862	S29392	S29392	SL	S33660
				60	SV	—	—	S29383	S29383	SL	S33660
				125	SR	LV426843	LV426863	S29393	S29393	SA	S33661
				250	SS	LV426844	LV426864	S29394	S29394	SC	S33662
 Undervoltage Trip (MN) H-, J-, and L-Frame	Instantaneously opens the circuit breaker when the under-voltage trip supply voltage drops to a value between 35% and 70% of its rated voltage. Closing is allowed when the supply voltage of the undervoltage trip reaches 85% of rated voltage.		AC	24	UK	LV426801	LV426821	S29404	S29404	UK	S33668
				48	UL	LV426802	LV426822	S29405	S29405	UL	S33669
				110–130	UA	LV426803	LV426823	S29406	S29406	UA	S33670
				220–240	UC	LV426804	LV426824	—	—	UC	S33671
				208–277	UD	LV426805	LV426825	S29407	S29407	—	—
				380–415	UF	LV426806	LV426826	—	—	—	—
				380–480	UH	LV426807	LV426827	S29408	S29408	UH	S33673
				525–600	UJ	—	—	S29409	S29409	—	—
			DC	12	UN	—	—	S29402	S29402	—	—
				24	UO	LV426801	LV426821	S29410	S29410	UK	S33668
				30	UU	—	—	S29411	S29411	UK	S33668
				48	UP	LV426802	LV426822	S29412	S29412	UL	S33669
				60	UV	—	—	S29403	S29403	UL	S33669
				125	UR	LV426803	LV426823	S29413	S29413	UA	S33670
				250	US	LV426815	LV426835	S29414	S29414	UC	S33671
Time Delay Unit 	Undervoltage trip with externally mounted adjustable time delay unit for UVR of 0.5, 0.9, 1.5, 3.0 seconds before circuit breaker trips		AC/DC	48	—	S33680 *[4]*	—	S33680 *[4]*	S33680 *[4]*	—	S33680 *[4]*
				100–130	—	S33681 *[4]*	—	S33681 *[4]*	S33681 *[4]*	—	S33681 *[4]*
				220–250	—	S33682 *[4]*	—	S33682 *[4]*	S33682 *[4]*	—	S33682 *[4]*
				380–480	—	—	—	—	—	—	S33683 *[4]*
	Undervoltage trip with externally mounted non-adjustable time delay unit of 0.25 sec before circuit breaker trips.		AC/DC	48	—	S29426 *[4]*	—	S29426 *[4]*	S29426 *[4]*	—	—
				100–130	—	—	—	—	—	—	S33684 *[4]*
				200–250	—	—	—	—	—	—	S33685 *[4]*
				220–240	—	S29427 *[4]*	—	S29427 *[4]*	S29427 *[4]*	—	—

[1] P-frame drawout circuit breaker only.
[2] Not available on electrically operated P-frame.
[3] SDE Adapter used for H- and J-frame only.
[4] Field-installable kit includes time delay module only. Order undervoltage trip separately.

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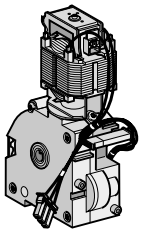
Motors and Rotary Handles

Table 7.103: Motor Operators for H-, J-, and L-Frame Circuit Breakers

Description		Rated Voltage		Factory Installed Cat. No. Suffix	Field-Installable Kit		
					H-Frame *[5]* Cat. No.	J-Frame Cat. No.	L-Frame 600 A Cat. No.
Motor Operator	Standard motor for electrically-operated circuit breakers *[6]*	AC	48–60	ML	S29440	S31548	S432639
			110–130	MA	S29433	S31540	S432640
			208–277 220–240	MD	S29434	S31541	S432641
			380–415	MF	—	—	S432642
			440–480	MH	S29435	S31542	S432647
		DC	24–30	MO	S29436	S31543	S432643
			48–60	MV	S29437	S31544	S432644
			110–130	MR	S29438	S31545	S432645
			250	MS	S29439	S31546	S432646
	Communicating motor for electrically-operated circuit breakers *[7]*	AC	220–240	NC	S429441	S431549	S432652
	Locking device	Mounting hardware		—	—	—	S32649
		Ronis lock		—	S41940	S41940	S41940
		Profalux lock		—	S42888	S42888	S42888
		Mounting hardware plus Ronis lock		—	S429449	S429449	—
	Operations counter			—	—	—	S32648
	Adapter for I-Line circuit breaker			—	S37420	S37420	—

Table 7.104: Spring-Charging Motors for Electrically-Operated P-Frame Circuit Breakers

Description		Rated Voltage		Factory Installed Cat. No. Suffix	P-Frame (For Field Replacement Only) Spring Charging Motor Cat. No.	Replacement Coils Opening/Closing Coil Cat. No.
 Spring-Charging Motor	Standard motor for electrically-operated circuit breakers. Factory-installed includes motor and opening/closing coils.	AC	48	ML	S47391	S33660
			100–130	MA	S47395	S33661
			220–240	MC	S47396	S33662
			380–415	MF	S47398	S33664
		DC	24–30	MO	S47390	S33659
			48–60	MV	S47391	S33660
			110–130	MR	S47392	S33661
			200–250	MS	S47393	S33662
	Communicating motor mechanism for electrically operated circuit breakers. Factory-installed includes motor and opening/closing coils.	AC	48	NL	S47391	S33034
			100–130	NA	S47395	S33035
			220–240	NC	S47396	S33036
			380–415	NF	S47398	S33038
		DC	24–30	NO	S47390	S33033
			48–60	NV	S47391	S33034
			110–130	NR	S47392	S33035
			200–250	NS	S47393	S33036

[5] Not available in H-frame 2P modules.
[6] Factory and field-installed standard motor operators for H- and J-frame circuit breakers require the SDE switch and SDE adapter (both included). Factory and field-installed standard motor operators for L-frame circuit breakers require the SDE switch (included).
[7] Installation requires BSCM with NSX Cord. For ordering information see page 7-67.

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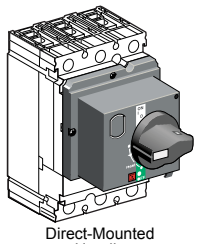
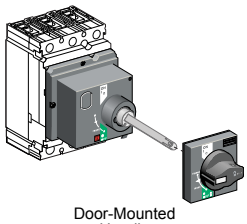
Rotary Handles



Direct-Mounted Handle



Door-Mounted Handle

Table 7.105: Rotary Operated Handles

Device		Description	B-Frame		H- and J-Frame *[8]*		L-Frame		P-Frame
			Factory Installed Cat. No. Suffix	Field-Installable Cat. No.	Factory Installed Cat. No. Suffix	Field-Installable Cat. No.	Factory Installed Cat. No. Suffix	Field-Installable Cat. No.	Factory Installed Cat. No. Suffix
Direct Mounted	Standard black handle	Operating mechanism kit	RD10	LV426930	RD10	S29337	RD10	S32597	RD10
	Standard black handle with	Two early-break and two early make switches	—	—	—	—	—	—	RD16
		One early-break switch	—	—	RD12	S29337 + S29345	RD12	S32597 + S32605	—
		Two early-make switches	—	—	RD13	S29337 + S29346	RD13	S32597 + S29346	—
	Red handle on yellow bezel	Operating mechanism kit	RD20	LV426931	RD20	S29339	RD20	S32599	—
		One early-break switch	—	—	RD22	S29339 + S29345	RD22	S32599 + S32605	—
		Two early-make switches	—	—	RD23	S29339 + S29346	RD23	S32599 + S29346	—
	MCC conversion accessory		—	—	—	S429341	—	S32606	—
	CNOMO conversion accessory		—	—	—	29342	—	S32602	—
Door Mounted	Standard black handle	Operating mechanism kit	—	LV426932	RE10	S29338	RE10	S32598	RE10
	Standard black handle with:	Two early-break and two early make switches	—	—	—	—	—	—	RE16
		Two early make switches	—	—	RE13	S29338 + S29346	RE13	S32598 + S29346	—
	Red handle on yellow bezel	Operating mechanism kit	—	LV426933	RE20	S29340	RE20	S32600	—
Rotary Handle Replacement Kit			—	—	—	—	—	—	S33875
Telescoping			—	—	RT10	S29343	RT10	S32603	—
Accessories	Key lock adapter		—	—	—	S429344	—	S32604	—
	Key locks	Ronis 1351.500	—	—	—	S41940	—	S41940	—
		Profalux KS5 B24 D4Z	—	—	—	S42888	—	S42888	—
		2 Ronis keylocks with 1 key	—	—	—	S41950	—	S41950	—
		2 Profalux keylocks with 1 key	—	—	—	S42878	—	S42878	—
	Indication Auxiliary Switch	One early-break switch	—	—	—	S29445	—	S32605	—
		Two early-make switches	—	—	—	S29346	—	S29346	—

[8] Not available in H-frame 2P modules.

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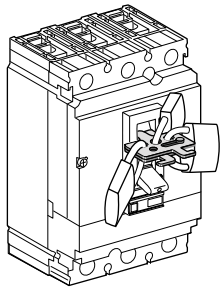
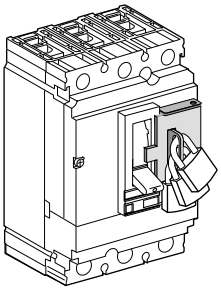
Locks, Installation Accessories, and Rear Connectors



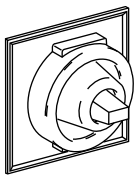
Removable Padlock Attachment



Fixed Padlock Attachment

Table 7.106: Locks, Interlocking

Device	Description		B-Frame		H- and J-Frame		Q-Frame		L-Frame	M- and P-Frame		R-Frame	
			Factory-Installed Cat. No. Suffix	Field-Installable Cat. No.	Factory-Installed Cat. No. Suffix	Field-Installable Cat. No.	Factory-Installed Cat. No. Suffix	Field-Installed Cat. No.	Field-Installable Cat. No.	Factory-Installed Cat. No. Suffix	Field-Installable Cat. No.	Factory-Installed Cat. No. Suffix	Field-Installable Cat. No.
Handle Padlocking Device	Removable (lock OFF only)		—	S29370	—	S29370	—		S29370	—	S44936	—	S33996
	Fixed (lock OFF or ON)		YP	LV426905 LV426907 (I-Line)	YP	S29371	YP	QBPA	S32631	YP	S32631	YP	S32631
	Fixed (lock OFF only)*[9]*		YQ	LV426906 LV426908 (I-Line)	YQ	S37422	YQ	QBPAF	NJPAF	YQ	MPRPAF	YQ	MPRPAF
	Fixed (lock OFF only)–2P		—	—	YQ	H2PHLA	YQ	—	—	—	—	—	—
Interlocking (Not UL listed)	Mechanical for circuit breakers with rotary handles*[9]*		—	—	—	S29369	—	—	S32621	—	S33890	—	—
	Mechanical for circuit breakers with toggles*[9]*		—	LV426994	—	S29354	—	QBMIK	S32614	—	—	—	—
Key Lockng	Provision only, vertical mount, 1 or 2 locks	Kirk	—	—	—	—	—	—	—	JA	—		—
	Provisions only, vertical mounting one key interlock including padlock provision, open position only.	Kirk	—	—	—	—	—	—	—	JE *[10][11]*	—	JE *[11]*	—
	Provision only, horizontal mount 1 lock, M- and P-frame 1 or 2 locks, R-frame	Kirk	—	—	—	—	—	—	—	JK	—	JK	—
		Ronis	—	—	—	—	—	—	—	JB *[12]*	—	JB	—
		Profalux	—	—	—	—	—	—	—	JD *[12]*	—	JD	—
	Provision and 1 lock, vertical mount	Kirk	—	—	—	—	—	—	—	JG	—	—	—
	Provision and 1 lock, horizontal mount	Kirk	—	—	—	—	—	—	—	JL	—	JL	—
		Ronis	—	—	—	—	—	—	—	JC *[12]*	—	JC	—
		Profalux	—	—	—	—	—	—	—	JF *[12]*	—	JF	—
	Provision and 2 locks keyed alike	Kirk	—	—	—	—	—	—	—	JN	—	JN	—
	Provision and 2 locks keyed differently	Kirk	—	—	—	—	—	—	—	JP	—	JP	—



Handle Rubber Boot

Table 7.107: Installation Accessories for B-, H-, J-, and L-Frame Circuit Breakers

Description	Field-Installable Cat. No.		
	B-Frame	H- and J-Frame	L-Frame
Front Panel Escutcheon for Toggle Breakers	—	S29315	32556
Front Panel Escutcheon for Rotary Handle, Motor Operator, or extended escutcheon	—	S29317	S32558
Phase Barriers (set of 6)	LV426920	S29329	32570
Handle Rubber Boot*[13]*	—	S29319	S32560
Sealing Accessories (for front cover screws)	S29375	S29375	S29375
DIN rail mounting kit (requires 15 mm depth on a 35 mm DIN rail)*[13]*	Standard	S29305	—
DIN rail adapter	Standard	—	—
Handle Extensions (set of 5)	—	S29313	S432553
Rear Insulation Kit (2P)	LV426921	—	—
Rear Insulation Kit (3P)	LV426922	—	—
Rear Insulation Kit (4P)	LV426923	—	—
Terminal Extensions-Spreaders (3P)	LV426940	—	—
Terminal Extensions-Spreaders (4P)	LV426941	—	—
5 N-m Torque Limiting Bit, Set of 6	LV426992	—	—
5 N-m Torque Limiting Bit, Set of 8	LV426993	—	—
9 N-m Torque Limiting Bit, Set of 6	LV426990	—	—
9 N-m Torque Limiting Bit, Set of 8	LV426991	—	—

[9] Not available in M frame or HD and HG 2P modules.
[10] Not available on M-frame.
[11] Not available on I-Line.
[12] Not available for M, P or P frame drawout. Only available on P frame electronic.
[13] Not available in HD and HG 2P modules.

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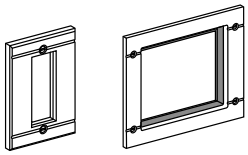
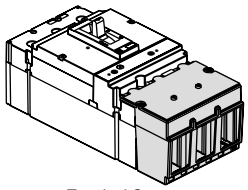


Door Escutcheon



Terminal Covers

Table 7.108: Installation Accessories for M-, P-, and R-Frame Circuit Breakers

Description		Frame	Field-Installable Cat. No.
Door Escutcheon	Accessory Cover	M-, P-Frame	S33718
		R-Frame	S33929
	Toggle Handle	M-, P-Frame	S33717
	Drawout	P-Frame	S33857
Terminal Covers	Short lug cover 3P	P-Frame	S33932
	Short lug cover 4P		S33933
	Long lug cover 3P		S33934
	Long lug cover 4P		S33935
Replacement Handle	Standard	R-Frame	S33997
	Standard Short	M-, P-Frame	S46998
	Long	M-, P-Frame	S46996

Table 7.109: Rear Connections

Device		Description	H-Frame			J-Frame			L-Frame		
			Poles	Factory-Installed Termination No.	Field-Installable Cat. No.	Poles	Factory-Installed Termination No.	Field-Installable Cat. No.	Poles	Factory-Installed Termination No.	Field-Installable Cat. No.
Rear Connection	Mixed Rear Connection Kit *[14]*		2	S	—	2	S	—	3	S	S32477
			3	S	S37432	3	S	S37437	4	S	S32478
	Consisting of:	Short rear connections (set of 2)	2 or 3	—	2x S37433	2 or 3	—	2x S37438	3	—	2-x S432475
		Long rear connections (set of 2)		—	S37434		—	S37439 *[15]*		—	2-x S432476
		Short terminal cover (3P)	3	—	S37436	3	—	S37440	3	—	2-x S32562
		Short terminal cover (4P)	4	—	—	—	—	—	4	—	2-x S32563

[14] Kit contains 4 short rear connections, 2 long rear connections (4 long rear connections for 4P), hardware, and 2 terminal covers..
[15] For use with 3P circuit breakers only.

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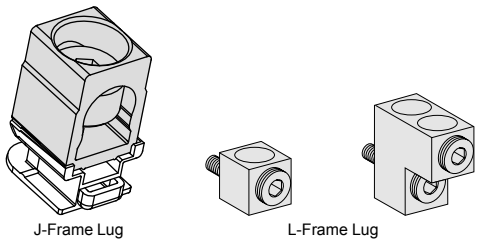
Mechanical Lugs

Table 7.110: Mechanical Lug Kits for B-Frame Circuit Breakers *[16]*

Description	Circuit Breaker Application			Ampere Rating	Number of Wires Per Lug and Wire Range	Factory-Installed Cat. Suffix	Field-Installable Cat. No.	Qty Per Kit
	Standard	Ampere Rating	Optional					
Al Lugs for Use with Al or Cu Wire			BD BG BJ	15-125 A	(1) 14-2/0 AWG Al or Cu	LH	LV426988	2
			BD BG BJ	15-125 A	(1) 14-2/0 AWG Al or Cu	LH	LV426989	3
Cu Lugs for Use with Cu Wire Only			BD BG BJ	15-125 A	(1) 14-1/0 AWG Cu	LC	LV426986	2
			BD BG BJ	15-125 A	(1) 14-1/0 AWG Cu	LC	LV426987	3
EverLink Lug	BD BG BJ (1P)	15 - 125 A			(1) 14-3/0 AWG Cu	—	LV426972	1
	BD BG BJ (2P)	15 - 125 A			(1) 14-3/0 AWG Cu	—	—	—
	BD BG BJ (3P)	15 - 125 A			(1) 14-3/0 AWG Cu	—	—	—
	BD BG BJ (4P)	15 - 125 A			(1) 14-3/0 AWG Cu	—	—	—
EverLink Lug with Control Wire Terminal		15 - 125 A	BD BG BJ (2P)		(1) 14-3/0 AWG Cu	LU, LV, or LW *[17]*	LV426973	1
		15 - 125 A	BD BG BJ (3P)		(1) 14-3/0 AWG Cu	LU, LV, or LW *[17]*	LV426974	1
		15 - 125 A	BD BG BJ (4P)		(1) 14-3/0 AWG Cu	LU, LV, or LW *[17]*	LV426975	1

Table 7.111: Mechanical Lug Kits for H- and J-Frame Circuit Breakers *[16]*

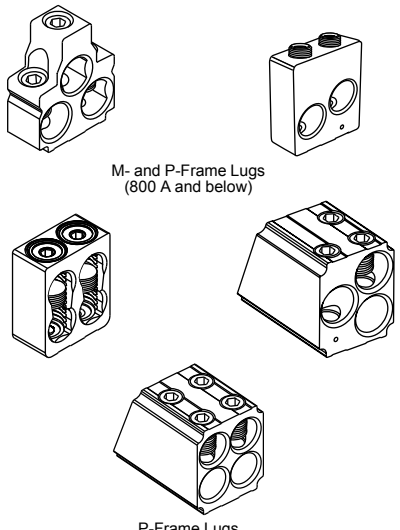
Description	Circuit Breaker Application			Ampere Rating	Number of Wires Per Lug and Wire Range	Kit Cat. No.	Qty Per Kit
	Standard	Ampere Rating	Optional				
Al Lugs for Use with Al or Cu Wire	HD, HG, HJ, HL	15–150 A			(1) 14–3/0 AWG Al or Cu	AL150HD	3
	JD, JG, JJ, JL	150–175 A			(1) 4-4/0 AWG Al or Cu	AL175JD	3
	JD, JG, JJ, JL	200–250 A	JD,JG,JJ,JL	150–175 A	(1) 3/0–350 kcmil Al or Cu	AL250JD	3
Cu Lugs for Use with Cu Wire Only			HD,HG,HJ,HL	15–150 A	(1) 14–2/0 AWG Cu	CU150HD	3
			JD,JG,JJ,JL	150–250 A	(1) 1/0–300 kcmil Cu	CU250JD	3
Control Wire Terminal for H-frame lug kit						S37423	2
Control Wire Terminal for J-frame lug kit						S37424	2



J-Frame Lug L-Frame Lug

Table 7.112: Mechanical Lug Kits for L-Frame Circuit Breakers *[18]*

Description	Circuit Breaker Application				Number of Wires Per Lug and Wire Range	Kit Cat. No.	Qty Per Kit
	Ampere Rating	Poles	Unit Mount	I-Line			
Al Lugs for Use with Al or Cu Wire	250	3	X	X	(1) 2 AWG–500 kcmil Al (1) 2 AWG–600 kcmil Cu	AL400L61K3	3
		4	X	—		AL400L61K4	4
	400/600	3	X	—	(2) 2/0 AWG–500 kcmil Al or Cu	AL600LS52K3	3
		4	X	—		AL600LS52K4	4
	400/600	3	X	X	(2) 3/0 AWG–500 kcmil Al or Cu	AL600LF52K3	3
Cu Lugs for Use with Cu Wire Only	250	3	X	X	(1) 2 AWG–600 kcmil Cu	CU400L61K3	3
		4	X	—		CU400L61K4	4
	400/600	3	X	—	(2) 2/0 AWG–500 kcmil Cu	CU600LS52K3	3
		4	X	—		CU600LS52K4	4
	400/600	3	X	X	(2) 3/0 AWG–500 kcmil Cu	CU600LF52K3	3



M- and P-Frame Lugs (800 A and below)

P-Frame Lugs (Above 800 A)

Table 7.113: Mechanical Lug Kits for M-, P- and R-Frame Circuit Breakers *[19]*

Description	Circuit Breaker Application				Wires per Lug and Wire Range	Cat. No.	Lugs Per Kit
	Standard	Rating	Optional	Rating			
Al Lugs for AL or Cu Wire	M-Frame, P-Frame	800 A	—	800 A	(3) 3/0 AWG-500 kcmil	AL800M23K	3
						AL800M23K4	4
		1200 A	MG, MJ, PG, PJ, PK, PL	800 A	(4) 3/0 AWG-500 kcmil	AL1200P24K *[20]*	1
		—	MG, MJ, PG, PJ, PK, PL	800 A	(2) 3/0 AWG-600 kcmil	AL800P6K *[20]*	3
						AL800P6K4 *[20]*	4
		—	MG, MJ, PG, PJ, PK, PL	800 A	(2) 3/0 AWG-750 kcmil 750 kcmil: compact AL only	AL800P7K *[20]*	3
						AL800P7K4 *[20]*	4
	P-Frame	1200 A	PG, PJ, PK, PL	800 A	(4) 3/0 AWG-500 kcmil	AL1200P25K *[21]*	3
						AL1200P25K4 *[21]*	4
		—	PG, PJ, PK, PL	800–1200 A	(3) 350-600 kcmil	AL1200P6KU *[21]*	3
						AL1200P6KU4 *[21]*	4
	PG,PJ,PL	—	PG, PJ, PK, PL	1200 A	(3) 3/0 AWG-750 kcmil 750 kcmil: compact AL only	AL1200P7KU *[21]*	3
						AL1200P7KU4 *[21]*	4
	R-Frame	1200 A	I-Line	—	(4) 3/0 AWG-600 kcmil	AL1200R53K	1
		2500 A	Unit Mount	—	(1) 3/0 AWG-750 kcmil	AL2500RK *[22]*	2
Cu Lugs for Cu Wire Only*[23]*	M-Frame, P-Frame	—	PJ	100–150 A	(1) 1-1/0 AWG	CU250P1K *[24]*	3
		800 A	MG, MJ, PG, PJ, PK, PL	—	(3) 3/0 AWG-500 kcmil	CU800M23K	3
						CU800M23K4	4
		1200 A	MG, MJ, PG, PJ, PK, PL	800–1200 A	(4) 3/0 AWG-500 kcmil	CU1200P24K *[20]*	1
	P-Frame	1200 A	PG, PJ, PK, PL	800–1200 A	(4) 3/0 AWG-500 kcmil	CU1200P25K *[21]*	3
						CU1200P25K4	4
	R-Frame	1200 A	I-Line	—	(4) 3/0 AWG-500 kcmil	CU1200R53K	1

[16] For terminal nuts/bus bar connections see page 7-61.
[17] LU = ON end only, LV = OFF end only, LW = BOTH ends
[18] Lug kits for Legacy L-frame circuit breakers can be found in Supplemental Digest Section 11 (i.e. LA, LH circuit breakers).
[19] For lug with a tapped hole for control wire, add a “T” before the “K” in the catalog number (for example, AL800P6TK).
[20] Does not fit onto ON end of unit-mount P-frame circuit breakers.
[21] For unit-mount circuit breaker only.
[22] All unit-mount R-frame circuit breakers require terminal pads for mounting lugs of any type. See page 7-61.
[23] Not available with tapped hole for control wire.
[24] This lug can only be used on low amp PJ frame breakers where the Instantaneous setting must not be turned OFF. The cables must be laced with rope per lug instructions.

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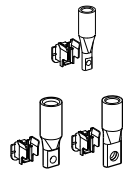
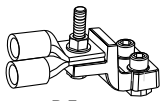
Compression Lugs


J-Frame Compression Lug


P-Frame Compression Lug Kit

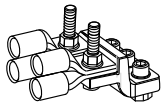

R-Frame Compression Lug Kit

Table 7.114: Compression Lug Kits for PowerPact™ Circuit Breakers

Description	Circuit Breaker Type	Ampere Rating	System Range	Mounting Type	Dimension A (in)	Max. Lugs per Terminal	Cat. No.	Qty. Per Kit
Compression Lug Kits for B-Frame Circuit Breakers								
Aluminum Compression Lug Kits	B-frame	125 A	8-1/0 AWG Al or Cu	Unit	1.3	1	LV426988	2
		125 A	8-1/0 AWG Al or Cu		1.3	1	LV426989	3
Copper Compression Lug Kits	B-frame	125 A	6-1/0 AWG Cu		1.4	1	LV426986	2
		125 A	6-1/0 AWG Cu		1.4	1	LV426987	3
Compression Lug Kits for H-Frame and J-Frame Circuit Breakers								
Aluminum Compression Lug Kits	H-frame	60 A	6–2 AWG Al or Cu	Unit/I-line *[25]*	1.2	1	YA060HD	3
		150 A	1/0–4/0 AWG Al or Cu		2.5	1	YA150HD	3
	J-frame	150 A	1–3/0 AWG Al or Cu		1.2	1	YA150JD	3
		250 A	3/0–350 kcmil Al or Cu		2.5	1	YA250J35	3
Copper Compression Lug Kits	H-frame	60 A	6–1/0 AWG Cu		1.0	1	CYA060HD	3
		150 A	4–2/0 AWG Cu		1.2	1	CYA150HD	3
	J-frame	150 A	6–1/0 AWG Cu		0.7	1	CYA150JD	3
		250 A	2/0–300 kcmil Cu		1.1	1	CYA250J3	3
Compression Lug Kits for L-Frame Circuit Breakers								
Aluminum Compression Lug Kits	L-frame	250 A	4-300 kcmil Al/Cu	Unit/I-line *[25]*	1.2	1	YA400L31K3	3
		400 A	4-300 kcmil Al/Cu		2.5	2	YA600L32K3	6
		250 A	2/0-500 kcmil Al/Cu			1	YA400L51K3	3
		600 A	2/0-500 kcmil Al/Cu			2	YA600L52K3	6
		400 A	500-750 kcmil Al 500 kcmil Cu			1	YA400L71K3	3
		250 A	4-300 kcmil Al/Cu			1	YA400L31K4	4
		400 A	4-300 kcmil Al/Cu			2	YA600L32K4	8
		250 A	2/0-500 kcmil Al/Cu			1	YA400L51K4	4
		600 A	2/0-500 kcmil Al/Cu		1.2	2	YA600L52K4	8
		400 A	500-750 kcmil Al 500 kcmil Cu		2.5	1	YA400L71K4	4
Copper Compression Lug Kits	L-frame	250 A	2/0-300 kcmil Cu	Unit/I-line *[25]*	1.2	1	CYA400L31K3	3
		400 A	2/0-300 kcmil Cu		2.5	2	CYA600L32K3	6
		250 A	250-500 kcmil Cu			1	CYA400L51K3	3
		600 A	250-500 kcmil Cu			2	CYA600L52K3	6
		250 A	2/0-300 kcmil Cu			1	CYA400L31K4	4
		400 A	2/0-300 kcmil Cu			2	CYA600L32K4	8
		250 A	250-500 kcmil Cu			1	CYA400L51K4	4
		600 A	250-500 kcmil Cu			2	CYA600L52K4	8
Compression Lug Kits for M-Frame, P-Frame, and R-Frame Circuit Breakers								
Aluminum Compression Lug Kits	M-, P-frame	250 A	2/0-300 kcmil	Unit/I-line *[25]*	3.7	1	YA250P3	1
		300 A	4/0-500 kcmil		3.9	1	YA300P5	1
		400 A	2/0-300 kcmil		4.3	2	YA400P3	1
		400 A	500-750 kcmil		3.7	1	YA400P7	1
		600 A	4/0-500 kcmil		3.9	2	YA600P5	1
		800 A	500-750 kcmil		4.3	2	YA800P7	1
	R-frame*[26]*	1200 A	2/0-300 kcmil	I-line *[25]*	3.8	4	YA1200R3	1
		1200 A	4/0-500 kcmil		4.0	4	YA1200R5	1
		1200 A	500-750 kcmil		4.4	4	YA1200R7	1
		2000 A	2/0-300 kcmil	Unit *[25]*	—*[26]*	8	YA2000R3	2
		2000 A	4/0-500 kcmil		—*[26]*	8	YA2000R5	2
		2500 A	500-750 kcmil		—*[26]*	8 *[27]*	YA2500R7	1
Copper Compression Lug Kits	M-, P-frame	400 A	4/0-500 kcmil	Unit *[25]*	3.3	1	CYA400P5	1
		600 A	4/0-500 kcmil		3.3	2	CYA600P5	1
		800 A	500-750 kcmil		3.6	2	CYA800P7	1
	R-frame	1200 A	4/0-500 kcmil	I-Line *[25]*	3.5	4	CYA1200R5	1
		1200 A	500-750 kcmil		3.8	4	CYA1200R7	1

[25] Not for use on I-Line™ circuit breakers unless wire bending space is adequate.
[26] All unit-mount R-frame circuit breakers require terminal pads for mounting lugs of any type. See page 7-61.
[27] 9 lugs for 3000 A circuit breakers

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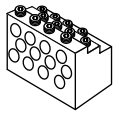
PDC6HD6

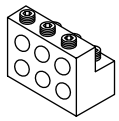
PDC6JD4

PDC3HD2

PDC3JD20

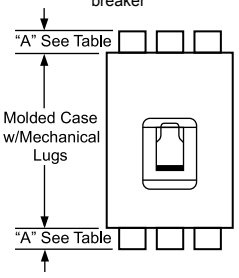


PDC12P4



PDC6P20

Crimp lugs or PDC connectors extension "A" past end of circuit breaker



Power Distribution Connectors

Table 7.115: Power Distribution Connectors for B-Frame, H-Frame, J-Frame and L-Frame Circuit Breakers *[28]*

Use with Circuit Breaker Type	Ampere Rating	(Wires Per Terminal) Wire Range	Dimension A (in.)	Cat. No.	Qty. Per Kit
BD, BG, BJ	125 A	(3) 14 - 2 AWG	1.2	PDC3BD2	3
	125 A	(6) 14 - 6 AWG	1	PDC6BD6	3
HD, HG, HJ, HL *[29]*	15–150 A	(6) 14–6 AWG Cu	1.0	PDC6HD6	3
	15–150 A	(3) 14–2 AWG Cu	1.2	PDC3HD2	3
JD, JG, JJ, JL *[29]*	150–250 A	(6) 14–4 AWG Cu	1.0	PDC6JD4	3
	150–250 A	(2) 14–1 AWG and (1) 3–2/0 AWG Cu	1.5	PDC3JD20	3
LD, LG, LJ, LL *[30]*	150–600 A	(3) 14–1 AWG and (2) 3–2/0 AWG	1.28	PDC5DG20L3	3
	150–600 A	(12) 14–4 AWG	1.31	PDC12DG4L3	3

Table 7.116: Power Distribution Connectors for M-Frame and P-Frame Circuit Breakers *[28]*

	Ampere Rating	(Wires Per Terminal) Wire Range	Cat. No.	Qty Per Kit
Use for multiple load connections on one circuit breaker in place of standard distribution block to save space and time. • Use on load end of circuit breaker only • Use in UL508 Industrial Control applications only. • Use in UL1995/CSA C22.2 No. 236 heating and cooling equipment. • For Cu wire only.	250–1200 A	(6) 12–2/0 AWG Cu	PDC6P20	3
		(6) 12–2/0 AWG Cu	PDC6P204	4
	250–1200 A	(12) 10–4 AWG Cu	PDC12P4	3
			PDC12P44	4

[28] Not for use with I-Line™ circuit breakers.

[29] Special Purpose—Not for General Use. Use on ON end of the circuit breaker only when ON end is used as Load end. Use on OFF end of the circuit breaker only when OFF end is used as Load end.

[30] Kit includes long terminal shield and cover, which adds 1.65 inches to standard lug with short terminal shield.

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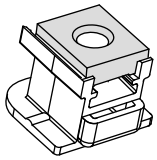
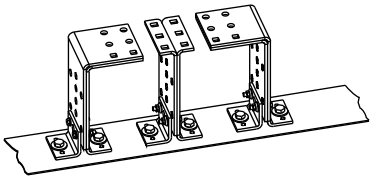
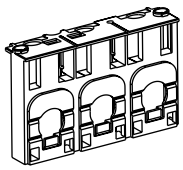
H-Frame Lug with Terminal Nut Insert



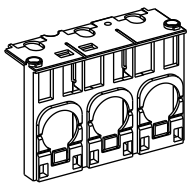
Terminal Nut Insert



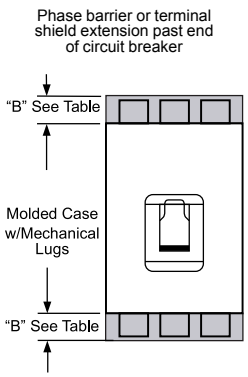
RLTB Terminal Pad Kit

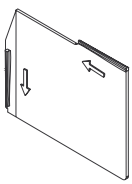


H-Frame Short Lug Shield



J-Frame Short Lug Shield





R-Frame Phase Barrier

Terminal Accessories

Table 7.117: Terminal Nuts for Bus Bar Connection of B-, H- and J-Frame Circuit Breakers

Description	Frame	Tap	Cat. No.	Qty Per Kit
B-Frame Terminal Nut Insert-Metric	BD/BG/BJ (2P)	M6	LV426962	2
B-Frame Terminal Nut Insert-Metric	BD/BG/BJ (3P)	M6	LV426963	3
H-Frame Terminal Nut Insert–English	HD/HG/HJ/HL	1/4-20	S37425	2
H-Frame Terminal Nut Insert–English	HD/HG/HJ/HL	1/4-20	S37444	3
H-Frame Terminal Nut Insert–Metric	HD/HG/HJ/HL	M6	S37426	2
J-Frame Terminal Nut Insert–English	JD/JG/JJ/JL	1/4-20	S37427	2
J-Frame Terminal Nut Insert–English	JD/JG/JJ/JL	1/4-20	S37445	3
J-Frame Terminal Nut Insert–Metric	JD/JG/JJ/JL	M8	S37428	2
Control Wire Terminal for H-Frame Terminal Nut	HD/HG/HJ/HL		S37429	2
Control Wire Terminal for J-Frame Terminal Nut	JD/JG/JJ/JL		S37430	2

Table 7.118: Bus Bar Connections Hardware for L-, M-, and P-Frame Circuit Breakers

Frame	Description	Term. No.	Poles	Cat. No.
L-Frame	Set of 4 terminal screws and washers for one side	F	4	S36967
M- and P-Frame	Bus Connector Kit for one pole, one end		1	S33928

Table 7.119: Terminal Pad Kits for R-Frame Circuit Breakers

R-Frame Circuit Breaker	Terminal Pad Kit Usage	Lugs per Phase	Field-Installable Kits 3P Kit (One End Only) Cat. No.	Field-Installable Kits 4P Kit (One End Only) Cat. No.
3000 A, 100% Rated	Required for cable or bus	9	RL3TB	RL3TB4
3000 A, Standard (80% Rated)	Required for cable or bus	8	RLTB	RLTB4
2500 A, 100% Rated	Required for cable or bus			
2500 A, Standard (80% Rated)	Required for cable, optional for bus			
All Other R-Frame Circuit Breakers	Required for cable, optional for bus			

For cable connection to RLTB, use AL2500RK lug. See page 7-59.

Table 7.120: Terminal Shields and Phase Barriers

Used With	Description				Dimension B (in.)	Cat. No.	Qty Per Kit
H- and J-Frame Mechanical Lugs	Short Lug Shield[31]	Frame	Max. Wire Size				
		H-Frame 60 A	3 AWG		0.50	S37446	1
		H-Frame 150 A	3/0 AWG		0.50	S37447	1
		J-Frame	350 kcmil		0.24	S37448	1
B-, H- and J-Frame Power Distribution Connectors and Compression Lugs		Compatible with:					
		PDC	Compression Lugs				
			Aluminum	Copper			
	B-Frame Long Lug Shield	PDC3BD2	LV426988	LV426986	1.9	LV426911 (2P) LV426912 (3P) LV426913 (4P)	1
		PDC6BD6	LV426989	LV426987			
	H-Frame Long Lug Shield	PDC6HD6	YA060HD	CY-A060HD	2.24	S37449	1
		PDC3HD2	YA150HD	CY-A150HD			
	J-Frame Long Lug Shield	PDC6JD4	YA150JD	CYA150JD	1.68	S37450	1
		PDC3JD2	[32]	CYA250J3			
L-Frame	3P Short Terminal Shield					LTSS3P	1
	3P Medium Terminal Shield					LTSM3P	1
	3P Long Terminal Shield					LTSL3P	1
	4P Medium Terminal Shield					LTSM4P	1
	4P Long Terminal Shield					LTSL4P	1
M-, P-Frame	Phase Barriers					S33646	3
R-Frame						S33998	

Table 7.121: Miscellaneous H-, J-, and L-Frame Circuit Breaker Accessories

Accessory	Description	Field-Installable Cat. No.
Spare Parts	Bag of screws for accessory cover, L-frame	S432552
	1 spare toggle extension, L-frame	32595
	Set of 10 identification labels	LV429226

[31] Short lug shields provide IP20 protection for mechanical lugs and are compatible with control wire terminals.
[32] J-frame terminal shield is not compatible with the YA250J35 compression terminal.

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H- and J-Frame
Plug-In Mounting

H- and J-Frame
Drawout Mounting

Mountings

Table 7.122: Plug-In and Drawout Mountings for H- and J-Frame Circuit Breakers (3P or 2P in a 3P module)

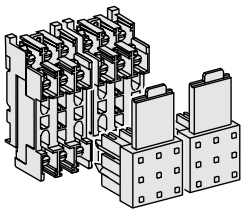
Description			Factory Installed Cat. No.	Field-Installable Cat. No.
Complete Factory-Assembled Circuit Breakers	Plug-in base shipped with circuit breaker		N	
	Drawout cradle shipped with circuit breaker		D	
Special Order Options for Plug-In and Drawout Circuit Breakers	Plug-In Base	Circuit breaker Only	HJ00	
		Plug-in base kit		S29278
	Drawout Cradle	Circuit breaker only	HJ00	
		Plug-in base kit		S29278
		Cradle side plates (fixed part of chassis)		S29282
		Circuit breaker side plates (moving part of chassis)		S29283
Accessories for Plug-In and Drawout	H-Frame Shutter Kit (set of two)			S37442
	J-Frame Shutter Kit (set of two)			S37443
	Secondary Disconnect Blocks	Fixed part 9-wire connector (mounted on base)		S29273
		Moving part 9-wire connector (mounted on circuit breaker)		S29274
		Support for 2-moving connectors		S29275
	Extended escutcheon with extended toggle handle			S29284
	Two position indicating switches (connected/disconnected)			S29287
	H-Frame Short Terminal Cover (3P			S37436
	J-Frame Short Terminal Cover (3P)			S37440

L-Frame
Plug-In Mounting

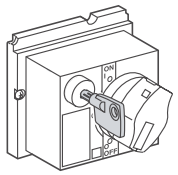
L-Frame
Drawout Mounting

Table 7.123: Plug-In and Drawout Mountings for L-Frame Circuit Breakers

Description		Poles	Plug-in Mounting		Drawout Mounting	
			Factory-Installed Cat. No.	Field-Installed Cat. No.	Factory-Installed Cat. No.	Field-Installable Cat. No.
Kit (stationary and moving parts)		3	N		D	
		4	N		D	
Stationary Part	Plug-in base	3		S32514		S32514
		4		S32515		S32515
	Fixed part of chassis					S32532
Moving Part	Circuit breaker only		HJ00		HJ00	
	Moving part of chassis					S32533
	Short terminal covers	3		2x S32562		2x S32562
		4		2x S32563		2x S32563



L-Frame Disconnecting Blocks



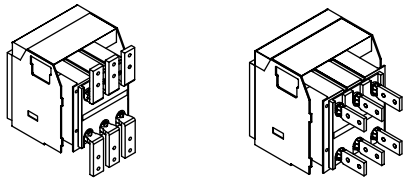
L-Frame Locking Device

Table 7.124: Plug-In and Drawout Accessories for L-Frame Circuit Breakers

Description			Field-Installable Cat. No.
Secondary Disconnecting Blocks	Fixed Part	9-wire connector	S29273
	Moving Part	9-wire connector	S32523
		Support for 3 moving connectors	S32525
	Fixed + Moving	9-wire manual auxiliary connector	S29272
Shutters	Two shutters for plug-in base		32521
Chassis Accessories	Extended escutcheon for toggle		S32534
	Locking device (key lock is not included)		S29286
	Two position indicating switches (connected/disconnected)		29287

Table 7.125: Termination Options

Termination Letter	Termination No.
N = Plug-in	L G L 3 6 4 0 0 U 3 1 X For factory-installed termination, place termination letter in the third block of the circuit breaker catalog number.
D = Drawout	



P-Frame Drawout Cradle Connections

Table 7.126: Drawout Cradle and Accessories for P-Frame Circuit Breakers

Description		Cat. No.
Drawout Cradle		Product Selector
Cradle Connectors	Front Connected Flat (FCF)	SFCF12 *[33]*
	Rear Connected T Horizontal/Vertical (RCTH/RCTV)	SRCTV12 *[33]*
Cradle Accessories	Modbus™ cradle communication module	S33852
	Safety shutters	S48933
	Secondary disconnects terminal shield	S33763
	Cradle position switch 1a/1b Form C— Connected/test/disconnected	S33170
	Low level cradle position switch 1a/1b Form C—Connected/test/disconnected	S33171
	Cell keying kit	S33767
	Disconnected position key locking—provision for Kirk or Federal Pioneer Lock	S33772
	Door interlock kit	S33786
	Racking interior kit	S33788
	Door escutcheon (for replacement only, included with circuit breaker)	S33857
	Transparent cover	S33859
	Push-in terminal kit (3 wires)	S33098
	Push-in terminal kit (6 wires)	S33099
	Finger cluster	S33166
	Cluster grease (12 oz. tube)	S48899

[33] Needs 2 kits per cradle.

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PowerPact H-, J-, and L-Frame Micrologic Trip Units

Micrologic Standard Trip Unit

Micrologic Ammeter and Energy Trip Unit

Micrologic Trip Units *[1]*

Micrologic Standard 3.2/3.3 Trip Units

PowerPact™ H-, J-, and L-frame molded case circuit breakers may be specified with any of the following Micrologic Electronic Trip Units.

- True RMS sensing
- LI, LSI trip configurations
- Field-interchangeable trip units
- LED long-time pickup and trip indication
- Test kits available
- Thermal imaging

Micrologic Ammeter 5.2A/5.3A/6.2A/6.3A Trip Units

Includes all features listed for Micrologic standard trip unit, as well as:

- Advanced user interface
- Neutral protection
- Incremental fine tuning of settings
- Up to 12 alarms
- Digital ammeter—phase and neutral (4-pole only)
- Phase loading bar graph
- Maintenance indicators including contact wear, number of operations, operating hours, and load profiles
- Cause of trip information for troubleshooting assistance
- LCD Display
- Zone-selective interlocking (ZSI) (short-time & ground-fault)
- Optional Modbus™ communications—PowerLogic™ compatible

Micrologic Energy 5.2E/5.3E/6.2E/6.3E Trip Units

Includes all features listed for Micrologic ammeter trip unit, as well as:

- Ground-fault trip with programmable ground fault alarm (available on 6.2E/6.3E only)
- Power and energy measurement
- Power quality measurements
- Current demand and power demand measurements

Table 7.127: Micrologic Trip Unit Settings for H- and J-Frame

Model	Trip Function	Trip Unit	Ampere Setting
Standard	LI	3.2	15-20-25-30-35-40-45-50-60
			35-40-45-50-60-70-80-90-100
			50-60-70-80-90-100-110-125-150
			70-80-100-125-150-175-200-225-250
	LSI	3.2S	15-20-25-30-35-40-45-50-60
			35-40-45-50-60-70-80-90-100
			50-60-70-80-90-100-110-125-150
			70-80-100-125-150-175-200-225-250
Ammeter	LSI	5.2A	15–60
			35–100
			50–150
			70–250
	LSIG	6.2A	15–60
			35–100
			50–150
			70–250
Energy	LSI	5.2E	15–60
			35–100
			50–150
			70–250
	LSIG	6.2E	15–60
			35–100
			50–150
			70–250

Table 7.128: Micrologic Trip Unit Settings for L-Frame

Model	Trip Function	Trip Unit	Ampere Setting
Standard	LI	3.3	70-80-100-125-150-175-200-225-250
			125-150-175-200-225-250-300-350-400
			200-225-250-300-350-400-450-500-600
	LSI	3.3S	70-80-100-125-150-175-200-225-250
			125-150-175-200-225-250-300-350-400
			200-225-250-300-350-400-450-500-600
Ammeter	LSI	5.3A	125–400
			200–600
	LSIG	6.3A	125–400
			200–600
Energy	LSI	5.3E	125–400
			200–600
	LSIG	6.3E	125–400
			200–600

[1] See Supplemental Digest Section 3 for circuit breakers with field-interchangeable trip units.

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Table 7.129: Micrologic Trip Units *[2]* for PowerPact H-, J-, and L-Frame Circuit Breakers

x– Standard Feature o – Available Option

Features	Standard		Ammeter		Energy	
	3.2/3/3	3.2S/3.3S	5.2A/5.3A	6.2A/6.3A	5.2E/5.3E	6.2E/6.3E
LI	x					
LSI *[3]*		x	x		x	
LSIG / Ground-Fault Trip*[4]*				x		x
Ground-Fault Alarm/Trip*[4]*				x		x
Current Setting Directly in Amperes	x	x	x	x	x	x
True RMS Sensing	x	x	x	x	x	x
UL Listed	x	x	x	x	x	x
Thermal Imaging	x	x	x	x	x	x
LED for Long-time Pickup	x	x	x	x	x	x
LED for Trip Indication	x	x	x	x	x	x
LED for Green “Ready”	x	x	x	x	x	x
Up to 12 Alarms Used Together			x	x	x	x
Digital Ammeter			x	x	x	x
Zone-selective Interlocking *[5]*			x	x	x	x
Communications	o	o	o	o	o	o
LCD Display			x	x	x	x
Front Display Module FDM121			o	o	o	o
Advanced User Interface			x	x	x	x
Neutral Protection*[4]*			x	x	x	x
Contact Wear Indication *[6]*			x	x	x	x
Incremental Fine Tuning of Settings			x	x	x	x
Load Profile *[6]*,*[7]*			x	x	x	x
Power Measurement					x	x
Power Quality Measurements					x	x

[2] DC not available with electronic trip units.
[3] The LSI with 3.2S/3.3S trip units have fixed short time and long time delays.
[4] Requires neutral current transformer on the three-phase four-wire loads.
[5] ZSI for H/J frames in only OUT. for L-frame ZSI is In and OUT.
[6] Indication available using the communication system only.
[7] % of hours in 4 current ranges: 0–49%, 50–79%, 80–89%, and >90% In.

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PowerPact P- and R-Frame Micrologic Trip Units

PowerPact P- and R-Frame Micrologic Trip Units

Standard Trip Unit | Ammeter Trip Unit | Power Trip Unit | Harmonic Trip Unit | Adjustable Rating Plug

Micrologic (Standard) 3.0 and 5.0 Trip Units

PowerPact™ P- and R-frame molded case circuit breakers may be specified with any of the following Micrologic Electronic Trip Units.

- True RMS sensing
- LI, LSI trip configurations
- Field-interchangeable long-time rating plugs
- LED long-time pickup indication
- Test kits available
- Thermal imaging

Micrologic (Ammeter) 3.0A, 5.0A and 6.0A Trip Units

Includes all features listed for Micrologic standard trip unit, as well as:

- LSIG trip configurations
- Digital ammeter—phase and neutral (4-pole only)
- Phase loading bar graph
- LED trip indication
- Zone-selective interlocking (ZSI) (short-time & ground-fault)
- Optional Modbus™ communications—PowerLogic™ compatible

Micrologic (Power) 5.0P and 6.0P Trip Units

Power measurement and advanced protection features includes all features listed for Micrologic ammeter trip unit, as well as:

- LSI trip configuration with programmable ground fault alarm
- LSIG (Ground-fault trip) with programmable ground fault alarm
- Incremental “fine tuning” of L, S, I, and G pickup and delay settings
- LCD dot matrix display and LED trip indication
- Advanced user interface
- Advanced protection IDMTL—selectable long-time delay bands
- Neutral protection
- Power measurement
- Contact wear indication
- Modbus communications—PowerLogic compatible
- Local and remote settings

Micrologic (Harmonic) 5.0H and 6.0H Trip Units

Power quality measurement and advanced protection features. Includes all features listed for the Micrologic power trip unit, as well as:

- Enhanced power measurements functions
- Power quality measurements

Adjustable Rating Plugs for PowerPact™ P-Frame and R-Frame and Masterpact™ NT and NW Circuit Breakers—Selection

To provide maximum design flexibility, system protection, and field upgradeability, each Micrologic™ trip unit is equipped with an interchangeable long-time rating plug. Each trip unit requires an adjustable rating plug to determine the long-time pickup range of the circuit breaker. These plugs are factory installed on new trip units, or can be ordered separately for field-installable upgrades.

Adjustable rating plugs are offered in eight different ranges of long-time pickup adjustments. The following chart show the ranges of adjustments. Each adjustment times the sensor rating (Ir x In) of the circuit breaker sets the long-time pickup value of the circuit breaker.

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Table 7.130: Micrologic Trip Unit and Options

Model	Protection	Additional Features	Field-Installable Cat. No.[8]
2.0 (IEC only)	LSO	None	S132R
3.0 (UL/ANSI only)	LI		S131A
5.0	LSI		S133A
2.0A (IEC only)	LSO	Ammeter	S142R [9]
3.0A (UL/ANSI only)	LI		S141A [9]
5.0A	LSI		S143A [9]
6.0A	LSIG		S144A [9]
5.0P	LSI	Metering, Adv. Protection	S163A [9][10]
6.0P	LSIG		S164A [9][10]
5.0H	LSI	Metering, Adv. Protection & Harmonic Analysis	S173A [9][10]
6.0H	LSIG		S174A [9][10]

Table 7.131: Micrologic Trip Units

x– Standard Feature o – Available Option

Features	Standard		Ammeter			Power		Harmonic	
	3.0	5.0	3.0A	5.0A	6.0A	5.0P	6.0P	5.0H	6.0H
LI	x		x						
LSI (Instantaneous can be turned off)		x		x	x	x	x	x	x
LSIG / Ground-Fault Trip[11]					x		x		x
Ground-Fault Alarm (No Trip)[11][12]						x		x	
Ground-Fault Alarm and Trip[11][12]							x		x
Adjustable Rating Plugs	x	x	x	x	x	x	x	x	x
True RMS Sensing	x	x	x	x	x	x	x	x	x
UL Listed	x	x	x	x	x	x	x	x	x
Thermal Imaging	x	x	x	x	x	x	x	x	x
Phase Loading Bar Graph			x	x	x	x	x	x	x
LED for Long-time Pickup	x	x	x	x	x	x	x	x	x
LED for Trip Indication			x	x	x	x	x	x	x
Digital Ammeter			x	x	x	x	x	x	x
Zone-selective Interlocking			x	x	x	x	x	x	x
Communications			o	o	o	x	x	x	x
LCD Dot Matrix Display						x	x	x	x
Advanced User Interface						x	x	x	x
Protective Relay Functions						x	x	x	x
Neutral Protection						x	x	x	x
Contact Wear Indication						x	x	x	x
Incremental Fine Tuning of Settings						x	x	x	x
Selectable Long-time Delay Bands						x	x	x	x
Power Measurement						x	x	x	x
Power Quality Measurements								x	x
Waveform Capture								x	x

Table 7.132: Long-Time Pickup Settings

Rating Plug	Long-time Pickup Settings								
A	.40	.45	.50	.60	.63	.70	.80	.90	1.0
B	.40	.44	.50	.56	.63	.75	.88	.95	1.0
C	.42	.50	.53	.58	.67	.75	.83	.95	1.0
D	.40	.48	.64	.70	.80	.90	.93	.95	1.0
E	.60	.70	.75	.80	.85	.90	.93	.95	1.0
F	.84	.86	.88	.90	.92	.94	.96	.98	1.0
G	.66	.68	.70	.72	.74	.76	.78	.80	.82
H	.48	.50	.52	.54	.56	.58	.60	.62	.64

Table 7.133: Special Options

Description	Factory-Installed Suffix	Field-Installable Cat. No.
Ship circuit breaker in closed position	YK	N/A
CT Characterization (Calibrated trip system)	Q	N/A
Alternate Maintenenace Setting (AMS) kit (use with 5.0/6.0 A, P or H and 5.3/6.3 A or E Micrologic trip units)	—	84957
Energy Reduction Maintenenace Setting (ERMS) kit (use with 5.0/6.0 P or H Micrologic trip units)	—	84956

[8] The standard rating plug supplied with a trip unit will be the “A” rating plug. To specify an alternative adjustable rating plug, please add the letter designation to the end of the catalog number. Please refer to page 7-67for a complete listing of adjustable settings available with each plug. (Example: S143B would specify a “B” rating plug instead of the standard "A" plug.) Use suffix “N” if no rating plug is required, deduct.

[9] When replacing a standard trip unit with Type A (Ammeter), P (Power metering) or H (Harmonic analysis) trip unit, order the 12-pin connector kit S33101 for the Masterpact NW and NT and the PowerPact P-frame drawout circuit breakers or kit S33100 for PowerPact P-frame and R-frame unit-mount and I-Line circuit breakers. See page 7-67.

[10] Requires Circuit Breaker Communications Module.

[11] Requires neutral current transformer in 3Ø4W systems.

[12] Alarm history is available through the trip unit display and communications. Local indication of an alarm requires an M2C or M6C Programmable Contact Module.

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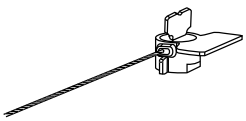
Full Function Test Kit



Trip Unit Seal

Sensor Plug

Trip Unit Accessories

Adjustable rating plug "A" is installed as standard on all Micrologic trip unit orders. However, an alternative selection may be specified from the "Assembled" table below, and factory installed with your trip unit order at no additional charge. To order, please attach the appropriate catalog suffix to the end of the trip unit Cat. No. (after specifying trip unit options). Adjustable rating plugs may also be purchased as field-installable components from the table below.

Table 7.134: Rating Plugs

Rating Plug *[13]*	Factory Installed Cat. Suffix	Field-Installable Cat. No.
A	A (standard)	S48818
B	B	S48819
C	C	S48820
D	D	S48836
E	E	S48837
F	F	S48838
G	G	S48839
H	H	S48840

Table 7.135: Neutral Current Transformers

For Use with Circuit Breaker	Cat. No.	Sensor
H-Frame	S429521	60–100
	S430562	150
J-Frame	S430563	250
L-Frame	S432575	400–600
P-Frame	S33575 *[14]*	250
	S33576 *[14]*	400–1600
R-Frame	S48916 *[14]*	250
	S34036 *[14]*	400–1600
	S48896 *[14]*	2000
	S48182 *[14]*	3000
All	NCTWIRING	All

Table 7.136: Trip Unit Accessories

Device	Frame	Cat. No.
Pocket Tester	H/J/L	S434206
UTA Tester		STRV00910
Spare UTA Tester		STRV00911
Bluetooth/Modbus for UTA Tester		SVW3A8114
Spare Power Supply for UTA Tester 110–120 Vac		TRV00915
Micrologic Cord for UTA Tester		TRV00917
Micrologic 5/6 Cover, Transparent	H/J	S429478
Micrologic 2/3 Cover, Transparent		S429481
Micrologic 5/6 Cover, Transparent	L	S432459
Micrologic 2/3 Cover, Transparent		S432461
LCD Display for Micrologic 5	H/J/L	S429483
LCD Display for Micrologic 6		S429484
Hand-held Test Kit	P/R	S33594
Primary Injection Test Adaptor		S33937
Full-function Adapter Kit		S48981
Full-function Test Kit		S33595
Seven-pin Test Cable (for connection between test kit and trip unit)*[15]*		S48907
Two-pin Test Cable (for connection between test kit and trip unit)*[16]*		S48908
230 Vac Filtered Power Cord*[17]*	P/R	S48856
120 Vac Filtered Power Cord*[17]*		S48855
Trip Unit Battery for Trip Indicator Lights		S33593
Power supply with:	H/J/L/P/R	
24–30 Vdc input		685823
48/60 Vdc input		685824
125 Vdc input		685825
110–130 Vac input		685826
200–240 Vac input		685827
380–415 Vac input		685829
Micrologic A Trip Unit Cover, clear	P/R	S33592
Micrologic P/H Trip Unit Cover, opaque gray		S47067
Trip Unit Seal (6 pieces) for compliance with NEC 240.6(c)	H/J/L/P/R	MICROTUSEAL
12-pin Trip Unit Connector for NT/NW Masterpact Circuit Breakers	P/R	S33101
12-pin Trip Unit Connector for P- and R-Frame Circuit Breakers		S33100
Battery Back-up (12 Hours)		685831

Table 7.137: Sensor Plugs for P- and R-Frame Circuit Breakers *[18][19]*

Circuit Breaker	Sensor Plug Range	Sensor Plug Catalog No.	Circuit Breaker Frames Accepting Sensor Plug								
P-Frame Circuit Breaker			250 A	400 As	600 As	630 A *[20]*	800 A	1000 A	1200 A	1250 A *[20]*	1600 A
UL	250 A	S47052	X								
	400 A	S47053		X	X		X				
	600 A	S48823			X		X	X	X		
	800 A	S33092					X	X	X		
	1000 A	S33093						X	X		
	1200 A	S48824							X		
IEC	630 A	S33091				X	X	X		X	X
	800 A	S33092					X	X		X	X
	1000 A	S33093						X		X	X
	1250 A	S33094								X	X
	1600 A	S33095									X
R-Frame Circuit Breaker			600 A	800 As	1000 As	1200 A	1600 A	2000 A	2500 A	3000 A	3200 A
UL	600 A	S48823	X	X	X	X					
	800 A	S33092		X	X	X	X				
	1000 A	S33093			X	X	X	X			
	1200 A	S48824				X	X	X	X		
	1600 A	S33095					X	X	X	X	
	2000 A	S33982						X	X	X	
	2500 A	S33983							X	X	
	3000 A	S48825								X	
IEC	1600 A	S33095					X	X	X	X	X
	2000 A	S33982						X	X	X	X
	2500 A	S33983							X	X	X
	3200 A	S33984									X

[13] Long-time pickup amperes (Ir) = Sensor Rating (In) X Setting of rating plug. “Fine adjustment tuning” is included on Micrologic Power and Harmonic trip units, allowing for incremental settings of 1 A between the plug setting and.40 X Sensor Rating.
[14] Includes NCTWIRING kit.
[15] Used for testing Micrologic trip units. Included in the price of the Hand-held/Full-function Test Kits. Kit for replacement only.
[16] Used for testing STR trip units. Included in the price of the Hand-held/Full-function Test Kits. Kit for replacement only.
[17] Included with the Full-function Test Kit. Kit for replacement only.
[18] For use only with circuit breakers with date codes later than 07011.
[19] See rating plug for long-time pickup range page 7-63.
[20] IEC Only.

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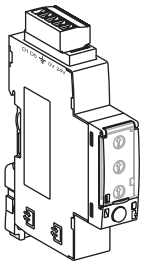
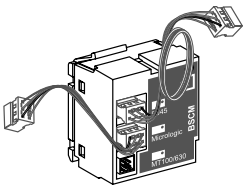
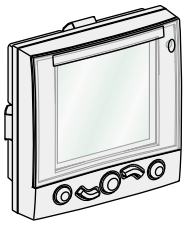


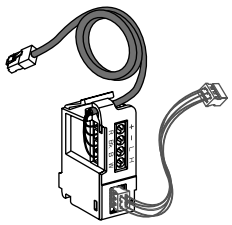
Modbus Interface Module (IFM)



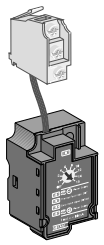
Breaker Status and Control Module (BSCM)



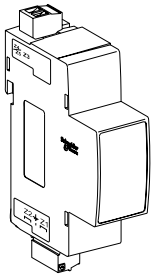
Front Display Module (FDM)



NSX Cord for Modbus Communications



SDTAM Module (Remote indication relay for motor applications)



ZSI Interface Module (Connects PowerPact H/J/L circuit breakers to PowerPact P/R and Masterpact NT/NW circuit breakers)

Trip Unit Accessories

Table 7.138: Communication Modules, Display Screens, and Wiring Accessories

Description		Field-Installable Kit Cat. No.
IFM Modbus-SL Interface for LV Circuit Breaker		STRV00210
Stacking Accessory (10 Stacking Accessories for IFM)		TRV00217
IFE Interface (Ethernet Module)		LV434010
IFE Interface + Gateway (Ethernet and ModbuGateway)		LV434011
I/O Module (Input/Output ProgrammableModule)		LV434063
Circuit Breaker ULP Cord–BCM to COMS	L = 0.35 m (1.15 ft)	LV434195
	L = 1.3 m (4.27 ft)	LV434196
	L = 3 m (9.24 ft)	LV434197
ULP Cable, 10 Cables (Male to Male RJ45)	L = 0.3 m (0.98 ft)	TRV00803
	L = 0.6 m (1.97 ft)	TRV00806
ULP Cable, 5 Cables (Male to Male RJ45)	L = 1 m (3.28 ft)	TRV00810
	L = 2 m (6.56 ft)	TRV00820
	L = 3 m (9.84 ft)	TRV00830
ULP Cable, 1 Cable (Male to Male RJ45)	L = 5 m (16.40 ft)	TRV00850
RJ45 Female/Female Connector, 10 Connectors		TRV00870
ULP Line Terminator, 10 Terminators		TRV00880
Insulated ULP Module and Circuit Breaker Cord (for System Voltage Greater than 480 Vac) (Cord with Female Socket)	L = 1 m (3.28 ft)	S434204
	L = 3 m (9.84 ft)	S434303
Two-Wire RS 485 Isolated Repeater Module		STRV00211
Modbus Line Terminator, 2 Terminators		VW3A8306DRC
FDM121 (1 Circuit Breaker to 1 Front Display)		STRV00121
Surface-Mounting Accessory for FDM		TRV00128
FDM128 (8 Circuit Breakers to 1 Front Display)		LV434128

Table 7.139: Trip Unit Field-Installable Accessories, Wire Harness *[21]* and ULP Cords for H-, J-, and L-Frame Circuit Breakers *[22]*

Description		Factory-Installed Cat. No. Suffix	Field-Installable Kit Cat. No.
External Accessories			
Isolated Modbus Repeater Module		—	STRV00211
ZSI Interface Module		—	S434212
Internal Accessories			
NSX Cord *[23]* (for Modbus Communication)	L = 1.3 m (4.27 ft)	EA	S434201
	L = 3 m (9.84 ft)	EB	S434202
BSCM (Breaker Status and Control Module) with NSX Cord *[23]*	L = 1.3 m (4.27 ft)	EG *[24]*	S434201BS
	L = 3 m (9.84 ft)	EH *[24]*	S434202BS
Replacement BSCM		—	S434205
BSCM with NSX Cord for V > 480 Vac *[23]*	L = 1.3 m (4.27 ft)	EK *[24]*	S434204BS
	L = 3 m (9.84 ft)	EL *[24]*	S434303BS
24 Vdc Terminal Block		EN	S434210
SDTAM 24/415 Vac/dc Module *[25]*		V	S429424
SDX Module 24/415 Vac/dc *[26]*		V	S429532
ZSI Wire Harness, H/J Frame		YH3	S434300
ZSI Wire Harness, L-Frame		YH3	S434301
ENCT Wire Harness		YH2	S434302
OF Wire Harness		YH1	S434500
SD/SDE Wire Harness		YH1	S434501
SDx/SDTAM Wire Harness		YH1	S434502
MN Wire Harness		YH1	S434503
MX Wire Harness		YH1	S434504
24 Vdc Terminal Block Wire Harness *[27]*		YH1	S434505
Motor Operator Wire Harness		YH1	S434506
Communicating Motor Operator Wire Harness		YH1	S434507
NSX Wire Harness *[27]*		YH1	S434508
ENCT and ZSI Wire Harness		YH4	—

Table 7.140: Trip Unit Field-Installable Accessories for P- and R-Frame Circuit Breakers

Description	Factory-Installed Cat. No. Suffix	Field-Installable Kit Cat. No.						
		P-Frame					R-Frame	
		Unit Mount	I-Line	Motor Operated	Drawout	With Rotary Handle	Unit Mount	I-Line
Circuit Breaker Communication Module (BCM) (Modbus)	E1	S64205	S64205	S64207	S64206	S64205	S64205	S64205
Two Programmable Contacts Module (M2C)	V	S64273	S64273	S64273	S64273	S64273	S64273	S64273
Six Programmable Contacts Module (M6C)	W	S64204	S64204	S64204	S64202	S64204	S64201	S64201
External Voltage Sensing (EVS)	YV	S64203	S64203	S64210	S64209	S64210	S64208	S64208

[21] Wire harness is required for I-Line applications, optional for unit-mount applications
YH1 = all installed accessories but ZSI and ENCT
YH2 = ENCT and all installed accessories
YH3 = ZSI and all installed accessories
YH4 = ZSI, ENCT and all installed accessories
[22] For proper selection, see catalog 0611CT1001.
[23] Installation requires IFM (STRV00210) for Modbus communication and/or FDM (STRV00121) for external display.
[24] If using with motor operator requires communicating motor operator (suffix NC).
[25] Remote indication relay for motor applications
[26] Remote indication relay
[27] I-Line wire harness is included for communication network accessories.
Optional wire harness for unit mount requires YH1 suffix.

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Masterpact NT

Masterpact NW

Full-Featured Performance

The Masterpact universal power circuit breaker offers a family of circuit protection products meeting the most common world standards, ANSI, UL and IEC. The basic design platform for each is common. The final result is UL, ANSI and IEC circuit breakers with the same basic external dimensions, features and accessories.

- Complete product offering up to 200 k AIR without fuses
- Circuit breakers tested to show arc flash hazard risk category as referenced by NFPA70E
- 800 A to 6000 A frames, fixed and draw-out
- Rated for AC voltage systems through 600 V (635 V ANSI)
- Short-time withstand ratings up to 100 kA
- Cradle position indicator: connected, test and disconnected
- Simple, visual contact wear indicators
- Full complement of field-installable accessories common to all standards
- Four interchangeable Micrologic trip units to choose from
- Available PowerLogic™ based power metering and monitoring capabilities
- Available protective relay functions as defined by ANSI C37.2 and C37.90

The following charts show the Masterpact NW and NT ratings for ANSI and UL 489. See Pricing Guide **0613PL0001** and Catalog **0613CT0001**.

Table 7.141: Masterpact NW Circuit Breaker Ratings

Standard Frame Rating Interrupting Code		ANSI C37 Certified/UL 1066 Listed																		UL 489 Listed							
		800–1600 A						2000 A					3200/4000 A *[1]*				4000/5000 A			800/1200/1600/2000 A				2500/3000 A		4000/5000/6000 A	
		N1	H1	H2	H3	L1 *[2]*	L1F *[2]*	H-1	H2	H3	L1 *[2]*	L1F *[2]*	H1	H2	H3	L1 *[2]*	H2	H3	L1 *[2]*	N	H	L *[2]*	LF *[2]*	H	L *[2]*	H	L *[2]*
Interrupting Current (kA RMS) 50/60 Hz	240 Vac	42	65	85	100	200	200	65	85	100	200	200	65	85	100	200	85	100	200	65	100	200	200	100	200	100	200
	480 Vac	42	65	85	100	200	200	65	85	100	200	200	65	85	100	200	85	100	200	65	100	150	150	100	150	100	150
	600 Vac	42	65	85	85	130	130	65	85	85	130	130	65	85	85	130	85	85	130	50	85	100	100	85	100	85	100
Short-time Withstand Current (kA RMS)		42	65	85	85	30	22	65	85	85	30	22	65	85	85	100	85	85	100	42 *[3]*	65*[3]*	30*[3]* *[4]*	22	65	65	85	100
Built-in Instantaneous Override (kA RMS ±10%)		35 *[5]*	35 *[5]*	35 *[5]*	85	35 *[5]*	24	—	—	85	35	24	—	—	85	117	—	—	117	40	40	35*[3]* *[4]*	24	65	65	75	75
Close and latch rating (kA RMS)		42	65	40	40	25	22	65	40	40	25	22	65	40	40	40	85	75	40	40	40	25*[6]*	22	40	40	40	40
Tested to show arc flash hazard risk category as referenced by NFPA70E		—	—	—	—	—	Yes	—	—	—	—	Yes	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—
Breaking time		25–30 ms with no intentional delay (9 ms for L1, L1F, L and LF)																									
Closing time		70 ms																									
Sensor Rating		100–250 A 400–800 A 800–1600 A						1000–2000 A					1600–3200 A				2000–4000 A 2500–5000 A			100–250 A 400–800 A 600–1200 A 800–1600 A 1000–2000 A				1200–2500 A 1600–3000 A		2000–4000 A 2500–5000 A 3000–6000 A	
Endurance Rating (C/O Cycles) With No Maintenance	Mechanical	12,500						10,000					10,000			5k	5,000			12,500*[7]*				10,000		5,000	
	Electrical	2800						1,000					1,000			1k	1,000			2800*[7]*				1,000		1,000	

[1] 4000 A standard width circuit breaker is not available in L1 interrupting rating code or drawout construction (fixed mounting only).
[2] Drawout mounted only.
[3] 24 kA RMS for 800 A circuit breaker frame with 100 A or 250 A sensor.
[4] 65 kA RMS for 2000 A.
[5] None except 24 kA RMS for 800 A circuit breaker frame with 100 A or 250 A sensor.
[6] 40 kA RMS for 2000 A.
[7] The endurance rating for 2000 A, N/H/L/LF is 10,000 for mechanical and 1000 for electrical.

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Table 7.142: Masterpact NT Circuit Breaker Ratings

Standard Frame Rating Interrupting Code		ANSI C37 Certified/ UL 1066 Listed	UL 489 Listed												
		800 A	800 A					1200 A					1600 A *[8]*			
		N1	N	H	L1	L	LF *[9]*	N	H	L1	L	LF *[9]*	N	H	L1	L
Interrupting Current (kA RMS) 50/60 Hz	240 Vac	42	50	65	100	200	200	50	65	100	200	200	50	65	100	200
	480 Vac	42	50	50	65	100	100	50	50	65	100	100	50	50	65	100
	600 Vac	—	35	50	—	—	—	35	50	—	—	—	35	50	N/A	N/A
Short-time Withstand Current (kA RMS)		42	35	35	10	10	10	35	35	10	10	10	35	35	10	10
Built-in Instantaneous Override (kA RMS ±10%)		—	40	40	10	10	10	40	40	10	10	10	40	40	10	10
Close and latch rating (kA RMS)		40	25	25	10	10	10	25	25	10	10	10	25	25	10	10
Tested to show the arc flash hazard risk category as referenced by NFPA70E		—	—	—	—	—	Yes	—	—	—	—	Yes	—	—	—	—
Breaking time		25–30 ms with no intentional delay	25–30 ms with no intentional delay (9 ms for L and LF)													
Closing time		< 50 ms														
Sensor Rating		100–250 A	100–250 A					600–1200 A					800–1600 A			
		400–800 A	400–800 A					—								
Endurance Rating (C/O Cycles) With No Maintenance	Mechanical	12,500	12,500					12,500					12,500			
	Electrical	2800	2800					2800					2800			

NWMPRR

Table 7.143: Masterpact NW/NT Circuit Breaker Remote Racking

Description	Cat. No.
Masterpact NW/NT Remote Racking Devices *[10]*	NWNTMPRRT
Masterpact NW Remote Racking Device *[10]*	NWMPRRT
Masterpact NT Remote Rackign Device *[10]*	NTMPRRT
Mounting Bracket Kit for NW Remote Racking (contains 10 mounting brackets) *[11]*	S47100
Mounting Bracket Kit for NT Remove Racking (contains 10 mounting brackets) *[11]*	S47104
Control Unit for NW Remote Racking *[11]*	S47101
30 ft Control Cable for NW Remote Racking *[11]*	S47102
Drive Shaft for NW Remote Racking *[11]*	S47103
Drive Shaft for NT Remote Racking *[11]*	S47105

[8] Fixed mounted only.
[9] Drawout mounted only.
[10] Unit comes with 10 mounting brackets included.
[11] For replacement only.

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Vigirex™ Ground-Fault Relay System

The Vigirex ground-fault relays, with associated sensors (current transformers), measure the residual current in an electrical installation to detect levels which may be damaging. When used for protection, they cause an associated circuit breaker or switch to interrupt the supply of power to the protected system. They may also be used for monitoring only, with output to an alarm. The product line includes fixed sensitivities from 30 mA to 1 A and adjustable sensitivities up to 30 A.

The Vigirex relays may be easily mounted on DIN rail or may be panel mounted in a meter cutout. Sensors for conductors range from a little more than an inch diameter toroids, to large rectangular sensors measuring 6 x 18 inches. The compact size of the relay and its sensor make it ideal for protection of OEM equipment as well as branch circuits.

RH99M

RH99P

Table 7.144: Vigirex Ground-Fault Relays (UL 1053 Listed)

Model	Delay	Reset	Control Voltage	Sensitivity	Cat. No.
DIN Rail Mounted					
RH10M	Instantaneous	Manual	12–24 Vac/12–48 Vdc	30 mA	56300
				100 mA	56302
				300 mA	56305
				500 mA	56306
				1 A	56307
			110–130 Vac	30 mA	56320
				100 mA	56322
				300 mA	56325
				500 mA	56326
				1 A	56327
			220–240 Vac	30 mA	56330
				100 mA	56332
				300 mA	56335
				500 mA	56336
				1 A	56337
RH21M	Instantaneous or 60 msec (2 settings)	Manual	12–24 Vac/12–48 Vdc	30 mA[1] or 300 mA (2 settings)	56360
			110–130 Vac		56362
			220–240 Vac		56363
RH99M	Adjustable (9 settings): 0, 0.06, 0.15, 0.23, 0.31, 0.5, 0.8, 1.0, 4.5 sec	Manual	12–24 Vac/12–48 Vdc	Adjustable, (9 settings): 0.03[1], 0.1, 0.3, 0.5, 1, 3, 5, 10, 30 A	56370TD
			110–130 Vac		56372TD
			220–240 Vac		56373TD
		Automatic	12–24 Vac/12–48 Vdc		56390TD
			110–130 Vac		56392TD
			220–240 Vac		56393TD
Panel Mounted					
RH10P	Instantaneous	Manual	12–24 Vac/12–48 Vdc	30 mA	56400
				100 mA	56402
				300 mA	56405
				500 mA	56406
				1 Amp	56407
			110–130 Vac	30 mA	56420
				100 mA	56422
				300 mA	56425
				500 mA	56426
				1 Amp	56427
			220–240 Vac	30 mA	56430
				100 mA	56432
				300 mA	56435
				500 mA	56436
				1 A	56437
RH21P	Instantaneous or 60 msec (2 settings)	Manual	12–24 Vac/12–48 Vdc	30 mA[1] or 300 mA (2 settings)	56460
			110–130 Vac		56462
			220–240 Vac		56463
RH99P	Adjustable (9 settings): 0, 0.06, 0.15, 0.23, 0.31, 0.5, 0.8, 1.0, 4.5 sec	Manual	12–24 Vac/12–48 Vdc	Adjustable (9 settings): 0.03[1], 0.1, 0.3, 0.5, 1, 3, 5, 10, 30 A	56470TD
			110–130 Vac		56472TD
			220–240 Vac		56473TD
		Automatic	12–24 Vac/12–48 Vdc		56490TD
			110–130 Vac		56492TD
			220–240 Vac		56493TD

PA50

SA200

Table 7.145: Sensors for Vigirex Ground-Fault Relays

Sensors	Type	Maximum Current [2]	Inside Diameter		Cat. No.
			in.	mm	
Closed Toroids, Type A	TA30	65 A	1.18	30	50437
	PA50	85 A	1.97	50	50438
	IA80	160 A	3.15	80	50439
	MA120	250 A	4.72	120	50440
	SA200	400 A	7.87	200	50441
	GA300	630 A	11.81	300	50442
Vigirex Sensor Iron Rings (Optional)	TA30	65 A	0.79	20	56055
	PA50	85 A	1.58	40	56056
	IA80	160 A	2.76	70	56057
	MA120	250 A	4.33	110	56058
Split toroids, Type TOA	TOA80	160 A	3.15	80	50420
	TOA120	250 A	4.73	120	50421
Rectangular Sensors	280 x 115	1600 A	11.02 x 4.53	280 x 115	56053
	470 x 160	3200 A	18.50 x 6.30	470 x 160	56054

[1] 30 mA is instantaneous only, except for RH99M and RH99P models. Their suffix TD indicates time delay at 30 mA. For models with no time delay (IEC compliant) consult catalog 0972CT0401.

[2] Use as a guideline for sizing wire through sensor.

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GFM250 with Optional GFM25CT

Micrologic™ Add-on Ground-Fault Module (GFM)

The Micrologic Ground-Fault Module (GFM) is a UL Listed/CSA Certified circuit breaker accessory which protects equipment from damage caused by ground faults. It is an add-on module which, when connected to a PowerPact H- or J-frame thermal-magnetic circuit breaker only, provides ground-fault sensing and ground-fault relay functions.

HD/JD ground-fault modules feature:

- Adjustable ground-fault pickup levels
- Adjustable ground-fault time delays
- Integral ground fault push-to-test feature
- Ground-fault indicator (mechanical for local, contacts for remote)
- All GFMs are supplied for I-Line™ mounting as standard, easily convertible to unit mount by removing the I-Line bracket
- Fault-powered (through the sensing current transformer) for electronics, shunt trip, and integral test feature. Meets NEC 230.95(C)
- A 12 Vdc shunt trip module (Catalog No. S29382) is required in the circuit breaker. This may be field installed or factory installed when the circuit breaker is ordered with an -SN suffix.
- UL 1053 — Ground-fault Sensing and Relaying Equipment

The GFM system requires the following:

- H-frame (15–150 A) or J-frame (150–250 A) molded case circuit breaker
- Shunt trip is required for the function of the GFM (may be factory-installed or field-installed)
- Bus bar connection (terminal nut inserts) for OFF end of circuit breaker
- Optional neutral current transformer, catalog number GFM25CT (must be ordered for 4-wire applications).NOTE: Ground-fault modules cannot be used for alarming only.

Table 7.146: Module/Enclosure Selection Chart *[3]*

Companion Circuit Breaker Prefix	Cat. No. *[4]*	I-Line Switchboard	Ground-fault Pickup Adjustment Range
HD, HG, HJ, HL	GFM150HD	LA	20–100 A
JD, JG, JJ, JL	GFM250JD	LA	40–200 A
Accessories			
H & J	GFM25CT	Optional Neutral Current Transformer (required for 4-wire loads)	

I-Line J-Frame with ELM Installed

Earth Leakage Module (ELM) for PowerPact H- and J-Frame MCCBs

The Earth Leakage Module (ELM) is an add-on module which, when connected to a PowerPact H- or J-frame MCCB, provides low-level ground-fault sensing and ground-fault relay functions.

Because these ELMs are highly sensitive (30 mA to 3 A), they provide much greater protection than GFMs (20 Amps to 200 Amps sensitivity). The ELMs provide greater protection of control circuits and other sensitive equipment. The associated circuit breaker must have a 48 Vdc shunt trip, which may be field-installed (kit S29392) or factory-installed (suffix –SP) in the H- or J-Frame circuit breaker.

Add-on Earth Leakage Module (ELM) Features:

- Adjustable ground-fault pickup levels as low as 30 mA
- Adjustable ground-fault time delays from instantaneous to 500 msec (Time delay can be applied to the 30 mA setting)
- Integral ground fault push-to-test feature
- Ground-fault indicator; pop-up button for local status and contacts for remote indication (to be used only with the tripping option)
- All ELMs are supplied for I-Line™ mounting and are easily convertible to unit-mount by removing the I-Line brackets
- Three poles; 240 to 600 Vac maximum: 3-wire applications only (no neutral)
- Line-power obtained through internal bus to provide power for electronics, shunt trip, and integral test feature.
- A shunt trip is required in the circuit breaker; it may be field-installed or factory-installed in the PowerPact H and J circuit breakers.
- UL 1053 – Ground-fault Sensing and Relaying Equipment

Table 7.147: ELM Selection Chart *[5]*

Companion Circuit Breaker *[6]*		Enclosure Space Required I-Line Switchboard	Pick-Up Adjustment Range	Catalog Number
Prefix	Size			
HD, HG, HJ, HL	15–150 A	LA	30 mA–3 A	ELM150HD
JD, JG, JJ, JL	150–250 A	LA	30 mA–3 A	ELM250JD

[3] At 250 A, the GFM250JD can be used with 80% rated circuit breakers only.
[4] See Supplemental Digest Section 3 for additional GFMs.
[5] At 250 A, the ELM250JD can be used with 80% rated circuit breakers only.
[6] For Factory Installation of ELM Module: For termination designation (3rd letter of catalog number) use ONLY “M”. Add factory installed 48 Vdc shunt trip (suffix SP) to breaker plus suffix VL or VM.

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Miniature and Molded Case Circuit Breaker Dimensions

Table 7.148: QO™, QOU, Multi 9™ Circuit Breakers

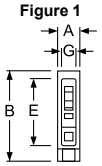
Circuit Breaker Cat. No. Prefix	Poles	Fig. No.	Dimensions—Inches						
			A	B	C	D	E	F	G
QO, QOB	1	1	0.75	3.00 *[1]*	2.31	2.91	2.25	—	0.59
	2	2	1.50	3.00 *[1]*	2.31	2.91	2.25	—	1.34
	3	3	2.25	3.00 *[1]*	2.31	2.91	2.25	—	2.09
QOB-VH 150 A QOB-VH 110–150 A	2	2	3.0	5.72	2.53	4.90	3.78	—	2.85
	3	3	4.50	5.72	2.53	4.90	3.78	—	4.35
QO-PL QO-GFI QO-EPD	1	4	0.75	4.12 *[2]*	2.31	2.91	2.25	—	0.59
	2	5	1.50	4.12 *[2]*	2.31	2.91	2.25	—	1.34
	3	5	2.25	4.12 *[2]*	2.31	2.91	2.25	—	2.09
QOU QYU Low Ampere	1	6	0.75	4.05 *[3]*	2.38	2.98	2.25	5.00 *[4]*	0.62
	2	7	1.50	4.05 *[3]*	2.38	2.98	2.25	5.00 *[4]*	1.37
	3	8	2.25	4.05 *[3]*	2.38	2.98	2.25	5.00 *[5]*	2.12
QOU High Ampere	1	10	0.75	4.45	2.37	2.96	2.25	6.78	—
	2	11	1.50	4.45	2.37	2.96	2.25	6.78	—
	3	12	2.25	4.45	2.37	2.96	2.25	6.78	—
Multi 9™ C60	1	13	0.71	3.19	1.73	2.76	1.77	—	—
	2	14	1.42	3.19	1.73	2.76	1.77	—	—
	3	15	2.13	3.19	1.73	2.76	1.77	—	—
	4	16	2.84	3.19	1.73	2.76	1.77	—	—
QO-PLPS Power Supply	2	9	1.45	4.35	2.42	3.11	—	—	—

Table 7.149: QB, QD, QG, QJ, Q4, FA, LA, Circuit Breakers

Circuit Breaker Cat. No. Prefix	Poles	Fig. No.	Dimensions—Inches							
			A	B	C	D	E	F	G	H
QB, QD, QG, QJ	2	22	6.47	3.00	3.02	3.93	*[6]*	4.25	—	—
	3	23	6.47	4.50	3.02	3.93	*[6]*	4.25	1.50	0.75
FAL, FHL	1	21	6.00	1.50	3.16	4.13	0.44	5.13	1.50	—
	2	22	6.00	3.00	3.16	4.13	0.44	5.13	—	—
	3	23	6.00	4.50	3.16	4.13	0.44	5.13	1.50	0.75
Q4L, LAL, LHL	2 & 3	23	11.00	6.00	4.06	5.84	0.88	9.25	2.00	1.00

Table 7.150: Shipping Weights *[7]*

Frame Size	Approx. Shipping Weight (Lbs.)	Frame Size	Approx. Shipping Weight (Lbs.)
FAL, FHL 1P	2	QB, QD, QG, QJ	4
FAL, FHL 2P	3	LAL, LHL	15
FAL, FHL 3P	5	Q4L	15

Figure 1


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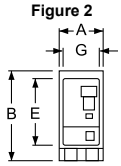

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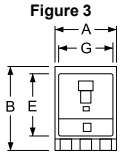
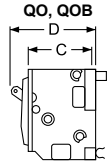


QO, QOB


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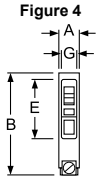

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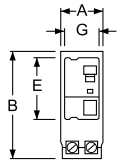
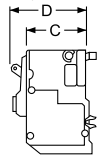
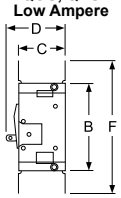


QO-GFI, QO-PL
QO-EPD


QOU, QYU
Low Ampere


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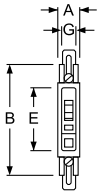

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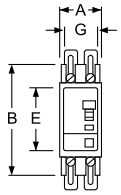

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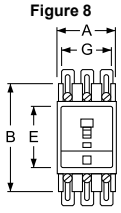

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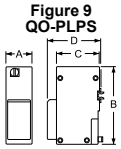
QO-PLPS


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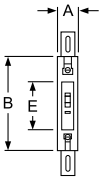

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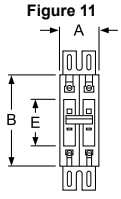

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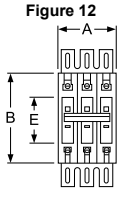
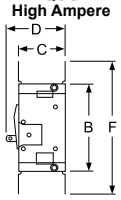


QOU
High Ampere


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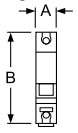

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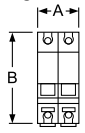

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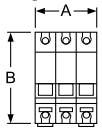

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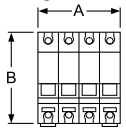

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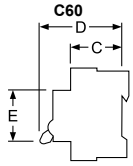

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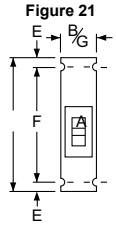

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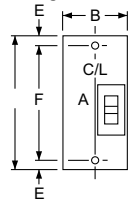

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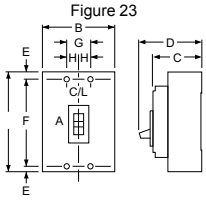

[1] 35–70 A is 3.12 in; 80–100 A 2P and 70–100 A 3P are 3.50 in.
[2] QO-PL is 4.55 in.
[3] 80–100 A 1P and 80–125 A 2P are 4.45 in.
[4] 80–100 A 1P and 80–125 A 2P are 6.78 in.
[5] 70–100 A is 6.78 in.
[6] Dimensions E are 1.59 in at ON end and 0.63 in at OFF end.
[7] All weights are for 3P circuit breakers unless otherwise noted.

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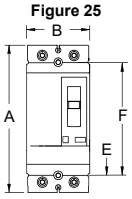
Figure 25



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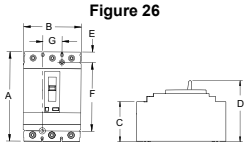

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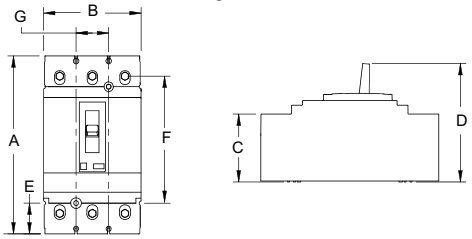


Figure 28

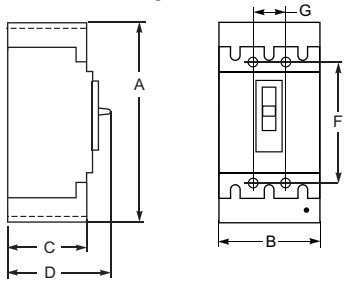


Figure 29

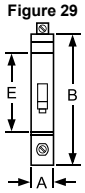


Figure 30

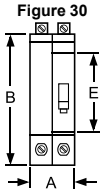
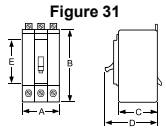


Figure 31



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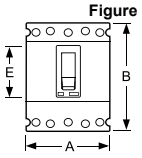


Figure 33

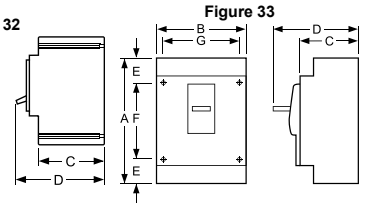
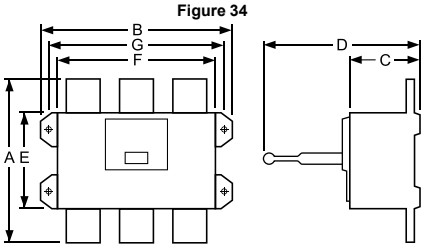


Figure 34



Molded Case Circuit Breaker Dimensions

Table 7.151: PowerPact B-, H-, J-, and L-Frame Circuit Breakers

Circuit Breaker Frame	No. of Poles	Fig. No.	Dimensions — Inches							
			A	B	C	D	E	F	G	H
B-Frame	1	35	6.79	1.06	3.15	4.01	0.20	6.33	—	5.39
	2	36	6.22	2.12	3.15	4.01	0.86	4.48	—	5.39
	3	37	6.22	3.19	3.15	4.01	0.86	4.48	1.06	5.39
	4	38	6.22	4.25	3.15	4.01	0.86	4.48	2.12	5.39
H-Frame	2 *[8]*	25	6.40	2.74	2.87	4.36	0.74	4.92	—	—
	3	26	6.40	4.12	2.87	4.36	0.74	4.92	1.38	—
J-Frame	3	27	7.52	4.12	2.87	5.00	1.30	4.92	1.38	—
L-Frame	3	28	13.38	5.51	3.75	6.61	2.22	7.87	1.77	—

Table 7.152: ED, EG, EJ, and GJ Circuit Breakers

Circuit Breaker Cat. No. Prefix	No. of Poles	Fig. No.	Dimensions — Inches				
			A	B	C	D	E
ED, EG, EJ	1	29	0.98	5.66	3.09	4.05	3.32
ED, EG, EJ	2	30	1.96	5.66	3.09	4.05	3.32
ED, EG, EJ	3	31	2.94	5.66	3.09	4.05	3.32
GJ	3	32	3.54	4.72	2.76	3.94	2.20

Table 7.153: PowerPact M-, P-, and R-Frame Circuit Breakers

Circuit Breaker Frame	No. of Poles	Fig. No.	Dimensions — Inches						
			A	B	C	D	E	F	G
M-Frame (800 A and below)	2, 3	33	12.86	8.27	5.77	8.05	2.49	7.87	7.83
P-Frame (1000–1200 A)	2, 3	33	16.16	8.27	5.77	8.05	4.19	7.87	7.83
R-Frame	2, 3	34	16.24	16.54	6.63	14.49	8.73	14.25	15.35

Table 7.154: Shipping Weights *[9]*

Frame Size	Approx. Shipping Weight (Lbs.)	Frame Size	Approx. Shipping Weight (Lbs.)
B-Frame 1P	1	H-Frame 2P	4
B-Frame 2P	2	H-Frame 3P	5
B-Frame 3P	3	J-Frame	5
B-Frame 4P	4	L-Frame	14
EDB 1P	2	M-Frame	29
EDB 2P	3	P-Frame	32
EDB 3P	4	R-Frame (Without RLTB)	52

Figure 35

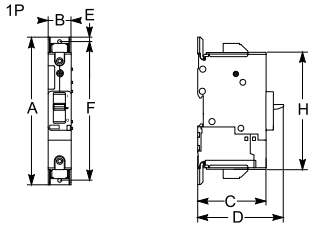


Figure 36

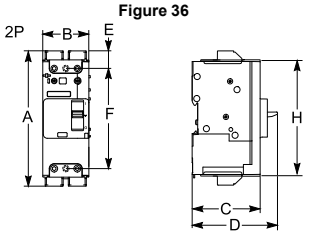
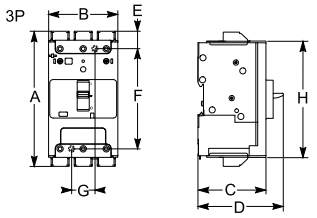


Figure 37



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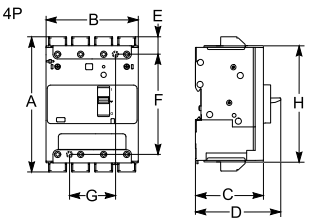

[8] Only HD and HG are in 2P module, HJ, HL and HR 2P are in 3P module.
[9] All weights are for 3P circuit breakers unless otherwise noted.

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FA100S

FA100RB

FA100DS

Circuit Breaker Enclosures

F- and L–Frame Thermal-Magnetic Circuit Breaker Enclosures

The enclosures for the F- and L-Frame thermal-magnetic circuit breakers are UL listed and CSA certified. The enclosures are suitable for service entrance equipment when neutral assembly is installed. The short circuit ratings of these enclosed circuit breakers are equal to the interrupter rating, at the supply voltage marked on the circuit breaker installed.

F-Frame Thermal-Magnetic Circuit Breaker Enclosures

The FA100RB enclosure has a provision of 3/4 through 2 1/2 inch B-Type bolt-on hubs in the top end wall. For details and hub catalog numbers see page 3-10.

Table 7.155: F-Frame Thermal-Magnetic Circuit Breaker Enclosures

Circuit Breaker			Cat. No.				
Cat. No. Prefix	Rating	Poles	Enclosure			Neutral Assembly Kit	Service Ground Kit
			NEMA 1 Flush	NEMA 1 Surface	NEMA 3R		
FAL, FHL, FCL	15–100 A	1, 2, 3	FA100F	FA100S	FA100RB	SN100FA	PKOGTA2
			NEMA 4, 4X, 5 *[1]* Type 304 Stainless Steel *[2]*	NEMA 12K With Knockouts	NEMA 12/3R Without Knockouts *[2]*		
FAL, FHL, FCL	15–100 A	1, 2, 3	FA100DS	FA100A	FA100AWK	SN100FA	PKOGTA2

L-Frame Thermal-Magnetic Circuit Breaker Enclosures

The LA400R enclosure has a blank top end wall and requires field cut openings. For details and hub catalog numbers see page 3-10.

Table 7.156: L-Frame Thermal-Magnetic Circuit Breaker Enclosures

Circuit Breaker			Enclosure			Neutral Assembly Kit	Service Ground Kit
Cat. No. Prefix	Rating	Poles	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
			NEMA 1 Flush	NEMA 1 Surface	NEMA 3R		
LAL, LHL, Q4L	125–225 A	2, 3	LA400F *[3]*	LA400S *[3]*	LA400R	SN225KA	PKOGTA2
	225–400 A					400SN	
LAL	125–400	3	—	LA400LS *[4] [5][6][7]*	—	SN400LA	
			NEMA 4, 4X, 5 *[1]* Type 304 Stainless Steel *[2]*	NEMA 12K With Knockouts	NEMA 12/3R Without Knockouts *[2]*		
LAL, LHL, Q4L	125–225 A	2, 3	LA400DS *[6]*	—	LA400AWK *[6]*	SN225KA	PKOGTA2
	225–400 A					SN400LA	

[1] Complete rating is NEMA 3, 3R, 4, 4X, 5, and 12.
[2] For NEMA 3R applications, remove drain screw from bottom endwall.
[3] Enclosures are provided with the Handle Padlock Attachment (HPALM) for field installation to lock the circuit breaker in the “ON” or “OFF” positions.
[4] Use copper conductors only.
[5] Maximum short circuit and voltage is 30 kAIR at 480 Vac.
[6] LAL or LHL circuit breakers with an MB or MT suffix are not compatible with these enclosures: LA400DS, LA400AWK, and LA400LS.
[7] Enclosure cover has an integral padlock provision to provide a means to lock the circuit breaker in the “ON” or “OFF” position.

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PowerPact Circuit Breaker Enclosures

The enclosures for the family of PowerPact circuit breakers H- through Q-frame are cULus listed unless otherwise noted. The enclosures are suitable for service entrance equipment when neutral assembly is installed. The short circuit current rating of the enclosed circuit breakers is equal to the rating of the circuit breaker installed unless otherwise noted. All enclosures will accept 100% rated circuit breakers unless otherwise noted.

PowerPact H- and J-Frame Circuit Breaker Enclosures

The enclosures' maximum short circuit ratings are 25 kAIR at 600 Vac, 65 kAIR at 480 Vac, 125 kAIR at 240 Vac and 20 kA at 250 Vdc unless otherwise noted. Enclosures accept 100% rated circuit breakers *[8]*. The enclosures are not compatible with earth-leakage or ground-fault modules.

Table 7.157: PowerPact H- and J-Frame Circuit Breaker Enclosures

Circuit Breaker			Enclosure Cat. No.			Neutral Assembly Kit Cat. No.	Service Ground Kit Cat. No.
Cat. No. Prefix	Rating	Poles					
			NEMA 1 Flush	NEMA 1 Surface	NEMA 3R		
HDL	15–100 A	3	—	HD100S *[9][10][11]*	—	SN100FA	PKOGTA2
HDL, JDL	125–225 A	3	—	JD250S *[12][10][11]*	—	SN225KA	PKOGTA2
	125–250					SN400LA	
HDL, HGL	15–100 A	2	H150F	H150S	H150R *[13]*	SN100FA	PKOGTH150
	125–150 A	2				SN400LA	
HJL, HLL	15–100 A	2	J250F	J250S *[14]*	J250R *[13][15]*	SN100FA	PKOGTH150
HDL, HGL, HJL, HLL	15–100 A	3					
	125–150 A	3				SN400LA*[16]*	
JDL, JGL, JJL, JLL	150–250 A	2, 3					PKOGTJ250
			NEMA 4, 4X, 5 *[17]* Type 304 Stainless Steel *[18]*	NEMA 4, 4x, 5 *[17]* Type 316 Stainless Steel *[18]*	NEMA 12/3R Without Knockouts *[18]*		
HDL, HGL, HJL, HLL	15–100 A	2, 3	J250DS *[19]*	J250SS *[19]*	J250AWK *[19]*	SN100FA	PKOGTH150
	125–150 A	2, 3					
JDL, JGL, JJL, JLL	150–250 A	2, 3				SN400LA *[16]*	PKOGTJ250

PowerPact L-Frame Circuit Breaker and Molded Case Switch Enclosures

All enclosures accept 80% rated circuit breakers. The enclosures will also accept 100% rated circuit breakers to 400 amps. The enclosures have a blank top end wall and require field-cut openings. For details and hub catalog numbers see page 3–10.

Table 7.158: PowerPact L-Frame Circuit Breaker Enclosures

Circuit Breaker			Cat. No.			
Cat. No. Prefix	Rating	Poles	NEMA 12/3R Enclosures Without Knockouts	Neutral Assembly Kit	Copper Only Neutral Assembly Kit	Service Ground Kit
LDL, LGL, LJL, LLL, LRL	250–400 A	3	L600AWK *[20][18][19]*	SN400LA	SNC400LX	PKOGTA4
	400–600 A			SN1000MA	SNC800LX	
LGL, LLL, LRL	250–400 A	3	L600AWKMC *[21][18]*	SN400LA	SNC400LX	PKOGTA4
	400–600 A			SN1000MA	SNC800LX	

PowerPact Q-Frame Circuit Breaker Enclosures

The enclosures for the PowerPact Q Frame Circuit Breaker are UL listed. The short circuit ratings of these enclosed circuit breakers are equal to the interrupter ratings, at the supply voltage marked on the circuit breaker installed, unless otherwise noted.

Table 7.159: PowerPact Q-Frame Circuit Breaker Enclosures

Circuit Breaker			Enclosure Cat. No.			Neutral Assembly Kit Cat. No.	Service Ground Kit Cat. No.
Cat. No. Prefix	Rating	Poles	NEMA 1 Flush	NEMA 1Surface	NEMA 3R		
QBL, QDL, QGL, QJL *[22]*	70–225 A	2	—	Q22200NS *[23]*	Q22200NRB *[23]*	—	PKOGTA2
		2, 3	Q23225NF	Q23225NS	Q23225NRB		

[8] Use only 90°C (minimum) rated wire sized per ampacity of 75°C rated conductors for 100% rated circuit breakers.
[9] Rated for 240 Vac maximum. Short circuit current rating is 25 kAIR at 240 Vac.
[10] Accepts standard 80% rated circuit breakers only. Not rated for 100% rated circuit breakers.
[11] Use copper conductors only.
[12] Rated 480 Vac maximum. Short circuit current rating is 18 kAIR at 480 V.
[13] For conduit entry through the top end wall use one of the following Square D conduit hubs: A200L for 2.00 in., A250L for 2.50 in., A300L for 3.00 in., A350L for 3.50 in. or A400L for 4.00 in.
[14] Add suffix BE if no knockouts are required on the end walls.
[15] For access to the circuit breaker's standard, ammeter or energy trip unit panel/LCD, add suffix T.
[16] For 200% neutral use copper wire only.
[17] Complete rating is NEMA 3, 3R, 4, 4X, 5, and 12.
[18] For NEMA 3R applications, remove drain screw from bottom endwall.
[19] Add suffix VW for visibility to the standard, ammeter or energy trip unit of the PowerPact circuit breaker.
[20] Will accept PowerPact L-frame circuit breakers and Motor Protectors with suffixes M38X
[21] Will accept PowerPact L-frame Molded Case Switches.
[22] When the QJL circuit breaker is installed in the enclosure, the enclosure is limited to Short Circuit Current ratings of 65 kAIR at 240 V and 100 kAIR at 208 V.
[23] Limited to 200 A.

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PowerPact M- and P-Frame Circuit Breaker Enclosures

All enclosures will accept 80% rated circuit breakers. The P1200 enclosures will accept 100% rated circuit breakers to 800 A. If a CT neutral is required, the enclosure will no longer accept a 200% neutral. The M800R and the P1200R enclosures have a blank top end wall and require field-cut openings. For details and hub catalog numbers see page 3-10.

Table 7.160: PowerPact M- and P-Frame Circuit Breaker Enclosures

Circuit Breaker			Cat. No.						
Cat. No. Prefix	Rating	Poles	Enclosure			Neutral Assembly Kit	200% Neutral Kit	CT Neutral Kit *[24][25]*	Service Ground Kit
			NEMA 1 Flush	NEMA 1 Surface	NEMA 3R				
MGL, MJL. PGL, PJL, PKL, PLL	300–800 A	2, 3	—	M800S	M800R	AL800SN	SN800SNI and 2 each SN1200	S33576MK	PKOGTA4
PGL, PJL, PKL, PLL	250–1200 A	2, 3	—	P1200S	P1200R	SN1200	—	S33576MK	PKOGTA4
			NEMA 4, 4X, 5 *[26]* Type 304 Stainless Steel *[27]*	NEMA 4, 4X, 5 *[26]* Type 316 Stainless Steel *[27]*	NEMA 12/3R Without Knockouts *[27]*				
MGL, MJL. PGL, PJL, PKL, PLL	300–800 A	2, 3	M800DS	M800SS	M800AWK	AL800SN	—	S33576MK	PKOGTA4
PGL, PJL, PKL, PLL	250–1200 A	2, 3	—	—	P1200AWK	SN1200	—	S33576MK	PKOGTA4

PowerPact L-Frame 500 Vdc Circuit Breaker Enclosures

The PowerPact L-frame circuit breaker enclosure's maximum short circuit rating is 20 kAIR at 250 Vdc and 50 kAIR at 500 Vdc.

Listed for use ONLY on UPS systems.

Table 7.161: DC CIrcuit Breaker Enclosures for LG and LL DC-Rated Circuit Breakers

Circuit Breaker *[28]*			NEMA 1 Surface Enclosure	Replacement Ground Lugs	Service Ground Kit
Cat. No. Prefix	Ampere Rating	Poles	Cat. No.	Cat. No.	Cat. No.
LGL, LLL	300–600 A	3	L1200S	8010440301	Standard
	700–1200 A	4	L1200S		

[24] Order current transformer kit S33576 seperately.
[25] Current transformers applicable only on PowerPact P circuit breakers. Current limitations are 400–800 A and 400–1200 A respectively for the M800 and P1200 family of enclosures.
[26] Complete rating is NEMA 3, 3R, 4, 4X, 5, and 12.
[27] For NEMA 3R applications, remove drain screw from bottom endwall.
[28] Use 500 Vdc or 250 Vdc rated circuit breakers only.

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Enclosures for Special Applications

Hazardous Locations: NEMA 7 And NEMA 9 Circuit Breaker Enclosures

The NEMA 7 and 9 enclosures are cULus listed unless otherwise noted. They are rated for use in hazardous locations as defined in NEC Article 500. The short circuit current rating of the enclosed circuit breakers is equal to the rating of the circuit breaker installed unless otherwise noted. They are suitable for use as service entrance equipment when neutral is installed. Enclosures require the use of 75°C copper wire only. The NEMA 7 enclosures are suitable for rainproof applications when the included PKDB1 breather and drain kit is installed.

Table 7.162: NEMA 7 and NEMA 9 Circuit Breaker Enclosures; Thermal-Magnetic F-Frame and PowerPact J-Frame Cicuit Breakers

Circuit Breaker			Enclosure Catalog Number		Neutral Assembly Kit Cat. No.	Service Ground Kit Cat. No.	Threaded Conduit Provisions, Inches
Cat. No. Prefix	Rating	Poles	NEMA 7 Cast Aluminum *[29]*	NEMA 9 Cast Aluminum *[30]*			
FAL, FHL	15–60 A	1, 2, 3	FA060X	FA060Y	100SNA	Included	3/4 in.
FAL, FHL	15–100 A	1, 2, 3	FA100X	FA100Y	100SNA	Included	1 1/4 in.
JDL, JGL	150–225 A	2, 3	J225X *[31][32]*	J225Y *[31][32]*	225SNA	Included	2 1/2 in.

Enclosures for Walking Beam Circuit Breakers

Table 7.163: Enclosures for Walking Beam Manually Operated Mechanical Interlock Circuit Breakers (UL Listed) *[33]*

Circuit Breaker			NEMA 1 Surface*[34]* Enclosure Cat. No.	NEMA 3R*[34][35]* Enclosure Cat. No.
Cat. No. Prefix...Suffix	Ampere Rating	Poles		
FAL...WB, FHL...WB	15–100 A	2, 3	KA250SWB	KA250RWB

Enclosed Motor-Operated Molded Case Circuit Breakers

For information on Enclosed Motor-Operated Molded Case Circuit Breakers see Supplemental Digest Section 3.

Enclosed Molded Case Switches

For information on enclosed molded case switches, see Supplemental Digest Section 3.

[29] NEMA 7 — Indoor Hazardous Locations — Division 1 and 2, Class I, Groups C and D; Class II, Groups E, F and G; Class III
[30] NEMA 9 — Indoor Hazardous Locations — Division 1 and 2, Class ii, Groups E, F and G; Class iii
[31] Short circuit current rating: 65 kAIR at 240 Vac, 25 kAIR at 480 Vac, and 18 kAIR at 600 Vac
[32] Not cULus listed due to wire bending space.
[33] Catalog number in table is enclosure only. For complete installation, the following must be ordered separately: WB Circuit Breakers (qty. 2, Supplemental Digest Section 3), Walking Beam Assembly (Supplemental Digest Section 3), Mounting Pan (Supplemental Digest Section 3) and Neutral and Service Ground Kits, below
[34] Enclosure has blank top endwall.
[35] For applications above 200 A requiring a neutral, use copper wire only.

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Enclosure Accessories

Table 7.164: Neutral Kit Terminal Data

Neutral Kit Catalog Number	Terminal Lug Data -Total Available (Line plus Load) AWG/kcmil AL/CU	All Copper Neutral Terminal Lug Data -Total Available (Line plus Load) AWG/kcmil
100SNA	(2) 14–1/0 Cu or (2) 12–1/0 Al plus (1) 14–4 Cu	—
SN100FA	(4) 14–1/0 Cu or (4) 12–1/0 Al	—
SN225KA	(2) 4–300 Al/Cu plus (2) 14–1/0 Al/Cu	—
225SNA	(4) 6–350 Al/Cu	—
400SN	(2) 1–600 or (4) 1–250 Al/Cu, plus (2) 4–300 Al/Cu	—
SN400LA	(2) 1–600 or (4) 1–250 Al/Cu, plus (2) 4–300 Al/Cu	—
SN1000MA	(6) 3/0–500 Al/Cu, plus (1) 1–4/0 Al/Cu	—
SNC400LX	—	(2) 2—600 Cu, plus (2) 6–250 Cu
SNC800LX	—	(4) 2–600 Cu, plus (1) 2–4/0 Cu
AL800SN	(6) 3/0–500 Al/Cu, plus (2) 6–250 Al/Cu	—
SN1200	(8) 3/0–750 Al/Cu, plus (2) 6–350 Al/Cu	—
S33576MK	(8) 3/0–500 Al/Cu, plus (2) 4–300 Al/Cu	—

Table 7.165: Service Ground Kit Terminal Data

Service Ground Kit Catalog Number	Terminal Data AWG/kcmil	Lugs Per Kit
PKOGTA2	10–2/0 Cu or 6–2/0 Al	2
PKOGTH150	14–2 Al/Cu	2
PKOGTJ250	6–300 Al/Cu	2
PKOGTA4	6–250 Al/Cu	4

See Supplemental Digest Section 3 for special options for enclosures:

- Stainless steel fronts
- Pilot lights, push buttons
- Lock-on SPL0
- Key interlock systems
- Legend plates

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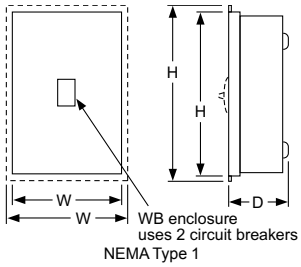
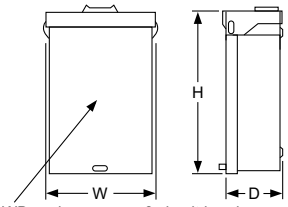
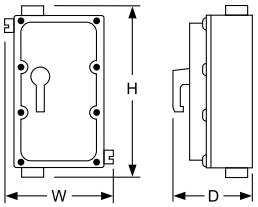
Enclosure Dimensions



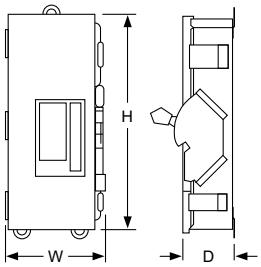
WB enclosure uses 2 circuit breakers
NEMA Type 1



WB enclosure uses 2 circuit breakers
NEMA Type 3R
(Uses side hinge cover)



NEMA Type 7, Type 9



NEMA Type 4, 4X, 5, 12, 12K

Table 7.166: Dimensions

Cat. No.	Series	Approximate Dimension					
		H		W		D	
		in.	mm	in.	mm	in.	mm
FA100A, AWK	E05	19.50	495	9.13	232	4.88	124
FA100DS	E05	19.50	495	9.13	232	4.88	124
FA100F	E2	19.50	495	9.88	251	4.13	105
FA100RB	E2	18.00	457	8.88	226	4.88	124
FA100S	E2	18.13	461	8.63	219	4.13	105
FA060X	E1	16.00	406	9.88	251	7.00	178
FA060Y	E1	16.00	406	9.88	251	7.00	178
FA100X	E1	16.00	406	9.88	251	7.00	178
FA100Y	E1	16.00	406	9.88	251	7.00	178
HD100S	A01	17.00	431.8	7.90	200.7	4.75	120.7
H150F	A01	32.40	823	15.40	391	6.00	152
H150R	A01	31.05	789	14.47	368	6.28	160
H150S	A01	31.36	797	14.36	365	6.00	152
J250F	A01	32.40	823	15.40	391	6.00	152
J250R	A01	31.05	789	14.47	368	6.28	160
J250S	A01	31.36	797	14.36	365	6.00	152
J250DS	A01	32.26	819	9.72	247	7.94	202
J250SS	A01	32.26	819	9.72	247	7.94	202
J250AWK	A01	32.26	819	9.72	247	7.94	202
JD250S	A01	26.40	670.6	8.90	226.1	5.50	139.7
J225X	A01	22.70	577	10.93	278	7.70	196
J225Y	A01	22.70	577	10.93	278	7.70	196
KA250SWB	E2	20.00	508	19.00	483	5.63	143
KA250RWB	E2	20.25	514	19.00	483	7.12	181
L600AWK	A01	57.50	1461	20.38	518	8.25	210
L600AWKVW	A01	57.50	1461	20.38	518	8.25	210
L600AWKMC	A01	57.50	1461	20.38	518	8.25	210
L1200S	A01	51.88	1818	20.25	514	7.75	197
LA400AWK	E05	42.25	1073	13.75	349	7.25	184
LA400DS	E05	42.25	1073	13.75	349	7.25	184
LA400F	E03	45.63	1159	16.50	419	6.50	165
LA400R	E03	44.00	1118	15.38	391	7.88	200
LA400S	E03	44.50	1130	15.38	391	6.50	165
LA400LS	A01	27.40	696.0	15.40	391.2	6.625	168.3
M800S	A01	40-3/8	1025.52	21	533.4	9-3/4	247.65
M800R	A01	40-3/8	1025.52	21	533.4	9-3/4	247.65
M800DS	A01	40-7/8	1036.96	20-3/4	527.05	9-1/2	241.3
M800SS	A01	40-7/8	1036.96	20-3/4	527.05	9-1/2	241.3
M800AWK	A01	40-7/8	1036.96	20-3/4	527.05	9-1/2	241.3
P1200S	A01	52-1/8	1323.98	21	533.4	9-3/4	247.65
P1200R	A01	52-1/8	1323.98	21	533.4	9-3/4	247.65
P1200AWK	A01	53	1346.20	20-3/4	527.05	9-1/2	241.3
Q22200NRB	E05	23.38	594	7.63	194	4.75	121
Q22200NS	E05	23.13	588	7.63	194	4.25	108
Q23225NF	E05	26.25	667	9.88	251	4.75	121
Q23225NRB	E05	26.25	667	9.88	251	5.50	140
Q23225NS	E05	26.25	667	9.88	251	4.75	121

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Section 8

Operating Mechanisms and Disconnect Switches

UL508 Motor Disconnect Switch

UL98 Fusible Switch

UL98 Style Flange Handle Disconnect Switch

9421 Type L Circuit Breaker Mechanism

9422 Type R Circuit Breaker Mechanism

9422 Type C Circuit Breaker Cable Operator

9423 Door Closing Mechanisms

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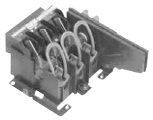
Selection Guide



Class	Vario	LK4	GS2	9422	9421	9422	9423
Type	Manual motor control switches	Nonfusible IEC style disconnect switches	Fusible IEC style disconnect switches	NEMA style fused or non-fusible disconnect switches	Circuit breaker operating mechanisms	Circuit breaker operating mechanisms	Door closing mechanisms
UL Rating	UL508	UL98	UL98	UL98	—	—	—
Handle Type	Rotary	Rotary	Rotary	Flange Adjustable rod or cable mechanism	Rotary	Flange Adjustable rod or cable mechanism	Rotary, works in conjunction with 9422 handle mechanisms
Mounting	Door or panel	—	Flange with cable mechanism panel	Panel or bracket mount	Panel	Panel	—
Load Voltage (max.)	600 Vac	600 Vac	600 Vac	600 Vac	600 Vac	600 Vac	—
Current Ratings	10–115	30–1200	30–800	30–400	Circuit breaker frame sizes 100–1200	Circuit breaker frame sizes 100–1200	—
Horsepower Ratings (max.)	2–60	7.5–500	7.5–500	7.5–350	—	—	—
Enclosure Type	Metallic: NEMA Type 1, 12, 4, 4X Plastic: IP55, NEMA Type 4X	Handle ratings: NEMA Type 1, 3R, 4, 4X, 12	Handle ratings: NEMA Type 1, 3R, 4, 4X, 12	Handle ratings: NEMA Type 1, 3R, 4, 4X, 12	Handle ratings: NEMA Type 1, 3R, 4, 4X, 12	Handle ratings: NEMA Type 1, 3R, 4, 4X, 12	Handle ratings: NEMA Type 4 and 12 sheet steel or stainless
Accessories	Power poles and auxiliary contacts	Auxiliary contacts and power lugs	Auxiliary contacts and power lugs	Auxiliary contacts	Auxiliary contacts	Auxiliary contacts	Right or left-hand operation
Approvals	UL File E164864 NLRV CSA File LR 81630 Class 3211 05	UL File E191098 WP2X / WP2X7 CSA 703149 Class 4652 04	UL File E191098 WP2X / WP2X7 CSA 703149 Class 4652 04	UL File E52639 WHTY2 CSA LR44199 Class 4652-04	UL File E62922 DIHS2 CSA LR44199 Class 3211 07	UL File E62922 DIHS2 CSA LR44199 Class 3211 07	—
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VCFN12GE

Identification System

The Mini-Vario and Vario motor disconnect switch catalog numbers can be identified as described in Table 8.1 Identification System, page 8-2.

Table 8.1: Identification System

				V	CF	N12	GE
Model (V-Vario, K-Operator)							
Operator Type/ Accessory Designation							
CD	Single hole Red & Yellow	**BD**	Single hole Black and Gray				
CF	Four hole Red & Yellow	**BF**	Four hole Black and Gray				
CCD	Single hole Red & Yellow w/ extension shaft	**VE**	Switch with Red handle installed on unit (one padlock only)				
CCF	Four hole Red & Yellow w/ extension shaft	**VD**	Switch with Black handle installed on unit (no padlock provision)				
Blank	No operator or accessory	**Z**	Accessory, power pole, neutral or ground				
Switch Type *[1]*							
Blank		**1**	Vario 20/32 A				
N12	Mini-Vario 10/12 A	**2**	Vario 25/40 A				
N20	Mini-Vario 16/20 A	**3**	Vario 45/63 A				
02	Vario 10/12 A	**4**	Vario 63/80 A				
01	Vario 16/20 A	**5**	Vario 100/125 A				
0	Vario 20/25 A	**6**	Vario 115/175 A				
Enclosure Type (if applicable)							
Blank	No Enclosure	**G30, A30, W30** Type 1/12/4/4X Metallic (Class 9421)					
GE	Mini-Vario IP55 Non-Metallic	**GU**	Vario IP55 Non-Metallic				

[1] Switches/contacts are dual rated (UL/IEC).

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VN12

VN12/KCC1YZ

VBDN12

VCDN12

VCCDN20

Metallic Enclosure

Mini-Vario

Table 8.2: Assembled Switches—Degree of Protection IP65, Type 1 and 12

Rating (A)		Complete Switches for Door Mounting (3-Padlock)		Complete Switches for Rear Mounting, Includes Extension Shaft (3-Padlock)
		Red/Yellow (Single Hole)	Black/Gray (Single Hole)	Red/Yellow (Single Hole)
UL	IEC	Catalog No.	Catalog No.	Catalog No.
10	12	VCDN12	VBDN12	VCCDN12
16	20	VCDN20	VBDN20	VCCDN20

Table 8.3: Enclosed Switches

Catalog No.	Complete Switches Mounted in IP55 Non-Metallic Enclosure Description
VCFN12GE	Red/Yellow Mounted In Sealable Enclosure, Non-UL Listed, Non-NEMA Rated
VCFN20GE	

Table 8.4: Component Parts

Catalog No.	Description
VN12 *[2]*	10/12 A switch only
VN20 *[2]*	16/20 A switch only
VZN12 *[2]*	Add on power pole for 10/12 A switch
VZN20 *[2]*	Add on power pole for 16/20 A switch
VZN11	Neutral Pole with early make, late break for VN12 or VN20 switch
VZN14	Grounding module for VN12 or VN20
VZN05	N.O. late make auxiliary contact *[3]*
VZN06	N.C. early break auxiliary contact *[3]*
VZN26	Single-pole shroud for auxiliary contacts
VZN08	Three-pole shroud for VN12 or VN20

Table 8.5: Operators and Accessories

Catalog No.	Description
KCC1YZ	45 x 45 mm Red & Yellow operator
KCD1PZ	60 x 60 mm Red & Yellow operator
KAD1PZ	60 x 60 mm Black & Gray operator
VZN17	300–340 mm shaft extension
VZN30	400–430 mm shaft extension
KZ32	Door interlocking plate for 45 or 60 mm operator
KZ83	Door mounting plate for 45 or 60 mm operator

Vario

Table 8.6: NEMA Type 1 and 12 Assembled Switches for Door Mounting

Rating (A)		Complete Switches (Switch and Handle) for Door Mounting (3-padlock)			
		Red/Yellow (Four Hole)	Black/Gray (Four Hole)	Red/Yellow (Single Hole)	Black/Gray (Single Hole)
UL	IEC	Catalog No.	Catalog No.	Catalog No.	Catalog No.
10	12	VCF02	VBF02	VCD02	VBD02
16	20	VCF01	VBF01	VCD01	VBD01
20	25	VCF0	VBF0	VCD0	VBD0
20	32	VCF1	VBF1	VCD1	VBD1
25	40	VCF2	VBF2	VCD2	VBD2
45	63	VCF3	VBF3	—	—
63	80	VCF4	VBF4	—	—
100	125	VCF5	VBF5	—	—
115	175	VCF6	VBF6	—	—

Table 8.7: NEMA Type 1 and 12 Assembled Switches for Rear Mounting

Rating (A)		Complete Switches for Rear Mounting with Extension Shaft (3-Padlock)*[4]*		Switches with Handles Installed on Unit, DIN Rail Mount Only	
		Red/Yellow (Four Hole)	Red/Yellow (Single Hole)	Red/Yellow (1-Padlock)	Black/Gray (No-Padlock)
UL	IEC	Catalog No.	Catalog No.	Catalog No.	Catalog No.
10	12	VCCF02	VCCD02	—	—
16	20	VCCF01	VCCD01	—	—
20	25	VCCF0	VCCD0	VVE0	VVD0
20	32	VCCF1	VCCD1	VVE1	VVD1
25	40	VCCF2	VCCD2	VVE2	VVD2
45	63	VCCF3	—	VVE3	VVD3
63	80	VCCF4	—	VVE4	VVD4
100	125	VCCF5	—	—	—
115	175	VCCF6	—	—	—

[2] Switches/contacts are dual rated (UL/IEC).
[3] Auxiliary contacts are dual rated (UL/IEC 10/12 A).
[4] Complete switch includes handle operator, shaft, door interlock plate, and line terminal shroud.

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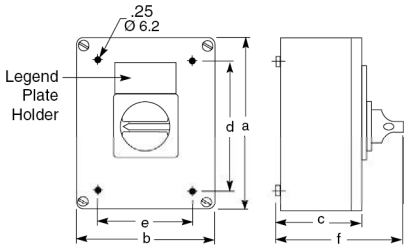
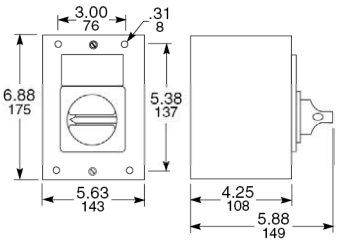
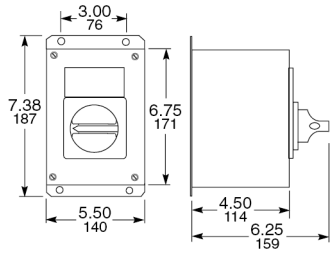




Class 9421 NEMA Type 1 V1G30, V2G30



Class 9421 NEMA Type 4, 4X, 12 V1W30, V2W30, V1A30, V2A30

Manual Motor Control Switch

Non-Metallic Enclosed Switches

The Vario Motor Disconnect Switch is also offered as an enclosed switch. The three-pole version makes the Vario switch ideal for manual motor control applications. They are compact, easy to wire and connect, and come undrilled to allow cable entry positions.

NOTE: VCGUN enclosures are UL approved.

Table 8.8: Non-Metallic Enclosed Switch *[5] [6]*

Ampere Size UL/IEC	IP55-PVC 3-Pole, NEMA Type 1 & 12
	Catalog No.
20/32	VC1GUN
25/40	VC2GUN
45/63	VC3GUN
63/80	VC4GUN
100/125	VC5GUN
115/175	VC6GUN

Table 8.9: Dimensions

Type	No. of Poles	a	b	c	d	e	f
VC1GUN	3	6.5 (164)	4.8 (121)	3.4 (87)	5.6 (141)	3.9 (98)	5.2 (132)
VC2GUN							
VC2GUN							
VC3GUN	3	7.6 (193)	6.5 (164)	3.4 (87)	6.7 (170)	5.6 (141)	5.2 (132)
VC4GUN							
VC5GUN	3	11.5 (291)	9.5 (241)	5.0 (128)	10.6 (269)	8.6 (219)	7.5 (191)
VC6GUN							

Metallic Enclosed Switches

Vario switches meet UL508 requirements as open manual motor controllers. They are also marked “Suitable as Motor Disconnect” allowing installation on the load side of the motor branch circuit short-circuit and ground-fault protection. If motor branch circuit short-circuit and ground-fault protection is needed, use a GS1 or 9422 fusible switch or circuit breaker meeting NEC 430.52 requirements.

Table 8.10: Metallic Enclosed Switches *[5] [7]*

Rating (A)		Horsepower Ratings			NEMA Type 1	NEMA Type 12	NEMA Type 4/4X *[7]*
UL	IEC	240 V	480 V	600 V	Catalog No.	Catalog No.	Catalog No.
20	32	5	10	10	9421V1G30	9421V1A30	9421V1W30
25	40	5	10	15	9421V2G30	9421V2A30	9421V2W30

Vario Manual Motor Control Switches

The V1 and V2 come in metallic enclosures (NEMA Type 1, 4, 4X, and 12). The NEMA Type 1 comes with conduit knockouts top and bottom. To factory install a VZ7 auxiliary contact in these metallic enclosures, add Form X11 to the end of the catalog number (for example, 9421V1G30X11). To factory install a VZ20 auxiliary contact in these enclosures, add Form X20 to the end of the catalog number (for example, 9421V1W30X20).

Table 8.11: Vario Manual Motor Control Switches, IEC

Rating (A) IEC	kW Rating				3-Pole Switch Body	
	230 V	240 V	400 V	415 V	500 V	690 V
12	3	3	4	4	5.5	7.5
20	4	4	5.5	5.5	7.5	11
25	5.5	5.5	7.5	7.5	11	15
32	5.5	5.5	11	11	11	15
40	7.5	7.5	15	15	18.5	15
63	15	15	22	22	30	22
80	18.5	18.5	30	30	37	30
125	22	22	37	37	45	37
175	30	30	45	45	55	45

Table 8.12: Vario Manual Motor Control Switches

Rating (A)	Horsepower Rating			Shaft Size	3-Pole Switch Body
UL	240 V	480 V	600 V	mm	Type
10	2	5	5	6	V02
16	3	7.5	7.5	6	V01
20	5	10	10	6	V0
20	5	10	10	6	V1
25	5	10	15	6	V2
45	10	20	30	8	V3
63	15	30	40	8	V4
100	25	50	50	8	V5
115	30	50	60	8	V6

[5] Assembled, includes switches mounted in enclosure with handle.
[6] Refer to Table 8.11 Vario Manual Motor Control Switches, IEC, page 8-4 and Table 8.12 Vario Manual Motor Control Switches, page 8-4 for horsepower ratings.
[7] For indoor use only. The NEMA Type 4/4X enclosure is made of #304 stainless steel with 3/4 in. T&B stainless steel hubs on the top and bottom.

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Table 8.13: Switch Body *[8]*

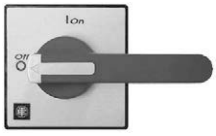
Rating (A)		Shaft Size mm	3-Pole Switch Body
UL	IEC		Type
10	12	6	V02
16	20	6	V01
20	25	6	V0
20	32	6	V1
25	40	6	V2
45	63	8	V3
63	80	8	V4
100	125	8	V5
115	175	8	V6

Single-Hole Operator

Four-Hole Operator (All except KDF3PZ and KBF3PZ)

Table 8.14: NEMA Type 1 and 12 Handle Operators: V02–V2 (6 mm Shaft), V3–V6 (8 mm Shaft) *[9]*

Operator Type		Red/Yellow Single Hole 45 x 45 mm	Red/Yellow Four Hole 45 x 45 mm	Black/Gray Single Hole 45 x 45 mm	Black/Gray Four Hole 45 x 45 mm
Switches	No. of Padlocks	Catalog No.	Catalog No.	Catalog No.	Catalog No.
V02–V2	0	KCC1LZ	KCE1LZ	KAC1BZ	KAE1BZ
V02–V2	1	KCC1YZ	KCE1YZ	—	—
Operator Type		**Red/Yellow Single Hole 60 x 60 mm**	**Red/Yellow Four Hole 60 x 60 mm**	**Black/Gray Single Hole 60 x 60 mm**	**Black/Gray Four Hole 60 x 60 mm**
V02–V2	0	KDD1PZ	KDF1PZ	KBD1PZ	KBF1PZ
V3–V4	0	—	KDF2PZ	—	KBF2PZ
V02–V2	3	KCD1PZ	KCF1PZ	KAD1PZ	KAF1PZ
V3–V4	3	—	KCF2PZ	—	KAF2PZ
Operator Type		**Red/Yellow Four Hole 90 x 90 mm**	**Black/Gray Four Hole 90 x 90 mm**		
V5–V6	0	KDF3PZ	KBF3PZ		
V5–V6	3	KCF3PZ	KAF3PZ		



Four-Hole Operator KDF3PZ and KBF3PZ

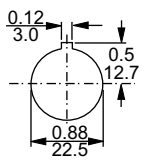
Low-Profile Handle KCD1YZ

Table 8.15: Low Profile Handle Operators *[9]*

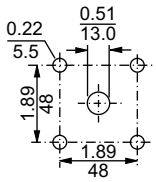
Operator Type		Red/Yellow Single Hole 60 x 60 mm	Red/Yellow Four Hole 60 x 60 mm	Black/Gray Single Hole 60 x 60	Black/Gray Four Hole 60 x 60 mm
Switches	No. of Padlocks	Catalog No.	Catalog No.	Catalog No.	Catalog No.
V02–V2	3	KCD1YZ	KCF1YZ	KADIXZ	KAF1XZ
V3–V4	3	—	KCF2YZ	—	KAF2XZ
Operator Type		**Red/Yellow Four Hole 90 x 90 mm**	**Black/Gray Four Hole 90 x 90 mm**		
V5–V6	3	KCG2YZ	KAG2XZ		

Table 8.16: Gasket Kits

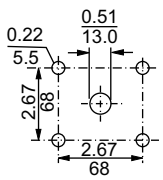
Catalog No.	Description
KZ65	45 x 45 mm gasket for V02-V2 for 4-hole type handles (order in quantities of 5)—IP65
KZ66	60 x 60 mm gasket for V02-V2 for 4-hole type handles (order in quantities of 5)—IP65
KZ62	60 x 60 mm gasket for V3-V4 for 4-hole type handles (order in quantities of 5)—IP65
KZ67	90 x 90 mm gasket for V5-V6 for 4-hole type handles (order in quantities of 5)—IP65



Single-Hole Mounting Dimensions



Four-Hole 60 x 60 Mounting Dimensions *[10]*



Four-Hole 90 x 90 Mounting Dimensions *[10]*

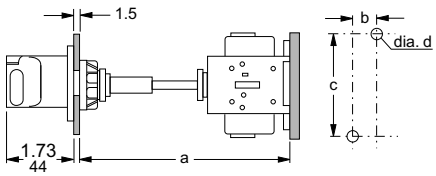


Table 8.17: Rear/Panel Mounting Switch Body Dimensions

Type	Shaft Extension	Dimensions							
		a		b		c		d	
		in.	mm	in.	mm	in.	mm	in.	mm
V02 to V2	VZ17 VZ30	5.5–13.0 5.5–16.9	140–330 140–430	0.60	15	2.4	60	0.17	4.2
V3 to V4	VZ18 VZ31	5.5–12.6 5.5–16.5	140–320 140–420	0.79	20	2.4	60	0.20	5.2
V5 to V6	VZ18 VZ31	6.5–13.8 6.5–17.7	165–350 165–450	1.20	30	3.9	100	0.28	7.0

[8] Refer to Table 8.10 Metallic Enclosed Switches, page 8-4 and Table 8.12 Vario Manual Motor Control Switches, page 8-4 for horsepower ratings.
[9] When using these handles for replacements on the non-metallic enclosed switches, the handle shaft that comes with the enclosure must be reused. See Section 17 of the Supplemental Digest.
[10] The door interlock plate included with VCC Kits has the same drilling as the handle operators.

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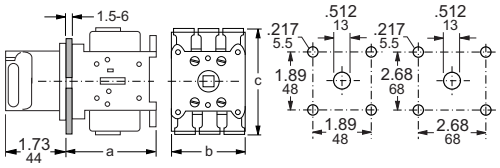
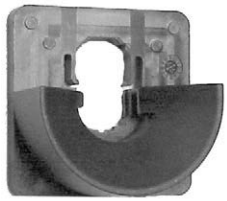


Shaft Extension Kit

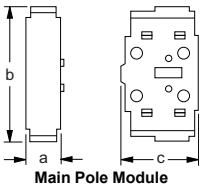


Door Interlock Plate
KZ32

Add-On Contact Module

Terminal Shroud for
Main Switch VZ8

Terminal Shroud for
Auxiliary Contact VZ29



Main Pole Module

Mini-Vario and Vario™ Accessories

Table 8.18: Door Mounting Switch Body Dimensions

Switch Type	Dimensions						Weight Approx. lbs.
	a		b		c		
	in.	mm	in.	mm	in.	mm	
V02 to V2 *[11]*	2.83	72	2.17	55	2.91	74	0.44
V02 to V2	2.36	60	2.17	55	2.91	74	0.44
V3 to V4	2.56	65	2.36	60	3.27	83	1.10
V5 to V6	3.54	90	3.54	90	4.92	125	2.00

Table 8.19: Shaft Extension and Door Interlock

Switch Type	Maximum Panel Depth		Shaft Extension Kit	Door Interlock Plate	Door Mounting Plate
	in.	mm			
V02 to V2	13.0	330	VZ17	KZ 32	KZ83
V3, V4	12.6	320	VZ18	KZ 74	KZ81
V5, V6	13.8	351	VZ18	KZ 74	KZ81
V02 to V2	16.9	429	VZ30	KZ 32	KZ83
V3, V4	16.5	419	VZ31	KZ 74	KZ81
V5, V6	17.7	450	VZ31	KZ 74	KZ81

Table 8.20: Accessories

Switch Type	Line Side Terminal Shroud For Main Switch	Terminal Shroud for Add-on Power Pole	Terminal Shroud for Auxiliary Contact
V02 to V2	VZ8	VZ26	VZ29
V3, V4	VZ9	VZ27	VZ29
V5, V6	VZ10	VZ28	VZ29

Table 8.21: Add-On Contact Modules

Switch Type	Main Pole Module	Main Pole	Ampere Rating UL/IEC	Auxiliary Contacts	
				1 N.O. & 1 N.C. *[12]*	2 N.O.
V02	VZ02	VZ02	10/12	VZ7 *[13]*	VZ20 *[13]*
V01	VZ01	VZ01	16/20		
V0	VZ0	VZ0	20/25		
V1	VZ1	VZ1	20/32		
V2	VZ2	VZ2	25/40		
V3	VZ3	VZ3	45/63		
V4	VZ4	VZ4	63/80		
V5	—	—	—		
V6	—	—	—		

Table 8.22: Add-On Contact Modules

Switch Type	Neutral Modules Early Make/Late Break	Grounding Module	Auxiliary Contacts	
	Catalog No.	Catalog No.	Catalog No.	Description
V02–V2	VZ11	VZ14	VZ7	1 Late Make N.O. & 1 Early Break N.C.
V3–V4	VZ12	VZ15	VZ20	2 N.O. Contacts
V5–V6	VZ13	VZ16	—	—

Table 8.23: Labeling Accessories

Nameplate Holder with Nameplate		Nameplate Holder Only	Nameplate Only	
Size	Catalog No.	Catalog No.	Use With	Catalog No.
45 x 45 mm	KZ13	KZ14	KZ14	KZ76
60 x 60 mm	KZ15	KZ16	KZ16	KZ77
90 x 90 mm	KZ103	KZ101	KZ1010	KZ100

Table 8.24: Shrouds

Switch Type	3-Pole Shroud	Single-Pole Shroud	
	Catalog No.	For Add-On Power Pole	Catalog No.
V02–V2	VZ8	VZ02-VZ2, VZ11 & VZ14	VZ26
V3–V4	VZ9	VZ23, VZ4, VZ12 & VZ15	VZ27
V5–V6	VZ10	VZ13 & VZ16	VZ28
—	—	For 2-Pole Aux. Contact	VZ29

Table 8.25: Main Pole Module Dimensions

Switch Type	Dimensions						Weight Approx. lbs.
	a		b		c		
	in.	mm	in.	mm	in.	mm	
V 02 to V Z2	0.63	16	2.9	74	1.38	35	0.10
V Z3 to V Z4	0.79	20	3.3	83	1.80	46	0.22

[11] Dimensions for single-hole mounting.
[12] Early Break, Late Make.
[13] Auxiliary contacts are rated UL/IEC 10/12 A.

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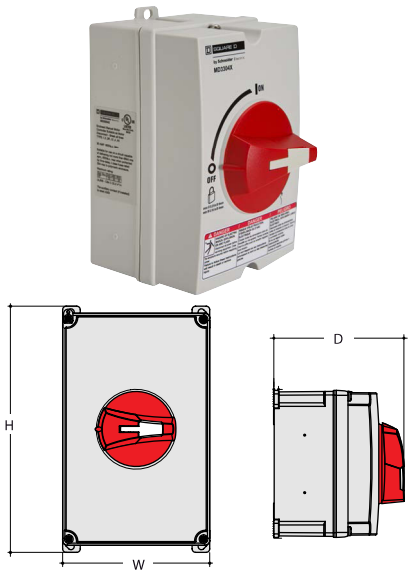


MD Motor Disconnect Switch

MD Motor Disconnect Switches

The MD motor disconnect switch is listed UL508 Suitable for Motor Control (UL File E164864) and conforms to IEC standard 60947-3. It is in a compact NEMA Type 4X enclosure suitable for use in NEMA Type 1, 3, 3R, 4, 4X, and 12 applications. The MD's key benefits are an extremely small footprint, a more economically efficient NEMA Type 4X solution and a handle interlock preventing cover removal when the switch is in the ON position.

Table 8.26: MD Motor Disconnect Switch—Non-Metallic NEMA Type 1, 3, 3R, 4, 4X, and 12 Enclosure *[14][15][16]*

Amperes	Cat. No.	Maximum Horsepower Ratings Three-Phase Vac			Height (in.)	Width (in.)	Depth (in.)
		220–240	440–480	600			
30	MD3304X	7.5	20	25	6.38	3.9	4.37
60	MD3604X	20	40	40	8.27	4.94	4.37

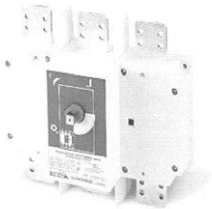
Table 8.27: MD Motor Disconnect Accessories

Cat. No.	Description
MDSAN20	2 N.O. auxiliary contact module
MDSAN11	1 N.O. and 1 N.C. auxiliary contact module
MDS30P	30 A add on power pole

Example of the Parts to Build a Complete GS or LK Switch

Example of the parts to order to build a complete GS or LK switch:

Choose a Switch + **Shaft** + **Handle Assembly** + **Lugs if needed**



600 A, LK4SU3N

Shaft 320 mm, GS2AE6

Black Handle, GS2AH150

Lugs Kit, GS1AW503

Example:

LK4SU3N (600 A nonfusible switch, use 15x12 shaft) + **GS2AE6** (320 mm Type S shaft) + **GS2AH150** (black/ black, lockable)

To add auxiliary contacts:

For front-mounted contacts order **LK4AD30N** (front-mounted auxiliary contact holder) + **GS2AM110**.

[14] See Table 8.20 Accessories, page 8-6.
[15] Complies with OSHA lockout/tagout requirements—accepts up to three 8 mm padlocks.
[16] Suitable for NEMA Type 1, 3R, 4, 4X, and 12 enclosure applications.

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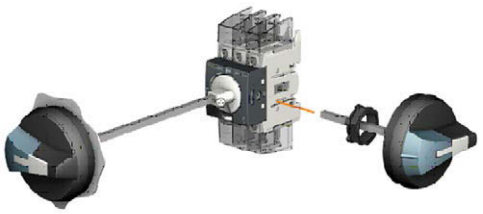

30–100 A Compact

100–400 A

GS2AH130

GS2AH150

GS2AH170

LK4 Nonfusible Disconnect Switches

Table 8.28: LK Nonfusible IEC Style Disconnect Switches

Pole	Rating (A)	Catalog No.	Maximum Horsepower Rating				Short Circuit Current Rating 600 Vac		Shaft Style
			240 V	480 V	600 V	250 Vdc	Fuse	SCCR kA	
NOTE: Switches in shaded area are now available as Kits. Please see Table 8.29.									
3	30	LK4DU3CN[1]	10	20	30	—	J	100	AL
3	60	LK4GU3CN[1]	20	40	50	—	J	100	AL
3	100	LK4JU3CN[1]	20	50	50	N/A	J	100	AL
3	100	LK4JU3N	30	75	100	15	J	200	B
3	200	LK4MU3N	75	150	200	15	J	200	B
3	400	LK4QU3N	125	250	350	50	J	200	B
3	600	LK4SU3N	200	400	350	50	J	200	D
3	800	LK4TU3N	200	500	500	—	L	100	D
3	1000	LK4UU3N	200	500	500	—	L	100	D
3	1200	LK4WU3N	200	500	500	—	L	100	D

Table 8.29: New! Kits for Compact Switches LK4: 30, 60 and 100 A

Rating	Kit Catalog Number	Pieces Included [2]				
		Compact Switch	400 mm Shaft	Handle Color / Rating	Handle	Guide Cone
30 A	LK4DUKB1	LK4DU3CN	LK4AE41CN	Black / NEMA 1, 12, 3R	LK4AH0110CN	GS2AEH12
30 A	LK4DUKB4	LK4DU3CN	LK4AE41CN	Black / NEMA 4, 4X	LK4AH0410CN	GS2AEH12
30 A	LK4DUKR1	LK4DU3CN	LK4AE41CN	Red / NEMA 1, 12, 3R	LK4AH0120CN	GS2AEH12
30 A	LK4DUKR4	LK4DU3CN	LK4AE41CN	Red / NEMA 4, 4X	LK4AH0420CN	GS2AEH12
60 A	LK4GUKB1	LK4GU3CN	LK4AE41CN	Black / NEMA 1, 12, 3R	LK4AH0110CN	GS2AEH12
60 A	LK4GUKB4	LK4GU3CN	LK4AE41CN	Black / NEMA 4, 4X	LK4AH0410CN	GS2AEH12
60 A	LK4GUKR1	LK4GU3CN	LK4AE41CN	Red / NEMA 1, 12, 3R	LK4AH0120CN	GS2AEH12
60 A	LK4GUKR4	LK4GU3CN	LK4AE41CN	Red / NEMA 4, 4X	LK4AH0420CN	GS2AEH12
100 A	LK4JUKB1	LK4JU3CN	LK4AE41CN	Black / NEMA 1, 12, 3R	LK4AH0110CN	GS2AEH12
100 A	LK4JUKB4	LK4JU3CN	LK4AE41CN	Black / NEMA 4, 4X	LK4AH0410CN	GS2AEH12
100 A	LK4JUKR1	LK4JU3CN	LK4AE41CN	Red / NEMA 1, 12, 3R	LK4AH0120CN	GS2AEH12
100 A	LK4JUKR4	LK4JU3CN	LK4AE41CN	Red / NEMA 4, 4X	LK4AH0420CN	GS2AEH12

Table 8.30: Handles and Shafts for LK Switches

Rating (A)	Handle			Shaft: 12.6 / 320 in. / mm	Shaft: 15.7 /400 in. / mm	Shaft Guide [3]	Shaft Style
	Catalog No.	Type	Color	Catalog No.	Catalog No.	Catalog No.	
NOTE: Switches in shaded area are now available as Kits. Please see Table 8.29.							
30–100	LK4AH110CN[1]	1, 3R, 12	Black	LK4AE12CN	—	GS2AEH12	AL
30–100	LK4AH1120CN[1]	1, 3R, 12	Red/ Yellow				
30–100	LK4AH410CN[1]	4, 4X	Black				
30–100	LK4AH420CN[1]	4, 4X	Red/ Yellow				
100–400	GS2AH130	1, 3R, 12	Black	GS2AE2	GS2AE21	GS2AEH12	B
100–400	GS2AH140	1, 3R, 12	Red/ Yellow				
100–400	GS2AH430	4, 4X	Black				
100–400	GS2AH440	4, 4X	Red/ Yellow				
600	GS2AH150	4, 4X	Black	GS2AE6	GS2AE61	GS2AEH12	D
600	GS2AH160	4, 4X	Red/ Yellow				
800–1200	GS2AH170	4, 4X	Black				
800–1200	GS2AH180	4, 4X	Red/ Yellow				

Table 8.31: Auxiliary Contacts for LK Switches

Switch Amperes	Catalog No.	Description
30–60	MDSAN11	Aux Contact 1 N.O. and 1 N.C.
30–60	MDSAN20	Aux Contact 2 N.O. and 2 N.C.
100–400	LK4AD10N	Aux Contact 1 N.O. and 1 N.C.
100–400	LK4AD20N	Aux Contact 2 N.O. and 2 N.C.
600–1200	LK4AD30N	Aux Contact Holder
600–1200	GS2AM110	Aux Contact 1 N.O.
600–1200	GS2AM101	Aux Contact 1 N.C.

[1] No longer sold as components. Purchase Kits containing Switch, Handle, Shaft, and Guide Cone as listed in Table 8.29.
[2] Components are NOT sold separately. Only 400 mm shaft can be purchase separately.
[3] Optional on shafts for LK4DU3CN, LK4GU3CN and LK4JU3CN.

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Table 8.32: Terminal Shrouds for LK Switches

Switch Amperes	Catalog No.	Description
30–60	LK4AP3CN	Shroud Top and Bottom, 3-Pole
100–200	LK4AP33TN	Shroud Top LK4, 3-Pole, 100/200 A
100–200	LK4AP33BN	Shroud Bottom LK4, 3-Pole, 100/200 A
400	LK4AP53TN	Shroud Top LK4, 3-Pole, 400 A
400	LK4AP53BN	Shroud Bottom LK4, 3-Pole, 400 A
600 *[4]*	LK4AP63N	Shroud Bottom LK4, 3-Pole, 600 A
800–1200 *[4]*	LK4AP83N	Shroud Bottom LK4, 3-Pole, 800–1200 A

GS2 Fusible Disconnect Switches

Table 8.33: GS Fusible IEC Style Disconnect Switches

Pole	Rating (A)	Catalog No.	Maximum Horsepower Rating				Short Circuit Current Rating 600 Vac		Shaft Style
			240 V	480 V	600 V	250 Vdc	Fuse	SCCR kA	
3	30	GS1DDU3	7.5	15	20	5	CC	100	AG
3	30	GS1DU3	7.5	15	20	5	J	100	AG
3	30	GS2EEU3	7.5	15	20	5	CC	100	B
3	30	GS2EU3N	7.5	15	20	5	J	100	B
3	60	GS2GU3N	15	30	50	10	J	100	B
3	100	GS2JU3N	30	60	75	20	J	200	B
3	200	GS2MU3N	60	125	150	40	J	200	B
3	400	GS2QU3N	125	250	350	50	J	200	B
3	600	GS2SU3	200	500	500	—	J	200	C
3	800	GS2TU3	200	500	500	—	J	200	C

GS2GU3N

GS2AH110

GS2AH130

GS2AH150

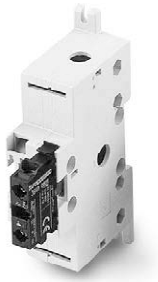
Table 8.34: Handles and Shafts for GS Switches *[5]*

Rating (A)	Handle			Shaft: 12.6 in. (320 mm)	Shaft: 15.7 in. (400 mm)	Shaft Guide	Shaft Style
	Catalog No.	Type	Color	Catalog No.	Catalog No.	Catalog No.	
30–60	GS2AH110	1, 3R, 12	Black	GS2AE8	GS2AE81	GS2AEH12	AG
30–60	GS2AH120	1, 3R, 12	Red/ Yellow				
30–60	GS2AH410	4, 4X	Black				
30–60	GS2AH420	4, 4X	Red/ Yellow				
30–400	GS2AH130	1, 3R, 12	Black	GS2AE2	GS2AE21	GS2AEH12	B
30–400	GS2AH140	1, 3R, 12	Red/ Yellow				
30–400	GS2AH430	4, 4X	Black				
30–400	GS2AH440	4, 4X	Red/ Yellow				
600–800	GS2AH150	4, 4X	Black	GS2AE5	GS2AE51	GS2AEH12	C
600–800	GS2AH160	4, 4X	Red/ Yellow				

NOTE: Hole adapter kit for GS1 to GS2 Handles: GS2AH100TO200.

Table 8.35: Auxiliary Contacts for GS Switches *[6]*

Switch Amperes	Catalog No.	Description
30–800	GS1AM110	Aux Contact 1 N.O.
30–800	GS1AM101	Aux Contact 1 N.C.
30	GS1AD10	Aux Contact Holder



Auxiliary Contacts
GS1AD10 + GS2AM110

Table 8.36: Shorting Links

For use on:	Shorting Links per Kit	Catalog No.
GS2, 60 A	3	GS1AU203
GS2, 100 A	3	GS1AU303
GS2, 200 A	3	GS1AU403
GS2, 400 A	3	GS1AU503
GS2, 600–800 A	3	GS1AU803

Table 8.37: NFPA79 Kit

For Use With:	Description	Kit PartNumber
GS2Q3N	NFPA 79 Internal Handle Kit 400 A Switch Shaft	GS2AD040N
GS2GU3N, GS2GLU3N, GS2JU3N, GS2JLU3N	NFPA 79 Internal Handle Kit 60–200 A Switch Shaft	GS2AD030N
GS1DDU3, GS1DU3	NFPA 79 Internal Handle Kit for 5 mm Shafts	GS1AD010

Shorting Links

Table 8.38: Terminal Shrouds for GS Switches, Line or Load *[7]*

Switch Amperes	Catalog No.	Description
30–100	—	Standard on product
200	GS2AP43	GS2, 3-Pole, 200 A
400	GS2AP53	GS2, 3-Pole, 400 A
600–800	GS2AP73	GS2, 3-Pole, 600–800 A

[4] 600–1200 A standard with top shroud.
[5] GS2AH100TO200–GS1 to GS2 Handle Adapter if using GS1 holes.
[6] GS1DU3 and GS1DDU3 switches allow up to 4 auxiliary contacts without adding contact holder GS1AD10. For more than 4 contacts, GS1AD10 is required.
[7] Order one terminal shroud per side. For example, order one terminal shroud for *either* the line side *or* load side; order two terminal shrouds for *both* the line side *and* load side.

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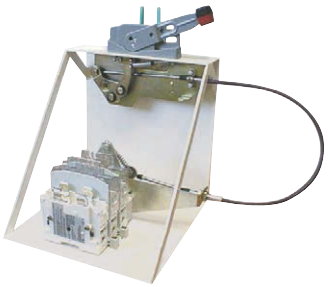


Flange Handle Cable Operator Kit

Terminal Lugs

New!

Cable Operator Kits for GS2 Switches

Table 8.39: Cable Operator Kits for GS2 Switches *[8]*

Catalog No.	Description
GS2AH36F	36 in. Cable Operator Kits for GS2 Switches
GS2AH60F	60 in. Cable Operator Kits for GS2 Switches
GS2AH120F	120 in. Cable Operator Kits for GS2 Switches
GS2AH144F	144 in. Cable Operator Kits for GS2 Switches
GS2AH180F	180 in. Cable Operator Kits for GS2 Switches

Table 8.40: Handles for use with Cable Operator Kits *[9]*

Catalog No.	NEMA Type Enclosure	Type of Handle
9422A1	1, 3, 3R, 4, (Sheet Steel)	6 in.
9422A2	4, 4X (Stainless)	6 in.
9422A3	1, 3, 3R, 4, (Sheet Steel)	4 in.
9422A4	4, 4X (Stainless)	4 in.

Accessories

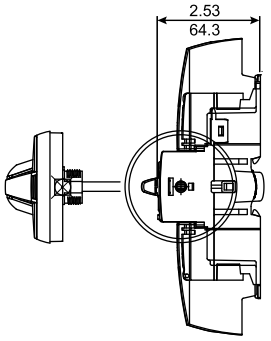
Table 8.41: Terminal Lugs

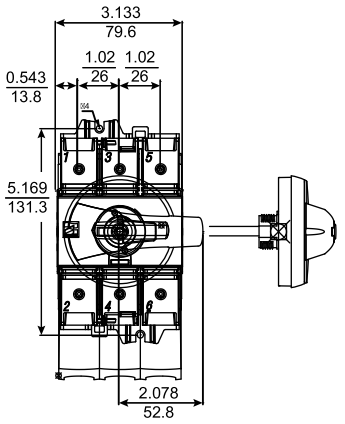
For Use On:	Rating	No. of Wires per Lug	No. of Lugs per Terminal	Lug Size (AWG)	Wire Type	Lugs per Kit	Lug Kit Catalog Number
LK4DU3CN	30	1	1	#12–2/0	Cu	—	Standard
LK4GU3CN	60	1	1	#12–2/0	Cu	—	Standard
LK4JU3N	100	1	1	6–300 kcmil	Cu/Al	6	GS1AW403
LK4MU3N	200	1	1	6–300 kcmil	Cu/Al	6	GS1AW403
LK4QU3N	400	2	1	350 MCM—6	Cu/Al	6	GS1AW603
		1	1	600 MCM—4	Cu/Al	6	GS1AW606
		2		250 MCM—1/0			
LK4SU3N	600	2	1	2 x 2–600 kcmil	Cu/Al	6	GS1AW503
LK4TU3N	800	2	2	2 x 2–600 kcmil	Cu/Al	12	GS1AW903
LK4UU3N	1000	2	2	2 x 2–600 kcmil	Cu/Al	12	GS1AW903
LK4WU3N	1200	2	2	2 x 2–600 kcmil	Cu/Al	12	GS1AW903
GS1DDU3	30	1	1	#14–#10	Cu	—	Standard
GS1DU3	30	1	1	#14–#10	Cu	—	Standard
GS2EEU3	30	1	1	#14–#10	Cu	—	Standard
GS2EU3N	30	1	1	#14–#6	Cu	—	Standard
GS2GU3N	60	1	1	#10–#6	Cu	—	Standard
GS2JU3N	100	1	1	#12–#1	Cu	—	Standard
GS2MU3N	200	1	1	6–300 kcmil	Cu/Al	6	GS1AW403
GS2QU3N	400	2	1	350 MCM—6	Cu/Al	6	GS1AW603
		1	1	600 MCM—4	Cu/Al	6	GS1AW606
		2		250 MCM—1/0			
GS2SU3	600	2	1	2 x 2–600 kcmil	Cu/Al	6	GS1AW503
GS2TU3	800	2	1	2 x 2–600 kcmil	Cu/Al	6	GS1AW503

Table 8.42: Power Distribution Lugs GS1 or GS2 Only

For Use On:	Rating	No. of Wires per Lug	Lug Size (AWG)	Wire Type	Lugs per Kit	Lug Kit Catalog No.
GS1JU3	100	6	#14–#6	Cu	3	GS1AW306 *[10]*
GS2MU3N	200	12	#14–#4	Cu	3	GS1AW406
GS2QU3N	400	12	#14–#4	Cu	3	GS1AW406
GS2MU3N	200	6	#12–2/0	Cu	3	GS1AW506
GS2QU3N	400	6	#12–2/0	Cu	3	GS1AW506

LK4DU3CN and LK4GU3CN, 30–100 A Compact Nonfusible Disconnect Switches





[8] Compatible with GS Switches up to 200 A. Does not include handle. For Handle, see Table 1.43.
[9] Not compatible with GS2EEU3..
[10] Cannot be used on GS2JU3N.

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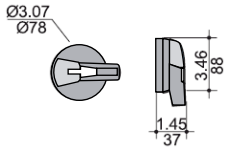
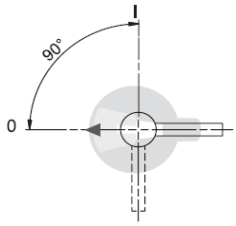
Handle for 30–100 A Compact Nonfusible Disconnect Switches

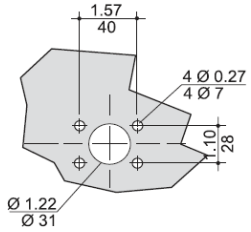
Handle Part No.
LK4AH110CN
LK4AH120CN
LK4AH410CN
LK4AH420CN



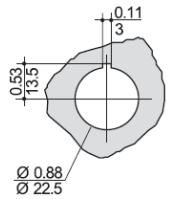
Right-side or front operation



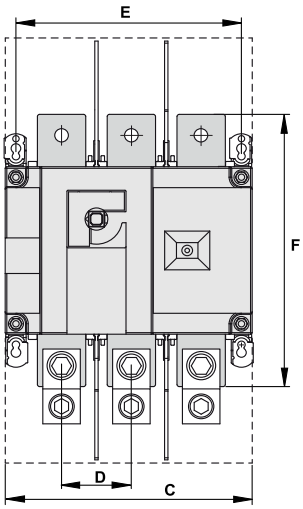
Door drilling with 4 fixing screws

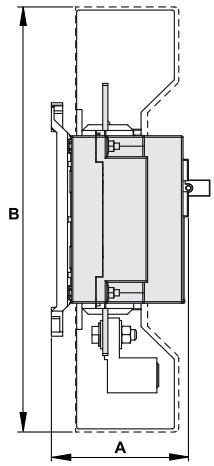


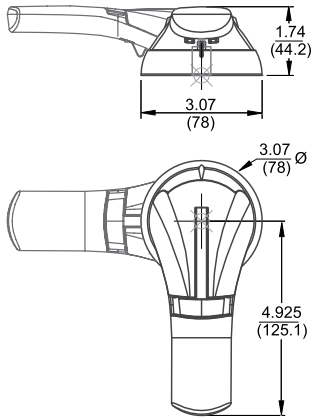
Door drilling with fixing nut



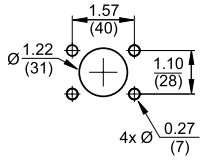
LK4JU3N / LK4MU3N / LK4QU3N, 100–400 A Nonfusible Disconnect Switches—Dimensions







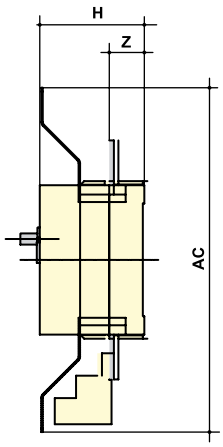
Handle Part No.
GS2AH130
GS2AH140
GS2AH430
GS2AH440

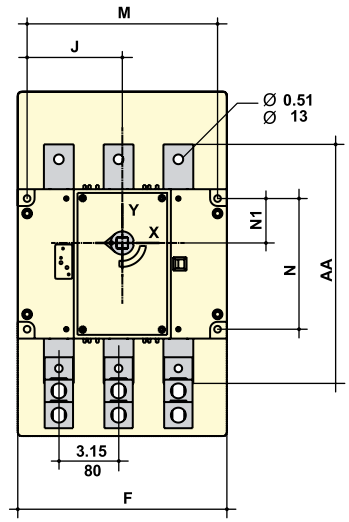


Dimensions: in. / mm

Rating (A)	Dimensions = in. (mm)					
	A	B	C	D	E	F
100–200	3.72 (94.6)	10.1 (256)	7.09 (1.80)	1.97 (50)	6.3 (160)	6.3 (160)
400	4.92 (128)	16 (406)	9.05 (230)	2.56 (65)	8.26 (210)	10.2 (260)

LK4SU3N, 600 A Nonfusible Disconnect Switches—Dimensions





Rating (A)	Dimensions = in. (mm)								
	AC	F	H	J	M	N	N1	AA	Z
600	18.12 (460)	11 (280)	5.5 (140)	5.0 (127.5)	10.03 (255)	6.88 (175)	2.34 (59.5)	12.6 (320)	1.85 (47)

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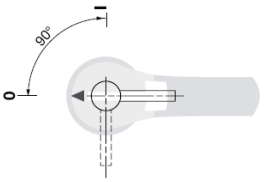
Handle for 600 A and 800 A Fusible Disconnect Switches

Front operation

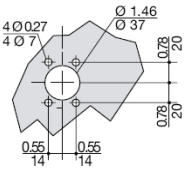
Handle Part No.

GS2AH150
GS2AH160

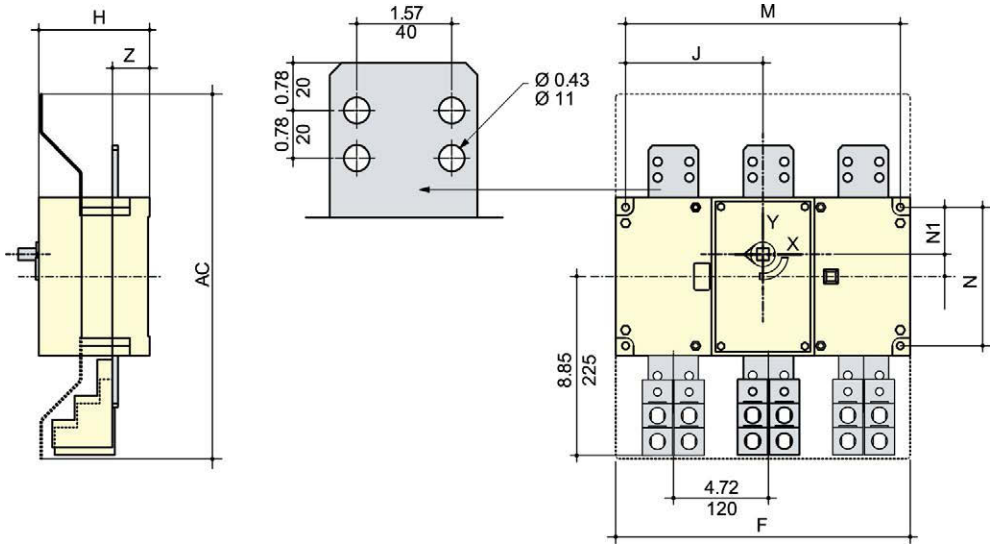
Direction of operation



Door drilling template



LK4TU3N / LK4UU3N / LK4WU3N, 800–1200 A Nonfusible Disconnect Switches—Dimensions



Rating (A)	Dimensions = in. (mm)							
	AC	F	H	J	M	N	N1	Z
800–1200	18.12 (460)	14.64 (372)	5.5 (140)	6.83 (173.5)	13.66 (347)	6.88 (175)	2.34 (59.5)	1.85 (47)

Handle for 800–1200 A Fusible Disconnect Switches

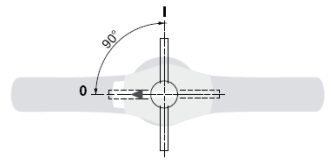
Front operation

Handle Part No.

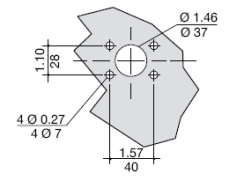
GS2AH170
GS2AH180

Dimensions: in. / mm

Direction of operation



Door drilling template



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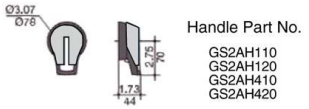
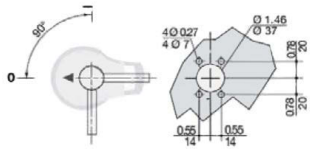
Handle for 30 A and 60 A Fusible Disconnect Switches



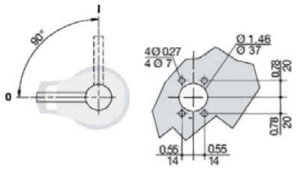
Handle Part No.

GS2AH110
GS2AH120
GS2AH410
GS2AH420



Front operation

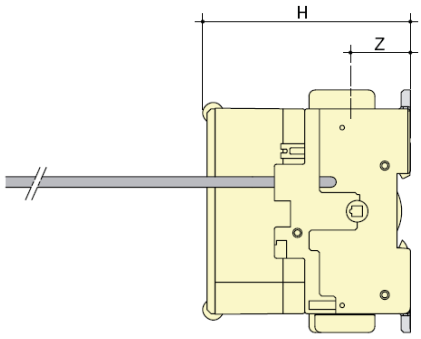
Direction of operation | Door drilling template

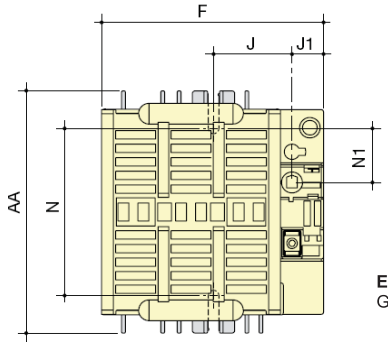


Side operation

Direction of operation | Door drilling template

GS1DDU3, 30 A Fusible Disconnect Switches, Class CC Fuses and GS1DU3, 30 A Fusible Disconnect Switches, Class J Fuses—Dimensions

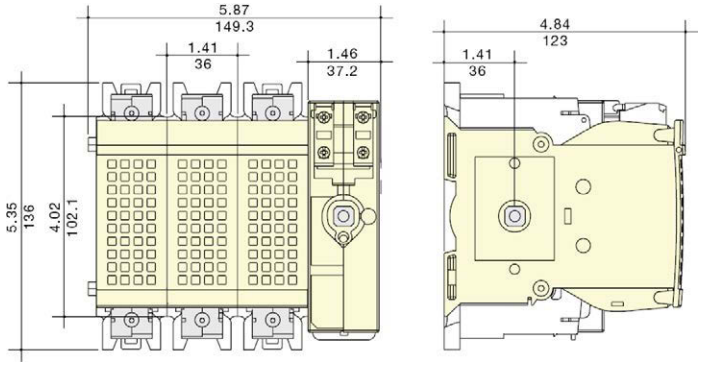




Example:
GS1DU3

Rating (A)	Dimensions = in. (mm)							
	F	H	J	J1	N	N1	AA	Z
30 / CC	3.78 (96)	3.28 (83.5)	1.47 (37.5)	0.59 (15)	3.13 (79.5)	1 (25.5)	4.56 (116)	1.12 (28.5)
30 / J	4.13 (105)	3.89 (99)	1.47 (37.5)	0.59 (15)	3.13 (79.5)	1 (25.5)	4.56 (116)	1.12 (28.5)

GS2GU3N, 60 A Fusible Disconnect Switches, Class J Fuses



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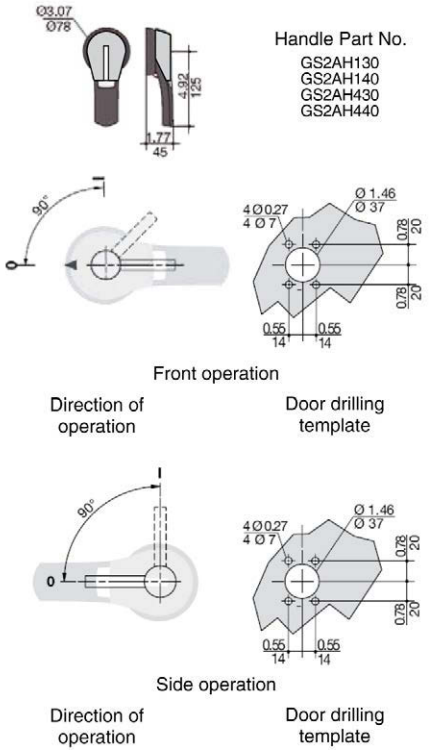
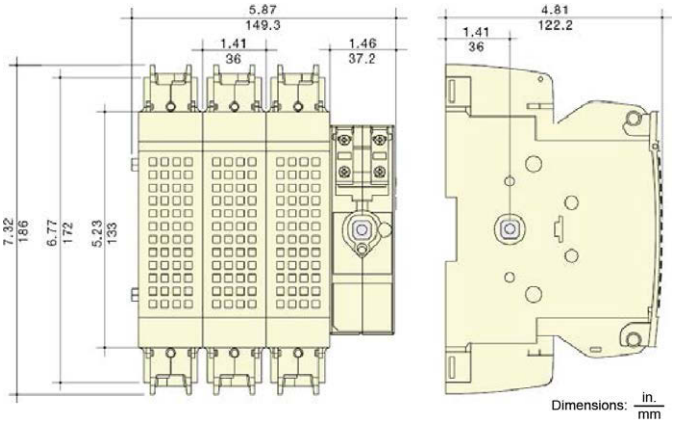
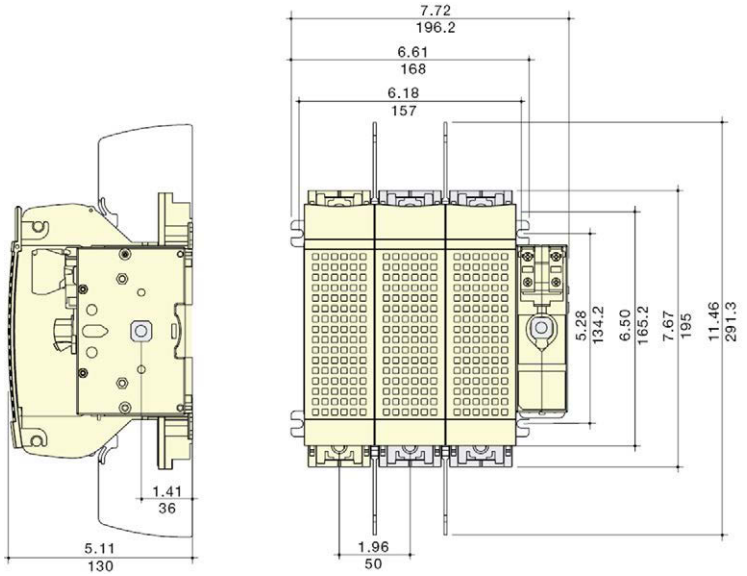
Handle for 100 A, 200 A, and 400 A Fusible Disconnect Switches



GS2JU3N, 100 A Fusible Disconnect Switches, Class J Fuses



GS2MU3N, 200 A Fusible Disconnect Switches, Class J Fuses



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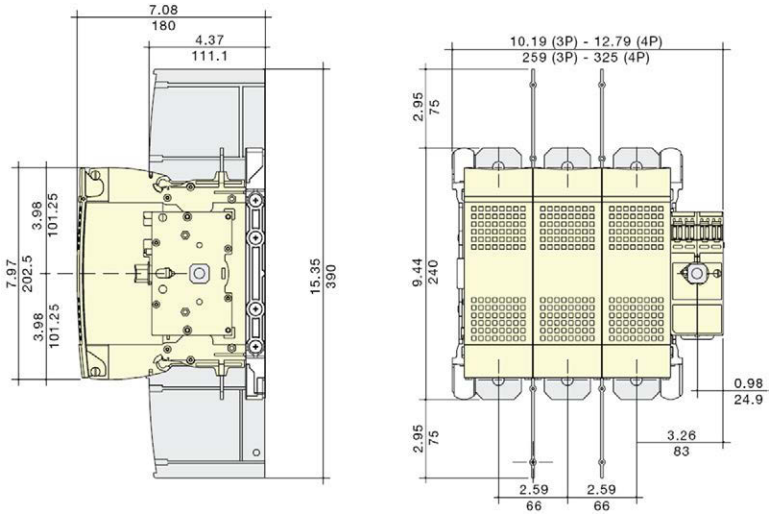
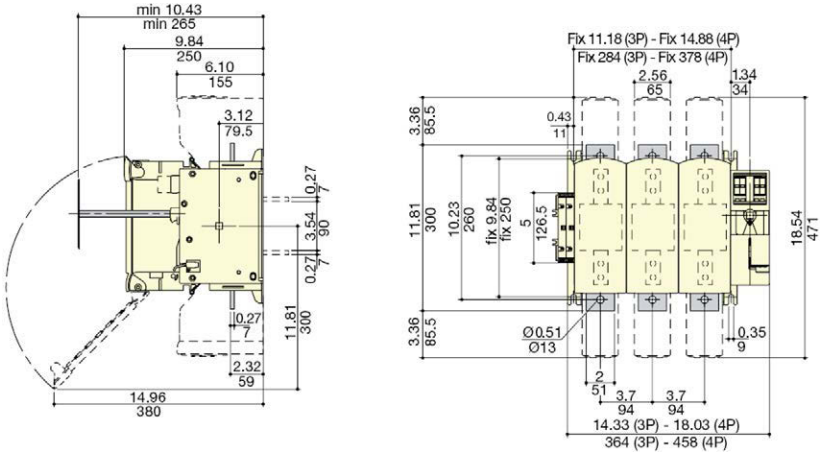
2/15/2017

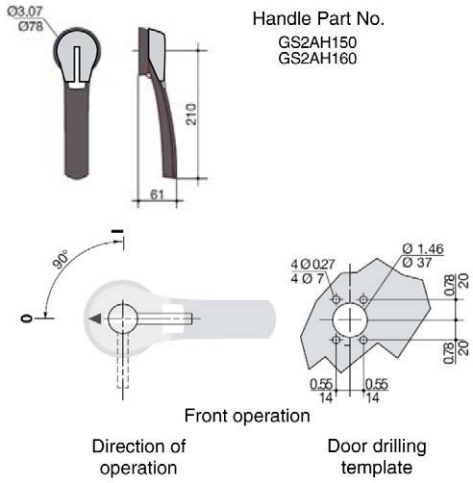
GS2QU3N, 400 A Fusible Disconnect Switches, Class J Fuses



GS2SU3, 600 A Fusible Disconnect Switches, Class J Fuses
GS2TU3, 800 A Fusible Disconnect Switches, Class J Fuses



Handle for 600 A and 800 A Fusible Disconnect Switches



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Disconnect Switches

The 9422 disconnect switches are the ideal selections for the PV String Combiner Box's internal disconnect switch and control panel applications. These switches are designed for variable depth, flange mounting, traditional side mounting and bracket mounting applications providing complete flexibility in the PV string combiner box designs. The switches are compatible with 9422A handle operators and 9423 door mechanisms and are UL98 recognized (E52369 Vol. 1, Sec. 18) and CSA certified. See Accessories , page 8-17,Dimensions, page 8-20, and Disconnect Switches—400 A Type TG, page 8-21 for dimensional information.

Table 8.43: 9422 Disconnect Switches, Flange Mounted and Variable Depth

Disconnect Switch Size	Variable Depth Min.–Max. (in.)	Maximum Horsepower Ratings						Fuse Type	Fuse Clip Rating (Amperes) Non-Interchangeable Type For Class H, J, K or R Fuses		Switch and Operating Mechanism Only, Does Not Include Handle Mechanism	Switch for Use With Cable Operators ONLY, Does Not Include Handle Mechanism or Cable Operator *[1]*	Switch and Operating Mechanism and Handle Mechanism, Overpacked*[2]*	
		AC Systems Volts (Motor Volts)				Vdc							Includes Type A1 Handle Mechanism	Includes Type A2 Handle Mechanism
		208 (200)	240 (230)	480 (460)	600 (575)	250	600		250 V	600 V	Cat. No. *[3]*	Cat. No. *[3]*	Cat. No. *[3]*	Cat. No. *[3]*
30 A	6.625–18	7.5	7.5	15	20	5	15	None	—	—	TCN30	TCN30C	ATCN301	ATCN302
								H, J, K, R	30	—	TCF30	TCF30C	ATCF301	ATCF302
									60	30	TCF33	TCF33C	ATCF331	ATCF332
60 A	6.625–18	—	15	30	50	10	30	None	—	—	TDN60	TDN60C	ATDN601	ATDN602
								H, J, K, R	60	30	TDF60	TDF60C	ATDF601	ATDF602
									—	60	TDF63	TDF63C	ATDF631	ATDF632
100 A	6.625–18	25	30	60	75	20	50	None	—	—	TEN10	TEN10C	ATEN101	ATEN102
								H, J, K, R	100	100	TEF10	TEF10C	ATEF101	ATEF102
200 A	9.12–19.25 *[4]*	40	60	125	150	40	50	None	—	—	TF1	—	ATF11	ATF21
								H, J, K, R	200	200	TF2	—	ATF12	ATF22
									—	400	TF3 *[5]*	—	ATF13 *[5]*	ATF23 *[5]*
400 A Fixed Depth *[6]*	11.38 (A5 or A6 Handle)	75	125	250	350	50	50	None	—	—	TG1 *[7][8]*	—	For handle selection, see Table 8.42, page 8-17.	
400 A Variable Depth *[6]*	15.87–19 (A7 or A8 Handle) *[9]*							H, J, K, R	400	400	TG2 *[7][10]*	—		

9422 TCN30

Bracket Mounted Disconnect Switch

The 9422 Bracket Mount Disconnect Switch is designed for combiner boxes and control panel applications. The Bracket Mount Disconnect Switch is shipped with the switch and external handle assembled to a bracket, ready for quick installation. A protective trim plate is provided to prevent any mounting screws from being accessible from the front. The trim plate also provides an attractive installation feature. The switches are fully compatible with the 9423 closing mechanisms.

Table 8.44: 9422 Bracket Mounted Disconnect Switches

Disconnect Switch Size	Maximum Horsepower Rating						Fuse Type	Fuse Clip Rating (A) Non-Interchangeable Type for Class H, J, K, or R Fuses		Switch and Operating Mechanism Only
	AC Systems (Motor Volts)				Vdc					
	208 (200)	240 (230)	480 (460)	600 (575)	250	600		250 V	600 V	Cat. No. *[11]*
30 A	7.5	7.5	15	20	5	15	None	—	—	BTCN30
							H, J, K, R	30	—	BTCF30
								60	30	BTCF33
							J *[12]*	60	30	BTCF32
60 A	15	15	30	50	10	30	None	—	—	BTDN60
							H, J, K, R	60	30	BTDF60
								—	60	BTDF63
							J *[12]*	—	60	BTDF62
100 A	25	30	60	75	20	50	None	—	—	BTEN10
							H, J, K, R	100	100	BTEF10
							J *[12]*	100	100	BTEF11
200 A	40	60	125	150	40	50	None	—	—	TFB1
							H, J, K, R	200	200	TFB2
							J *[12]*	—	400	TFB3

[1] See Table 8.49 Cable Operators for 9422 Disconnect Switches, page 8-18 for ordering information for the cable operator.
[2] Variable depth only — no cable operator.
[3] For ordering use the suffix 9422, e.g., order TCN30 using catalog number 9422TCN30.
[4] 9422 R2 will extend maximum mounting depth 7 inches, see Table 8.54 Dimensions (in. / mm) for 200 A Type TF Disconnect Switches , page 8-20for information.
[5] Accommodates Class J fuses only.
[6] Switches are fixed-depth or adjustable depending on handle selection.
[7] Commercially available enclosures may not accept 9422TG1 and 2 operating mechanisms. Contact enclosure manufacturer for availability of enclosures for use with these switches.
[8] Right hand flange mounting only and requires a special enclosure.
[9] Variable in increments of 0.63 inches.
[10] Right hand flange mounting only and requires a special enclosure.
[11] For ordering use the suffix 9422, e.g., order BTCN30 using catalog number 9422BTCN30.
[12] Space saving design—Type J fuses mounted on the non-fused bracket.

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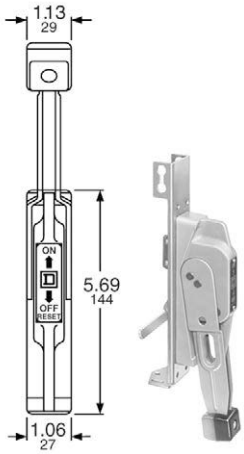
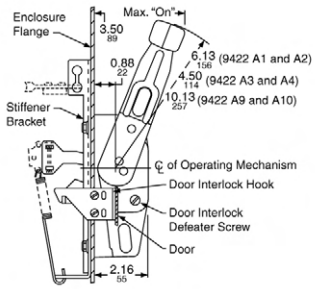


Type A1

Handle Information for 9422 Disconnect Switches

The Handle Mechanism Kit contains all parts needed to mount the handle to the flange of the enclosure. Two flange mounting methods are offered. For right or left hand flange mounting use Types A1–A4 and Types A9–A10 kits. For right-hand mounting only, use Type A5–A8 handles. The type AP1 and AP2 handles are used exclusively on the PowerPact™ M and P operating mechanisms, 9422 RM1 and 9422 CMP. The dimensions are identical to 9422 A1.



9422 A1, A2, A3, A4, A9, and A10 Handles

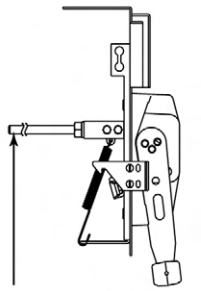

Rod used only on the variable-depth mechanism

Table 8.45: 9422 Disconnect Switch and Circuit Breaker Handle Mechanisms

Handle Depth (in.)	NEMA Type 1, 3, 3R, 4, 12 Enclosures	NEMA Type 4, 4X Stainless Steel Enclosures
	Cat. No.*[13]*	Cat. No.*[13]*
4 *[14]*	A3	A4
6 *[14]*	A1	A2
6 *[14] [15]*	AP1	AP2
10 *[16]*	A9	A10
12 *[17] [18]*	A7	A8

Accessories

Class R Fuse Kits

When installed, this kit rejects all fuses except Class R. The kits are available for field installation. With rejection kit and Class R fuses installed, the switch is UL component recognized for use on systems with fault current up to 200,000 RMS symmetrical amperes.

Table 8.46: Class R Fuse Kits

Disconnect Switch Type	Switch Type	Fuse Clip Rating		Class R Kit
		250 V*[19]*	600 V	Cat No.
30 A	TCF30	30	—	RFK03 *[20]*
	TCF33	60	30	RFK06 *[20]*
60 A	TDF60	60	30	RFK06 *[20]*
	TDF63	—	60	RFK06H *[20]*
100 A	TEF10	100	100	RFK10 *[20]*
200 A	TF2	200	200	9999SR4
	TF3	200	200	9999SR4
400 A	TG2	400	400	9999SR5

Electrical Interlocks for Disconnect Switches

Table 8.47: Electrical Interlocks

Disconnect Switch Size	Switch Type	Electrical Interlocks
		Cat No.*[21]*
30 A 60 A 100 A	TCF, TCN, TDF, TDN, TEF, TEN	TC10 *[22]*
		TC20 *[23]*
	BTCF, BTCN, BTDF, BTDN, BTEF, BTEN	TC11 *[22]*
		TC21 *[23]*
200 A	TF, ATF	R8 *[22]*
	TF, ATF	R9 *[23]*
400 A	TG	R35 *[22]*
	TG	R36 *[23]*

[13] For ordering use the suffix 9422, e.g., order A2 using catalog number 9422A2.
[14] Use with 30–200 A 9422 switches and all circuit breaker mechanisms.
[15] Use only with 9422 RM1, 9422 CMP and PowerPact M and P operating mechanisms.
[16] Use with Type D2 remote or dual adapter kit. See Remote or Dual Adapter Kit, page 8-28.
[17] Use only with 400 A 9422TG1 and 9422TG2 disconnect switch.
[18] Adjustable depth.
[19] Use Discount Schedule DE1, not CP1.
[20] Use Discount Schedule DE1 for price, not CP1.
[21] For ordering use the suffix 9999, e.g., order TC10 using catalog number 9999TC10.
[22] 1 N.C. or N.O. Contact depending on wiring.
[23] 2 N.C. or N.O. or 1 N.O. or 1 N.C. Contact depending on wiring.

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Internal Barrier Kits

Provides an additional barrier that helps prevent accidental contact with live parts. Field-installed transparent barriers do not restrict visual inspection of the switch. Barriers provide IEC529 IP2X “finger safe” protection when door of enclosed disconnect switch is open. A convenient door allows use of test probes without accessing fuses and replacement of fuses without removing barrier. Barrier must be used with the skirt kit to enclose a panel mounted 9422 disconnect.

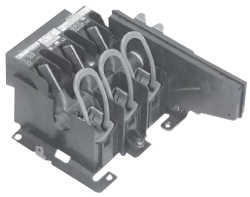
Table 8.48: Internal Barrier Kits

Disconnect Switch Size	Barrier	Skirt
	Cat. No. *[24]*	Cat No. *[24]*
30 A	SS06	SS0306SK
60 A	SS06	SS0306SK
100 A	SS10	SS10SK

Cable Operators for 9422 Disconnect Switches

Table 8.49: Cable Operators for 9422 Disconnect Switches

Switch Type	Cable Mechanisms *[25]*		Cable Mechanisms with A1 Handle for NEMA Type 1, 3, 3R, 4, and 12 Enclosures
	Cable Length (inches)	Cat. No.	Cat. No.
TCN30C, TCF30C, TCF33C, TDN60C, TDF60C, TDF63C, TEN10C, TEF10C	36	9422CFT30	9422CFT31
	48	9422CFT40	—
	60	9422CFT50	9422CFT51
	120	9422CFT10	9422CFT11



9422 TCN30

Table 8.50: Class 9422 Replacement / Refrofit Fuse Clip Kits

Disconnect Switch Size	Switch Type	Fuse Type	Fuse Clip Rating (Amperes)		Line and Load Fuse Clip Kit (includes load base and fuse pullers)
			250 V	600 V	Type
30 A	TCF30 TCN30 TCF33	H, K, J, R	30	—	TC30
			60	30	TC33
60 A	TDN60	H, K, J, R	60	30	TC33
			—	60	TD63

Table 8.51: Lug Data

Disconnect Switch Size	Wire Size (Min-Max)		Lug Kits Copper	Lug Kits Al
	Cu	Al	Cat No.	Cat No.
30–60 A	#14–#2	#10–#2	CL0306F	AL0306F
100 A	#10–#0	#6–#0	CL10F	AL10F
200 A	#6–600 kcmil	#6–#600 kcmil	—	—
400 A	#4–500 kcmil	—	—	—

[24] Use Discount Schedule DE1 for price, not CP1.
[25] Purchase handle mechanism separately (9422A1, A2, A3, or A4).

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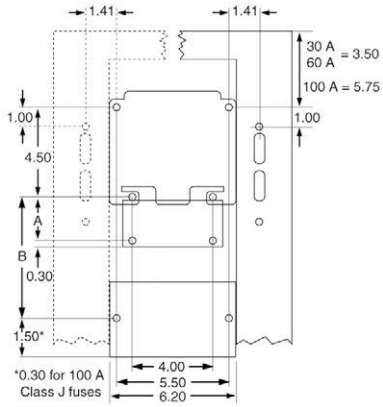


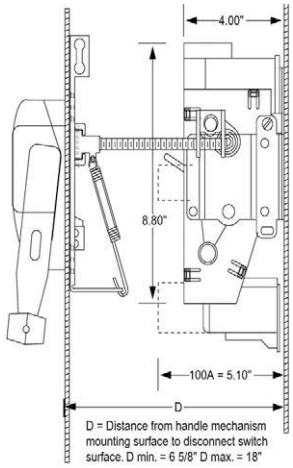
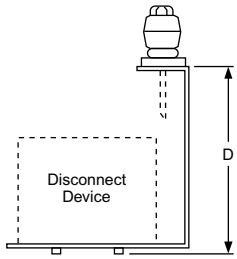
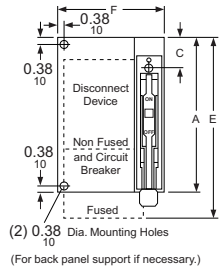


Table 8.52: Dimensions 30, 60, and 100 A Class 9422 Disconnect Switches

Switch Type	Maximum Voltage	Fuse Type	Dimension A	Dimension B
30 A	30 A, 250 V	H, K, R	1.625	—
	30 A, 600 V	H, K, R	4.25	
	30 A, 600 V	J	1.625	
60 A	60 A, 250 V	H, K, R	2.25	
	60 A, 600 V	H, K, R	4.75	
	60 A, 600 V	J	1.625	
100 A	100 A, 250 V	H, K, R	—	3.25
	100 A, 600 V	H, K, R		5.25
	100 A, 600 V	J		3.25





(For back panel support if necessary.)

Table 8.53: Dimensions

Type	A in. (mm)	C in. (mm)	D in. (mm)	Min. Enclosure Depth *[26]* in. (mm)	E in. (mm) Fusible Device	F in. (mm)
BTCN, BTDN, BTEN	—	—	6.56 (167)	8.00 (203)	—	—
BTCF, BTDF, BTEF	9.50 (241)	1.88 (48)	8.56 (217)	10.00 (254)	11.88 (302)	6.38 (162)
TFB1	11.50 (292)	3.88 (99)	9.50 (241)	12.00 (305)	—	13.19 (335)

NOTE: Back panel support is recommended for Types TFB1, 2, & 3. Other devices may also require support if the flange is not sufficiently rigid.

[26] The minimum enclosure depth is greater than Dimension D since additional space is needed when mounting the mechanism.

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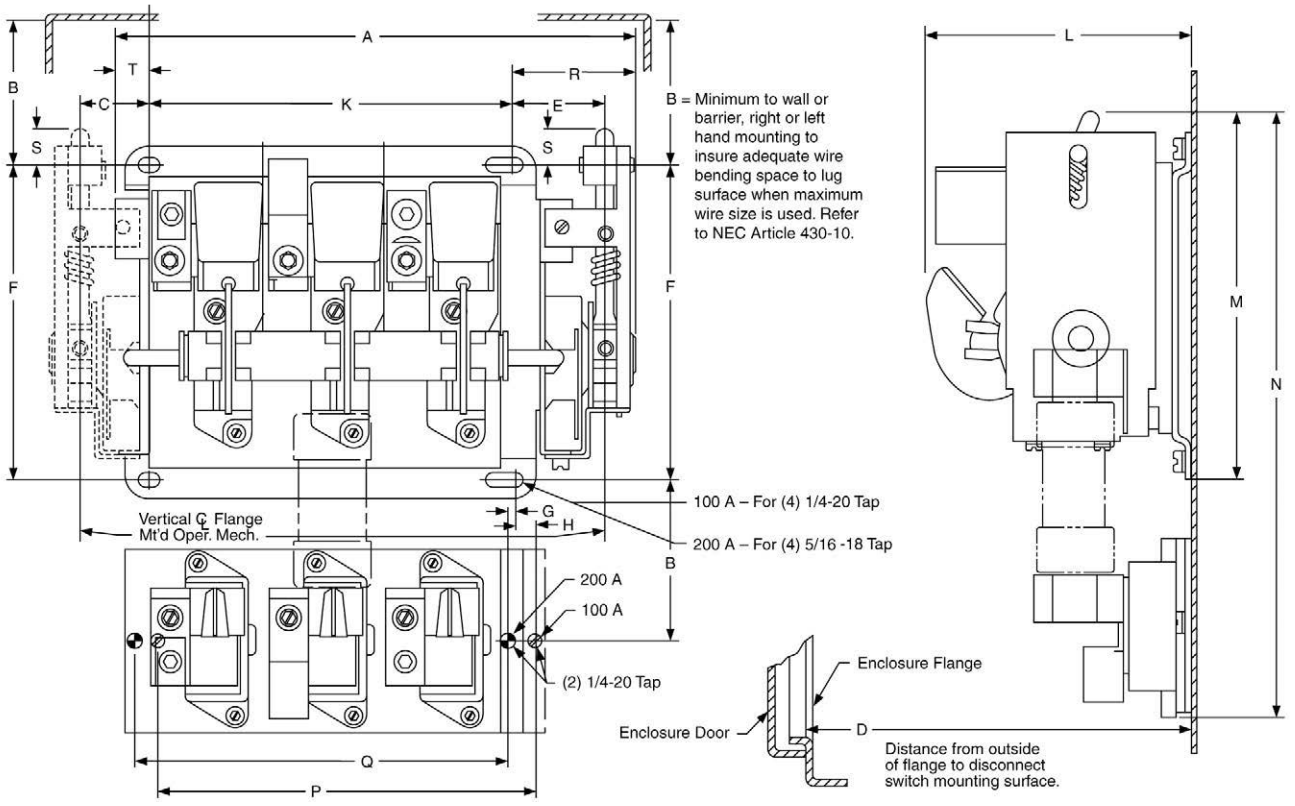
Dimensions

Table 8.54: Dimensions (in. / mm) for 200 A Type TF Disconnect Switches

Type	Switch Size (A)	Switch Size Fuse Clips	A	B	C	D *[27]* Min.–Max.	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
TF1	200	None	**13.33** 339	**9.38** 238	**1.64** 42	**9.12–19.25** 232 489	**2.33** 59	**8.00** 203	—	—	—	**9.44** 240	**6.50** 165	**9.53** 242	—	—	—	**3.14** 80	**1.03** 26	**0.75** 19
TF2	200	Class J 200 A 600 V	**13.33** 339	**9.38** 238	**1.64** 42	**9.12–19.25** 232 489	**2.33** 59	**8.00** 203	**0.09** 3	—	**2.77** 70	**9.44** 240	**6.50** 165	—	**14.11** 358	—	**9.63** 245	**3.14** 80	**1.03** 26	**0.75** 19
TF2	200	Class H, K, R 200 A 250 V	**13.33** 339	**9.38** 238	**1.64** 42	**9.12–19.25** 232 489	**2.33** 59	**8.00** 203	**0.09** 3	—	**4.14** 105	**9.44** 240	**6.50** 165	—	**15.48** 393	—	**9.63** 245	**3.14** 80	**1.03** 26	**0.75** 19
TF2	200	Class H, K, R 200 A 600 V	**13.33** 339	**9.38** 238	**1.64** 42	**9.12–19.25** 232 489	**2.33** 59	**8.00** 203	**0.09** 3	—	**6.64** 169	**9.44** 240	**6.50** 165	—	**17.98** 457	—	**9.63** 245	**3.14** 80	**1.03** 26	**0.75** 19
TF3	200	Class J 400 A 600 V	**13.33** 339	**9.38** 238	**1.64** 42	**9.12–19.25** 232 489	**2.33** 59	**8.00** 203	**0.09** 3	—	**2.77** 70	**9.44** 240	**6.50** 165	**9.53** 242	**18.53** 471	—	**9.63** 245	**3.14** 80	**1.03** 26	**0.75** 19



[27] The dimensions shown may be extended 7 in. by using 9422R2 (two required per switch).

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Disconnect Switches—400 A Type TG

Outline Dimensions and General Location
400 A Disconnect Switches Nonfusible and Non-Interchangeable Fuse Clip Type Fusible Switches

Table 8.55: Handle Mechanism—Type A7 and A8

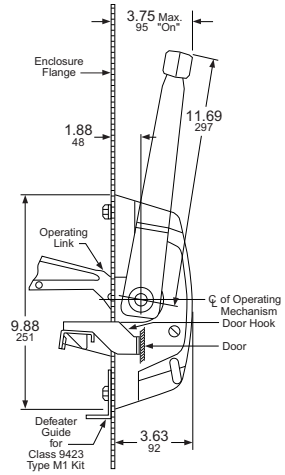


Figure 1

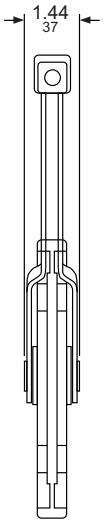


Figure 2

NOTE: Commercially available enclosures may not accept type TG operating mechanisms. Contact the enclosure manufacturer for availability of enclosures for use with these switches.

Switch Type	B	X
TG1, 2	**11.28** 286	**16.06** 408

NOTE: B and X = Minimum to wall or barrier to ensure adequate wire bending space to lug surface when maximum wire size is used.
Refer to NEC Article 430.10.

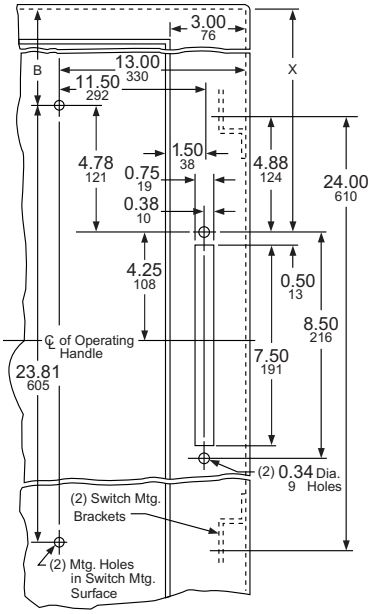


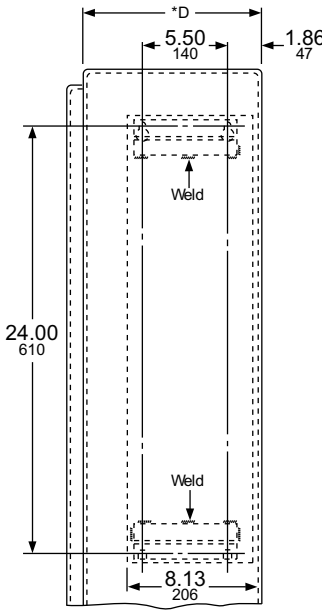
Figure 3

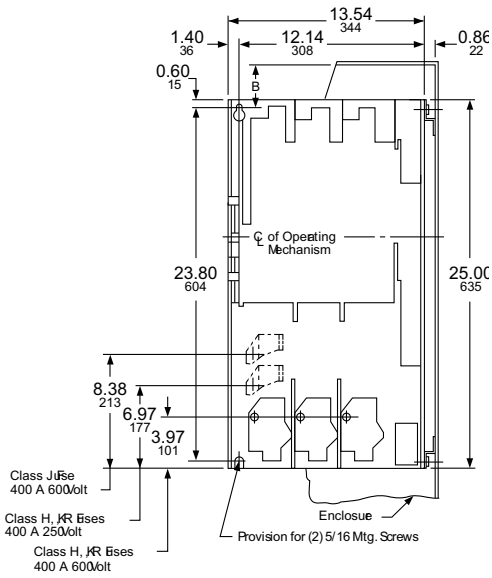
Table 8.56: Nonfusible and Fusible Switches

Dimension D = Distance from outside of flange to disconnect switch mounting surface.				
For Type TG1 or TG2 with:				
Type A7 or A8 adjustable depth handle mechanism	D =	**15.87** 403	to	**19** 483
	In steps of	**0.63** 16		

NOTE: Copper lugs are standard on all Type TG disconnect switches.

* D = Mounting depth measured from the switch mounting surface to the surface of flange.





Dim. = in. / mm

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9421 Type L
Circuit Breaker Mechanism

Type L Circuit Breaker Mechanisms

Type L door-mounted, variable depth operating mechanisms feature heavy duty, all metal construction with trip indication. All mechanisms can be padlocked in the "OFF" position when the enclosure door is open. Further, the handle assemblies can be locked "OFF" with up to three padlocks, which also locks the enclosure when the door is closed. (The 3" handle accepts one padlock.) Complete kits are rated for NEMA Type 1, 3R, and 12 enclosures. They include a handle assembly, operating mechanism, and shaft assembly.

Table 8.57: Complete Kits

Complete Kit Does Not Include Circuit Breaker			Includes: Operating Mechanism Standard 6 in. Handle Standard Shaft Kit		Includes: Operating Mechanism Standard 6 in. Handle Long Shaft Kit		Includes: Operating Mechanism Short 3 in. Handle Long Shaft Kit	
Use With								
Circuit Breaker or Interrupter Type	No. of Poles	Frame Size (A)	Type	Mounting Depth *[1]* Min. – Max.	Type	Mounting Depth *[1]* Min. – Max.	Type	Mounting Depth *[1]* Min. – Max.
NSF, PowerPact™ H and J	2–3	250	LJ1	5-1/2–10-3/4	LJ4	5-1/2–21-3/8	LJ3	5-1/2–21-3/8
PowerPact D and L	2–3	600	LD1	7-1/4–12-1/16	LD4	7-1/4–22-5/8	3 in. handles are not recommended for use with these circuit breakers.	
PowerPact M and P *[2]*	3	1200	L-W1 *[4]*	9.00–12.50	LW4 *[5]*	9.00–23.50		

Table 8.58: Component Parts

Use With			3 in. Handle Assemblies Type 1, 3R, 12	Standard Handle Assemblies Type 1, 3R, 12	Operating Mechanism Includes Lockout	Standard Shaft (Support Bracket Not Required)		Long Shaft (Support Bracket Included)	
Circuit Breaker or Interrupter Type	No. of Poles	Frame Size (A)	Type	Type	Type	Mounting Depth *[1]* Min. – Max.	Type	Mounting Depth *[1]* Min. – Max.	Type
NSF, PowerPact H & J	2–3	250	LH3 *[6]*	LH6 *[6]*	LJ7	5-1/2–10-1/4	LS8	5-1/2–21-3/8	LS13
PowerPact D & L	2–3	600	*[7]*	LH6 *[6]*	LD7	7-1/4–12-1/16	LS8	7-1/4–22-5/8	LS13
PowerPact M & P *[2]*	3	1200	*[7]*	LHP8 *[6]*	LW7	7-3/16–11-5/8	LS8	7-3/16–22-1/4	LS10

3 in. Handle Assembly

Standard Handle Assembly

Table 8.59: NEMA Type 4 and 4X Handle Assemblies

Use With			Standard Handle Assemblies		Special 3 in. Version	
Circuit Breaker or Interrupter Type	No. of Poles	Frame Size (A)	NEMA Type 1, 3R, 4, 12 (Painted)	NEMA Type 1, 3R, 4, 4X, 12 (Chrome Plated)	NEMA Type 1, 3R, 4, 12 (Painted)	NEMA Type 1, 3R, 4, 4X, 12 (Chrome Plated)
			Type	Type	Type	Type
NSF, PowerPact H and J	2–3	250	LH46	LC46	LH43	LC43
PowerPact D and L	2–3	600	LH46	LC46	3 in. handles are not recommended for use with these circuit breakers.	
PowerPact M and P	3	1200	LHP48	LCP48		

Table 8.60: Auxiliary and Alarm Switches for PowerPact™ Circuit Breakers *[8]*

Description	H- and J-Frame	D- and L-Frame	D- and L-Frame
1 Auxiliary Switch 1a 1b	S29450	S29450	S29450
2 Auxiliary Switch 2a 2b	2 x S29450	2 x S29450	2 x S29450
3 Auxiliary Switch 3a 3b	—	3 x S29450	3 x S29450

NOTE: The location of the accessory in the circuit breaker determines its function.

[1] Mounting depth measured in inches from circuit breaker mounting surface (control panel) to outside of enclosure door.
[2] These circuit breaker operating mechanisms must use the 9421LHP** or LCP** handles only.
[3] Type LW1 and LW4 include an 8 in. handle (9421LHP8) rather than a 6 in. handle.
[4] Type LW1 and LW4 include an 8 in. handle (9421LHP8) rather than a 6 in. handle.
[5] Type LW1 and LW4 include an 8 in. handle (9421LHP8) rather than a 6 in. handle.
[6] For a red handle and yellow bezel, add suffix RY to catalog number, e.g., 9421LH6RY.
[7] 3 in. handles are not recommended for use with these circuit breakers.
[8] Discount Schedule: DE2.

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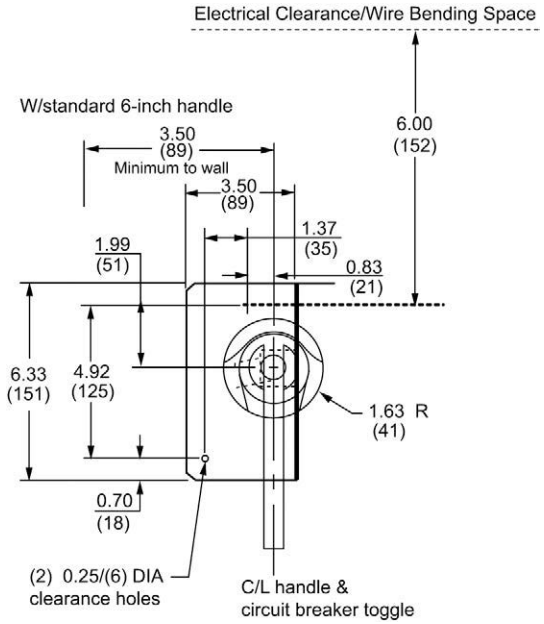
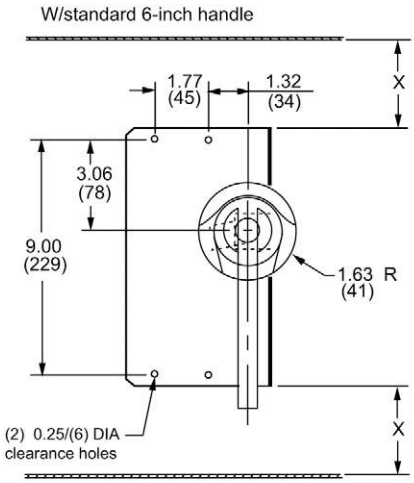
Dimensions for Type L Operating Mechanisms

Panel Drilling for PowerPact™ H and J Circuit Breaker Operating Mechanisms: 9421LJ1, 9421LJ4, and 9421LJ7

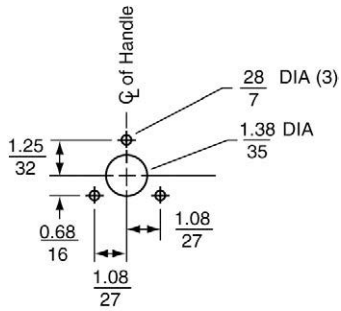


Panel Drilling for PowerPact™ D and L Circuit Breaker Operating Mechanisms: 9421LD1, 9421LD4, and 9421LD7

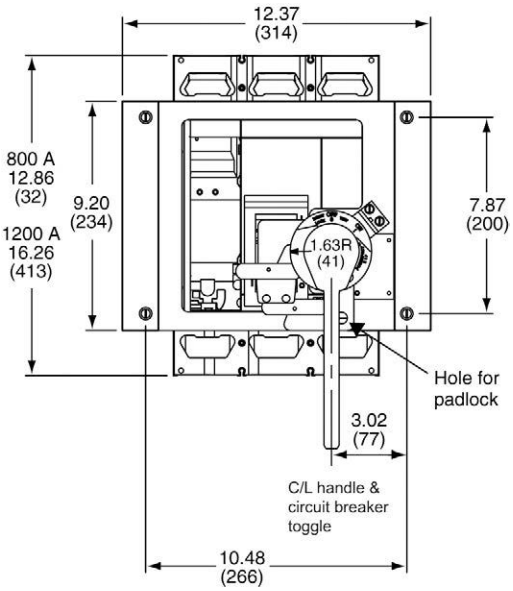


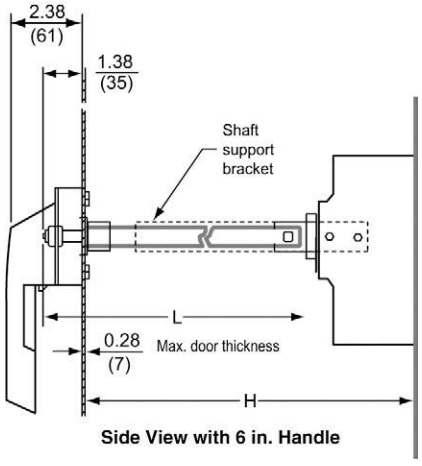
X: Minimum to wall or barrier to insure adequate wire bending space to lug surface when the maximum wire size is used. Refer to NEC 430-10.

Panel Drilling for PowerPact™ M and P Circuit Breaker Operating Mechanisms: 9421LW1, 9421LW4, and 9421LW7



Door Drilling Dimensions





Side View with 6 in. Handle

Table 8.61: Shaft Cutting Dimensions

Class	Type	Shaft Length Formula	H = Standard Shaft		H = Long Shaft	
			Min.	Max.	Min.	Max.
9421	LJ1, LJ4, LJ7	L = H – 3.0-0 76	5.5 138	10.75 273	5.5 138	21.63 543
9421	LD1, LD4, LD7	L = H – 4.2-5 108	7.25 184	12.06 306	7.25 184	22.63 575
9421	LW1, LW4, LW7	L = H – 4.8-9 124	7.19 183	11.63 295	7.19 183	22.25 565

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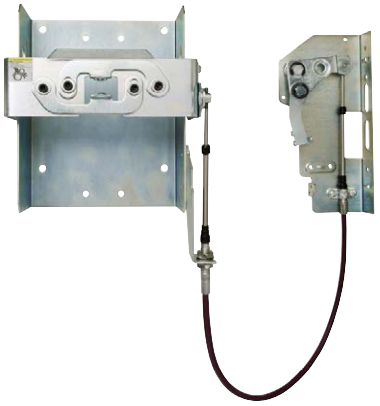


Flexible Cable Mechanism 9422CSJ30

Flexible Cable Mechanisms

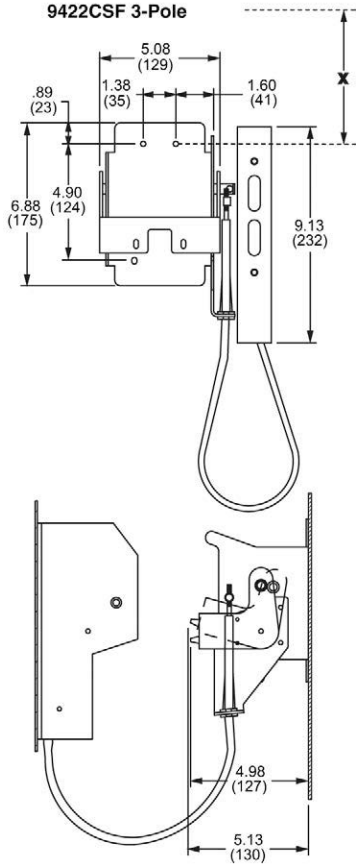
For use with Class 9422 handle operators specially designed for tall, deep enclosures where placement flexibility is required.

Table 8.62: Flexible Cable Mechanisms for use with Schneider Electric™ (formerly Merlin Gerin™) Circuit Breakers and PowerPact™ 3-Pole Circuit Breakers

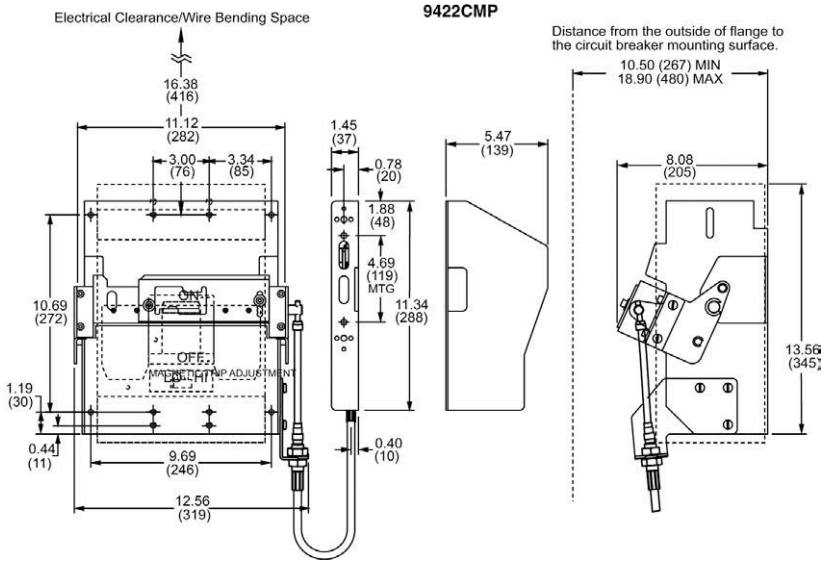
Circuit Breaker Type	No. of Poles	Frame Size (A)	Cable Mechanism	
			Length	Type
MG-NSF PowerPact H- and J-Frame	2–3	250	36 in.	CSF30
			60 in.	CSF50
			84 in.	CSF70
			120 in.	CSF10
MG-NSF	4	250	36 in.	CSF304
			60 in.	CSF504
			120 in.	CSF104
MG-NSJ PowerPact D- and L-Frame	3	600	36 in.	CSJ30
			60 in.	CSJ50
			120 in.	CSJ10
MG-NSJ PowerPact D- and L-Frame	4	600	36 in.	CSJ304
			60 in.	CSJ504
			120 in.	CSJ104
PowerPact M- and P-Frame *[9]*	3	1200	48 in.	CMP40
			50 in.	CMP50
			120 in.	CMP10

NOTE: Refer to NEC Article 430-10 for minimum dimension X from circuit breaker top mounting hole to wall or barrier to ensure adequate wire bending space.
NOTE: Bend radius in cable must never be less than 6 inches. Electrical clearances must be maintained between cable and live electrical parts.

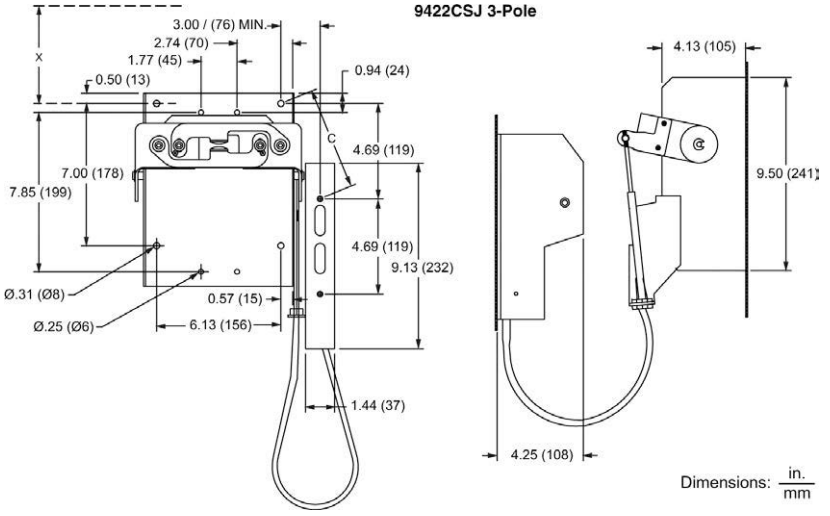
9422CSF 3-Pole



9422CMP



9422CSJ 3-Pole



Dimensions: in. / mm

[9] Must use 9422AP1 or 9422AP2 Handle with this operating mechanism.

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9422CSFD33

Dual Cable Operating Mechanisms for Square D™ Circuit Breakers

Dual Cable Operating Mechanisms are designed for use with Square D brand PowerPact™ D, H, J, and L circuit breakers through 600 A frame sizes. The cable mechanisms allow for a single handle operator, Class 9422Ax, to operate both circuit breakers. The cable mechanism is designed especially for tall, deep enclosures where placement flexibility is required. There are numerous cable arrangements to choose from to accommodate many applications.

Features

- Separate cables for each circuit breaker
- Rugged metal flange handle operator
- Maximized flexibility of circuit breaker placement for existing and new applications
- Control panel can be fed from two separate supply voltages (if required)
- Dual mechanism allows both separate supply voltages to be controlled by a single handle to improve security features

Table 8.63: Dual Cable Operating Mechanisms Selection

Circuit Breaker Type	Cable Length in. / mm (quantity)	Catalog Number	Frame Size (max.)
PowerPact H & J MG NSF	120 in. / 3048 mm (2)	9422CSFD1	250 A
	36 in. / 914 mm (1) 60 in. / 1524 mm (1)	9422CSFD35	
	60 in. / 1524 mm (1-CSF 3 pole) 60 in. / 1524 mm (1-CSF 4 pole)	9422CSFD345	
	36 in. / 914 mm (1) 120 in. / 3048 mm (1)	9422CSFD31	
	36 in. / 914 mm (2)	9422CSFD33	
	60 in. / 1524 mm (1) 120 in. / 3048 mm (1)	9422CSFD51	
	60 in. / 1524 mm (2)	9422CSFD55	
PowerPact D & L MG NSJ	60 in. / 1524 mm (2-CSJ)	9422CSJD50 *[10]*	600 A
	120 in. / 3048 mm (2-CSJ)	9422CSJD10 *[10]*	
	60 in. / 1524 mm and 120 in. / 3048 mm (2-CSJ)	9422CSJD51 *[10]*	
	120 in. / 3048 mm (1-CSF) and 120 in. / 3048 mm (1-CSJ)	9422CSFJD10	250 A and 600 A
	60 in. / 1524 mm (1-CSF) 60 in. / 1524 mm (1-CSJ)	9422CSFJD50	

Handle Mechanisms

Handle Mechanisms

These handle mechanism kits are used with the circuit breaker variable depth and cable operating mechanisms. The kits contain all parts necessary for mounting the handle to the flange of the enclosure. Types A1/AP1 to A4 are suitable for right or left-hand flange mounting.

Table 8.64: Handle Mechanisms

Type of Handle	NEMA Type Enclosure	Type
6 in.	1, 3, 3R, 4 (sheet steel), 12	A1
	4, 4X (stainless) *[11]*	A2
6 in. *[12]*	1, 3, 3R, 4 (sheet steel), 12	AP1
	4, 4X (stainless) *[11]*	AP2
4 in.	1, 3, 3R, 4 (sheet steel), 12	A3
	4, 4X (stainless) *[11]*	A4

NOTE: See Handle Information, page 8-17 for dimensional information.

[10] Must use the 9422AP1 or 9422AP2 operating handle with this operating mechanism.
[11] All external metal parts are either stainless steel or a chrome-plated non-ferrous die casting.
[12] Must be used with 9422 RM1, 9422CMP, and 9422CSJD (dual cable mechanism) only.

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9422 Type R
Circuit Breaker Mechanism

Flange-Mounted, Variable-Depth Operating Mechanisms

Designed for installation in custom built control enclosures where main or branch circuit protective devices are required. All circuit breaker operating mechanisms are suitable for either right- or left-hand flange mounting, convertible on the job. Selection of a 9422Ax handle is required to complete the operating mechanism.

Table 8.65: Variable-Depth Operating Mechanisms for Use with Schneider Electric™ (formerly Merlin Gerin™) Circuit Breakers

Use with				Operating Mechanism
Circuit Breaker Frame Size	No. of Poles	Frame Size A	Variable Depth Mtg. Range Min.-Max. (Inches)*[13]*	Operating Mechanism Only—Does Not Include Handle Mechanism Type
Schneider Electric (formerly Merlin Gerin) Circuit Breakers and PowerPact™ Frame 3-Pole Circuit Breakers				
MG-NSF PowerPact H- and J-Frame	2–3	250	5.88–17.75	RQ1
MG-NSJ PowerPact D-and L-Frame	3	600	9.00–17.75	RS1
PowerPact M- and P-Frame *[14]*	3	1200	10.50–18.38	RM1

Table 8.66: Electrical Interlocks—Class 9999

Description	Class	Type
Single Pole, Double Throw	9999	R26
Double Pole, Double Throw	9999	R27

[13] Class 9422 Type R2 will extend mounting depth 7 inches—not recommended for use with the 9422RM1 operating mechanism (see Table 8.45 9422 Disconnect Switch and Circuit Breaker Handle Mechanisms, page 8-17).

[14] These circuit breaker operating mechanisms must use the 9422APx handles.

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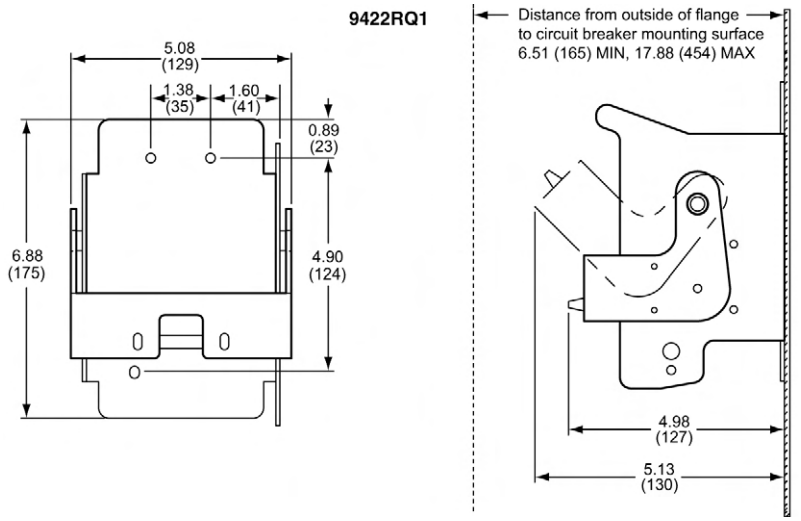
Dimensions

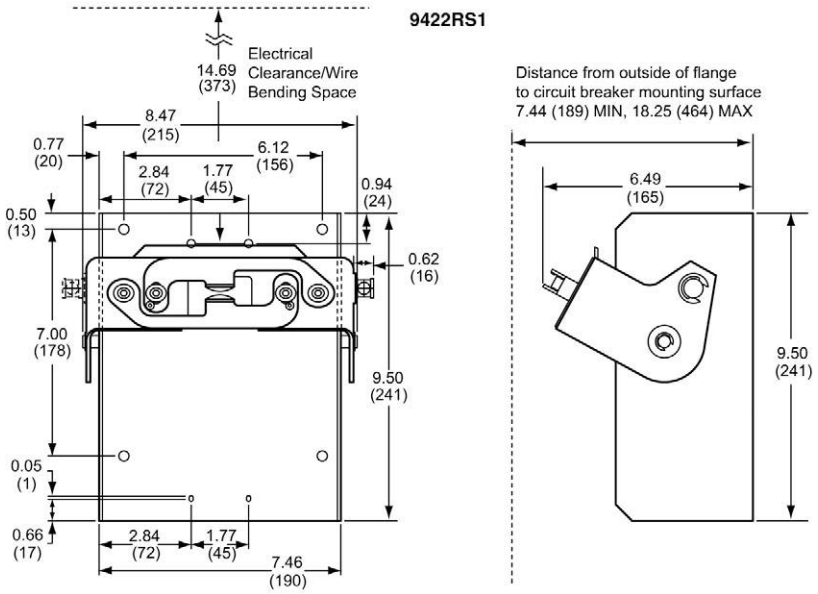
Minimum to wall or barrier to insure adequate wire bending space to lug surface when the maximum wire size is used with standard lugs. Refer to NEC 430-10.

Dimensions: $\frac{\text{in.}}{\text{mm}}$

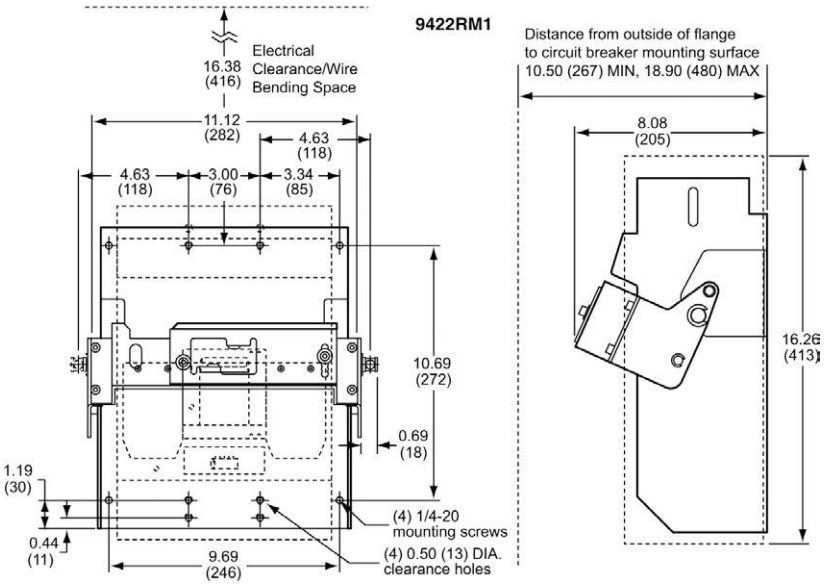
9422RQ1



9422RS1



9422RM1



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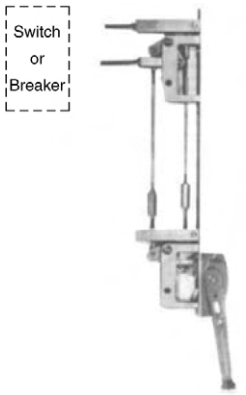
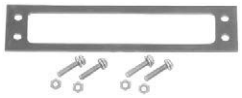


Remote operation shown
(handle mechanism not included in kit)



Alternate Mounting Kit

Channel/Flange
Support Kit

Auxiliary Lock Plate

Remote or Dual Adapter Kit

For the remote or dual operation of 30, 60, 100, and 200 A disconnect switches.

Remote Operation—permits mounting the Class 9422 Type A9 or A10 handle mechanism at a lower level than the disconnect device it controls. This arrangement is often required where the disconnect device is mounted too high for personnel to easily reach a conventional operator.

Dual Operation—permits controlling two disconnect devices, one in line with and one remote from a single Class 9422 Type A9 or A10 handle mechanism.

NOTE: A Class 9422 Type A9 or A10 handle (see Flange Mounted and Cable Operated, page 8-15) and the preferred mounting method **must** be used.

Table 8.67: Disconnect Device

Disconnect Device	Enclosure Mounting Depth		Type
	Min.	Max.	
Disconnect Switch			
30 A Type TCF/TCN	10.63	19.50	D2
60 A Type TDF/TDN	10.63	19.50	
100 A Type TEF/TEN	12.13	20.25	
200 A Type TF	13.13	20.81	

Table 8.68: Other Accessories

Accessory	Description	Class	Type
Alternate Mounting Kit	Permits mounting Class 9422 Type A1 or A2 handle mechanisms in enclosures with flange thickness of 16 gauge to 0.5 in.	9422	AM2
Channel/Flange Support Kit	Auxiliary kit recommended for use with 30 and 60 A disconnect switches and PowerPact™, NSF, and NSJ circuit breaker mechanisms when these devices are to be mounted on the center channel of a multi-door enclosure or when extra rigidity for the flange is required. Supplied as standard with 100 and 200 A disconnect switches.	9422	C1
Auxiliary Lock Plate	Auxiliary kit recommended for use with the Class 9422 Type A-1 flange handle to facilitate padlocking the handle in the "OFF" position. Primarily used when the handle is mounted on the center channel of a multi-door enclosure. Also in any case where the enclosure doors interfere with the normal padlock slot in the flange handle. Meets both the Automotive and NFPA 79 specifications.	9422	L1
Special Lugs for Disconnect Switches	Copper Lugs only—Specify Form Y157	—	—
	Tin Plated Aluminum Lugs for 400 A Type TG Switch—Specify Form Y1572 (000–750 kcmil Cu/Al wire)	—	—
	Anderson Type VCEL Compression Lugs—Specify Form Y1574 **Exceptions:** None of the 30 A or 60 A disconnect switches are available with compression lugs.	—	—
Operating Rods	Standard operating rod for use with Class 9422 variable depth mechanisms. Included as standard in each kit.	9422	R1
	Extra long operating rod for use with Class 9422 variable depth mechanisms. Can be used as a substitute for the standard rod included in each kit to increase the maximum mounting depth 7 in. (Two are required for Types ARR, RR, ART, RT, ATE, TE, ATF, TF).	9422	R2

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Door Closing Mechanisms

Class 9423 door closing mechanisms cover a range of enclosures with door openings up to a maximum of 91 in. high. The door closing mechanisms are designed to be used on control enclosures and interlocked with a Class 9422 disconnect device, although they all can be used independently. Three different systems are available, and their use is as recommended below. A complete system is available for interlocking all the doors of a multi-door enclosure with the master door when using the 6 in. or 8 in. vault handle mechanism.

Note that the “Master Door” is defined to be the door of a single or multi-door enclosure which is interlocked directly with the disconnect device. The master door can be hinged on either the right or left hand side. It can be located in any position on a multi-door enclosure. An “Auxiliary Door” is defined to be any remaining doors of a multi-door enclosure which are interlocked with the master door by means of the overhead interlocking system as illustrated on pages 8-29 and 8-30.

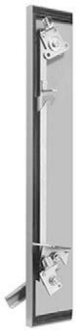
Selection Procedure

1. Determine enclosure construction (no. of doors, door height, hinge location, etc.).
2. Determine Class 9422 disconnect device to be used—either a disconnect switch or a circuit breaker mechanism.
3. Determine the location of the disconnect device and handle mechanism (right- or left-hand flange or center channel).
4. Select the door closing mechanism required.
5. Select the auxiliary door closing mechanisms and multi-door interlocking hardware, if required. (A complete system for interlocking all auxiliary doors of a multi-door enclosure with center channel is available for the medium and large enclosures.)

Type M4 Latch bar not included, but most prepunched enclosures that accept Square D™ operating mechanisms supply a pre-drilled latch bar.

Circuit Breaker Operating Mechanism

Table 8.69: Door Closing Mechanism

60 in. Maximum Door Opening (Recommended)	46–60 in. Door Opening (Recommended)	61–91 in. Door Opening (Recommended)
 • 2 Point Locking is Standard • A Third Roller Latch Kit is Available for 3 Point Locking • For 3/4 in. Door Depths	• For use on Single or Multi-Door Enclosures • For use with Doors Hinged on Right or Left Side • Referred to as the 6 in. Vault Handle Mechanism • For 3/4 in. Door Depths	• For use on Single or Multi-Door Enclosures • For use with Doors Hinged on Right or Left Side • Referred to as the 8 in. Vault Handle Mechanism • For 1-1/8 in. Door Depths

The door closing mechanisms listed below are for use on small to medium size single door control enclosures. They are designed to be used in conjunction with Class 9422 flange-mounted disconnect switches and circuit breaker operating mechanisms; however, they can be used independently as well. When used on properly designed and gasketed NEMA Type 12 enclosures, they meet NFPA 79 standards.

Table 8.70: Single Door Enclosures—NEMA Type 4 or 12 with 60 in. High Maximum Opening

Description	For Use On: (Enclosure Type)	Use in Conjunction With:	Door Latch Handle Length	Suggested Maximum Door Opening	Door Depth	Type
Two point, roller latch, door closing mechanism for use on enclosures with doors hinged on the **left** hand side.	NEMA Type 4 and 12 Sheet Steel	Class 9422 Types A1, A3, A9	4 in.	Less than 39 in.	3/4 in.	M4
			4 in.	Less than 39 in.	*[1]*	M10
			6 in.	60 in.	3/4 in.	M9
	NEMA Type 4 and 12 Stainless Steel	Class 9422 Types A2, A4, A10	4 in.	Less than 39 in.	3/4 in.	M24
Two point, roller latch, door closing mechanism for use on enclosures with doors hinged on the **right** hand side.	NEMA Type 4 and 12 Sheet Steel	Class 9422 Types A1, A3, A9	4 in.	Less than 39 in.	3/4 in.	M4L
			4 in.	Less than 39 in.	*[1]*	M10L
			6 in.	60 in.	3/4 in.	M9L
	NEMA Type 4 and 12 Stainless Steel	Class 9422 Types A2, A4, A10	4 in.	Less than 39 in.	3/4 in.	M24L
Third roller latch kit for 3 point locking; for use where 3 point locking is desired or where the door opening is 39 in. or more.	NEMA Type 4 and 12 Sheet Steel	Class 9423 Types M4, M9, M4L, M9L	—	—	3/4 in.	M3
	NEMA Type 4 and 12 Stainless Steel	Class 9423 Types M24, M24L	—	—	3/4 in.	M23

[1] Suitable for door depths of 1-1/8 in., 1-1/4 in., 1-3/8 in. and 1-1/2 in.

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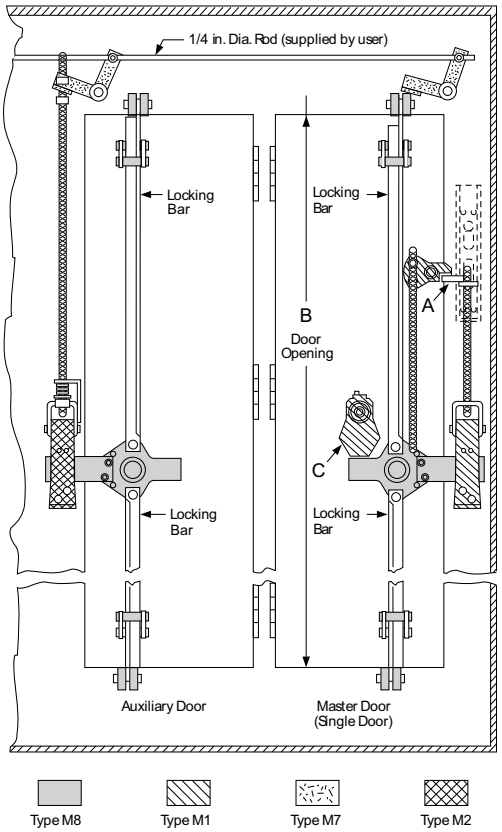
Vault Type for Single and Multi-Door Enclosures

Table 8.68, page 8-30 shows the requirements for the door closing mechanism, the locking bar kit, and the mechanical interlock kit, if used.

Table 8.71: Single or Multi-Door Enclosures—NEMA Type 12 with 40 in. to 60 in. Door Opening

Single-Door Enclosure		Multi-Door Enclosure		
Without Interlocking	**With Interlocking**	**Without Interlocking**	**With Interlocking**	
1—M6 door closing mechanism 1—Type M660 locking bar kit	1—M6 door closing mechanism 1—Type M660 locking bar kit 1—Type M5 (use with 9422A handles)	For *each* door: 1—M6 door closing mechanism 1—Type M660 locking bar kit	For *Master* door: 1—M6 door closing mechanism 1—Type M660 locking bar kit 1—Type M5 (for use with 9422A handles)	For each *Auxiliary* door: 1—M6 door closing mechanism 1—Type M660 locking bar kit Necessary quantities of Types M2 and M7 for each door (see below)



NOTE: A - Interlocking lever extension of the flange-mounted handle mechanism.

NOTE: B - Actual enclosure opening—not door height.

NOTE: C - Screwdriver interlock assembly can be ordered separately. Class 9423 Type **CEQ2493**.

NOTE: All mechanisms listed on this page are suitable for either left or right hand mounting.

Table 8.72: Door Interlocks

Type	Description
Type M6 Door Closing Mechanism	The Class 9423 Type M6 door closing mechanism is designed to close and seal 0.75 in. deep doors of single or multi-door NEMA Type 12 enclosures. The Type M6 can be used on doors hinged on either the left or right hand side. Recommended door openings are from 40–60 in. Vault type handle length is 6 in.
Type M660 Locking Bar Kits	The lock bar kit for the Type M6 door closing mechanism contains two lock bars and is available from stock. The bars can be cut to fit door openings through 60 in. One lock bar kit is required for each Type M6 ordered.
Type M5	The Class 9423 Type M5 mechanical interlock kit is designed to interlock a Class 9422 handle mechanism with the Type M6 door closing mechanism. This kit prevents the opening of the master door (or single door) with the disconnect handle in the “ON” position, making it mandatory to use a screwdriver to gain entry to the enclosure at any time, regardless of the disconnect handle position.

Table 8.73: Required Accessories for Auxiliary Doors

Type	Description
Type M2	One Type M2 kit is required for each auxiliary door. This kit is required to interlock any auxiliary door(s) with the master door.
Type M7	The first auxiliary door requires 2 Type M7 kits. Additional auxiliary doors require only 1 Type M7 kit. The 0.25 in. diameter rod used to interconnect the M7 kits is furnished by the user. If the distance between any two Type M7 kits exceeds 36 in., an additional Type M7 kit should be installed to prevent the rod from buckling.

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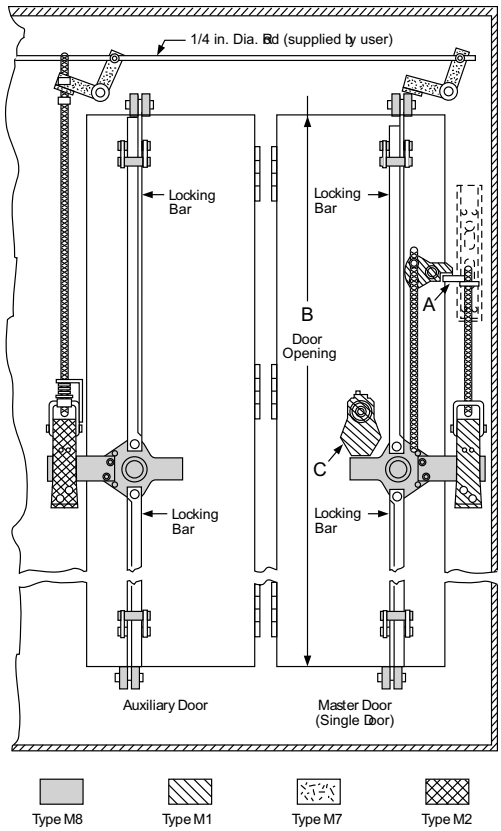
Vault Type for Single and Multi-Door Enclosures

Table 8.74 shows the requirements for the door closing mechanism, the locking bar kit, and the mechanical interlock kit, if used.

Table 8.74: Single Or Multi-Door Enclosures—NEMA Type 12 with 61 in. to 91 in. Door Openings

Single-Door Enclosure		Multi-Door Enclosure		
Without Interlocking	**With Interlocking**	**Without Interlocking**	**With Interlocking**	
1—M8 door closing mechanism 1—Type M891 locking bar kit	1—M8 door closing mechanism 1—Type M891 locking bar kit 1—Type M1 (for use with 9422A handles)	For each door: 1—M8 door closing mechanism 1—Type M891 locking bar kit	For *Master* door: 1—M8 door closing mechanism 1—Type M891 locking bar kit 1—Type M1 (for use with 9422A handles)	For each *Auxiliary* door: 1—M8 door closing mechanism 1—Type M891 locking bar kit Necessary quantities of Types M2 and M7 for each door (see below)



NOTE: A - Interlocking lever extension of the flange-mounted handle mechanism.

NOTE: B - Actual enclosure opening—not door height.

NOTE: C - Screwdriver interlock assembly can be ordered separately. Class 9423 Type **CEQ2493**.

NOTE: All mechanisms listed on this page are suitable for either left or right hand mounting.

Table 8.75: Door Interlocks

Type	Description
Type M8 Door Closing Mechanism	The Class 9423 Type M8 door closing mechanism is designed to close and seal 1.125 in. deep doors of single or multi-door NEMA Type 12 enclosures. The Type M8 can be used on doors hinged on either the left or right hand side. Recommended door openings are from 61–91 in. Vault type handle length is 8 in.
Type M891 Locking Bar Kits	The lock bar kit for the Type M8 door closing mechanism contains two lock bars and is available from stock. The bars can be cut to fit door openings through 91 in.. One lock bar kit is required for each Type M8 ordered.
Type M1	The Class 9423 Type M1 mechanical interlock kit is designed to interlock a Class 9422 handle mechanism with the Type M8 door closing mechanism. This kit prevents the opening of the master door (or single door) with the disconnect handle in the “ON” position, making it mandatory to use a screwdriver to gain entry to the enclosure at any time, regardless of the disconnect handle position.

Table 8.76: Required Accessories for Auxiliary Doors

Type	Description
Type M2	One Type M2 kit is required for each auxiliary door. This kit is required to interlock any auxiliary door(s) with the master door.
Type M7	The first auxiliary door requires 2 Type M7 kits. Additional auxiliary doors require only 1 Type M7 kit. The 0.25 in. diameter rod used to interconnect the M7 kits is furnished by the user. If the distance between any two Type M7 kits exceeds 36 in., an additional Type M7 kit should be installed to prevent the rod from buckling.

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Enclosure Construction and General Location Information For Types M5 and M6

Drilling and location information below is complete for a single door enclosure with door hinged on left side, incorporating a Type M6, M5, and Class 9422 handle mechanism. Transpose all horizontal dimensions for doors hinged on right side.

Dimension A

NOTE: Single door enclosures: A minimum = 1 in.

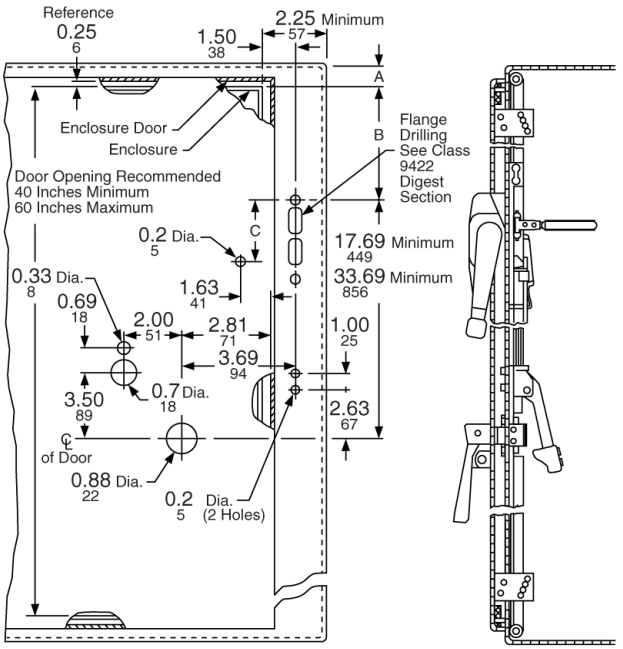
NOTE: Multi-door enclosures without overhead interlocking system: A minimum = 1 in.

NOTE: Multi-door enclosures with overhead interlocking system: A minimum = 4–1/2 in.

NOTE: Overhead interlocking system consists of the required number of Class 9423 Type M2 and M7 kits for interlocking the auxiliary doors with the master door. See Vault Type for Single and Multi-Door Enclosures, page 8-30.

Table 8.77: Dimension B (Minimums)

Type	Disconnect Device	If A = 1 Minimum B =	If A = 4–1/2 Minimum B =	C
TCF, TCN, TDF, TDN, TD	60 A Disconnect Switch	3-/16	2-1/2	3-3/16
TE, TEF, TEN	100 A Disconnect Switch	5-1/4	2-1/2	3-3/16
TF	200 A Disconnect Switch	11-5/8	8-1/8	3-3/16
TG	400 A Disconnect Switch	15-1/16	11-9/16	6-3/4
RN1	FAL, FHL, Circuit Breaker	4-27/32	2-1/2	3-3/16
RP1	KAL, KHL Circuit Breaker	11-5/32	7-21/32	3-3/16
RR2	ILL Circuit Breaker	17-31/32	14-15/32	3-3/16
RT1	MAL, MHL, MEL, MXL Circuit Breaker	18-5/8	15-1/8	3-3/16



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Enclosure Construction and General Location Information For Types M1 and M8

Drilling and location information below is complete for a single door enclosure with the door hinged on the left side, incorporating a Type M8, M1, and Class 9422 handle mechanism. Transpose all horizontal dimensions for doors hinged on the right side.

Dimension A

NOTE: Single door enclosures: A minimum = 1-1/2 in.

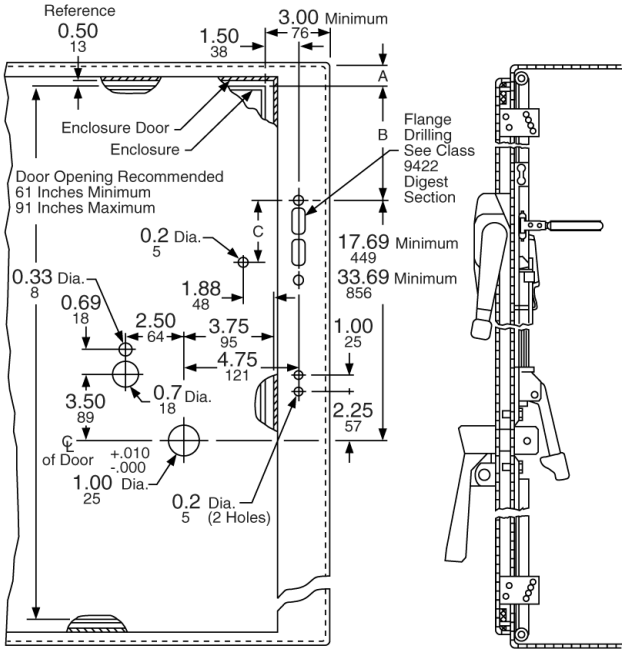
NOTE: Multi-Door enclosures without overhead interlocking system: A minimum = 1-1/2 in.

NOTE: Multi-Door enclosures with overhead interlocking system: A minimum = 4-1/2 in.

NOTE: Overhead interlocking system consists of the required number of Class 9423 Type M2 and M7 kits for interlocking the auxiliary doors with the master door. See Vault Type for Single and Multi-Door Enclosures, page 8-30.

Table 8.78: Dimension B (Minimums)

Type	Disconnect Device	If A = 1–½ Minimum B =	If A = 4–½ Minimum B =	C
TCF, TCN, TDF, TDN, TD	60 A Disconnect Switch	2-15/16	2-1/2	3-3/16
TE, TEF, TEN	100 A Disconnect Switch	4-3/4	2-1/2	3-3/16
TF	200 A Disconnect Switch	11-1/8	8-1/8	3-3/16
TG	400 A Disconnect Switch	14-9/16	11-9/16	5-7/8
RN1	FAL, FHL Circuit Breaker	4-11/32	2-1/2	3-3/16
RP1	KAL, KHL Circuit Breaker	10-21/32	7-21/32	3-3/16
RR2	ILL Circuit Breaker	17-15/32	14-15/32	3-3/16
RT1	MAL, MHL, MEL, MXL Circuit Breaker	18-1/8	15-1/8	3-3/16



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NQ Panelboards

This page contains UL Tested and Certified series combination ratings for panelboards. These ratings apply to either an integral main located in the same enclosure or a remote main located in a separate enclosure.

Table 9.1: NQ Series Connected Circuit Breaker Ratings (RMS Symmetrical)

Maximum System Voltage AC *[1][2]*	Maximum Short Circuit Current Rating	Square D™ Brand Integral or Remote Main Circuit Breakers and Remote Main Fuses	Square D™ Brand Branch Circuit Breaker Catalog Designation and Allowable Ampere Ranges *[3][4][5][6]*			
			Type	1 Pole	2 Pole	3 Pole
120/240 1P/3W *[7]*	22,000	MG	QO (B)	15–30 A	—	—
	25,000	LD, HD, JD	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	15–70 A	15–125 A	—
			QO (B) PL	15–30 A	15–60 A	—
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) EPD	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	15–20 A	—
			QO (B) DF	15–20 A	—	—
	65,000	HG, JG	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	15–70 A	15–125 A	—
			QO (B) PL	15–30 A	15–60 A	—
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) EPD	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	15–20 A	—
			QO (B) DF	15–20 A	—	—
		LG	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	15–70 A	15–125 A	—
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) EPD	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	15–20 A	—
			QO (B) DF	15–20 A	—	—
		LJ	QO (B) GFI	15–30 A	40–60 A	—
			QO (B) EPD	15–30 A	40–60 A	—
	100,000	HJ, JJ	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	15–70 A	15–125 A	—
			QO (B) PL	15–30 A	15–60 A	—
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) EPD	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	15–20 A	—
			QO (B) DF	15–20 A	—	—
		LJ	QO (B)	15–70 A	15–125 A	—
			QO(B) VH	15–70 A	15–125 A	—
			QO (B) H	—	15–100 A	—
			QO (B) GFI	—	15–30 A	—
			QO (B) EPD	—	15–60 A	—
			QO(B) AFI	15–20 A	—	—
			QO(B) CAFI	15–20 A	15–20 A	—
			QO (B) DF	15–20 A	—	—
		DJ 400 A	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	—	150 A	—
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) EPD	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
			QO(B) CAFI	15–20 A	15–20 A	—
			QO (B) DF	15–20 A	—	—
		QJ	QO (B)	15–70 A	15–125 A	—
			QO (B) AS	15–30 A	15–30 A	—
			QO (B) VH	—	150 A	—
			QO (B) PL	15–30 A	15–60 A	—
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
			QO(B) CAFI	15–20 A	15–20 A	—
			QO (B) DF	15–20 A	—	—
	125,000	HL, JL	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	15–70 A	15–125 A	—
			QO (B) PL	15–30 A	15–60 A	—
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) EPD	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—

[1] For shown circuit breakers rated less than this maximum voltage, the indicated short circuit current rating also applies, but at the voltage rating of the circuit breaker
[2] Short circuit tests are conducted at 100–105% of the maximum rated voltage of the panelboard.
[3] Suffixes HID, and SWD may also be applied to the applicable branch circuit breakers shown above. Suffix SWN may not be applied in combination with LC main breakers.
[4] Where QO (B) circuit breakers are shown above, QO (B) H, QO (B) VH, and QOH (B) circuit breakers may also be used.
[5] Where QO (B) GFI circuit breakers are shown above, QO (B) EPD and/or QO (B) EPE circuit breakers may also be used. QO–EPE only comes in 3 pole construction.
[6] Where QO (B) AFI circuit breakers are shown above, QO (B) CAFI circuit breakers may also be used.
[7] Two Pole CAFI breakers are only 120/240 VAC and may only be used on 120/240 VAC single phase 3 wire systems.

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Table 9.1 NQ Series Connected Circuit Breaker Ratings (RMS Symmetrical) (cont'd.)

Maximum System Voltage AC *[1][2]*	Maximum Short Circuit Current Rating	Square D™ Brand Integral or Remote Main Circuit Breakers and Remote Main Fuses	Square D™ Brand Branch Circuit Breaker Catalog Designation and Allowable Ampere Ranges *[3][4][5][6]*			
			Type	1 Pole	2 Pole	3 Pole
			QO(B) CAFI	15–20 A	15–20 A	—
			QO (B) DF	15–20 A	—	—
208Y/120 3P/4W 240/120 V 3P/4W	18,000	LA/LH (L) 34200MC	QO (B)	15–30 A	15–30 A	15–30 A
		LA/LH (L) 34225MC				
		LA/LH (L) 34250MC				
		LA/LH (L) 34400MC				
	25,000	LD	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	15–30 A	15–125 A	15–150 A
			QO (B) GFI	15–30 A	15–60 A	15–30 A
			QO (B) EPD	15–30 A	15–60 A	15–30 A
			QO (B) EPE	—	—	15–30 A
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	—	—
			QO (B) DF	15–20 A	—	—
	30,000	DJ–W 150 A MC	QO (B)	15–70 A	15–100 A	—
			QO (B) VH	—	15–125 A	15–150 A
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
		DJ–W 250 A MC	QO (B)	15–70 A	15–100 A	—
			QO (B) VH	—	—	15–150 A
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
		DJ–W 600 A MC	QO (B)	15–70 A	15–100 A	—
			QO (B) VH	—	—	15–150 A
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
208Y/120 3P/4W 240/120 V 3P/4W	65,000	LG	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	15–70 A	15–125 A	15–150 A
			QO (B) H	—	15–100 A	—
			QO (B) GFI	15–30 A	15–60 A	15–30 A
			QO (B) EPD	15–30 A	15–60 A	15–30 A
			QO (B) EPE	—	—	15–30 A
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	—	—
			QO (B) DF	15–20 A	—	—
		LJ	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	15–70 A	15–125 A	15–150 A
			QO (B) H	—	15–100 A	—
			QO (B) GFI	15–30 A	15–60 A	15–30 A
			QO (B) EPD	15–30 A	15–60 A	15–30 A
			QO (B) EPE	—	—	15–30 A
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	—	—
			QO (B) DF	15–20 A	—	—
		LL	QO (B) GFI	—	—	15–30 A
			QO (B) EPD	—	—	15–30 A
			QO (B) EPE	—	—	15–30 A
	100,000	DJ 400 A	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	—	—	15–150 A
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) EPD	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	—	—
			QO (B) DF	15–20 A	—	—
		QJ	QO (B)	15–70 A	15–125 A	15–30 A
			QO (B) VH	—	—	15–150 A
			QO (B) PL	15–30 A	15–60 A	15–30 A
			QO (B) GFI	15–30 A	15–60 A	15–50 A
			QO (B) EPD	15–30 A	15–60 A	15–50 A
			QO (B) EPE	15–30 A	15–60 A	15–50 A
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	—	—
			QO (B) DF	15–20 A	—	—
		LJ	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	15–70 A	15–125 A	15–150 A
			QO (B) H	—	15–100 A	—
			QO (B) GFI	—	15–30 A	—
			QO (B) EPD	—	15–60 A	—
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	—	—

[1] For shown circuit breakers rated less than this maximum voltage, the indicated short circuit current rating also applies, but at the voltage rating of the circuit breaker
[2] Short circuit tests are conducted at 100–105% of the maximum rated voltage of the panelboard.
[3] Suffixes HID, and SWD may also be applied to the applicable branch circuit breakers shown above. Suffix SWN may not be applied in combination with LC main breakers.
[4] Where QO (B) circuit breakers are shown above, QO (B) H, QO (B) VH, and QOH (B) circuit breakers may also be used.
[5] Where QO (B) GFI circuit breakers are shown above, QO (B) EPD and/or QO (B) EPE circuit breakers may also be used. QO–EPE only comes in 3 pole construction.
[6] Where QO (B) AFI circuit breakers are shown above, QO (B) CAFI circuit breakers may also be used.

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Table 9.1 NQ Series Connected Circuit Breaker Ratings (RMS Symmetrical) (cont'd.)

Maximum System Voltage AC *[1][2]*	Maximum Short Circuit Current Rating	Square D™ Brand Integral or Remote Main Circuit Breakers and Remote Main Fuses	Square D™ Brand Branch Circuit Breaker Catalog Designation and Allowable Ampere Ranges *[3][4][5][6]*			
			Type	1 Pole	2 Pole	3 Pole
			QO (B) DF	15–20 A	—	—
240/120 V 3P/4W	22,000	QO (B) VH	QO (B)	15–70 A	15–125 A	15–100 A
			QO (B) GFI	15–30 A	15–60 A	15–50 A
			QO (B) EPD	15–30 A	15–60 A	15–50 A
			QO (B) EPE	—	—	15–50 A
			QO (B) PL	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	—	—
			QO (B) DF	15–20 A	—	—
240/120 V 3P/4W	25,000	QD	QO (B)	15–70 A	15–125 A	15–30 A
			QO (B) VH	—	—	35–150 A
			QO (B) PL	15–30 A	15–60 A	15–30 A
			QO (B) GFI	15–30 A	15–60 A	15–50 A
			QO (B) EPD	15–30 A	15–60 A	15–50 A
			QO (B) EPE	—	—	15–50 A
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	—	—
			QO (B) DF	15–20 A	—	—
		ED, FD	QO (B)	15–70 A	15–125 A	15–100 A
			QO (B) GFI	15–30 A	15–60 A	15–50 A
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	—	—
			QO (B) DF	15–20 A	—	—
		KD	QO (B)	15–70 A	15–125 A	15–100 A
			QO (B) AS	15–30 A	15–30 A	15–30 A
			QO (B) GFI	15–30 A	15–60 A	—
			QO (B) AFI	15–20 A	—	—
		HD, JD	QO (B)	15–70 A	15–125 A	15–100 A
			QO (B) VH	—	—	35–150 A
			QO (B) H	—	15–100 A	—
			QO (B) GFI	15–30 A	15–60 A	15–50 A
			QO (B) EPD	15–30 A	15–60 A	15–50 A
			QO (B) EPE	—	—	15–50 A
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	—	—
			QO (B) DF	15–20 A	—	—
		LD	QO (B)	15–70 A	15–125 A	—
			QO (B) VH	15–30 A	15–125 A	15–150 A
			QO (B) H	—	15–100 A	—
			QO (B) GFI	15–30 A	15–60 A	15–30 A
			QO (B) EPD	15–30 A	15–60 A	15–30 A
			QO (B) EPE	—	—	15–30 A
			QO (B) AFI	15–20 A	—	—
			QO (B) CAFI	15–20 A	—	—
			QO (B) DF	15–20 A	—	—

[1] For shown circuit breakers rated less than this maximum voltage, the indicated short circuit current rating also applies, but at the voltage rating of the circuit breaker
[2] Short circuit tests are conducted at 100–105% of the maximum rated voltage of the panelboard.
[3] Suffixes HID, and SWD may also be applied to the applicable branch circuit breakers shown above. Suffix SWN may not be applied in combination with LC main breakers.
[4] Where QO (B) circuit breakers are shown above, QO (B) H, QO (B) VH, and QOH (B) circuit breakers may also be used.
[5] Where QO (B) GFI circuit breakers are shown above, QO (B) EPD and/or QO (B) EPE circuit breakers may also be used. QO–EPE only comes in 3 pole construction.
[6] Where QO (B) AFI circuit breakers are shown above, QO (B) CAFI circuit breakers may also be used.

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NF and I-Line™ Panelboards

This page contains UL Tested and Certified series combination ratings for panelboards. These ratings apply to either an integral main located in the same enclosure or a remote main located in a separate enclosure.

Table 9.2: NF Series Connected Circuit Breaker Ratings (RMS Symmetrical)

Maximum System Voltage, AC *[8]*	Max. Short Circuit Current Rating	Square D™ Brand Integral or Remote Main Circuit Breakers and Remote Main Fuses	Square D™ Brand Branch Circuit Breaker Catalog Designation and Allowable Ampere Ranges
120 120/240 240	65,000	EG, FH, FG, KH, LH, MH, MX, HG, JG, DG	EDB, EDB-EPD
		LG	EDB
		EG	ECB-G3
	100,000	EJ, FC, FJ, KC, LC, HJ, JJ	EDB, EDB-EPD, EGB
		DJ, LJ	EDB, EGB
		EJ, FC, KC, HJ, JJ	ECB-G3
	125,000	HL, JL	EDB, EDB-EPD, EGB, ECB-G3
	200,000	FI, KI, LI, LXI, HR, JR, LR	EDB, EDB-EPD, EGB, EJB
		FI, KI, HR, JR	ECB-G3
		Class J or T (600 V) 200 A Max Fuses	ECB-G3
277 480Y/277	35,000	EG, FG, KH, LH, HG, JG, DG, LG	EDB, EDB-EPD
		EG, HG, JG	ECB-G3
	65,000	EJ, FC, FJ, KC, LC, LX, HJ, JJ, DJ	EDB, EDB-EPD, EGB
		EJ, FC, KC, HJ, JJ	ECB-G3
		LJ	EDB, EDB-EPD, EGB, EGB-EPD
		LL	EDB-EPD, EGB-EPD
	100,000	HL, JL	EDB, EDB-EPD, EGB, EJB
		DL, LL	EDB, EGB, EJB
		400 A Max Fuses	EDB, EDB-EPD, EGB, EJB
	200,000	FI, KI, LI, LXI, HR, JR, LR	EDB, EDB-EPD, EGB, EJB
		FI, KI, HR, JR	ECB-G3
		200 A Max Fuses	EDB, EDB-EPD, EGB, EJB, ECB-G3
600Y/347	18,000	HG, JG, MG,	EDB
		LG	EDB (15–110 A)
	25,000	EJ, FI, KH, KI, LC, LE, LX, LI, LXI, HJ, JJ	EDB, EGB
		LJ	EDB (15–110 A), EGB (15–110 A)
		LH	(15–70 A) EDB, EGB
	35,000	LC, LE, LX	EDB, EGB, EJB
	50,000	HL, JL,	EDB, EGB, EJB
		LL	EDB (15–110 A), EGB (15–110 A),EJB (15–110 A)
	65,000	FI, KI, HR, JR	EDB, EGB, EJB
		LI, LXI, LR	EJB
	200,000	Class J or T (600 V) 200 A Max Fuses	EDB, EGB, EJB

Table 9.3: I-Line Series Connected Circuit Breaker Ratings (RMS Symmetrical)

Maximum System Voltage AC *[8]*	Max. Short Circuit Current Rating (RMS Symm.)	Integral or Remote 2- or 3- pole Main Circuit Breaker	Square D TM Brand Branch Circuit Breakers	
			Designation	Poles
120	42k	MG	FY	1
	65k	QG, LH	FA, FD*[9]*	
	100k	FJ*[9]*, QJ	FD*[9]*	
		QJ, LC	FA	
		LJ	FH	
	200K	LR	FH, FY	
208Y/120	100K	QJ	FA, FD*[9]*	2,3
		QJ, PH, PJ, RJ	QD, QG	
240	35K	MG	FA	1
	42K	KA	FD*[9]*	1, 2, 3
		LA, MA	HD, JD, QD	2, 3
	50K	MG	FA	
		MG	FA (25 A. MAX.)	1
	65K	HG, JG	FA, HD	2, 3
		JG	JD, QD	
		QG	FA, FD*[9]*, QD	
		LH, MH, PA, PG, RG	HD, JD, QD	
		FG*[9]*, FH, MH, MX, PJ	FD*[9]*	1, 2, 3
		FC, KC, KH, LC, LH	FD*[9]*, FG*[9]*	
		LH	FA	
		LH	LA	2,3
		MG	HD, JD, KA	
		LG	HD, JD, KA, LA, LD, MA	
		DG	FH, HD, JD, KA, LA, MA	
	85K	RL	FH, KH	
	100K	FC, KC, LC, LX	FD*[9]*, FG*[9]*, FJ*[9]*	1
		PH, PJ, RJ	QD, QG	2,3
		QJ	FD*[9]*	2
		FJ*[9]*	FD*[9]*	2,3
		FC, KC	FA, FH, FD*[9]*, FG*[9]*, FJ*[9]*	
		LC, LX	FH, FD*[9]*, FG*[9]*, FJ*[9]*	
		KC, LC, LX	KA	

[8] Short circuit tests are conducted at 100–105% of the maximum rated voltage of the panelboard.
[9] Obsolete. Contact your local Schneider Electric representative or distributor for the replacement circuit breaker.

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Table 9.3 I-Line Series Connected Circuit Breaker Ratings (RMS Symmetrical) (cont'd.)

Maximum System Voltage AC *[9]*	Max. Short Circuit Current Rating (RMS Symm.)	Integral or Remote 2- or 3- pole Main Circuit Breaker	Square D TM Brand Branch Circuit Breakers	
			Designation	Poles
		KC, LC	KH	
		LC	LA, LH, MG	
		LC	FA	1, 2, 3
		HJ, JJ	FA, FH, HD, HG	
		JJ	JD, JG	
		LC, LX, MJ, PJ, RJ	HD, HG, JD, JG	
		MJ	LA, LH	
		LJ	FH, HD, HG, JD, JG, KA, LA, LD, LG, MA, MG	
		DJ	FH, HD, HG, JD, JG, KA, LA, MA, MG	
		RL	RG	2, 3
		HL, JL	HD, HG, HJ, FA, FH	
	125K	JL	JD, JG, JJ	
		PC, PH, PL, RL	HD, HG, JD, JG	
		PC, PL, RL	HJ, JJ	
		FI, KI, LI, LXI	HD, HG, HJ	
		KI, LI, LXI	JD, JG, JJ	
	200K	FI, KI, LI, LXI	FD*[10]*, FG*[10]*, FJ*[10]*	1
		FI, KI	FA, FH, FC, FD*[10]*, FG*[10]*, FJ*[10]*	
		LI, LXI	FH, FD*[10]*, FG*[10]*, FJ*[10]*	
		LI	FC	2, 3
		KI, LI, LXI	KA, QD, QG, QJ	
		LI	KC	
		LR	FH, HJ, HL, JJ, JL, LA, LH, QD, QG, QJ	
277	18K	LD	FY	1
	25K	FH, KA	FD*[10]*	
	35K	FG*[10]*, KH, LH	FD*[10]*	
		DG	FH, FY	
		LG	FH, FY	
	65K	FJ*[10]*	FD*[10]*	
		FC, KC	FA, FH, FY, FD*[10]*, FG*[10]*	
		LC, LX, (400A MAX.)	FH	
		LC, LX, (600A MAX.)	FY, FD*[10]*, FG*[10]*	
		LJ	FH, FY	
		DJ	FH, FY	
		LL	FY	
	100K	DL	FH, FJ*[10]*	
		LL	FH, FJ*[10]*	
	200K	FI, KI	FA, FH, FY, FD*[10]*, FG*[10]*, FJ*[10]*	
		HR	FA, FJ*[10]*, FY	
		JR	FA, FJ*[10]*, FY	
		LI, LXI, (400A MAX.)	FH	
		LI, LXI, (600A MAX.)	FY, FD*[10]*, FG*[10]*, FJ*[10]*	
		LR	FH, FY	
480	22K	MG	FA	2,3
	30K	KH, LA, MA, MX, PA, PC, PX, PJ	FH	
		LA, MA, PA, PC, PX	KA	
		LA, MA, PA	HD, JD	
		MG	FA (25 A. MAX.), FH, KA	
	35K	MH, MX, PA	HD, JD	
		HG, JG	FA, HD	
		JG	JD	
		LH, MG, PG, RG	HD, JD	
		LG	FH, HD, JD, KA, LA, LD, MA	
		DG	FH, HD, JD, KA, LA, MA	
	42K	MJ	FH (25A MAX.)	
		RL	RG	
	50K	MJ	KA, KH	
	65K	FC, KC	FA, FH	
		HJ, JJ	FA, FH, HD, HG	
		JJ	JD, JG	
		LC, LI, LX, LXI	HD, HG, JD, JG	
		LC, LX, (400A MAX.)	FH	
		KC, LC, LX	KA	
		LC, LX	LA	
		LJ	FH, HD, HG, JD, JG, KA, LA, LD, LG, MA	
		DJ	FH, HD, HG, JD, JG, KA, LA, MA	
	100K	HL, JL	FA, FH, HD, HG, HJ	
		JL	JD, JG, JJ	
		JR	FA	
		LI, LXI (600A MAX.)	KA	
		LL	FH, HD, HG, HJ, JD, JG, JJ, KA, LA, LD, LG, LJ, MA	
		DL	FH, HD, HG, HJ, JD, JG, JJ, KA, LA, MA	
		PC, PH, PL, RL	HJ, JJ	
		RL	RG	
	200K	FI, KI	FA, FH, FC, HD, HG, HJ	
		HR	FA, HD, HG, HJ, HL	
		JR	HD, HG, HJ, HL, JD, JG, JJ, JL	
		KI	JD, JG, JJ, KA	

[9] Short circuit tests are conducted at 100–105% of the maximum rated voltage of the panelboard.
[10] Obsolete. Contact your local Schneider Electric representative or distributor for the replacement circuit breaker.

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Table 9.3 I-Line Series Connected Circuit Breaker Ratings (RMS Symmetrical) (cont'd.)

Maximum System Voltage AC *[9]*	Max. Short Circuit Current Rating (RMS Symm.)	Integral or Remote 2- or 3- pole Main Circuit Breaker	Square D TM Brand Branch Circuit Breakers	
			Designation	Poles
		LI	FC, KA, KC, LA, HJ, HL, JJ, JL	
		LR	FH, HJ, HL, JJ, JL, LA, LH	
		LXI	KA, HJ, HL, JJ, JL	
	25K	FH, KA	FD*[11]*	
	35K	FG*[11]*, KH, LH	FD*[11]*	
	65K	FJ*[11]*	FD*[11]*	
480Y/277		FC, KC	FD*[11]*, FG*[11]*	
		LC, LX (600A MAX.)	FD*[11]*, FG*[11]*	
	200K	FI, KI	FD*[11]*, FG*[11]*, FJ*[11]*	
		LI, LXI (600A MAX.)	FD*[11]*, FG*[11]*, FJ*[11]*	
	18K	HG, JG	FA, HD	
		JG	JD	
		LG	HD, JD, LD	
		MG, PG, RG	HD, JD	
		MG	FA	
	25K	HJ, JJ	FA, HD, HG	
		JJ	JD	
		LJ	HD, HG, JD, JG, LD, LG, MA	
		PJ, RJ	MG	
	35K	LC	FH, HD, HG, HJ, JD, JG, JJ, LA	
600	50K	HL, JL	FA, HD, HG, HJ	
		JL	JD, JG, JJ	
		LL	HD, HG, HJ, JD, JG, JJ, LD, LG, LJ, MA	
		PK	HJ, JJ, MJ	
	65K	LR	HJ, JJ	
	100K	FI, KI	HD, HG, HJ	
		HR	FA, HD, HG, HJ, HL	
		JR	FA, HD, HG, HJ, HL, JD, JG, JJ, JL	
		KI	JD, JG, JJ	
		KI, LI	FH	
		LI	LA	
		LR	HL, JL	
	18K	MG	FA (25A MAX.)	
600Y/347	25K	MJ	FA (25A MAX.)	1
	50K	HL, JL	FJ*[11]*	

Note: LD, LG, LJ, and LL breakers are only available in 3 pole configurations.

[9] Short circuit tests are conducted at 100–105% of the maximum rated voltage of the panelboard.
[11] Obsolete. Contact your local Schneider Electric representative or distributor for the replacement circuit breaker.

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I-Line Panelboards

Table 9.4: Fuse/I-Line Circuit Breaker Series Connected Ratings

Maximum System Voltage AC	Max. Short Circuit Current Rating (RMS Symm.)	Remote Main Fuse		Square D™ Brand Branch Circuit Breakers
		Maximum Amperage	Fuse Class	Designation *[12]*
120/240 1Ø 208Y/120	100,000	1200 A	L, T (300 V)	QD, QG
		800 A	T (600 V)	QD, QG
		600 A	J, RK5	QD, QG
240	65,000	1200 A	L, T (300 V)	QD
		800 A	T (600 V)	QD
		600 A	J, RK5	QD
240	100,000	1200 A	L, T (300 V)	QD, QG (2-pole)
		800 A	T (600 V)	QD, QG (2-pole)
		600 A	J, RK5	QD, QG (2-pole)
			L, T (600 V)	FA, FH, KA, KH, KC, LA, LH, MA, MH, MX, PG
			RK5	FH, KA, KH, LA, LH, MA, MH, MX, PG, HD, HG, HJ, HL, JD, JG, JJ, JL
			J	HD, HG, HJ, HL, JD, JG, JJ, JL
		800 A	T (600 V)	FH, KA, KH, LA, LH, MA, MH, MX, PG
			T (300 V)	PG
			L	FH,KA,KH,LA,LH,MA,MH,MX,PG
		1200 A	L	FH, KH, LA, LH, MA, MH, MX, PG
			T (600 V)	HD, HG, HJ, HL, JD, JG, JJ, JL
		1600/2000 A	L	KH, MA, MH, MX, PG
		4000 A	L	HD, HG, HJ, HL, JD, JG, JJ, JL
240	200,000	600 A	J, T (600 V)	FA(3-pole only), FH, FC, KA, KH, KC, LA, LH, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL
			RK5	FH, FC, HD, HG, HJ, HL, JD, JG, JJ, JL KH, KC, LA, LH, LC, MA, MH, MX, NC, NX, PG, PJ, PL
			J	HD, HG, HJ, HL, JD, JG, JJ, JL
		800 A	T (600 V)	FH, FC, KA, KH, KC, LA, LH, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL
			T (300 V)	PG, PJ, PL
			L	FH,FC, KH, KC, LA, LH, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL
		1200 A	L	FC, KH, KC, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL
			T (600 V)	HD, HG, HJ, HL, JD, JG, JJ, JL
		1600/2000 A	L	NA, NC, NX, PJ, PL
		4000 A	L	HD, HG, HJ, HL, JD, JG, JJ, JL
480	100,000	400 A	J, T (600 V)	HD, HG, HJ, HL, JD, JG, JJ, JL
		600 A	J, RK5	HJ, HL, JJ, JL
			J, T (600 V)	FC, KA, KH, KC, LA, LH, LC, MA, MH, MX, NA, PG, PJ
			RK5	FC, KA, KH, KC, LA, LH, LC, MA, MH, MX, NA, PG, PJ
		800 A	L, T (600 V)	FC, KA, KH, KC, LA, LH, LC, MA, MH, MX, NA, PG, PJ
		1200 A	L	FC, KH, KC, LA, LH, LC, MA, MH, MX, NA, PG, PJ
			T (600 V)	HJ, HL, JJ, JL
		1600 A	L	KC, LC, MA, MH, MX, NA, PG, PJ
		2000 A	L	KC, LC, MH,MG, MJ, MX, NA, PG, PJ
		4000 A	L	HJ, HL, JJ, JL
480	200,000	200 A	RK5	HJ, HL
		400 A	J	FA, FH, FC, HJ, HL, JJ, JL, KA, KH, KC, LA, LH, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL
			T(600V)	FA, FH, FC, HJ, HL, JJ, JL, KA, KH, KC, LA, LH, MA, MH, MX, NA, NC, NX
		600 A	J	FC, KA, KH, KC, LA, LH, LC, MA, MH, MX, MG, MJ, NA, NC, NX, PG, PJ, PL
			T (600V)	KA, KH, KC, LA, LH, MA, MH, MX, NA, NC, NX
			RK5	KC, LA, LH, LC, MA, MH, MX, MG, MJ, NC, NX, PG, PJ,
		800 A	T (300 V)	PG, PJ, PL
			T (600 V)	KA, KH, KC, LA, LH, MA, MH, MX, MG, MJ, NA, NC, NX, PG, PJ, PL
			L	KC, LA, LH, LC, MA, MH, MX, NA, NC, NX, PG, PJ, PL
		1200 A	L	KC, LC, MA, MH, MX, MG, MJ, NA, NC, NX, PG, PJ, PL
		1600/2000 A	L	NA, NC, NX
600	100,000	30 A	CC	HG, JG (molded case switches)
		200 A	J	HD, HG, HJ, HL, JD, JG, JJ, JL
		400 A	J, T (600 V)	HJ, HL, JJ, JL
		600 A	R	MG, MJ
		1200 A	L	MG, MJ
600	200,000	600 A	J	MG, MJ
		800 A	T (600 V)	MG, MJ

- The fuse used in this UL test is an envelope (umbrella) fuse. This fuse is designed as a “worst case” fuse. Thus, no matter what manufacturer’s fuse is used, the Square D™ brand circuit breaker is protected.
- The line side fused switch may be in a separate enclosure or in the same enclosure as the loadside circuit breaker. A line side fused switch may be a submain, integral main, or remote main. A load side circuit breaker may be a branch, submain, or an integral main used on the load side of a remote main. This series combination short circuit current rating shall not exceed that of the line side fused switch. The charts apply to Square D™ brand load side circuit breakers only. However, the line side fuse ratings are independent of the fuse manufacturer.
- Not applicable to Corner Grounded Systems.
- Limiters used in Square D™ brand DSL and DSL II fused power circuit breakers are not class L fuses and do not have series ratings.

[12] Series rating valid for 2-pole or 3-pole circuit breakers.

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NQ and NF Panelboard Merchandised Selection Procedure

1. Review maximum electrical system voltage, ampacity, and available fault current, and determine the type of panelboard is desired (see tables Table 9.1–Table 9.4).
2. Identify type (plug-on or bolt-on) and total quantity of branch circuit breaker poles and panel spaces required (see Digest sections 7 and 9 for catalog numbers).
3. Select proper main lug interior (from tables Table 9.5, Table 9.7, or Table 9.40) or:
   - Select main circuit breaker interior and main circuit breaker adapter kit (from tables Table 9.6, Table 9.8, or Table 9.41), based upon the equivalent number of poles and ampere rating.
     NOTE: Interiors include solid neutral and are field convertible to top-feed.
   - If a main circuit breaker interior was selected, select a main circuit breaker (or fuse) from pages page 7-2, page 7-6, page 7-7, page 7-10, or page 7-11, or Table 9.49.
4. Select ground bars from tables Table 9.9 or Table 9.48 and any non-standard neutral bars (i.e., 200% neutral for non-linear loads) from tables Table 9.10 or Table 9.43.
5. Select any required sub-feed circuit breakers, sub-feed lugs (SFL), or feed-through lugs (FTL) kits:
   - Sub-feed lugs (SFL) or feed-through lugs (FTL) kits: tables Table 9.11 or Table 9.44 in the NQ or NF Accessories sections.
   - Any subfeed circuit breakers: Table 7.1 or tables Table 9.16–Table 9.20 or tables Table 9.49–Table 9.61.
6. Determine the total mounting inches required by adding requirements from interior, main circuit breaker, neutrals and ground bars, SFL, FTL, or sub-feed circuit breaker.
7. Select enclosure from the tables Table 9.5–Table 9.14, Table 9.22, Table 9.24, Table 9.26, Table 9.42, Table 9.45, and Table 9.46.
   Type 1—select box and front (cover) catalog number corresponding to interior catalog number.
   Type 3R, 5, 12—select enclosure. Cover for Type 3R, 5, 12 is included with the enclosure.
8. Select the branch circuit breakers to be installed in the panel.
   For NQ panelboards use QO circuit breakers from tables Table 7.1, page 7-13–page 7-14, or QOB circuit breakers from tables Table 9.16–Table 9.20.
   For NF panelboards, use E-frame circuit breakers from Table 9.49.
9. Select options and accessories from tables Table 9.7–Table 9.15 or Table 9.43–Table 9.48.
   NOTE: Additional NF and NQ options may be found in the Supplemental and Obsolescence Digest, Section 4.

NQ Merchandised Selection Example

208Y/120 Vac, 3Ø4W, 10 kA SCCR, 225 A, MLO, Type-1, surface-mount, bolt-on, branch circuit breakers, main sub-feed lugs

Branches	Table No.	Catalog Number	Spaces
(20) 20/1	Table 9.17	(20) QOB120	20
two 40/2	Table 9.17	two QOB240	4
two 30/3	Table 9.17	two QOB330	6
			Total 30 spaces

			Min. Box Height
225 A MLO Interior	Table 9.5	NQ430L2	32 inches
Enclosure (Box)	Table 9.5	MH38	—
Front (Cover)	Table 9.5	NC382S	—
Sub-feed Lugs	Table 9.11 and Table 9.12	NQSFL2	6 inches
			Total 38 inches

NF Merchandised Selection Example

480Y/277 Vac, 3Ø4W, 25 kA SCCR, fully rated, copper bus, 100 A, main circuit breaker, Type 1, flush-mount, bolt-on, branch circuit breakers

Branches	Table No.	Catalog Number	Spaces
(13) 20/1	Table 9.49	EGB14020	13
one 40/2	Table 9.49	EGB24040	2
one 50/3	Table 9.49	EGB34050	3
			Total 18 spaces

			Min. Box Height
125 A MLO Cu Bus Interior	Table 9.40	NF418L1C	—
With Main Circuit Breaker Adapter Kit	Table 9.41	N150MH	38 inches
Main Circuit Breaker	Section 7 page 31	HGL36100	—
Enclosure (Box)	Table 9.41	MH38	—
Front (Cover)	Table 9.41	NC38F	—
			Total 38 inches

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NQ Merchandised Panelboards

Table 9.5: Main Lug Interiors—Accepts plug-on and bolt-on circuit breakers

Pole Spaces	Mains Rating	Interior Only (Order Branch Circuit Breakers Separately)	Type 1 Enclosure			Type 3R, 5, 12 Enclosure *[1]*	
			Box 20 in. W x 5.75 in. D *[2]*	Mono-Flat™ Front *[3]*	Hinged Front	Enclosure 20 in. W x 6.5 in. D	Height (In.)
		Catalog No. *[4]*	Catalog No.	Catalog No.	Catalog No.	Catalog No.	
20-inch-wide Cabinet —Single Phase 3-Wire							
18	100	NQ18L1	MH26	NC26 ( )	NC26( )HR	MH26WP	26
		NQ18L1C					
30		NQ30L1	MH32	NC32 ( )	NC32( )HR	MH32WP	32
		NQ30L1C					
30	225	NQ30L2	MH32	NC32 ( )	NC32( )HR	MH32WP	32
		NQ30L2C					
42		NQ42L2	MH38	NC38 ( )	NC38( )HR	MH38WP	38
		NQ42L2C					
72*[5]*		NQ72L2	MH44	NC44 ( )	NC44( )HR	MH44WP	44
		NQ72L2C					
84*[5]*		NQ84L2	MH50	NC50 ( )	NC50( )HR	MH50WP	50
		NQ84L2C					
30	400	NQ30L4	MH50	NC50V ( )	NC50V( )HR	MH50WP	50
		NQ30L4C					
42		NQ42L4					
		NQ42L4C					
54		NQ54L4	MH56	NC56V( )	NC56V( )HR	MH56WP	56
		NQ54L4C					
84*[5]*		NQ84L4C	MH68	NC68V ( )	NC68V( )HR	MH68WP	68
30	600	NQ30L6C	MH50	NC50V ( )	NC50V( )HR	MH62WP*[6]*	50/62
42		NQ42L6C					
54		NQ54L6C	MH56	NC56V( )	NC56V( )HR	MH56WP	56
84*[5]*		NQ84L6C	MH68	NC68V ( )	NC68V( )HR	MH80WP*[6]*	68/80
20-inch-wide Cabinet —Three Phase 4-Wire							
18	100	NQ418L1	MH26	NC26 ( )	NC26( )HR	MH26WP	26
		NQ418L1C					
30		NQ430L1	MH32	NC32 ( )	NC32( )HR	MH32WP	32
		NQ430L1C					
30	225	NQ430L2	MH32	NC32 ( )	NC32( )HR	MH32WP	32
		NQ430L2C					
42		NQ442L2	MH38	NC38 ( )	NC38( )HR	MH38WP	38
		NQ442L2C					
54		NQ454L2					
		NQ454L2C					
72*[5]*		NQ472L2	MH44	NC44 ( )	NC44( )HR	MH44WP	44
		NQ472L2C					
84*[5]*		NQ484L2	MH50	NC50 ( )	NC50( )HR	MH50WP	50
		NQ484L2C					
30	400	NQ430L4	MH50	NC50V ( )	NC50V( )HR	MH50WP	50
		NQ430L4C					
42		NQ442L4					
		NQ442L4C					
54		NQ454L4	MH56	NC56V( )	NC56V( )HR	MH56WP	56
		NQ454L4C					
72*[5]*		NQ472L4	MH62	NC62V ( )	NC62V( )HR	MH62WP	62
		NQ472L4C					
84*[5]*		NQ484L4C	MH68	NC68V ( )	NC68V( )HR	MH68WP	68
30	600	NQ430L6C	MH50	NC50V ( )	NC50V( )HR	MH62WP*[6]*	50/62
42		NQ442L6C					
54		NQ454L6C	MH56	NC56V( )	NC56V( )HR	MH56WP	56
84*[5]*		NQ484L6C	MH68	NC68V ( )	NC68V( )HR	MH80WP*[6]*	68/80

[1] Enclosure includes trim kit.
[2] Embossed mounting holes add a 0.25-inch standoff to back of MH box.
[3] Add “F” for flush mount, “S” for surface mount.
[4] “C” suffix indicates copper bussing.
[5] Use only if the Local Jurisdiction where this panelboard interior is being applied has adopted the 2008 NEC, which allows single panelboard interiors greater than 42 circuits.
[6] When NEMA 3R, 5, or 12 enclosures are selected, an NQ12RDE kit should also be selected. See NQ Merchandised Accessories, page 9-14.

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NQ Main Circuit Breaker Interiors—240 Vac, 48 Vdc

Table 9.6: Main Circuit Breaker Interiors—Will accept plug-on and bolt-on circuit breakers

Pole Spaces	Mains Rating	Interior Only (Order Branch Circuit Breakers Separately)	Main Circuit Breaker Adapter Kit (Less Circuit Breaker)		Type 1 Enclosure			Type 3R, 5, 12 Enclosure *[7]*	Height (In.)
					Box 20 in. W x 5.75 in. D *[8]*	Mono-Flat™ Front	Hinged Front	Enclosure 20 in. W x 6.5in. D	
		Catalog No. *[9]*	Catalog No.	Circuit Breaker Frame Size *[10]*	Catalog No.	Catalog No. *[11]*	Catalog No.	Catalog No.	
20-inch-wide Cabinet *[12]*—Single Phase 3-Wire									
16*[13]*	100 back-fed	NQ18L1	—	Select QOB 2-pole or QOB-VH*[14]*	MH26	NC26 ( )	NC26( )HR	MH26WP	26
		NQ18L1C	—						
28*[13]*		NQ30L1	—		MH32	NC32 ( )	NC32( )HR	MH32WP	32
		NQ30L1C	—						
18	100	NQ18L1	NQMB2HJ NQMB2Q	HD, HG, HJ, HL*[15]* or QB, QD, QG, QJ 100A maximum	MH38	NC38 ( )	NC38( )HR	MH38WP	38
		NQ18L1C							
30	100	NQ30L1			MH44	NC44 ( )	NC44( )HR	MH44WP	44
		NQ30L1C							
30	225	NQ30L2	NQMB2HJ NQMB2Q	HD, HG, HJ, HL*[15]* or JD, JG, JJ, JL QB,QD,QG,QJ	MH44	NC44 ( )	NC44( )HR	MH44WP	44
		NQ30L2C							
42	225	NQ42L2			MH50	NC50 ( )	NC50( )HR	MH50WP	50
		NQ42L2C							
72*[16]*	225	NQ72L2			MH56	NC56 ( )	NC56( )HR	MH56WP	56
		NQ72L2C							
84*[16]*	225	NQ84L2			MH62	NC62 ( )	NC62( )HR	MH62WP	62
		NQ84L2C							
30	400	NQ30L4	NQMB4LA	LA/LH*[17]*	MH62	NC62V ( )	NC62V( )HR	MH62WP	62
		NQ30L4C							
42	400	NQ42L4	NQMB4LA	LA/LH*[17]*	MH62	NC62V ( )	NC62V( )HR	MH62WP	62
		NQ42L4C							
54	400	NQ54L4	NQMB4LA	LA/LH*[17]*	MH68	NC68V ( )	NC68V( )HR	MH68WP	68
		NQ54L4C							
84*[16]*	400	NQ84L4C	NQMB4LA	LA/LH*[17]*	MH80	NC80V ( )	NC80V( )HR	MH80WP	80
20-inch-wide Cabinet *[12]*—Three Phase 4-Wire									
15*[13]*	100 back-fed	NQ418L1	—	Select QOB 3-pole or QOB-VH*[14]*	MH26	NC26 ( )	NC26( )HR	MH26WP	26
		NQ418L1C	—						
27*[13]*		NQ430L1	—		MH32	NC32 ( )	NC32( )HR	MH32WP	32
		NQ430L1C	—						
18	100	NQ418L1	NQMB2HJ NQMB2Q	HD, HG, HJ, HL, or QB, QD, QG, QJ 100A maximum	MH38	NC38 ( )	NC38( )HR	MH38WP	38
		NQ418L1C							
30		NQ430L1			MH44	NC44 ( )	NC44( )HR	MH44WP	44
		NQ430L1C							
30	225	NQ430L2	NQMB2HJ NQMB2Q	HD, HG, HJ, HL or JD, JG, JJ, JL QB,QD,QG,QJ	MH44	NC44 ( )	NC44( )HR	MH44WP	44
		NQ430L2C							
42		NQ442L2			MH50	NC50 ( )	NC50( )HR	MH50WP	50
		NQ442L2C							
54		NQ454L2							
		NQ454L2C							
72		NQ472L2			MH56	NC56 ( )	NC56( )HR	MH56WP	56
		NQ472L2C							
84		NQ484L2			MH62	NC62 ( )	NC62( )HR	MH62WP	62
		NQ484L2C							
30	400	NQ430L4	NQMB4LA	LA/LH*[17]*	MH62	NC62V ( )	NC62V( )HR	MH62WP	62
		NQ430L4C							
42		NQ442L4							
		NQ442L4C							
54		NQ454L4	NQMB4LA	LA/LH*[17]*	MH68	NC68V ( )	NC68V( )HR	MH68WP	68
		NQ454L4C							
72		NQ472L4	NQMB4LA	LA/LH*[17]*	MH74	NC74V ( )	NC74V( )HR	MH74WP	74
		NQ472L4C							
84*[16]*		NQ484L4C	NQMB4LA	LA/LH*[17]*	MH80	NC80V ( )	NC80V( )HR	MH80WP	80

[7] Enclosure includes trim kit.
[8] Embossed mounting holes add a 0.25 inch standoff to back of MH box.
[9] "C" suffix indicates copper bussing.
[10] Circuit breaker interrupt ratings, see the tables starting on page 7-29.
[11] Add "F" for flush mount, "S" for surface mount.
[12] For the NQ14-inch-wide panelboard offer, See NQ 14-inch-wide—240 Vac, 48 Vdc, page 9-13.
[13] Pole spaces shown are available for branch circuits, with spaces deducted for the back fed main breaker.
[14] QOB2150VH takes four pole spaces; all other QOB two pole circuit breakers take two pole spaces.
NOTE: Do not select a back-fed main for panels to be "Suitable for use as UL service equipment."
[15] For single phase applications, order a 3-pole breaker. Example: HDL36100.
[16] Use only if the Local Jurisdiction where this panelboard interior is being applied has adopted the 2008 NEC, which allows single panelboard interiors greater than 42 circuits.
[17] For 400 A applications, order short handle circuit breaker (LAL36400MB).

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NQ 14-inch-wide—240 Vac, 48 Vdc

Features

14-inch-wide NQ panelboards are now available for those customers whose equipment space is limited. Developed with customer input, Square D™ brand NQ panelboards are built to last, featuring innovations for ease of installation and durability.

- 240 Vac, 48 Vdc maximum
- 225 A maximum main circuit breaker or main lugs
- 60 A maximum branch circuit breakers
- Visi-Trip™ indication on branch circuit breakers
- 10,000–65,000 A Short Circuit Current Rating (SCCR)
- Interiors supplied with tin plated copper bus as standard
- Interiors accept bolt-on and plug-on branch circuit breakers
- Three-phase, four-wire, and single-phase, three-wire interiors available
- Panelboards available with Mono-Flat™ front
- Suitable for use as service entrance equipment
- Branch circuit filler plates provide fast and easy installation
- Both fully and series-rated systems are available

14–inch wide NQ Panelboard Main Lug

Main Circuit Breaker Panelboard

Main Lug Panelboard

Table 9.7: Main Lug Interiors—Accepts Plug-On and Bolt-On Branch Breakers

Max. Number of Breakers	Main Ratings	Interior Only (Order Branch Circuit Breakers Seperately)	Type 1 Enclosure		
			Box 14"W x 5.75" Db	Mono Flat Front	Hinged Front
		Cat. No.	Cat. No.	Cat. No. *[18]*	Cat. No.
14-inch-wide Cabinet—Single Phase 3-Wire					
18	100 A	NQ18L1C14	NQB532	NQC32	N/A
30		NQ30L1C14	NQB532	NQC32	N/A
30	225 A	NQ30L2C14	NQB532	NQC32	N/A
42		NQ42L2C14	NQB538	NQC38	N/A
14-inch-wide Cabinet—Three Phase 4-Wire					
18	100 A	NQ418L1C14	NQB532	NQC32	N/A
30		NQ430L1C14	NQB532	NQC32	N/A
30	225 A	NQ430L2C14	NQB532	NQC32	N/A
42		NQ442L2C14	NQB538	NQC38	N/A

Table 9.8: Main Circuit Breaker Interiors—Accepts Plug-On and Bolt-On Branch Breakers

Max. Number of Breakers	Main Ratings	Interior Only (Order Branch Circuit Breakers Seperately)	Main Circuit Breaker Adapter Kit (Less Circuit Breaker)		Type 1 Enclosure		
					Box 14"W x 5.75" Db	Mono Flat Front	Hinged Front
		Cat. No.	Cat. No	Cat. No	Cat. No. *[19]*	Cat. No. *[18]*	Cat. No.
14-inch-wide Cabinet—Single Phase 3-Wire							
16 *[20]*	100	NQ18L1C14	—	Select QOB 2-pole or QOB-VH*[21]*	NQB532	NQC32	N/A
28 *[20]*		NQ30L1C14	—		NQB532	NQC32	N/A
30	225	NQ30L2C14	NQMB2HJ14 or NQMB2Q14	HD, HG, HJ, HL, OR JD, JG, JJ, JL, QB , QD, QG, QJ	NQB544	NQC44	N/A
42		NQ42L2C14			NQB550	NQC50	N/A
14-inch-wide Cabinet—Three Phase 4-Wire							
15 *[20]*	100	NQ418L1C14	—	Select QOB 3-pole or QOB-VH*[21]*	NQB532	NQC32	N/A
27 *[20]*		NQ430L1C14	—		NQB532	NQC32	N/A
30	225	NQ430L2C14	NQMB2HJ14 or NQMB2Q14	HD, HG, HJ, HL, OR JD, JG, JJ, JL, QB , QD, QG, QJ	NQB544	NQC44	N/A
42		NQ442L2C14			NQB550	NQC50	N/A

Table 9.9: NQ Accessories

Description	Catalog No.
Equipment Ground Bars	
Aluminum	PK27GTA
PK23GTA+ #1 to #4/0 Al or Cu lug	PK23GTAL
Copper	PK27GTACU
Ground Bar Insulator Kit	PKGTAB
Filler plate (15 per package)	NQFP15
Handle Attachments—Branch Circuit Breakers	
Handle lock-off	HLO1
Handle tie - (QO and QOB only)	QO1HT
Handle padlock attachment—1-pole	QO1PA
2- and 3-pole	QO1PL
Handle tie and lock-off for three 1-pole (QO, QOB)	QO3HT

[18] Add “F” for flush mount, “S” for surface mount.
[19] All 14” W boxes come with blank endwalls.
[20] Pole spaces shown are available for branch circuits, with spaces deducted for the back-fed main breaker.
[21] Select a Q or H frame circuit breaker (and associated main circuit breaker kit) from the list for 225 interiors, for panels to be "Suitable for use as UL service equipment."

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NQ Merchandised Accessories

Table 9.10: NQ Merchandised Neutrals

Mains Ampacity	200% Neutral Kit			Copper 100% Neutral Kit		
	Catalog No.	Box Add	Schedule	Catalog No.	Box Add	Schedule
100	NQNL1	no adder	PE-1A	NQN1CU	no adder	PE-1A
225	NQNL2 or NQNL2ACCY*[22]*			NQN2CU		
400	NQNL4*[23]*	no adder	PE-1A	NQN6CU	no adder	PE-1A
600	Not Available			NQN6CU		

Table 9.11: NQ Merchandised Sub-feed Lugs, Feed-through Lugs and Sub-feed Breakers

Mains Ampacity	Sub-feed Lugs (N/A in MCB Interiors)		Feed-through Lugs		Sub-feed Circuit Breaker Kits (breaker not incl.)			
					Single SFB		Two SFB	
	Catalog No.	Schedule	Catalog No.	Schedule	Catalog No.	Schedule	Catalog No.	Schedule
100 A	NQSFL1	PE-1A	100 A not available; use 225 A interior	—	—	—	—	—
225 A	NQSFL2	PE-1A	NQFTL2L*[24]*	PE-1A	NQSFB2Q or NQSFB2HJ	PE-1A	—	—
			NQFTL2H*[25]*					
400 A	NQSFL4	PE-1A	NQFTL4L*[24]*	PE-1A	Use the 2 SFB kit	—	NQSFB4Q or NQSFB4HJ	PE-1A
			NQFTL4H*[25]*					
600 A	Use FTL		Factory Assembled Only					

NOTE: See Table 9.12 and Table 9.13.

Table 9.12: Box Selection Table: Merchandised NQ Main Lug Panelboards with Accessories

Feature Circuits	Sub-feed Lugs				Feed-through Lugs				Sub-feed Circuit Breakers			
	100 A	225 A	400 A	600 A	100 A	225 A	400 A	600 A	100 A	225 A (one)	400 A (two)	600 A (two)
18	MH26	—	—	Use FTL	—	—	—	Factory Asssembled Only	—	—	—	Factory Asssembled Only
30	MH32	MH38	MH50	Use FTL	Use 225A Interior	MH38	MH50		—	MH50	MH74	
42	—	MH44	MH50	Use FTL		MH38	MH56		—	MH56	MH74	
72	—	MH50	MH62	Use FTL		MH50	MH68		—	MH62	MH86	
84	—	MH56	MH68	Use FTL		MH56	MH68		—	MH68	*[26]*	

Table 9.13: Box Selection Table: Merchandised NQ Vertically Mounted Main Breaker Panelboards w/ Accessories

Feature Circuits	Feed-through Lugs				Sub-feed Circuit Breakers			
	100 A	225 A	400 A	600 A	100 A	225 A (one)	400 A (two)	600 A (two)
18	—	—	—	Factory Asssembled Only	—	—	—	Factory Asssembled Only
30	—	MH50	MH62		—	MH62	MH86	
42	—		MH68		—	MH68	MH86	
72	—	MH62	MH80		—	MH74	*[26]*	
84	—	MH68	MH80		—	MH80	*[26]*	

NOTE: See Table 9.157 NQ SurgeLogic SurgeLoc Plug-on SPDs, page 9-55

Table 9.14: NQ Optional Lugs

Ampacity	AL Compression Lug Kit		CU Mechanical Lug Kit		CU Compression Kit	
	Catalog No.	Lug Wire Range	Catalog No.	Lug Wire Range	Catalog No.	Lug Wire Range
100	NQALV1	one #8–1/0 AWG	NQCUM1	one #6–2/0 AWG	NQCUV1	one #6–1/0 AWG
225	NQALV2	one #4–300 kcmil	NQCUM2	one #6–250 kcmil	NQCUV2	one 2/0–300 kcmil
400	NQALV4	two 2/0–500 kcmil	NQCUM4	one 1/0–750 kcmil two 1/0–350 kcmil	NQCUV4	one 400–700 kcmil
600	NQALV6	two 2/0–500 kcmil	NQCUM6	one 1/0–750 kcmil two 1/0–350 kcmil	NQCUV6	two 250–500 kcmil

[22] For 225A panel with SFL, FTL, or SFB, use NQNL2ACCY (enclosure size increases by 6 inches). Otherwise, use NQNL2.
[23] Not to be used with SFL, FTL, or SFB. These combinations are factory assembled only.
[24] The final character L indicates the kit is used for Low circuit count interiors 30 and 42.
[25] The final character H indicates the kit is used for High circuit count interiors 54, 72, and 84.
[26] Requires box longer than available box offer.

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Table 9.15: NQ Accessories

Description		Catalog No.
Sub-feed (Bolt-on)		
2-pole		QOB2125SL
3-pole		QOB3125SL
Equipment Ground Bars		
Aluminum		PK27GTA
PK23GTA+ #1 to #4/0 Al or Cu lug		PK23GTAL
Copper		PK27GTACU
Ground Bar Insulator Kit		PKGTAB
Filler plate (15 per package)		NQFP15
Circuit I.D. Number Strips		
1–102 odd/even (left side numbered 1,3,5 ...101)		NQ102OE
103–204 odd/even (left side numbered 103,105,107 ... 203)		NQ204OE
1–102 sequential (left side numbered 1,2,3 ... 102)		NQ102S
103–204 sequential (left side numbered 103,104,105 ... 204)		NQ204S
Rail and Deadfront Extensions	6 in. Extension	NQ6RDE
	12 in. Extension	NQ12RDE
	18 in. Extension	NQ18RDE
	24 in. Extension	NQ24RDE
Touch-up paint USAS #49 Gray (Aerosol can)		PK49SP
Handle Attachments—Branch Circuit Breakers		
Handle lock-off		HLO1
Handle tie - (QO and QOB only)		QO1HT
Handle padlock attachment—1-pole		QO1PA
2- and 3-pole		QO1PL
Handle tie and lock-off for three 1-pole (QO, QOB)		QO3HT
Handle tie for two 10–30 A single pole QO(B) circuit breaker		QOHT2
Handle tie for three 10–30 A single pole QO(B) circuit breaker		QOHT3
Handle Padlock Attachment for Padlocking in OFF position		
For padlocking 1P QO circuit breaker in OFF position only, fixed attachment		QO1PAF
For padlocking 2P and 3P QO circuit breaker in OFF position only, fixed attachment		QO2PAF
For padlocking 1P QO-GFI, QO-AFI, QO-CAFI, and QO-EPD circuit breakers in OFF position only, fixed attachment		QOGFI1PAF
For padlocking 2P QO-GFI and QO-EPD circuit breakers in OFF position only, fixed attachment		QOGFI2PAF
Neutral or Ground Lugs		
#10 to #2 Al or #14 to #4 Cu		QO70AN
#4 to #1/0 Al or Cu		Q1100AN
#1 to #4/0 Al or Cu		Q1150AN
Endwalls for MH Enclosures		
Blank (one per package)		8011010501
With Knockouts (one per package)		8011010401

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QOB Bolt-On Circuit Breakers [1]

Table 9.16: QOB-GFI, QOB-EPD, and QOB-EPE Circuit Breakers

Ampere Rating [2]	One-pole	Two-pole—Common Trip	Three-pole—Common Trip	
	Catalog No.	Catalog No.	Catalog No.	Catalog No.
QOB-GFI—QOB Qwik-Gard™ Circuit Breaker With Ground Fault Circuit Interrupter—UL Class A 4–6 mA People Protection. [3]				
	120 Vac—10 k AIR	120/240 Vac—10 k AIR	208Y/120 Vac—10 k AIR	
15 A	QOB115GFI	QOB215GFI	QOB315GFI	
20 A	QOB120GFI	QOB220GFI	QOB320GFI	
25 A	QOB125GFI	QOB225GFI	—	
30 A	QOB130GFI	QOB230GFI	QOB330GFI	
40 A	—	QOB240GFI	QOB340GFI	
50 A	—	QOB250GFI	QOB350GFI	
60 A	—	QOB260GFI [4]	—	
QOB-VHGFI [5]				
	120 Vac—22 k AIR			
15 A	QOB115VHGFI			
20 A	QOB120VHGFI			
25 A	QOB125VHGFI			
30 A	QOB130VHGFI			
QOB-EPD—QOB Equipment protection circuit breakers with UL Listed 30 mA (EPD) or 100 mA (EPE) equipment protection.				
	120 Vac—10 k AIR	120/240 Vac—10 k AIR	240 Vac—10 k AIR	
15 A	QOB115EPD	QOB215EPD	QOB315EPD[6]	QOB315EPE[6]
20 A	QOB120EPD	QOB220EPD	QOB320EPD[6]	QOB320EPE
25 A	QOB125EPD	QOB225EPD	—	—
30 A	QOB130EPD	QOB230EPD	QOB330EPD[6]	QOB330EPE[6]
40 A	—	QOB240EPD	QOB340EPD[6]	QOB340EPE[6]
50 A	—	QOB250EPD	QOB350EPD[6]	QOB350EPE[6]
60 A	—	QOB260EPD	—	—
QOB-VHEPD				
	120 Vac—22 k AIR			
15 A	QOB115VHEPD			
20 A	QOB120VHEPD			
25 A	QOB125VHEPD			
30 A	QOB130VHEPD			
QOB-HM—High magnetic trip circuit breakers				
15 A	QOB115HM[7]			
20 A	QOB120HM[7]			
QOB-K—Key operated QOB circuit breakers [8]				
	120 Vac—10 k AIR			
10 A	QOB110K			
15 A	QOB115K			
20 A	QOB120K			
25 A	QOB125K			
30 A	QOB130K			

Table 9.17: Standard Interrupting QOB 10,000 AIR Circuit Breakers

Ampere Rating [2]	One-pole	Two-pole—Common Trip	Two-pole—Common Trip [9]	Three-pole—Common Trip
	Catalog No.	Catalog No.	Catalog No.	Catalog No.
QOB Bolt-On				
	120 Vac—10 k AIR 48 Vdc—5 k AIR	120/240 Vac—10 k AIR 48 Vdc—5 k AIR [10]	240 Vac—10 k AIR	240 Vac—10 k AIR 48 Vdc—5 k AIR [10]
10 A	QOB110	QOB210	—	QOB310
15 A	QOB115[7][11]	QOB215[11]	QOB215H	QOB315[11]
20 A	QOB120[7][11]	QOB220[11]	QOB220H	QOB320[11]
25 A	QOB125[11]	QOB225 [11]	QOB225H	QOB325[11]
30 A	QOB130[11]	QOB230[11]	QOB230H	QOB330[11]
35 A	QOB135[11]	QOB235[11]	—	QOB335[11]
40 A	QOB140[11]	QOB240[11]	QOB240H	QOB340[11]
45 A	QOB145[11]	QOB245[11]	—	QOB345[11]
50 A	QOB150[11]	QOB250[11]	QOB250H	QOB350[11]
60 A	QOB160[11]	QOB260[11]	QOB260H	QOB360[11]
70 A	QOB170[11]	QOB270[11]	QOB270H	QOB370[11][10]
80 A	—	QOB280[11] [10]	QOB280H	QOB380[11][10]
90 A	—	QOB290[11] [10]	QOB290H	QOB390[11] [10]
100 A	—	QOB2100[11] [10]	QOB2100H	QOB3100[11] [10]

[1] For QO plug-on circuit breakers, see the tables starting on Digest page 7-11.
[2] 10–30 A circuit breakers are suitable for use with 60 °C or 75 °C conductors. 35–60 A circuit breakers are suitable for use with 75 °C conductors.
[3] Do not connect to more than 250 feet of load conductor for the total one-way run to prevent nuisance tripping.
[4] Suitable only for feeding 240 Vac and 208 Vac two-wire loads. Does not contain load neutral connection.
[5] Recommended for applications where high initial inrush may occur and for individual dimmer applications.
[6] See note in Instruction Bulletin when using in an enclosure with a QO403 or QON prefix.
[7] UL Listed as SWD (switching duty) rated suitable for switching 120 Vac fluorescent lighting loads.
[8] Available in single pole construction and can be mounted in any single pole space which will accept a standard QOB. These circuit breakers can be turned ON or OFF or RESET with a special key (Catalog No. QOK10) included with the circuit breaker. These circuit breakers are UL Listed and available as shown in the table.
[9] UL Listed 5,000 AIR on 3Ø corner grounded delta systems.
[10] DC Rating is not available on indicated products.
[11] UL Listed as HACR type for use with air conditioning, heating, and refrigeration equipment having motor group combinations and marked for use with HACR type circuit breakers.

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Table 9.17 Standard Interrupting QOB 10,000 AIR Circuit Breakers (cont'd.)

Ampere Rating *[9]*	One-pole	Two-pole—Common Trip	Two-pole—Common Trip *[10]*	Three-pole—Common Trip
	Catalog No.	Catalog No.	Catalog No.	Catalog No.
110 A	—	QOB2110*[12] [13]*	—	—
125 A	—	QOB2125*[12] [13]*	—	—
Molded Case Switch 60 A max—240 Vac		QOB200	—	QOB300
Molded Case Switch 100 A max—240 Vac		QOB2000	—	QOB3000

Table 9.18: High Interrupting QOB and Specialty Circuit Breakers

Ampere Rating *[9]*	One-pole	Two-pole—Common Trip	Three-pole—Common Trip
	Catalog No.	Catalog No.	Catalog No.
QOB-VH			
	120 Vac—22 k AIR	120/240 Vac —22 k AIR	240 Vac—22 k AIR
15 A	QOB115VH *[14][12]*	QOB215VH*[12]*	QOB315VH*[12]*
20 A	QOB120VH *[14][12]*	QOB220VH*[12]*	QOB320VH*[12]*
25 A	QOB125VH*[12]*	QOB225VH*[12]*	QOB325VH*[12]*
30 A	QOB130VH*[12]*	QOB230VH*[12]*	QOB330VH*[12]*
40 A	QOB140VH	QOB240VH*[12]*	QOB340VH*[12]*
50 A	QOB150VH	QOB250VH*[12]*	QOB350VH*[12]*
60 A	QOB160VH	QOB260VH*[12]*	QOB360VH*[12]*
70 A	QOB170VH	QOB270VH*[12]*	QOB370VH*[12]*
80 A	—	QOB280VH*[12]*	QOB380VH*[12]*
90 A	—	QOB290VH*[12]*	QOB390VH*[12]*
100 A	—	QOB2100VH*[12]*	QOB3100VH*[12]*
110 A	—	QOB2110VH*[12]*	QOB3110VH *[15]*
125 A	—	QOB2125VH*[12]*	QOB3125VH *[15]*
150 A	—	QOB2150VH *[15]*	QOB3150VH *[15]*
QHB			
	120 Vac—65 k AIR	120 Vac/240 Vac—65 k AIR	240 Vac—65 k AIR
15 A	QHB115 *[14][16]*	QHB215*[12]*	QHB315*[12]*
20 A	QHB120 *[14][16]*	QHB220*[12]*	QHB320*[12]*
25 A	QHB125*[12]*	QHB225*[12]*	QHB325*[12]*
30 A	QHB130*[12]*	QHB230*[12]*	QHB330*[12]*
QOB-HID—**HID circuit breakers** *[17]*			
	120 Vac—10 k AIR	120/240 Vac—10 k AIR	240 Vac—10 k AIR
15 A	QOB115HID *[14]*	QOB215HID	QOB315HID
20 A	QOB120HID *[14]*	QOB220HID	QOB320HID
25 A	QOB125HID	QOB225HID	QOB325HID
30 A	QOB130HID	QOB230HID	QOB330HID
40 A	QOB140HID	QOB240HID	—
50 A	QOB150HID	QOB250HID	—
QOB-SWN—**Switch Neutral—Common Trip—NEC 514.11**			
		1-pole—2-Wire 2 Spaces —120 Vac	2-pole—3-Wire 3 Spaces—120/240 Vac
10 A	—	QOB210SWN	QOB310SWN
15 A	—	QOB215SWN	QOB315SWN
20 A	—	QOB220SWN	QOB320SWN
25 A	—	QOB225SWN	QOB325SWN
30 A	—	QOB230SWN	QOB330SWN
40 A	—	QOB240SWN	QOB340SWN
50 A	—	QOB250SWN	QOB350SWN

Table 9.19: QO/QOB Circuit Breaker Wire Sizes

Breaker Type	Ampere Rating *[18]*	Wire Size (AWG)	
		Al	Cu
QOB 1-pole	10–30 A	#14–8	#14–8
	10–30 A	—	two #14–10
	35–70 A	#8–2	#8–2
QOB 2-pole	10–30 A	#14–8	#14–8
	10–30 A	—	two #14–10
	35–70 A	#8–2	#8–2
	80–125 A	#4–2/0	#4–2/0
	150–200 A	#4–300 kcmil	#4–300 kcmil
QOB 3-pole	10–30 A	#14–8	#14–8
	35–70 A	#8–2	#8–2
	80–125 A	#4–2/0	#4–2/0
QOB-VH	110–150 A	#4–300 kcmil	#4–300 kcmil
QOB-GFI and QOB-EPD	15–30 A	#12–8	#14–8
	40, 50, or 60 A	#12–4	#14–6

[9] 10–30 A circuit breakers are suitable for use with 60 °C or 75 °C conductors. 35–60 A circuit breakers are suitable for use with 75 °C conductors.
[10] UL Listed 5,000 AIR on 3Ø corner grounded delta systems.
[12] UL Listed as HACR type for use with air conditioning, heating, and refrigeration equipment having motor group combinations and marked for use with HACR type circuit breakers.
[13] DC Rating is not available on indicated products.
[14] UL Listed as SWD (switching duty) rated suitable for switching 120 Vac fluorescent lighting loads.
[15] QOB2150VH uses 4 pole spaces. QOB3110VH, QOB3125VH, and QOB3150VH each use 6 pole spaces. 40A maximum circuit breaker mounted opposite. Use with 75 °C wire only.
[16] UL Listed as SWD (switching duty) rated suitable for switching 120 Vac fluorescent lighting loads.
[17] UL Listed for use on circuit feeding fluorescent and High Intensity Discharge (HID) lighting systems such as mercury vapor, metal halide, or high pressure sodium. These circuit breakers are physically interchangeable with QOB circuit breakers.
[18] 10–30 A circuit breakers are suitable for use with 60 °C or 75 °C conductors.
35–60 A circuit breakers are suitable for use with 75 °C conductors.

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Table 9.20: QO™ Arc-Fault Circuit Breakers *[19][20]*

Circuit Breaker Type	Ampere Rating *[21]*	1P 120 Vac 10 kAIR 1 Space Required	1P 120 Vac 22 kAIR 1 Space Required
		Catalog Number	Catalog Number
Combination Arc-Fault Interupter	15 A	QOB115CAFI	QOB115VHCAFI
	20 A	QOB120CAFI	QOB120VHCAFI

NOTE: For accessories, see Accessories for QO/QOB Circuit Breakers, page 7-15.

Sub-feed Circuit Breakers

Main lugs or main circuit breaker interior—1Ø or 3Ø.
Maximum 1 circuit breaker per 225 A main lug or 250 A main circuit breaker panelboard, 2 circuit breakers per 400–600 A panelboard.

Table 9.21: Sub-feed Circuit Breaker (110–225 A)

No. of Poles	Ampacity
2	110–225 A
3	110–225 A
Space Only	110–225 A

QJ, HJ, HL, JJ, and JL circuit breakers are also available.

Table 9.22: Sub-feed Circuit Breaker Cabinet Data

Max. No. of Branch Spaces (Does not include sub-feed circuit breaker spaces)	Box Height (20 in. W x 5.75 in. D)					
	225 A	250 A	400 A		600 A	
	Main Lug	Main Circuit Breaker	Main Lug	Main Circuit Breaker	Main Lug	Main Circuit Breaker
30	50	62	74	86	74	Not available with MCB
42	56	68	74	86	80	
54	56	68	80	—	80	
72	62	74	86	—	86	
84	68	80	—	—	—	

Not Available in Type 3R, 5, 12 if subfeed breaker is over 150 A.

Sub-feed Lugs

NOTE: Available on main lug interiors only, 1Ø or 3Ø.

Table 9.23: Sub-feed Wire Range Per Phase

Mains Rating	Incoming	Outgoing
100	one #6-2/0 Al or Cu	one #6-2/0 Al or Cu
225	one 1/0-350 kcmil Al or Cu	one 1/0-350 kcmil Al or Cu
400	one 1/0-750 kcmil Cu only	one 1/0-750 kcmil Cu only

Table 9.24: Sub-feed Lug Cabinet Data

Max. No. of Branch Spaces	Box Height (20 in. W x 5.75 in. D)		
	100 A	225 A	400 A
18	MH26	—	—
30	MH32	MH38	MH50
42	—	MH44	MH50
54	—	MH44	MH50
72	—	MH50	MH62
84	—	MH56	MH68

Feed-through Lugs

Table 9.25: Feed-through Lugs

Mains Rating	Feed-Through Wire Range Per Phase
100 A	one #6-2/0 Al or Cu
225 A	one #6–350 kcmil Al or Cu
400 A	one 1/0–750 kcmil or two 1/0–350 kcmil Al or Cu
600 A	two 1/0–750 kcmil Al or Cu

Table 9.26: Feed-through Lug Cabinet Data

Max. No. of Branch Spaces	Box Height (20 in. W x 5.75 in. D)					
	225 A	250 A	400 A		600 A	
	Main Lugs	Main Circuit Breaker	Main Lugs	Main Circuit Breaker	Main Lugs	Main Circuit Breaker *[1]*
30	38	50	50	62	62	68
42	38	50	56	68	62	80
72	50	62	68	80	74	—
84	56	68	68	80	80	—

Table 9.27: Ground Bars

Ground Bars
Equipment Ground Bar
Copper Ground Bar
Insulated/Isolated Ground Bar

Table 9.28: Name Plates

Name Plates
Standard white face/black letter laminated bakelite, 1 in. x 3.5 in., adhesive backed or screw mountable with screws in a bag assembly

Table 9.29: Copper Bus Bars

Copper Bus Bars
100 A, 225 A, 250 A
400 A
600 A

Table 9.30: Copper Neutrals

Copper Neutrals
100–600 A

[19] UL Listed as HACR type for use with air conditioning, heating, and refrigeration equipment having motor group combinations and marked for use with HACR type circuit breakers.
[20] QO arc-fault circuit breakers provide branch feeder protection (for example, QO115AFI) or combination protection (for example, QO115CAFI) as required by the NEC and local code adoption, and comply with UL 1699.
[21] 10–30 A circuit breakers are suitable for use with 60 °C or 75 °C conductors. 35–60 A circuit breakers are suitable for use with 75 °C conductors.
[1] 8.75 in. deep box, ship fully assembled only.

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Table 9.31: 200% Rated Neutrals

Panelboards with 200% rated neutrals are not available with 250 A J- and K-frame main circuit breakers or integral lighting contactors	
100 A*[2]*	one #6-2/0 kcmil Al or Cu per lug
225 A*[2]*	one #6-350 kcmil Al or Cu per lug
400 A*[2]*	one #1/0-750 kcmil Al or Cu per lug or two 1/0-300 kcmil per lug

Table 9.32: NQ Main Neutral Conductors—Required Size and Quanitity

Panelboard Ampacity	Neutral Conductors Required	Actual Lug Wire Range
100/125	(2) 1/0 Cu or Al	(2) #4-300kcmil
225	(2) 4/0 Cu or (2) 300 kcmil Al	(2) #4-300 kcmil
400 A	(4) 3/0 Cu or (4) 250 kcmil Al (2) 600 kcmil Cu (2) 750 kcmil Al	(2) 1/0-300 kcmil or (1) 750 kcmil

NOTE: Neutral conductors must be of size and quantity per table above.

Table 9.33: Metal Directory Frames

Metal Directory Frame
Replaces standard plastic stick-on directory pouch

Table 9.34: Hinged Door-in-Door Trims

Hinged Door-in-Door Trim
Hinged Door-in-Door Trim has piano hinge down one side. Inner door has a lock, outer door is retained with screws
Hinged Door-in-Door with Outer Door Lock in place of screws

Table 9.35: Weatherproof or Dusttight Cabinets—Type 3R, 5, 12

Weatherproof or Dusttight Cabinets
NOTE: 600 A L-Frame main circuit breaker NQ panelboards are not available with a weatherproof enclosure (Use I-Line)
400 and 600 A NQ panelboards with sub-feed circuit breakers are not available with a weatherproof enclosure (Use I-Line).
400 A NQ panelboards are available with a subfeed breaker up to 150 A. See Table 9.22 Sub-feed Circuit Breaker Cabinet Data, page 9-18.

Table 9.36: Optional Factory Assembled Lugs for Main Lug Interiors

Main Lug Interiors
Aluminum Compression Lugs
Copper Mechanical Lugs
Copper Compression Lugs

Table 9.37: Optional Factory Assembled Lugs for Main Circuit Breaker Interiors

Main Circuit Breaker Interiors:
Aluminum Compression Lugs
Copper Mechanical Lugs
Copper Compression Lugs

NOTE: Optional lugs are not available for Q frame main or QOB circuit breakers

Table 9.38: Surgelogic™ SurgeLoc Plug-On SPD *[3]*

Surge Current Rating kA
80 kA
100 kA
120 kA
160 kA
200 kA
240 kA

Table 9.39: Surgelogic SPD Options

Description
Surge Counter
Dry Contacts
Remote Monitor

NOTE: Additional factory modifications, see Modifications For Factory Assembled Panelboards, page 9-54.

[2] Two incoming neutral lugs per panel
[3] SurgeLogic units occupy 12 circuit positions (6 adjacent mounting spaces per side.)

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20-inch Wide Enclosures 480Y/277 Vac Max.

Table 9.40: NF Main Lug Interiors—Use I-Line™ Panelboards on 480 V 3Ø3W Delta Applications

Max No. of Single Pole EDB Circuit Breakers	Mains Rating	Interior Only [1]	NEMA 1 Enclosure			NEMA 3R, 5, 12 Enclosure [2]	
			Box 20 in. W x 5.75 in. D [3]	Mono-Flat™ Front [4]	Hinged Front	Enclosure 20 in. W x 6.5 in. D	Height (In.)
		Catalog No. [5]	Catalog No.	Catalog No.	Catalog No.	Catalog No.	
(Single Phase 3-Wire: Factory Assembled Only) Three Phase 4-Wire							
18	125	NF418L1	MH26	NC26( )	NC26( )HR	MH26WP	26
		NF418L1C	MH26	NC26( )	NC26( )HR	MH26WP	
30	125	NF430L1	MH32	NC32( )	NC32( )HR	MH32WP	32
		NF430L1C	MH32	NC32( )	NC32( )HR	MH32WP	
30	250	NF430L2	MH38	NC38( )	NC38( )HR	MH38WP	38
		NF430L2C	MH38	NC38( )	NC38( )HR	MH38WP	
42	250	NF442L2	MH44	NC44( )	NC44( )HR	MH44WP	44
		NF442L2C	MH44	NC44( )	NC44( )HR	MH44WP	
54	250	NF454L2	MH50	NC50( )	NC50( )HR	MH50WP	56
		NF454L2C	MH50	NC50( )	NC50( )HR	MH50WP	
66 [6]	250	NF466L2	MH62	NC62( )	NC62( )HR	MH62WP	62
		NF466L2C	MH62	NC62( )	NC62( )HR	MH62WP	
30	400	NF430L4	MH50	NC50V( )	NC50V( )HR	MH50WP	50
		NF430L4C	MH50	NC50V( )	NC50V( )HR	MH50WP	
42	400	NF442L4	MH56	NC56V( )	NC56V( )HR	MH56WP	56
		NF442L4C	MH56	NC56V( )	NC56V( )HR	MH56WP	
66 [6]	400	NF466L4	MH74	NC74V( )	NC74V( )HR	MH74WP	74
		NF466L4C	MH74	NC74V( )	NC74V( )HR	MH74WP	
84 [6]	400	NF484L4	MH86	NC86V( )	NC86V( )HR	MH86WP	86
		NF484L4C	MH86	NC86V( )	NC86V( )HR	MH86WP	
30	600	NF430L6C	MH50	NC50V( )	NC50V( )HR	Factory Assembled Only	50
42	600	NF442L6C	MH56	NC56V( )	NC56V( )HR		56
66 [6]	600	NF466L6C	MH74	NC74V( )	NC74V( )HR		74
84 [6]	600	NF484L6C	MH86	NC86V( )	NC86V( )HR	—	—
	800	Factory Assembled Only					

Table 9.41: NF Main Circuit Breaker Interiors—Use I-Line Panelboards on 480 V 3Ø3W Delta Applications

Max. No. of One-pole EDB Circuit Breakers	Mains Rating	Main Circuit Breaker Adapter Kit	Main Circuit Breaker Frame	Interior Only [1]	NEMA 1 Enclosure			NEMA 3R, 5, 12 Enclosure [2]	
					Box 20 in. W x 5.75in. D [3]	Mono-Flat™ Front [4]	Hinged Front	Enclosure 20 in. W x 6.5 in. D	Height (In.)
		Kit		Catalog No. [5]	Catalog No.	Catalog No.	Catalog No.	Catalog No.	
(Single Phase 3-Wire: Factory Assembled Only) Three Phase 4-Wire									
15	125	Back-fed Main Breaker[7]	EDB, EGB or EJB	NF418L1	MH26	NC26( )	NC26( )HR	MH26WP	26
				NF418L1C	MH26	NC26( )	NC26( )HR	MH26WP	
27	125			NF430L1	MH32	NC32( )	NC32( )HR	MH32WP	32
				NF430L1C	MH32	NC32( )	NC32( )HR	MH32WP	
18	125	N150MH or N100MFI[8]	HD/HG/ HJ/HL or FI	NF418L1	MH38	NC38( )	NC38( )HR	MH38WP	38
				NF418L1C	MH38	NC38( )	NC38( )HR	MH38WP	
30	125			NF430L1	MH44	NC44( )	NC44( )HR	MH44WP	44
				NF430L1C	MH44	NC44( )	NC44( )HR	MH44WP	
30	250	N250MJ or N250MKC[8]	JD/JG/ JJ/JL or KI	NF430L2	MH50	NC50( )	NC50( )HR	MH50WP	50
				NF430L2C	MH50	NC50( )	NC50( )HR	MH50WP	
42	250			NF442L2	MH56	NC56( )	NC56( )HR	MH56WP	56
				NF442L2C	MH56	NC56( )	NC56( )HR	MH56WP	
54	250			NF454L2	MH62	NC62( )	NC62( )HR	MH62WP	56
				NF454L2C	MH62	NC62( )	NC62( )HR	MH62WP	
66 [9]	250			NF466L2	MH74	NC74( )	NC74( )HR	MH74WP	74
				NF466L2C	MH74	NC74( )	NC74( )HR	MH74WP	
30	400	N400M[8]	LA/LH	NF430L4	MH62	NC62V( )	NC62V( )HR	MH62WP	62
				NF430L4C	MH62	NC62V( )	NC62V( )HR	MH62WP	
42	400	N400M[8]		NF442L4	MH68	NC68V( )	NC68V( )HR	MH68WP	68
				NF442L4C	MH68	NC68V( )	NC68V( )HR	MH68WP	
66 [9]	400	N400M[8]		NF466L4	MH86	NC86V( )	NC86V( )HR	MH86WP	86
				NF466L4C	MH86	NC86V( )	NC86V( )HR	MH86WP	

Table 9.42: NF Merchandised SPD Box Selection Table

Mains Rating	Max. Breaker Spaces	Main Lug Panelboard Box Requirements				Main Circuit Breaker Panelboard Box Requirements			
		NEMA 1 Enclosure			NEMA 3R, 5, 12 Enclosure	NEMA 1 Enclosure			NEMA 3R, 5, 12 Enclosure
		Box	Front	Hinged	Enclosure	Box	Front	Hinged	Enclosure
250A	42	MH56	NC56( )	NC56( )HR	MH56WP	MH68	NC68( )	NC68( )HR	MH68WP
400 A	42	MH68	NC68V( )	NC68V( )HR	MH68WP	MH80	NC80( )	M/B NC80V( )HR	MH80WP

[1] Order branch circuit breakers separately.
[2] Enclosure includes trim kit.
[3] Embossed mounting holes add a 0.25-inch standoff to back of MH box.
[4] Add "F" for flush mount, "S" for surface mount.
[5] "C" suffix indicates copper bussing.
[6] Use only if the Local Jurisdiction where this panelboard interior is being applied has adopted the 2008 NEC, which allows single panelboard interiors greater than 42 circuits.
[7] Back-fed EDB 125 A 3 pole main circuit breaker must be ordered separately and field installed. Maximum breaker rating opposite is 20 A.
[8] Select the appropriate main circuit breaker from pages starting on The PowerPact Advantage, page 7-29.
[9] Use only if the Local Jurisdiction where this panelboard interior is being applied has adopted the 2008 NEC, which allows single panelboard interiors greater than 42 circuits.

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Accessories

Table 9.43: NF Merchandised Neutrals

Mains Ampacity	200% Neutral Kit	Copper 100% Neutral Kit
	Catalog No.	Catalog No.
125	NFNL1	NFN1CU
250	NFNL2	NFN2CU
400	NFNL4 *[10]*	NFN6CU
600	Factory Assembled Only	NFN6CU *[10]*

Table 9.44: Modifications (Single- or Three-phase)

Mains Ampacity	Sub-feed Lugs *[11] [12]*	Feed-through Lugs *[11] [12]*
	Catalog No.	Catalog No.
125	NF125SFL	NF125FTL
250	NF250SFL	NF250FTL
400	NF400SFL *[14]*	NF400FTL
600	*[15]*	*[15]*
800		

Mains Ampacity	Sub-feed Circuit Breaker Kits *[11]* (circuit breaker not Included) *[13]*	
	Single Sub-feed Circuit Breaker	Twin Sub-feed Circuit Breakers
	Catalog No.	Catalog No.
250	NF250SFBH/NF250SFBJ	—
400	—	NF600SFBH
	—	NF600SFBJ
600	FACTORY ASSEMBLED ONLY	
800	FACTORY ASSEMBLED ONLY	

NOTE: NF250SFBH and NF600SFBH are for use with HDL, HGL, HJL, and HLL circuit breakers. NF600SFBJ are for use with JDL, JGL, JJL, and JLL circuit breakers.

Table 9.45: Special Features Box Selection Table—Standard Mechanical Lugs Only

Feature	Main Lugs Only												
	Sub-feed Lugs					Feed-through Lugs					Sub-feed Circuit Breaker		
No. of Circuits	18	30	42	66	84	18	30	42	66	84	30	42	66
Ampacity	Cat. No.	Cat. No.	Cat. No.	Cat No.	Cat No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
100/125	MH26	MH32	—	—	—	MH32	MH38	—	—	—	—	—	—
250	—	MH38	MH44	MH62	—	—	MH50	MH56	MH74	—	MH56	MH62	MH80
400	—	MH50	MH56	MH74	MH86	—	MH56	MH62	MH80	MH92	MH68	MH74	—
600	—	*[15]*	*[15]*	*[15]*	*[15]*	—	*[15]*	*[15]*	*[15]*	*[15]*	*[15]*	*[15]*	*[15]*
800													

Table 9.46: Special Features Box Selection Table—Standard Mechanical Lugs Only *(continued)*

Feature	Vertical Main Circuit Breaker *[16]*						Back-fed Main Circuit Breaker	
	Feed-through Lugs				Sub-feed Circuit Breaker		Feed-through Lugs	
No. of Circuits	18	30	42	66	30	42	18	30
Ampacity	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
100/125	MH44	MH50	—	—	—	—	MH32	MH38
250	—	MH62	MH68	MH86	MH68	MH74	MH38	MH44
400 *[16]*	—	MH68	MH74	MH92	MH80	MH86	—	—
600	Available factory assembled only.						—	—

Table 9.47: Optional Main Lug Kits for Main Lug Panelboards

Ampacity	AL Compression Lug Kit		CU Mechanical Lug Kit		CU Compression Lug Kit *[14]*	
	Catalog No.	Lug Wire Range	Catalog No.	Lug Wire Range	Catalog No.	Lug Wire Range
125	NFALV1 *[17]*	one #4–300 kcmil	NFCUM1	#6–2/0 AWG	NFCUV1 *[18]*	one #6–1/0
250	NFALV2	one 250–350 kcmil	NFCUM2	#6–250 kcmil	NFCUV2 *[18]*	one 2/0–300 kcmil
400	NFALV4	two 2/0–500 kcmil	NFCUM4	one 1/0–750 kcmil, two 1/0–350 kcmil	NFCUV4	one 400–750 kcmil
600	NFALV6	two 2/0–500 kcmil	NFCUM6	two 1/0–750 kcmil	NFCUV6	two 250–500 kcmil
800	Contact your local Schneider Electric representative or distributor.					

Table 9.48: NF Accessories

Description	Catalog No.
Aluminum Equipment Ground Bar	PK27GTA
Copper Equipment Ground Bar	PK27GTACU
Large Aluminum Lug for Equipment Ground Bar	PK23GTAL
Equipment Ground Bar Insulator Kit	PKGTAB
Circuit I.D. number strips	
1–102 odd/even (left side numbered 1, 3, 5...101)	NF102OE
103–204 odd/even (left side numbered 103, 105, 107...203)	NF204OE
1–102 sequential (left side numbered 1, 2, 3 ...102)	NF102S
103–204 sequential (left side numbered 103, 104, 105... 204)	NF204S
Rail and Deadfront Extensions	
6 in. Extension	NF6RDE
12 in. Extension	NF12RDE
18 in. Extension	NF18RDE

Description	Catalog No.
Filler plate (15 per package)	NFFP15
EXB Fixed padlock attachment, Lock ON/OFF for ED, EG, and EJ Circuit Breakers 1, 2, or 3 poles	EDPA
EXB Fixed padlock attachment, Lock OFF only for ED, EG, and EJ Circuit Breakers 1, 2, or 3 poles	EDPAF
Oversized Lugs for Neutral or Ground Bar	
#10 to #2 Al or #14 to #4 Cu	QO70AN
#4 to #1/0 Al or Cu	Q1100AN
#1 to #4/0 Al or Cu	Q1150AN
Drip Hood for 20 in. wide enclosures	MHT2DH20

[10] Not to be used with SFL, FTL, or SFB. These combinations are factory assembled only.
[11] Available factory assembled only on non-linear panelboards.
[12] Select box from the Box Selection Table.
[13] Order appropriate circuit breaker.
[14] Use copper wire only.
[15] Available factory assembled only.
[16] 400 A dimension for LA/LH main circuit breakers only.
[17] Use of this kit requires an additional 6 in. added to box height.
[18] Use of this kit to terminate larger than standard wire size requires an additional 6 in. added to box height.

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EDB, EGB, EJB
1–pole
15–70 A

EDB, EGB, EJB
2–pole
15–125 A

For NF Merchandised Panelboards

Table 9.49: E-frame—125 A, Thermal-magnetic (480Y/277 Vac)

Ampere Rating	ED, EG, EJ (480Y/277 Vac)		"D" Interrupting Level 18 kA @ 480Y/277 Vac	"G" Interrupting Level 35 kA @ 480Y/277 Vac	"J" Interrupting Level 65 kA @ 480Y/277 Vac	Terminal Wire Range
	Hold	Trip	Catalog Number	Catalog Number	Catalog Number	
1-pole, 277 Vac						
15 A	270	875	EDB14015*[1][2]*	EGB14015*[1][2]*	EJB14015*[1][2]*	AL30FD #14–#6 Al or Cu
20 A			EDB14020*[1][2]*	EGB14020*[1][2]*	EJB14020*[1][2]*	
25 A			EDB14025*[2]*	EGB14025*[2]*	EJB14025*[2]*	
30 A			EDB14030*[2]*	EGB14030*[2]*	EJB14030*[2]*	
35 A	630	1800	EDB14035*[2]*	EGB14035*[2]*	EJB14035*[2]*	AL100FD #14–2/0 Al or Cu
40 A			EDB14040*[2]*	EGB14040*[2]*	EJB14040*[2]*	
45 A			EDB14045*[2]*	EGB14045*[2]*	EJB14045*[2]*	
50 A			EDB14050*[2]*	EGB14050*[2]*	EJB14050*[2]*	
60 A			EDB14060	EGB14060	EJB14060	
70 A			EDB14070	EGB14070	EJB14070	
2-pole, 480Y/277 Vac *[3]*						
15 A	270	875	EDB24015*[2]*	EGB24015*[2]*	EJB24015*[2]*	AL30FD #14–#6 Al or Cu
20 A			EDB24020*[2]*	EGB24020*[2]*	EJB24020*[2]*	
25 A			EDB24025*[2]*	EGB24025*[2]*	EJB24025*[2]*	
30 A			EDB24030*[2]*	EGB24030*[2]*	EJB24030*[2]*	
35 A	630	1800	EDB24035*[2]*	EGB24035*[2]*	EJB24035*[2]*	AL100FD #14–2/0 Al or Cu
40 A			EDB24040*[2]*	EGB24040*[2]*	EJB24040*[2]*	
45 A			EDB24045*[2]*	EGB24045*[2]*	EJB24045*[2]*	
50 A			EDB24050*[2]*	EGB24050*[2]*	EJB24050*[2]*	
60 A			EDB24060	EGB24060	EJB24060	
70 A			EDB24070	EGB24070	EJB24070	
80 A	1000	2300	EDB24080	EGB24080	EJB24080	AL100FD #14–2/0 Al or Cu
90 A			EDB24090	EGB24090	EJB24090	
100 A			EDB24100	EGB24100	EJB24100	
110 A			EDB24110	EGB24110	EJB24110	
125 A			EDB24125	EGB24125	EJB24125	
3-pole, 480Y/277 Vac						
15 A	270	875	EDB34015*[2]*	EGB34015*[2]*	EJB34015*[2]*	AL30FD #14–#6 Al or Cu
20 A			EDB34020*[2]*	EGB34020*[2]*	EJB34020*[2]*	
25 A			EDB34025*[2]*	EGB34025*[2]*	EJB34025*[2]*	
30 A			EDB34030*[2]*	EGB34030*[2]*	EJB34030*[2]*	
35 A	630	1800	EDB34035*[2]*	EGB34035*[2]*	EJB34035*[2]*	AL100FD #14–2/0 Al or Cu
40 A			EDB34040*[2]*	EGB34040*[2]*	EJB34040*[2]*	
45 A			EDB34045*[2]*	EGB34045*[2]*	EJB34045*[2]*	
50 A			EDB34050*[2]*	EGB34050*[2]*	EJB34050*[2]*	
60 A			EDB34060	EGB34060	EJB34060	
70 A			EDB34070	EGB34070	EJB34070	
80 A	1000	2300	EDB34080	EGB34080	EJB34080	AL100FD #14–2/0 Al or Cu
90 A			EDB34090	EGB34090	EJB34090	
100 A			EDB34100	EGB34100	EJB34100	
110 A			EDB34110	EGB34110	EJB34110	
125 A			EDB34125	EGB34125	EJB34125	
EPDs (Equipment Protection Devices), 1-pole, 277 Vac, Thermal-magnetic with 30 mA ground-fault protection*[4]*						
15 A	270	875	EDB14015EPD*[1][2]*	EGB14015EPD*[1][2]*	EJB14015EPD*[1][2]*	#14–#6 Cu or #12–#4 Al
20 A			EDB14020EPD*[1][2]*	EGB14020EPD*[1][2]*	EJB14020EPD*[1][2]*	
30 A			EDB14030EPD*[2]*	EGB14030EPD*[2]*	EJB14030EPD*[2]*	
40 A	630	1800	EDB14040EPD*[2]*	EGB14040EPD*[2]*	EJB14040EPD*[2]*	
50 A			EDB14050EPD*[2]*	EGB14050EPD*[2]*	EJB14050EPD*[2]*	

NOTE: All EDB, EGB, and EJB circuit breakers are UL Listed as HACR Type. For 50 °C calibration, use a CA suffix. NF branch circuit breakers are fungus proof as standard.

[1] UL Listed as SWD (Switching duty rated).
[2] UL Listed as HID (High Intensity Discharge rated).
[3] UL Listed for use on 240 V Corner-grounded Delta Systems (Grounded B Phase). See data bulletin 2700DB0202.
[4] All EPDs occupy two spaces, with or without Alarm Switch option. For alarm switch, add 158 list Price and the suffix BA.

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EDB, EGB, EJB
3–pole
15–125 A

EDB, EPD
1–pole
with Alarm Switch

Table 9.50: Factory installed Electrical Accessories

Auxiliary Switch (1A/1B)	Alarm Switch (NO)	Coil Burden Max. (VA)	Minimum Recommended Supply Transformer (VA)
		288	50
Monitors circuit breaker contact status and provides a remote signal indicating the circuit breaker contacts are OPEN or CLOSED. **Application** Max Load = 10 A @ 120 Vac 50/60 Hz Terminals for #14 AWG Cu wire	Used with control circuits and is actuated only when the circuit breaker has tripped. **Application** Max Load = 7 A @ 120 Vac 50/60 Hz Terminals for #14 AWG Cu wire.	Shunt Trip—Trips the circuit breaker from a remote location by means of a coil energized from a separate circuit. A 120 V shunt trip will operate at 55% or more of rated voltage. **Application** For use with momentary or maintained push button. 120 Vac 50/60 Hz Terminals for #14 AWG Cu wire.	

Table 9.51: Factory Installed Electrical Accessory Packages for ED, EG, EJ Circuit Breakers

Accessory Package	Suffix
[5][6]	AABA
Shunt Trip Package*[5][6]*	SA
Auxiliary Switch/Alarm Switch/Shunt Trip Package*[5][6]*	AABASA
Alarm Switch (N.O.) Package for EPDs only	BA

Table 9.52: Terminal Nut Insert Kit

Circuit Breaker Type	Qty. per Kit	Catalog No.
ED, EG, EJ	3	TIKFD

Table 9.53: Handle Accessories

Circuit Breaker Type	No. of Poles	Catalog No.
EXB Fixed Padlock Attachment, Lock ON/OFF		
ED, EG, EJ	1, 2, or 3	EDPA
EXB Fixed padlock attachment, Lock OFF only		
ED, EG, EJ	1, 2, or 3	EDPAF
EXB Removable padlock attachment, Lock OFF only		
ED, EG, EJ	1, 2, or 3	HPAFD
EXB Handle Ties		
ED, EG, EJ	Ties 2 – 1P	ECB2HT
	Ties 3 – 1P	ECB3HT

Table 9.54: Interrupt Ratings (kA)

	EDB	EGB	EJB
120 V	25	65	100
240 V	18 (1P), 25	35 (1P), 65	65 (1P), 100
480Y/277 V	18	35	65

Table 9.55: Mechanical Lug Kit Information (Al lugs for use with Al or Cu wire)*[6]*

Circuit Breaker Application				Number of Wires Per Lug and Wire Range	Catalog Number	Lugs Per Kit
Standard	Ampere Rating	Optional	Ampere Rating			
EDB, EGB, EJB	15–30 A	—	—	one #12—#6 AWG Al or one #14—#6 AWG Cu	AL30FD	3
	35–125 A	EDB, EGB, EJB	15–30 A *[7]*	one #12—2/0 AWG Al or one #14—2/0 AWG Cu	AL100FD	3
—	—	EDB, EGB, EJB	15–125 A	one #14—1/0 AWG Cu	CU100FD	3

E-frame dimensions ED, EG, EJ, and GJ Circuit Breakers, page 7-74.

Sub-feed Circuit Breaker

Available on 1Ø or 3Ø, 250–800 A main lugs or 250–600 A main circuit breaker interiors

- One sub-feed HD, HG, HJ, or HL or JD, JG, JJ, or JL circuit breaker per 250 A panelboard
- Two sub-feed HD, HG, HJ, or HL or two JD, JG, JJ, or JL circuit breakers per 400 A panelboard (do not mix H and J in a Panel)
- One sub-feed LA, LH, or LC circuit breaker (400 A max.) and one JD, JG, JJ, or JL circuit breaker or two sub-feed JD, JG, JJ, or JL circuit breakers per 600 A or 800 A panelboard (JJ and LC sub-feed circuit breakers cannot be used together).

Table 9.56: Sub-feed Circuit Breaker (150–400 A)

No. of Poles
2
3

Table 9.57: Sub-feed Circuit Breaker Cabinet Data

Max. No. of Branch Spaces (Does not include sub-feed circuit breaker spaces)	Box Height (20 in. W x 5.75 in. D)						
	250 A		400 A LA/LH		600 A		800 A
	Main Lugs	Main Breaker	Main Lugs	Main Breaker	Main Lugs	Main Breaker *[1]*	Main Lugs *[2]*
30	56	68	68	80	74	80*[3]*	68
42	62	74	74	86	80	86*[3]*	74
54	68	80	80	92	86	92*[3]*	80
66	80	N/A					
84	N/A						

[5] Accessory package takes an additional pole space.
[6] Not available for EPD.
[7] Factory installed only. Use suffix “LH”
[1] 600 A main circuit breaker panelboards require an 8.75 in. deep, 26 in. wide box.
[2] 800 A main lug panelboards require an 8.75 in. deep, 26 in. wide box.
[3] Dimensions also for 400 A LC/LI main circuit breaker panels.

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Common Features

Table 9.58: Sub-feed (Double) Lugs (Standard Aluminum Mechanical Lugs)

Mains Rating	Sub-feed Wire Range Wire Bending Space per NEC Table 373-6
125 A	two #6–2/0 Al or Cu
250 A	two 1/0–350 kcmil Al or Cu
400 A	two 1/0–600 kcmil Cu
600 A	(4) 4/0–500 kcmil Al or Cu
800 A	(6) 3/0–500 kcmil Al or Cu

Sub-feed (Double) Lugs (Standard Aluminum Mechanical Lugs): An additional mains and termination point that can be used to feed out to another panelboard or device from the incoming service lines.
Available on main lug interiors only.

Table 9.59: Sub-feed Lug Cabinet Data (Standard Aluminum Mechanical Lugs)

Max. No. of Branch Spaces	Main Lugs Box Height in Inches (20 in. W x 5.75 in. D)				
	125 A	250 A	400 A	600 A	800 A *[4]*
18	26	—	—	—	—
30	32	38	50	74	74
42	—	44	56	80	80
54	—	50	62	86	86

Table 9.60: Feed-through Lugs (Standard Aluminum Mechanical Lugs)

Mains Rating	Feed-through Wire Range Wire Bending Space per NEC Table 373-6
125 A	one #6–2/0 kcmil Al or Cu
250 A	one #6–350 kcmil Al or Cu
400 A	one 1/0–750 kcmil or two 1/0–350 kcmil Al or Cu
600 A	two 1/0–600 kcmil Al or Cu

Feed-through Lugs (Standard Aluminum Mechanical Lugs): A second set of lugs assembled at the opposite end from the mains of the panelboard. Often used to connect another panelboard or device to the incoming lines.
Available on main lugs and main circuit breaker panelboards.

Table 9.61: Feed-through Lug Cabinet Data (Standard Aluminum Mechanical Lugs)

Max. No. of Branch Spaces	Box Height in Inches (20 in. W x 5.75 in. D)									
	125 A	100/125 A		250 A		400 A LA/LH		600 A		800 A
	Main Breaker (back-fed only)	Main Lugs	Main Breaker	Main Lugs	Main Breaker	Main Lugs	Main Breaker	Main Lugs	Main Breaker *[5]*	Main Lugs *[6]*
18	38	32	44	—	—	—	—	—	—	—
30	44	38	50	50	62	56	68	62	74	56
42	50	—	—	56	68	62	74	68	80	62
54	—	—	—	62	74	68	80	74	86	68

Table 9.62: Ground Bars

Ground Bars
Equipment Ground Bar
Copper Ground Bar
Insulated/Isolated Ground Bar

Table 9.63: Name Plates

Name Plates
Standard white face/black letter laminated bakelite, 1 in. x 3.5 in., adhesive-backed or screw mountable with screws in a bag assembly

Table 9.64: Copper Bus Bars

Copper Bus Bars
100 A, 250 A
400 A
600 A, 800 A

Table 9.65: Copper Neutral

Copper Neutral
100–600 A
800 A

Table 9.66: 200% Rated Neutrals

Panelboards with 200% rated neutrals are available with sub-feed lugs, feed-through lugs, and main circuit breakers
250 A
400 A
600 A
800 A

Table 9.67: NF Main Neutral Conductors—Required Size and Quantity

Panelboard Ampacity	Neutral Conductors Required *[6]*	Actual Lug Wire Range
125	(2) 1/0 Cu or (2) 1/0 Al	(2) #6-2/0
250	(2) 4/0 Cu or (2) 300 kcmil Al	(2) #6-350 kcmil

[4] 800 A main lug panelboards require an 8.75 in. deep and 26 in. wide box.
[5] 600 A main circuit breaker panelboards require an 8.75 in. deep, 26 in. wide box.
[6] 800 A main lug panelboards require an 8.75 in. deep, 26 in. wide box.

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Table 9.67 NF Main Neutral Conductors—Required Size and Quantity (cont'd.)

Panelboard Ampacity	Neutral Conductors Required *[7]*	Actual Lug Wire Range
400 A	(4) 250 kcmil Al or (4) 3/0 Cuor (2) 600 kcmil Al	(2) 1/0-300 kcmil or (1) 1/0-750 kcmil
600	(4) 500 kcmil Al or (4) 350 kcmil Cu	(2) 1/0-750 kcmil

NOTE: Neutral conductors must be of size and quantity per table above.

Table 9.68: Metal Directory Frame

Metal Directory Frame
Not available with LC/LI main circuit breaker (Replaces standard plastic stick-on directory pouch)

Table 9.69: Hinged Door-in-Door Trim

Hinged Door-in-Door Trim
Hinged Door-in-Door Trim has piano hinge down one side. Inner door has a lock, outer door is retained with screws
Hinged Door-in-Door with Outer Door Lock in place of screws

Table 9.70: Weatherproof or Dusttight Cabinets (Type 3R, 5, 12)

Weatherproof or Dusttight Cabinets —Type 3R, 5, 12
(Not available with panelboards having LC/LE/LI/LX/LXI main circuit breakers)

Table 9.71: Optional Factory Assembled Lugs for Main Lug Interiors

Main Lug Interiors
Aluminum Compression Lugs
Copper Mechanical Lugs
Copper Compression Lugs

Table 9.72: Optional Factory Assembled Lugs for Main Circuit Breaker Interiors

Main Circuit Breaker Interiors
Aluminum Compression Lugs
Copper Mechanical Lugs
Copper Compression Lugs

Table 9.73: Surgelogic™ Hard Bus SPD—Model IMA *[7]*

Surge Current Rating kA
100
120
160
200
240

Table 9.74: Surgelogic SPD Options

Surgelogic SPD Options
Surge Counter
Dry Contacts
Remote Monitor

NOTE: For additional factory modifications, see Modifications For Factory Assembled Panelboards, page 9-54.

[7] 800 A main lug panelboards require an 8.75 in. deep, 26 in. wide box.
[7] Panelboard box height with SPD unit—Contact your local Schneider Electric representative or distributor.

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(60 A Max. Branch Circuit Breaker)
NQ Application Data

Application: For use on ac only. Meet Federal Specification W-P-115c, Type 1, Class 1. UL Listed.
Service: 1Ø3W, 3Ø3W, 3Ø4W,
3 Grd. "B" Ø—240 Vac max.
AIR: See the tables starting on page 7-1.
Mains: Type NQ—Bolt-on main lugs: 100 A, 225 A

- Main circuit breaker: 100 A—QOU, 225 A—QB
- See the tables starting on page 7-1for main circuit breaker interrupt ratings. See catalog for terminal lug data.
- Main circuit breakers with higher interrupt ratings are available as factory assembled panelboards.

Branches: Bolt-on QOB, 60 A maximum. QOB 10-60 A 1-, 2- and 3-pole. See QOB Bolt-On Circuit Breakers, page 9-16 and NQ Factory Assembled Panelboards, page 9-18 for branch circuit breaker terminal data. QOB-VH and QHB branch circuit breakers are also available as factory assembled.

Cabinet: Front—Screw cover. Box—galvanized steel with removable endwalls.

Gutters:

- 100 A—4 in. min. mains end, 3 in. min. opposite mains
- 225 A—10 in. min. mains end, 5 in. min. opposite mains

Table 9.75: NQ Single-Row (Column-width)—240 Vac Bolt-on *[1]*

Max. No. of Poles	Mains Rating	Box and Interior with Solid Neutral (8.625 in. W. x 5 in. D.) (Order branch circuit breakers separately)		Front (Surface Mount)
		Catalog Number	Box Height (In.)	Catalog Number
1 Phase 3-Wire Main Lugs Only				
30	225	NQ830L2C	45	LX45TS
Main Circuit Breaker—2-pole				
20	100	NQ820B1C	40	LX40TS
3 Phase 4-Wire Main Lugs Only				
30	100	NQ8430L1C	40	LX40TS
42	225	NQ8442L2C	58	LX58TS
Main Circuit Breaker—3-pole				
30	100	NQ8430B1C	45	LX45TS
42	225	NQ8442B2C	62	LX62TS

Table 9.76: Cable Troughs and Pull Boxes

Cable Troughs (L=Length) *[2]*		Pull Boxes with Solid Neutral	
L (In.)	8.625 in. x 5 in. Catalog Number	S/N Terminals	Catalog Number
36	MTX836	42	MPX81542
48	MTX848		
56	MTX856		
66	MTX866		

[1] 60 A Maximum Branch—Copper Bus Standard.
[2] Cable troughs are standard with a trough barrier.

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(60 A Max. Branch Circuit Breaker)
NF Application Data

Application: For use on ac only. Meet Federal Specification W-P-115c, Type 1, Class 1. UL Listed.

Service: 480Y/277 Vac, 3Ø4W

AIR: See the tables starting on page 7-1.

Mains: Type NF–Bolt-on main lugs: 125 A, 225 A

- Main circuit breaker: 100 A—FA, 100 A—HD, 225 A—JD. See the tables starting on page 7-1 for main circuit breaker interrupt rating. See the catalog section for terminal lug data.
- Main circuit breakers with higher interrupt ratings are available as factory assembled panelboards.

Branches: EDB, EDG, or EDJ, 60 A maximum. See Table 9.49 E-frame—125 A, Thermal-magnetic (480Y/277 Vac), page 9-22 for branch circuit breaker catalog numbers and terminal data.

Cabinet: Front—Screw cover. Box—galvanized steel with removable endwalls.

Gutters:

- 100 A—4 in. min. mains end, 3 in. min.opposite mains
- 225 A—10 in. min. mains end, 5 in. min. opposite mains

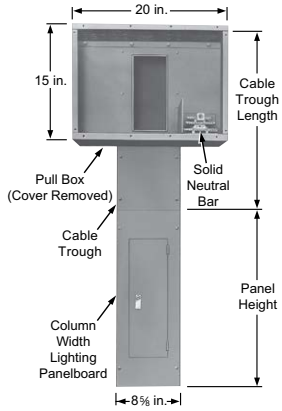

Table 9.77: NF Single-Row (Column-width)—480Y/277 Vac Bolt-on

Max. No. of Poles	Mains Rating	Box and Interior with S/N (8.625 in. W. x 5.625 in. D.)		Front (Surface Mount)
		Catalog Number	Box Height (In.)	Catalog Number
Main Lugs Only—3 Phase 4-Wire				
30	125	NF8430L1C	59	NC59TS
42	225	NF8442L2C	71	NC71TS
Main Circuit Breaker—3-pole				
30	100	NF8430M1C NF8430M1HDC	65	NC65TS
42	225	NF8442M2JDC	85	NC85TS

Table 9.78: Cable Troughs and Pull Boxes

Cable Troughs (L=Length) *[3]*		Pull Boxes with Solid Neutral	
L (In.)	8.625 in. x 5.625 in. Catalog Number *[4]*	S/N Terminals	Catalog Number
36	NTX836	42	MPX81542
48	NTX848		
56	NTX856		
66	NTX866		

[3] Cable troughs are standard with a trough barrier.
[4] Box width = 8.625 in.; width at front, including flange, is 9.625 in..

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Powerlink available in column width design

Powerlink™ Intelligent Lighting Control Systems

Powerlink intelligent lighting control systems are ideally suited for controlling lighting and other loads in commercial, institutional, and industrial facilities. Such systems are typically used to lower utility cost by switching branch circuits OFF during non-occupied periods when lighting is unnecessary or during peak demand periods when a partial reduction in load can save significant money.

These systems utilize remotely operated circuit breakers to switch branch circuits ON and OFF via a time schedule or by an externally generated signal (typically a low voltage wall switch, photocell, access system, fire alarm or building management system). All Powerlink components mount inside a standard lighting panelboard to provide a compact, space saving installation.

Powerlink intelligent lighting control systems feature a powerful microprocessor based controller that provides system intelligence for 168 remotely operated branch circuits. Master panelboards contain the control electronics, power supply, and control bus strips for up to 42 branch circuit breakers. Sub-panels extend the capability of the system by allowing remotely operated branch circuit breakers to be operated from the master controller via a simple, 4-wire, sub-net connection.

Powerlink panels systems have the capability of being networked together and operated from a central workstation or via a remote modem connection. Powerlink software allows users to remotely configure the system, change time schedules, monitor circuit breaker or input status, and override zones and breakers.

BACnet Capability

The Building Automation and Control network (BACnet) communication protocol is incorporated into the Powerlink™ controller design. The addition of the BACnet protocol allows Powerlink panels to be easily integrated into a Building Automation System (BAS) employing this open communication standard without the need for communication bridges or gateways.

Controller Models

The following Powerlink controller models support ‘native’ BACnet communications:

- NF2000G3 — Ethernet communications, shared remote inputs, network time synchronization
- NF3000G3 — Email upon alarm, onboard web pages for status/control/configuration
- NF3500G4 — Embedded web server, 256 communication inputs available

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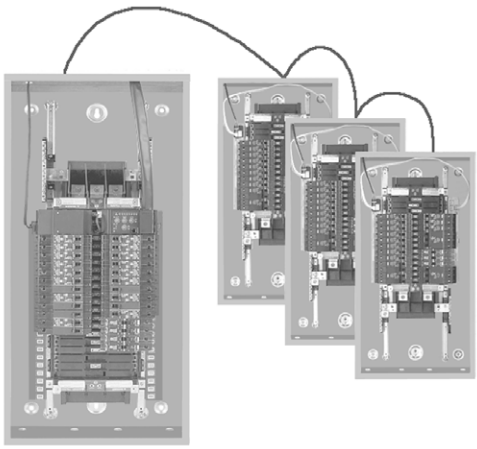
Factory Assembled System

The following factory engineered pricing procedure may be used to price either 240 V or 480Y/277 V Powerlink intelligent lighting control systems:

- Select system type and interior size from Table 9.79 , page 9-29. All Powerlink panels are furnished with either 1 or 2 control bus strips.
- All Powerlink panels use NF type panelboard interiors, boxes, and trims and are suitable for either 240 V or 480Y/277 V systems.
- Select branch circuit breaker requirements. Powerlink panels can accommodate both ECB-G3 remotely operated circuit breakers and EDB, EGB and EJB standard branch circuit breakers.
- Refer to panelboard section for additional panelboard accessories.
- For complete price, order by description.
- Apply appropriate discount schedule.

240 V Factory Assembled System Example:

500 level system with 225 A MLO panelboard rated for 208Y/120 V, 3Ø4W, 10kAIR, Type 1, surface mount with ground bar and (12) 20 A 1-pole bolt-on remote operated circuit breakers.



Up to eight panels can be controlled from a single controller.

Table 9.79:

Item	Page No.
System Type: 500 controller with 12 ckt bus	page 9-30
Panel type: 250 A MLO	page 9-20
Branch circuit breakers: (12) 20 A 1-pole	page 9-29
Ground bar	page 9-24

Table 9.80:

Feature	System Level				
	500	1000	2000	3000	3500
Inputs					
2 - wire	8	16	16	16	16
2 - wire with status feedback[1]	8	8	8	8	8
3 - wire	8	8	8	8	8
Time Scheduler					
Independent schedules	—	16	16	16	64
ON-OFF periods/schedule	—	24	24	24	999
Special events/holiday periods	—	32	32	32	64
Automatic daylight savings	—	X	X	X	X
Sunrise/sunset tracking	—	X	X	X	X
Network Variables					
Communications inputs accessible	64	64	64	64	256
Remote sources (per controller)	—	—	32	32	128
Maximum subscriptions	—	—	256	256	256
Zones					
Maximum number	64	64	64	64	256
Maximum number of sources per zone	1	1	4	4	4
Maximum number of remotely operated circuit breakers (per subnet)	168	168	168	168	168
Networking					
RS-232 port/RS-485 port	X	X	X	X	X
Ethernet (100BaseT port)	—	—	X	X	X
Protocols					
Modbus™ ASCII/RTU	X	X	X	X	X
Modbus TCP	—	—	X	X	X
BACnet/IP, BACnet MS/TP	—	—	X	X	X
DMX512	—	X	X	X	X

Powerlink™ ECB-G3 Circuit Breakers

Table 9.81: ECB-G3 Circuit Breakers Bolt-On Remotely Operated

Ampere Rating	One-Pole 27 7 Vac – 14,000 AIR 120 Vac – 65,000 AIR	Two-Pole 480Y/277 Vac – 14,000 AIR 120/240 Vac – 65,000 AIR 240 Vac – 14,000 AIR Ground B Phase	Three-Pole 480Y/277 Vac – 14,000 AIR 240 Vac – 42,000 AIR
15	ECB14015G3[2]	ECB24015G3[2]	ECB34015G3[2]
20	ECB14020G3[2]	ECB24020G3[2]	ECB34020G3[2]
30	ECB14030G3	ECB24030G3	ECB32030G3[3]

ECB-G3 Circuit Breakers

Table 9.82: ECB-G3 Circuit Breakers for Emergency Lighting (requires 2-pole spaces)

Ampere Rating	One-Pole 480 Y/277 – 14,000 AIR 240 V – 65,000 AIR
20	ECB142020G3EL

NOTE: All are listed as HACR type for use with air conditioning, heating and refrigeration equipment having motor group combinations and marked for use with HACR type circuit breakers. UL listed as HID rated for use with high intensity discharge lighting systems. (1) #12–8 Al or (1) #10–8 Cu. Suitable for use with 75°C conductors.

[1] 7.5 mA maximum load per input terminal.
[2] UL listed as SWD (switching duty) rated.
[3] Rated for 240 Vac only – 42,000 AIR

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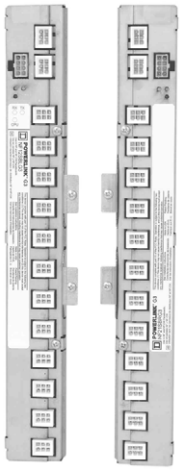
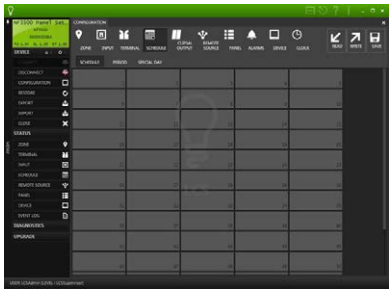


Control Bus

Power Supply

NF3500G4 Controller



Powerlink Software

Powerlink™ Accessories

Table 9.83: Control Bus

Max. No. of Control Circuits	Required Interior Size	Panel Orientation	Catalog No.
12	30	Left	NF12SBLG3
12	30	Right	NF12SBRG3
18	42	Left	NF18SBLG3
18	42	Right	NF18SBRG3
21	54	Left	NF21SBLG3
21	54	Right	NF21SBRG3

Table 9.84: Power Supply

Voltage	Primary Source	Catalog No.
120 V	Panel Bus	NF120PSG3
240 V	Panel Bus	NF240PSG3
277 V	Panel Bus	NF277PSG3
120 V	External	NF120PSG3L
240 V	External	NF240PSG3L
277 V	External	NF277PSG3L

Table 9.85: Controller

Description	Catalog No.
500	NF500G3
1000	NF1000G3
2000	NF2000G3
3000	NF3000G3
3500	NF3500G4

Table 9.86: Remote Source Controller (for additional inputs)—

Voltage	Catalog No.
120 V	RSC16G3120
240 V	RSC16G3240
277 V	RSC16G3277

Table 9.87: Cables & Accessories

Description	Catalog No.
Control bus cables	
Harness standard panel	NF2HG3
Sub-net accessories & cables	
Sub-panel address selector*[4]*	NFSELG3
6’ sub-net cable	NFSN06
10’ sub-net cable	NFSN10
25’ sub-net cable	NFSN25
50’ sub-net cable	NFSN50
Serial cables	
Controller front panel cable	NFFPCG3

Table 9.88: Miscellaneous Hardware

Description	Catalog No.
Circuit Breaker Handle Padlock (Lock On or Off)	HPAFD
Fixed Barrier	NFASBKG3
Remote Mounting Adapter	NFADAPTERG3

Table 9.89: Software

Description	Catalog No.
LCSV2 Software*[5]*	LCSV2

[4] One address selector required for each sub-panel.
[5] Required for G4 controllers (NF3500G4). Will also support G3 controllers.

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Remote Mount Controller

Remote Mount Controller

Table 9.90: Remote Mount Controller (for externally mounted electronics) Includes NEMA 1 enclosure, controller, and power supply

Voltage	Catalog No.	Controller Type
120 V	RMC500G3120	NF500G3
240 V	RMC500G3240	NF500G3
277 V	RMC500G3277	NF500G3
120 V	RMC1000N2G3120	NF1000N2G3
240 V	RMC1000N2G3240	NF1000N2G3
277 V	RMC1000N2G3277	NF1000N2G3
120 V	RMC1000G3120	NF1000G3
240 V	RMC1000G3240	NF1000G3
277 V	RMC1000G3277	NF1000G3
120 V	RMC2000G3120	NF2000G3
240 V	RMC2000G3240	NF2000G3
277 V	RMC2000G3277	NF2000G3
120 V	RMC3000G3120	NF3000G3
240 V	RMC3000G3240	NF3000G3
277 V	RMC3000G3277	NF3000G3
120 V	RMC3000G3C120	NF3000G3C
240 V	RMC3000G3C240	NF3000G3C
277 V	RMC3000G3C277	NF3000G3C

Powerlink Network Accessories

Table 9.91: Powerlink Network Accessories

Description	Catalog No.
RS232/485 Converter	6382RS485G3KIT

Table 9.92: Powerlink Remote Modem Support *[6]*

Description	Catalog No.
Modem Kit (for G3 Controllers)	6382G3MODEM

NF Panelboards 240 V and 480Y/277 V Factory Assembled Systems—Max. Voltage 480Y/277 Vac

Table 9.93: Branch Circuit Breaker

Powerlink G3—ECB Bolt-On 65 kA AIR@240 Vac, 14 kA AIR@480 Y/277		Standard Breakers—EDB Bolt-On 18 kA AIR 1-pole, 25 kA AIR 2 & 3-pole @ 240 V, 18 kA AIR@480 Y/277		Standard Breakers HIC—EGB Bolt-On 65 kA AIR@240 Vac, 35 kA AIR@480 Y/277		Standard Breakers Extra HIC—EJB Bolt-On 100 kA AIR@240 Vac, 65 kA AIR@480 Y/277	
Voltage	Ampere Rating	Voltage	Ampere Rating	Voltage	Ampere Rating	Voltage	Ampere Rating
240 Vac	15–20	480Y/277 Vac	15–60	480Y/277 Vac	15–60	480Y/277 Vac	15–60
	30		70		70		70
480Y/277 Vac	15–20		80–100		80–100		80–100
	30		110–125		110–125		110–125
Space Only			Space Only		Space Only		Space Only

NOTE: All EC, ED, EG and EJ branch circuit breakers are UL Listed as HACR type.

Table 9.94: Sub-Feed Breaker Cabinet Data

Max. No. of Branch Spaces (Does not include sub-feed breaker spaces)	Box Height (20" W x 5.75" D)						
	250 A		400 A LA/LH		600 A		800 A
	Main Lugs	Main Circuit Breaker	Main Lugs	Main Circuit Breaker	Main Lugs *[8]*	Main Circuit Breaker *[9][10]*	Main Lugs *[11]*
30	56	68	68	80	68	80	68
42	62	74	74	86	74	86	74
54	68	80	80	92	80	92	80

- Available on 1Ø or 3Ø, 125–800 A main lugs or 125–600 A main circuit breaker interiors
- One sub-feed JD, JG, JJ or JL circuit breaker per 250 A panelboard
- Two sub-feed JD, JG, JJ or JL circuit breakers per 400 A panelboard *[7]*

- PowerLogic™ metering
- Customer equipment space
- Increased box depth
- Box extensions top, bottom and side
- Drip hoods
- Non-standard paint
- NEMA 1 gasketed
- NEMA 4 Stainless steel enclosure
- NEMA 4X Fiberglass enclosure (NQOD and NF)
- Stainless steel trim front (NQOD, NF and I-LINE)
- Padlockable hasp
- Special locks (Corbin, Yale, Best)
- Equal height boxes
- Common trip to cover two equal height boxes
- Panelboard skirthides conduits feeding a panelboard
- Panelboard wireway for terminating conduit in wireway endwall
- Panelboard interiors and special fronts to fit existing boxes

[6] Requires 2000 and 3000 controller and either Analog or Ethernet modem connection to each master panel.
[7] LC and JJ may not be combined.
[8] 600 A main lug panelboards require an 8.75" deep box.
[9] Dimensions also for 400 A LC/LI main circuit breaker panels.
[10] 600 A main lug panelboards require an 8" deep, 26" wide box.
[11] 800 A main lug panelboards require an 8.75" deep, 26" wide box.

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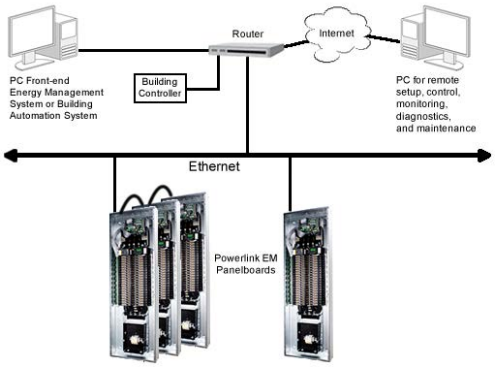
Powerlink Energy Management (EM) Lighting Control System



Energy Management (EM) Lighting Control System

The Powerlink Energy Management (EM) Lighting Control System incorporates the same features found in the Powerlink 3000 level system, in addition to integral branch circuit and optional main metering for energy monitoring and verification of the lighting system. Integral metering is accomplished using the PowerLogic™ Branch Circuit Power Meter (BCPM), which is a highly accurate, full-featured multi-branch circuit power meter that provides unrivalled low-current monitoring.

The Powerlink system reduces electrical energy consumption associated with lighting and other loads by automatically switching loads off during non-occupied periods. The Powerlink system is often ideal for reducing th epeak demand by switching unnecessary lights off in response to an automated response signal or when high time-of-day energy tariffs occur.

- Integral individual and optional mains metering to provide utmost flexibility in assurng a sustainable metering and verification program
- Monitors current, voltage, energy consumption, demand, and power factor for complete energy profiling
- Accumulated metering information transmitted via Modbus communications interface
- Data updates occurring within seconds to provide timely preventative maintenance information
- Optional EGX web interface for storing and reporting data via standard web browser (suggested for applications without Energy Management System [EMS] software)
- Alarm indication when parameters approach user-configured thresholds
- 16 hard-wired inputs available for connection to devices with physical dry-contacts
- 64 communication inputs available for network connection
- 16 independent time schedules, each can be configured into 24 distinct periods
- 7-day repeating clock with changeable automatic daylight savings time
- Automatic sunrise/sunset tracking with offsets
- 32 special event periods
- 32 remote sources for sharing input status, time schedules, or zone status between controllers
- Full custom logic capabilities, including full Boolean functions and synchronization services
- RS232 and RS485
- Serial communications using Modbus ASCII/RTU, BACnet MS/TP and DMX512 protocols (metering Modbus only)
- Ethernet 10BaseT communications using Modbus TCP and BACnet/IP protocols

Table 9.95: Characteristics, Standards Compliance, and BCPM Specifications

Characteristics	
Operating Temperature	-5° to 40°C (23° to 104°F) (95%RH, non-condensing)
Storage Temperature	-20° to 85°C (-4° to 185°F) (<95%RH, non-condensing)

Regulatory/Standards Compliance

- UL Listed 916, Energy Management Equip
- FCC Part 15, Class A
- NEC Class 1 and Class 2 Control Circuits
- ESD Immunity: IEC 1000, level 4
- RF Susceptibility: IEC 1000, level 3
- Electrical Fast Transient Susceptibility: IEC 1000, level 3
- Electrical Surge Susceptibility: IEC 1000, level 4 (power line)
- Electrical Fast Transient Susceptibility: IEC 1000, level 3 (interconnection lines)

BCPM Specifications	
General	
Control Power	90–277 Vac
Frequency	50/60 Hz
Sampling Frequency	2560 Hz
Update Rate	1.6 seconds per panelboard
Overload Capability	10 kAIC
Ribbon Cable Support	Up to 20 ft.
Operating Temperature	0° to 60°C (32°C to 122°F) (<95%RH, non-condensing)
Storage Temperature	-40° to 70°C (-40° to 158°F)
Accurancy	
Current Monitoring	0.25 A to 100A: 3% of reading from 0.25 A to 2 A; 2% of reading from 2 A to 100 A
Auxiliary Inputs	2% of reading from 1% to 10% of rated current; 1% of reading from 10% to 100% of rated current (0 to 0.333 Vac)
Voltage Input	90–277 Vac; 1% of reading from 90–277 L-N (models BCPMA and BCPMB only)
Power	4% of reading from 0.25 A to 2 A; 3% of reading 2 A to 100 A*[1]* (models BCPMA and BCPM only)
Network Communications	
Serial	Modbus™ RTU
Ethernet	TCP/IP

[1] Recommended for application where EMS software monitoring is not provided.

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New! **I-Line Combo Panelboard**

Table 9.96: Interior Boxes and Fronts — Includes Solid Neutral

I-Line Mounting Space	Part Number	Panelboard Ampacity	Single/ Duplex	Lighting Section Type	Lighting Section Amperage	Lighting Section Circuits	Busing	Phase	Ground Bar	Box	4 Piece Trim Without Door	Trim with Door	NEMA 3R/5/12 (Includes Front)
18	CP18864N3Q2C	400	S	NQ	225	30	Cu	3	PK32DGTACU	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP18864N3Q2	400	S	NQ	225	30	Al	3	PK32DGTA	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP18864N4Q2C	400	S	NQ	225	42	Cu	3	PK32DGTACU	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP18864N4Q2	400	S	NQ	225	42	Al	3	PK32DGTA	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP18864N3F2C	400	S	NF	250	30	Cu	3	PK32DGTACU	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP18864N3F2	400	S	NF	250	30	Al	3	PK32DGTA	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP18864N4F2C	400	S	NF	250	42	Cu	3	PK32DGTACU	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP18864N4F2	400	S	NF	250	42	Al	3	PK32DGTA	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP118864N4Q4C	400	S	NQ	400	42	Cu	1	PK32DGTACU	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP18866N3Q4C	600	S	NQ	400	30	Cu	3	PK32DGTACU	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP18866N4Q4C	600	S	NQ	400	42	Cu	3	PK32DGTACU	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP118866N4Q6C	600	S	NQ	600	42	Cu	1	PK32DGTACU	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP18866N3F4C	600	S	NF	400	30	Cu	3	PK32DGTACU	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
18	CP18866N4F4C	600	S	NF	400	42	Cu	3	PK32DGTACU	HC2686DB	HC2686T( ) 4P	HC2686T( ) HR	HC2686WP
22.5	CP23734N3Q2C	400	S	NQ	225	30	Cu	3	PK32DGTACU	HC3273DB9	HCM73T( )V	HCM73T( )VD	N/A
22.5	CP23734N3Q2	400	S	NQ	225	30	AL	3	PK32DGTA	HC3273DB9	HCM73T( )V	HCM73T( )VD	N/A
22.5	CP123734N3Q4C	400	S	NQ	400	30	Cu	1	PK32DGTACU	HC3273DB9	HCM73T( )V	HCM73T( )VD	N/A
22.5	CP23734N3F2C	400	S	NF	250	30	Cu	3	PK32DGTACU	HC3273DB9	HCM73T( )V	HCM73T( )VD	N/A
22.5	CP23734N3F2	400	S	NF	250	30	AL	3	PK32DGTA	HC3273DB9	HCM73T( )V	HCM73T( )VD	N/A
22.5	CP23736N3Q4C	600	S	NQ	400	30	Cu	3	PK32DGTACU	HC3273DB9	HCM73T( )V	HCM73T( )VD	N/A
22.5	CP23736N3F4C	600	S	NF	400	30	Cu	3	PK32DGTA	HC3273DB9	HCM73T( )V	HCM73T( )VD	N/A
22.5	CP23914N4Q2C	400	S	NQ	225	42	Cu	3	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23914N4Q2	400	S	NQ	225	42	Al	3	PK32DGTA	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23914N5Q2C	400	S	NQ	225	54	Cu	3	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23914N5Q2	400	S	NQ	225	54	Al	3	PK32DGTA	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23914N4F2C	400	S	NF	250	42	Cu	3	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23914N4F2	400	S	NF	250	42	Al	3	PK32DGTA	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23914N5F2C	400	S	NF	250	54	Cu	3	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23914N5F2	400	S	NF	250	54	Al	3	PK32DGTA	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23916N4Q4C	600	S	NQ	400	42	Cu	3	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23916N5Q4C	600	S	NQ	400	54	Cu	3	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP123916N5Q4C	600	S	NQ	400	54	Cu	1	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23916N4F4C	600	S	NF	400	42	Cu	3	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23916N5F4C	600	S	NF	400	54	Cu	3	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP123916N5Q6C	600	S	NQ	600	54	CU	1	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23916N44Q4C	600	D	NQ	400	42/42	Cu	3	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP123916N44Q4C	600	D	NQ	400	42/42	Cu	1	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
22.5	CP23916N53Q4C	600	D	NQ	400	54/30	Cu	3	PK32DGTACU	HC3291DB9	HCM91T( )V	HCM91T( )VD	N/A
31.5	CP32866N44Q4C	600	D	NQ	400	42/42	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32866N53Q4C	600	D	NQ	400	54/30	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32866N4BQ4C	600	D	NQ	400	42/B*	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP132866N44Q6C	600	D	NQ	600	42/42	Cu	1	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32866N44F4C	600	D	NF	400	42/42	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32866N53F4C	600	D	NF	400	54/30	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32866N4BF4C	600	D	NF	400	42/B*	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32868N44Q6C	800	D	NQ	600	42/42	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP132868N44Q6C	800	D	NQ	600	42/42	Cu	1	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32868N53Q6C	800	D	NQ	600	54/30	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32868N3BQ6C	800	D	NQ	600	30/B[1]	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32868N4BQ6C	800	D	NQ	600	42/B[1]	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP132868N4BQ6C	800	D	NQ	600	42/B[1]	Cu	1	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32868N5BQ6C	800	D	NQ	600	54/B[1]	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32868N44F6C	800	D	NF	600	42/42	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32868N53F6C	800	D	NF	600	54/30	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32868N3BF6C	800	D	NF	600	30/B[1]	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32868N4BF6C	800	D	NF	600	42/B[1]	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP
31.5	CP32868N5BF6C	800	D	NF	600	54/B[1]	Cu	3	PK32DGTACU	HC4486DB	HCR86T( )	HCR86T( )D	HC4486WP

[1] B denotes a blank space on the right hand side of a duplex panel for future expansion

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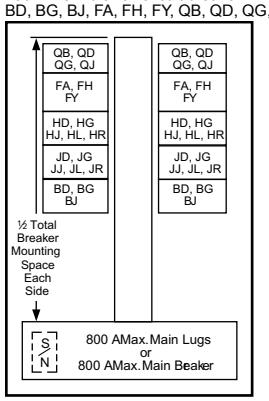
Table 9.97: RTI Cabled Lighting Section Kit for I-Line Combo Panelboard

Part Number	Description	MLO Panelboard Ampacity	Lighting Section Type	Lighting Section Circuits
NFICRT418L1C	NF Lighting Section Kit	125	NF	18 dual
NFICRT442L2C	NF Lighting Section Kit	250	NF	42
NFICRT442L4C	NF Lighting Section Kit	400	NF	42
NFICRT442L6C	NF Lighting Section Kit	600	NF	42
NQICRT418L1C	NQ Lighting Section Kit	100	NQ	18 dual
NQICRT442L2C	NQ Lighting Section Kit	225	NQ	42
NQICRT442L4C	NQ Lighting Section Kit	400	NQ	42
NQICRT442L6C	NQ Lighting Section Kit	600	NQ	42
NQICRT418C1C	Contactor with 18 Circuit NQ Lighting Section Kit	100	NQ	18
NFICRT418C1C	Contactor with 18 Circuit NF Lighting Section Kit	125	NF	18

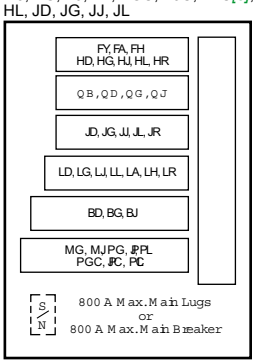
I-Line Panelboard

TYPE HCM
250 A max. branch circuit breaker
BD, BG, BJ, FA, FH, FY, QB, QD, QG, QJ, HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR



Box Size:
32 in. Wide, 8.25 in. Deep

TYPE HCP-SU *[2]*
800 A max. main circuit breaker
600 A max. branch circuit breaker
BD, BG, BJ, FY, FA, FH, LA, LD, LG, LJ, LL, LH, LR, MG, MJ, PG, PJ, PL, PGC, PJC, PLC *[3]*, QB, QD, QG, QJ, HD, HG, HJ, HL, JD, JG, JJ, JL



Box Size:
26 in. Wide, 9.5 in. Deep

Table 9.98: Interiors, Boxes and Fronts

Total Circuit Breaker Mounting Space (In.)	Mains Ampere Rating	Interior Assembly (Less Branch Circuit Breakers) Catalog Number	Front *[4]* 4 Piece Trim Without Door Catalog Number	Front *[4]* Trim With Door *[6]* Catalog Number	Box *[5]* Type 1 Catalog Number	Box *[5]* NEMA 3R/5/12 *[7]* (Includes Front) Catalog Number	Box Height (In.)
HCM **Main Lugs Only** **3-pole—Suitable for use as service equipment when provided with a main circuit breaker.** *[8]*							
27	225 A	HCM14482N	HCM48T( )	HCM48T( )D	HC3248B	HC3248WP	48
	400 A	HCM14484					
	600 A	HCM14486					
	800 A	HCM14488					
45	225 A	HCM23642N	HCM64T( )	HCM64T( )D	HC3264B	HC3264WP	64
	400 A	HCM23644					
	600 A	HCM23646					
	800 A	HCM23648					
63	225 A	HCM32732N	HCM73T( )	HCM73T( )D	HC3273B	HC3273WP	73
	400 A	HCM32734					
	600 A	HCM32736					
	800 A	HCM32738					
99	225 A	HCM50912N	HCM91T( )	HCM91T( )D	HC3291B	HC3291WP	91
	400 A	HCM50914					
	600 A	HCM50916					
	800 A	HCM50918					
HCM **Main Circuit Breaker** *[9] [10]* **Includes 3-pole, vertically mounted main circuit breaker—Suitable for use as service equipment.**							

[2] For main circuit breaker panel, order plug-on I-Line type PG, PJ, PL, MG, or MJ circuit breakers from 9–47 through 9–48 and backfeed as the main breaker (order solid neutral from 9–37).
[3] PG, PJ, PL circuit breakers are available with both thermal-magnetic equivalent and Micrologic trip. The Micrologic circuit breakers are available 80% and 100% rated. “C” suffix denotes a 100% rating.
[4] Add “F” for flush mount, “S” for surface mount.
[5] For Type 1 applications, order interior, front, and box. For Type 3R/5/12 applications, order interior and box only. The front is included with the box.
[6] For Type 1 applications order interior, trim and box. For type 3R/5/12, order interior and box only.
[7] Remove drain screws for Type 3R rating.
[8] Suitable for use as service equipment if equipped with an integral main circuit breaker or when not more than six main disconnecting means are provided and the panelboard is not used as a lighting and appliance branch circuit panelboard.
[9] Bottom feed standard.
[10] Circuit breaker interrupt ratings, see the tables starting on page 7-29.

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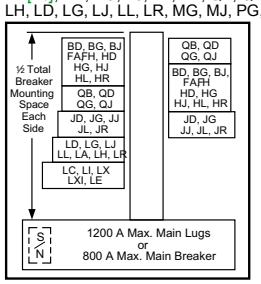
Table 9.98 Interiors, Boxes and Fronts (cont'd.)

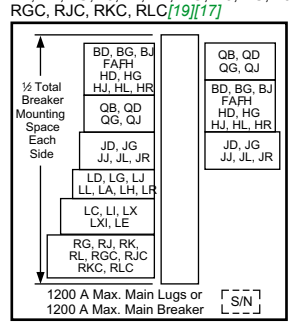
Total Circuit Breaker Mounting Space (In.)	Mains Ampere Rating	Interior Assembly (Less Branch Circuit Breakers)	Front [4]		Box [5]		Box Height (In.)
			4 Piece Trim Without Door	Trim With Door[6]	Type 1	NEMA 3R/5/12 [7] (Includes Front)	
		Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	
27	400 A	HCM14644M	HCM64T( )	HCM64T( )D	HC3264B	HC3264WP	64
36	225 A	HCM18642MN					
	600 A	HCM18736MP	HCM73T( )	HCM73T( )D	HC3273DB9[11]	Use HCP	—
	800 A	HCM18738MP					
45	400 A	HCM23734M	HCM73T( )	HCM73T( )D	HC3273B	HC3273WP	73
54	225 A	HCM27732MN					
72	600 A	HCM36916MP	HCM91T( )	HCM91T( )D	HC3291DB9[11]	Use HCP	—
	800 A	HCM36918MP					
81	400 A	HCM41914M	HCM91T( )	HCM91T( )D	HC3291B	HC3291WP	91
HCP-SU [12] **Universal Single Row Main Lugs or Main Circuit Breaker** [13] **3-pole—Suitable for use as service equipment when provided with a main circuit breaker.** [14]							
54	800	HCP54868SU	**HC2686T( )4P**	**HC2686T( )HR**[15]	HC2686DB	HC2886WP	86

TYPE HCP
800 A max. branch circuit breaker
FA [16], BD, BG, BJ, FA, FH, QB, QD, QG, QJ, HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR, LA, LH, LD, LG, LJ, LL, LR, MG, MJ, PG, PJ, PL, PGC, PJC, PLC [17]



Box Size: 42 in. Wide, 9.5 in. Deep

TYPE HCR-U Universal Mains
1200 A max. branch circuit breaker
FA [18], BD, BG, BJ, FA, FH, QB, QD, QG, QJ, HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR, LA, LH, LD, LG, LJ, LL, LR, MG, MJ, PG, PJ, PK, PL, RG, RJ, RK, RL, PGC, PJC, PKC, PLC, RGC, RJC, RKC, RLC[19][17]



Box Size: 44 in. Wide, 9.5 in. Deep

Table 9.99: Circuit Breaker / Sub-feed Lug Kit Mounting Space Requirement

Type of Circuit Breaker	Maximum Ampacity	No. of Poles	Inch Mounting Require-ments	Type of Circuit Breaker	Maximum Ampacity	No. of Poles	Inch Mounting Require-ments
FY	30	1	1.5				
FA, FH	100	1	1.5	QB, QD, QG, QJ	225	2	3
FA, FH		2	3	QB, QD, QG, QJ	225	3	4.5
FA, FH, SL-100		3	4.5	JD, JG, JJ, JL, JR, KI, SL250	250	2, 3	4.5
FI		2, 3	4.5	LA, LH, SL400	400		6
BD, BG, BJ	125	1	1.5	LD, LG, LJ, LL, LR	600		6
BD, BG, BJ		2	3	LC, LI, LXI	600		7.5
BD, BG, BJ		3	4.5	MG, MJ, MA, MH, SL800, PGC, PJC, PLC	800		9
HD, HG	150	2	3				
HD, HG		3	4.5	PG, PJ, PL, S33931	1200		
HJ, HL, HR		2, 3	4.5	RG, RJ, RL, RGC, RJC, RLC, S33930			15

[4] Add "F" for flush mount, "S" for surface mount.
[5] For Type 1 applications, order interior, front, and box. For Type 3R/5/12 applications, order interior and box only. The front is included with the box.
[6] For Type 1 applications order interior, trim and box. For type 3R/5/12, order interior and box only.
[7] Remove drain screws for Type 3R rating.
[11] DB9 box is 9.5 inches deep.
[12] For main lugs panel, order sub-feed lug kit and back-feed as main lugs.
[13] Circuit breaker interrupt ratings, see the tables starting on page 7-29.
[14] Suitable for use as service equipment if equipped with an integral main circuit breaker or when not more than six main disconnecting means are provided and the panelboard is not used as a lighting and appliance branch circuit panelboard.
[15] Hinged trim with door.
[16] FA and JDA circuit breakers with field installable ground fault kits may be mounted in type HCP, HCP-SU, and HCR-U panelboards as shown, and require L-frame mounting space.
[17] PG, PJ, and PL circuit breakers are available with both thermal-magnetic equivalent and Micrologic trip. The Micrologic circuit breakers are available 80% and 100% rated. "C" suffix denotes a 100% rating.
[18] FA and JDA circuit breakers with field installable ground fault kits may be mounted in type HCP, HCP-SU, and HCR-U panelboards as shown, and require L-frame mounting space.
[19] When RL main circuit breakers with equipment ground fault are applied on a 3Ø4W system, order solid neutral catalog number HCR12SNCT. The HCR12SNCT includes a neutral current transformer.

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Table 9.100: (1200 A Interiors Include solid neutral, all others without solid neutral) *[20]*

Total Circuit Breaker Mtg. Space (In.)	Mains Amp. Rating	Max. No. of LC, MJ, PL, RL Circuit Breakers	Interior Assembly (Less Branch Circuit Breakers)	Front *[21]*		Box *[22]*	Box Height (In.)
				4 Piece Trim Without Door *[23]*	Trim With Door		
			Catalog Number	Catalog Number	Catalog Number	Catalog Number	
HCP **Main Lugs Only—3-pole** Suitable for use as service equipment when provided with a main circuit breaker. *[24]*							
27	400	1PL	HCP14504	HCW50T( )	HCW50T( )D	HC4250DB	50
	600		HCP14506				
	800		HCP14508				
	1200		HCP145012N				
45	400	2PL	HCP23594	HCW59T( )	HCW59T( )D	HC4259DB	59
	600		HCP23596				
	800		HCP23598				
	1200		HCP235912N				
63	400	3PL	HCP32684	HCW68T( )	HCW68T( )D	HC4268DB	68
	600		HCP32686				
	800		HCP32688				
	1200		HCP326812N				
99	400	5PL	HCP50864	HCW86T( )	HCW86T( )D	HC4286DB	86
	600		HCP50866				
	800		HCP50868				
	1200		HCP508612N				
HCP **Main Circuit Breaker***[25]***—**Includes 3-pole Vertically mounted main circuit breaker—Suitable for use as service equipment.							
36	600	2LC	HCP18686M	HCW68T( )	HCW68T( )D	HC4268DB	68
	800		HCP18688M				
72	600	4LC	HCP36866M	HCW86T( )	HCW86T( )D	HC4286DB	86
	800		HCP36868M				
HCR-U **Universal Main Lugs or Main Circuit Breaker** *[26]* **—3-pole** Suitable for use as service equipment when provided with a main circuit breaker. For Main Lugs panel, order sub-feed lug kit catalog number S33930 and back feed as main lugs. For Main Circuit Breaker panel, order plug-on I-Line type PG, PJ, PL, RGC, RJC, or RLC *[27]*circuit breakers from page 9-46 through page 9-49, and back feed as the main circuit breaker. (Order solid neutral separately)							
108 *[28]*	1200	6PL or 3RLC	HCR548612U	HCR86T( )*[29]*	HCR86T( )D	HC4486DB	86

Table 9.101: Main Circuit Breaker Interiors —Standard Frame Types *[25]*

Main Circuit Breaker Ampacity	Panelboard Type	Factory Supplied Main Circuit Breaker
225	HCM	JDA36225
400	HCM	LAP36400MB
600 or 800	HCM, HCP	MGP36600 or MGP36800

Table 9.102: Standard Copper Bus Interiors

Type	Main Ampacity
HCM, HCP-SU	800
HCP, HCR-U	800 and Above

NOTE: Merchandised copper interiors are not available in all ampacities. For example, if the application calls for a HCN 225 A copper bus interior, order an HCN 600 A interior .

[20] Order solid neutral from Table 9.103 I-Line Merchandised Panelboard Accessories, page 9-37.
[21] Add “F” for flush mount, “S” for surface mount.
[22] For 42 in. wide weatherproof enclosures, see Table 9.107 Type 3R/5/12 Enclosures, page 9-38
[23] Add-on door kit available. Example: For HCW50TS trim kit, order HCW50D door kit.
[24] Suitable for use as service equipment if equipped with an integral main circuit breaker or when not more than six main disconnecting means are provided and the panelboard is not used as a lighting and appliance branch circuit panelboard.
[25] Circuit breaker interrupt ratings, see the tables starting on page 7-29.
[26] Add “F” for flush mount, “S” for surface mount.
[27] When RL main circuit breakers with equipment ground fault are applied on a 3Ø4W system, order solid neutral catalog number HCR12SNCT. The HCR12SNCT includes a neutral current transformer.
[28] 15 in. of mounting space is taken up by the back fed main lug kit or RG, RJ, RL main circuit breaker, leaving 93 in. of branch circuit breaker mounting space.
[29] Add-on door kit available. Example: For HCR86TS trim kit, order HCW86D door kit.

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Accessories

Blank Fillers Equipment Ground Bar Solid Neutral

Table 9.103: I-Line Merchandised Panelboard Accessories

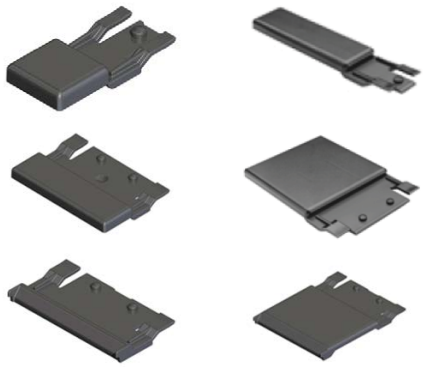
	Description	Catalog No.
Blank Filler Kit—1.5 in. *[30]* (One kit contains quantity of 3 filler places.)		HNM1BL
Blank Filler Kit—4.5 in. *[30]* (One kit contains quantity of 5 filler places.)		HNM4BL
Solid Neutral Assemblies		
	225 A	HC2SN
	400 A	HC4SN *[31]*, HCW4SN *[32]*
	600 A	HC6SN *[31]*, HCW6SN *[32]*
	800 A	HC8SN *[31]*, HCW8SN *[32]*
		HCPSU8SN *[33]*
		HCPSU8SNCW *[33]*
	1200 A	HCW12SN *[32]*
	1200 A, for use with HCR-U universal panel only	HCWM12SN *[34]*
	1200 A, including neutral Current Transformer (CT) for 3Ø4W systems	HCR12SNCTW *[34]*
Equipment Ground Bar Kits—HCJ, HCM, HCP, HCP-SU (single row), HCR-U		PK32DGTA
Blank Extensions (For replacement purposes)		
 Blank Extensions	1.5 in. for mounting on wide side of I-Line panelboard *[35]*	HLW1BL (Kit contains quantity of 3.)
	4.5 in. for mounting on wide side of I-Line panelboard *[35]*	HLW4BL (Kit contains quantity of 5.)
	1.5 in. for mounting on narrow side of I-Line panelboard *[36]*	HLN1BL (Kit contains quantity of 3.)
	4.5 in. for mounting on narrow side of I-Line panelboard *[35]*	HLN4BL (Kit contains quantity of 5.)
	4.5 in. for mounting on wide side of I-Line panelboard *[35]*	HLW4EBL (Kit contains quantity of 5.)
	4.5 in. for mounting on narrow side of I-Line panelboard *[36]*	HLN4EBL (Kit contains quantity of 5.)

Table 9.104: Blank Extensions

Application	Circuit Breaker Mounting Ht.	Branch Circuit Side	Catalog Number
All applications, except Powerpact H/J with Micrologic trip unit 5/6	1.5 in.	Wide Side	HLW1BL
	4.5 in.		HLW4BL
All applications, except Powerpact H/J with Micrologic trip unit 5/6	1.5 in.	Narrow Side	HLN1BL
	4.5 in.		HLN4BL
Only Powerpact H/J circuit breakers with Micrologic trip unit 5/6	4.5 in.	Narrow Side	HLN4EBL
Only Powerpact H/J circuit breakers with Micrologic trip unit 5/6	4.5 in.	Wide Side	HLW4EBL

[30] Blank extension and blank filler pricing is per kit. See note on kit number for number included in each kit.
[31] Used on Type HCJ, HCN, HCM.
[32] Used on 400 A, 600 A, 800 A, and 1200 A HCP (main lugs), and 600 A and 800 A (main circuit breaker).
[33] Used on Type HCP-SU (single row).
[34] Used on Type HCR-U.
[35] Blank extension and blank filler pricing is per kit. See note on kit number for number included in each kit.
[36] Blank extension pricing is per unit. Multiply the list price by the quantity ordered. Note minimum order quantity.

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Table 9.105: Solid Neutral Lug Quantities and Sizes

Solid Neutral Assembly	Terminal Wire Range
HC2SN	(9)-#14-1/0, (1)-#6-300, (45)-#14-#4
HC4SN	(7)-#6 - 350, (45)-#14 - #4
HC6SN, HC6SNCU	(9)-#14 - 1/0, (7)-#6 - 350, (28)-#14 - #4
HC8SN	(9)-#14 - 1/0, (7)-#6 - 350, (34)-#14 - #4
HC8SNCU	(9)-#14 - 1/0, (7)-#6 - 350, (28)-#14 - #4
HCW12SN	(9)-#14 - 1/0, (7)-#6 - 350, (34)-#14 - #4, (4)-3/0-750
HCW12SNCU	(9)-#14 - 1/0, (7)-#6 - 350, (28)-#14 - #4, (4)-2/0-500
HCW4SN	(2)-#4-600, (7)-#6-350, (45)-#14-#4
HCW4SNCU	(9)-#14 - 1/0, (7)-#6 - 350, (28)-#14 - #4, (2)-#2-600
HCW6SN	(9)-#14 - 1/0, (7)-#6 - 350, (34)-#14 - #4, (4)-3/0-750
HCW6SNCU	(9)-#14 - 1/0, (7)-#6 - 350, (28)-#14 - #4, (2)-#2-600
HCW8SN	(9)-#14 - 1/0, (7)-#6 - 350, (34)-#14 - #4, (4)-3/0-750
HCW8SNCU	(9)-#14 - 1/0, (7)-#6 - 350, (28)-#14 - #4, (4)-3/0-750
HCWM12SN	(9)-#14 - 1/0, (7)-#6 - 350, (34)-#14 - #4, (4)-3/0-750
HCPSU8SN	(7) #6-350, (34) #4- #14, (9) #14-1/0
HCPSU8SNCW	(3) 3/0-750, (7) #6-350, (34) #14-#4, (9) #14-1/0

Table 9.106: Panelboard Adapter Kits

Crimp Lug Adapter Kits *[37]*	I-Line Panelboard Type	
	HCM	HCP, HCR-U *[38]*
400 A	HCM400VCA	HCW400VCA
600 A	HCM600VCA	HCW600VCA
800 A	HCM800VCA	HCW800VCA
1200 A	—	HCW1200VCA

Table 9.107: Type 3R/5/12 Enclosures

Catalog Number	Interior Type	Dimensions (In.)		
		H	W	D
HC4250WP	HCP	50	42	12.95
HC4259WP	HCP	59	42	12.95
HC4268WP	HCP	68	42	12.95
HC4286WP	HCP	86	42	12.95
HC4486WP	HCR-U	86	44	14.50

Table 9.108: Box Extensions

	Catalog Number	Interior Type	Extension
	HC2609DEX (F or S)	HCP-SU	9 in.
	HC3209EX (F or S)	HCM	9 in.
	HC4212DEX (F or S)	HCP	12 in.
	HC4406DEX (F or S)	HCR-U	6 in.
	HC4412DEX (F or S)	HCR-U	12 in.

Sub-feed Lug Kits

[37] For use with MLO panel, order VCEL lugs seperately.
[38] Not for use with P- or R-frame circuit breakers or sub-feed kits S33930 or S33931.

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Table 9.109: Sub-feed Lug Kits *[39][40][41]*

Ampere Rating	Height		Catalog Number	Max. Short Circuit System Ratings RMS Symmetrical Amperes			Protected by Circuit Breaker	For Use in I-Line Panelboard Types
	In.	(mm)		240 Vac	480 Vac	600 Vac		
100 A	4.5	114	SL100	100,000	65,000	18,000	FA, FH, FD, FG, FJ	HCM, HCP, HCP-SU, HCR-U
250 A	4.5	114	SL250	200,000	200,000	100,000	FA, FD, FG, FH, FJ, HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR, KI	HCM, HCP, HCP-SU, HCR-U
400 A	6	152	SL400 *[41]*	200,000	200,000	100,000	FA, FD, FG, FH, FJ, KA, KH, KC, KI, HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR, LA, LH, LC, LX, LI, LXI, DG, DJ, DL, LD, LG, LJ, LL, LR ("L" & "D" FRAME 400 A MAX.)	HCP, HCP-SU, HCR-U (wide side only)
800 A	9	229	SL800	200,000	100,000	50,000	FA, FD, FG, FH, FJ, KA, KH, KC, KI, HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR, LA, LH, LC, LX, LI, LXI, MA, MH, MX, DG, DJ, DL, LD, LG, LJ, LL, LR	HCM, HCP, HCP-SU, HCR-U
800 A	9	229	SL800M5	125,000	100,000	25,000	FA, FD, FG, FH, FJ, KA, KH, KC, KI, HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR, MA, MH, MX, MG, PG, MJ, PJ, PK, PL, DG, DJ, DL, LD, LG, LJ, LL, LR	HCM, HCP, HCP-SU, HCR-U
1200 A	9	229	S33931	125,000	100,000	50,000	FA, FD, FG, FH, FJ, KA, KH, KC, KI, HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR, LA, LH, LC, LX, LI, LXI, MA, MH, MX, MG, PG, MJ, PJ, PK, PL, DG, DJ, DL, LD, LG, LJ, LL, LR	HCP, HCP-SU, HCR-U
1200 A	15	381	S33930	125,000	100,000	50,000	FA, FD, FG, FH, FJ, KA, KH, KC, KI, HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR, LA, LH, LC, LX, LI, LXI, MA, MH, MX, NA, NC, NX, MG, PG, MJ, PJ, PK, PL, RG, RJ, RL, RK, DG, DJ, DL, LD, LG, LJ, LL, LR	HCR-U
1200 A	9	229	SL1200P5, SL1200P6, SL1200P7	125,000	100,000	50,000	FA, FD, FG, FH, FJ, KA, KH, KC, KI, HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR, MG, PG, MJ, PJ, PK, PL, RG, RJ, RL, RK, DG, DJ, DL, LD, LG, LJ, LL, LR	HCP, HCP-SU, HCR-U

NOTE: S33930, S33931, SL1200P5, SL1200P6, SL1200P7, SL Kits are rated 1200 A and may be applied to 1200 ampere loads when installed into HCRU panelboards. However, when installed into HCP and HCPSU panelboards they are only rated 800 amperes maximum due to restricted wire bending space.

For Surgelogic™ I-Line plug-on SPD information, starting on Digest page .
For field-installable I-Line door kits, see the Supplemental and Obsolescence Digest, Section 4.

Table 9.110: Sub-feed Lug kit terminal data

Catalog No. (Prefix)	No. Poles	Ampere Rating	Standard Lug Wire Size *[42]*
SL100	3	100	#14–1/0 AWG Cu or #12–1/0 AWG Al
SL250	3	250	1– #4 AWG–300 kcmil
SL400	3	400	1– #1 AWG–600 kcmil or 2– #1 AWG–250 kcmil
SL800	3	800	3– #3/0 AWG–500 kcmil
SL800M5	3	800	3– #3/0 AWG–500 kcmil
S33931	3	1200	4– #3/0 AWG–500 kcmil
S33930	3	1200	4– #3/0 AWG–600 kcmil
SL1200P5	3	1200	4– #3/0 AWG–500 kcmil
SL1200P6	3	1200	3– 350–600 kcmil
SL1200P7	3	1200	3– #3/0 AWG–750 kcmil

[39] Plug-on in same manner as a branch circuit breaker
[40] For other ratings, see the latest edition of I-Line Information Manual, #80043-309-xx.
[41] SL400 cannot be used in HCM panelboards due to inadequate wire bending space.
[42] Unless otherwise specified, wire sizes apply to both aluminum and copper conductors.

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PowerPact™ B-frame

Table 9.111: B-frame Interrupting Rating

D - SCCR	Interrupting Rating			
	D	G	J	K
240 Vac	25 kA	65 kA	100 kA	100 kA
480/277 Vac	18 kA	35 kA	65 kA	65 kA
480 Vac	18 kA	35 kA	65 kA	65 kA
600Y/347 Vac	14 kA	18 kA	25 kA	65 kA

Table 9.112: PowerPact B-frame, 125A max, Thermal Magnetic UL Circuit Breaker (PowerPact B-frame 1–pole branch circuit breakers utilize 1.5" of I-Line mounting space, 2–pole branch circuit breakers utilize 3" of I-Line mounting space and 3–pole B-frame circuit breakers utilize 4.5" of I-Line mounting space.)

D - SCCR					
480Y/277 Vac	1-pole	2-pole	3-pole	Fixed AC Magnetic Trip	
Amps	277 Vac	480/277 Vac	480/277 Vac	Hold	Trip
15	BDA14015	BDA24015Y	BDA34015Y	400 A	600 A
20	BDA14020	BDA24020Y	BDA34020Y	400 A	600 A
25	BDA14025	BDA24025Y	BDA34025Y	400 A	600 A
30	BDA14030	BDA24030Y	BDA34030Y	400 A	600 A
35	BDA14035	BDA24035Y	BDA34035Y	400 A	600 A
40	BDA14040	BDA24040Y	BDA34040Y	400 A	600 A
45	BDA14045	BDA24045Y	BDA34045Y	400 A	600 A
50	BDA14050	BDA24050Y	BDA34050Y	480 A	720 A
60	BDA14060	BDA24060Y	BDA34060Y	640 A	960 A
70	BDA14070	BDA24070Y	BDA34070Y	640 A	960 A
80	BDA14080	BDA24080Y	BDA34080Y	800 A	1200 A
90	BDA14090	BDA24090Y	BDA34090Y	1000 A	1500 A
100	BDA14100	BDA24100Y	BDA34100Y	1000 A	1500 A
110	BDA14110	BDA24110Y	BDA34110Y	1000 A	1500 A
125	BDA14125	BDA24125Y	BDA34125Y	1000 A	1500 A
G - SCCR					
480Y/277 Vac	1-pole	2-pole	3-pole	Fixed AC Magnetic Trip	
Amps	277 Vac	480/277 Vac	480/277 Vac	Hold	Trip
15	BGA14015	BGA24015Y	BGA34015Y	400 A	600 A
20	BGA14020	BGA24020Y	BGA34020Y	400 A	600 A
25	BGA14025	BGA24025Y	BGA34025Y	400 A	600 A
30	BGA14030	BGA24030Y	BGA34030Y	400 A	600 A
35	BGA14035	BGA24035Y	BGA34035Y	400 A	600 A
40	BGA14040	BGA24040Y	BGA34040Y	400 A	600 A
45	BGA14045	BGA24045Y	BGA34045Y	400 A	600 A
50	BGA14050	BGA24050Y	BGA34050Y	480 A	720 A
60	BGA14060	BGA24060Y	BGA34060Y	640 A	960 A
70	BGA14070	BGA24070Y	BGA34070Y	640 A	960 A
80	BGA14080	BGA24080Y	BGA34080Y	800 A	1200 A
90	BGA14090	BGA24090Y	BGA34090Y	1000 A	1500 A
100	BGA14100	BGA24100Y	BGA34100Y	1000 A	1500 A
110	BGA14110	BGA24110Y	BGA34110Y	1000 A	1500 A
125	BGA14125	BGA24125Y	BGA34125Y	1000 A	1500 A
J - SCCR					
600Y/347 Vac	1-pole	2-pole	3-pole	Fixed AC Magnetic Trip	
Amps	347 Vac	600Y/347 Vac	600Y/347 Vac	Hold	Trip
15	BJA16015	BJA26015	BJA36015	400 A	600 A
20	BJA16020	BJA26020	BJA36020	400 A	600 A
25	BJA16025	BJA26025	BJA36025	400 A	600 A
30	BJA16030	BJA26030	BJA36030	400 A	600 A
35	BJA16035	BJA26035	BJA36035	400 A	600 A
40	BJA16040	BJA26040	BJA36040	400 A	600 A
45	BJA16045	BJA26045	BJA36045	400 A	600 A
50	BJA16050	BJA26050	BJA36050	480 A	720 A
60	BJA16060	BJA26060	BJA36060	640 A	960 A
70	BJA16070	BJA26070	BJA36070	640 A	960 A
80	BJA16080	BJA26080	BJA36080	800 A	1200 A
90	BJA16090	BJA26090	BJA36090	1000 A	1500 A
100	BJA16100	BJA26100	BJA36100	1000 A	1500 A
110	BJA16110	BJA26110	BJA36110	1000 A	1500 A
125	BJA16125	BJA26125	BJA36125	1000 A	1500 A

Coming Soon
Coming Soon
Coming Soon

F-frame

Table 9.113: QO™ Distribution Panel—240 Vac Max. Only Mounts in Type HCM, HCP, HCP-SU, or HCR-U I-Line panelboards, 30 A max. branch circuit breaker.

Maximum No. 1-pole QO Circuit Breakers	Phase Connection	Mounting Height		2-pole Catalog Number	3-pole Catalog Number
		In.	mm		
6	AB	4.5	114	HQO206AB	—
6	BC	4.5	114	HQO206BC	—
6	AC	4.5	114	HQO206AC	—
6	ABC	4.5	114	—	HQO306

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FA/FH, 1-pole
1.5 in (38 mm)
Mounting Height

FA/FH, 2-pole
3 in (76 mm)
Mounting Height

FA/FH, 3-pole
4.5 in (114 mm)
Mounting Height

Table 9.114: Example: BD, 20 A 1-Pole, 277 Vac and 90 A 2- and 3- Pole BD 240 Vac. Use phase option number for BD, BG, BJ, HD, HG, HJ, HL, HR, JD, JG, JJ, JL, JR, MG, and MJ.

Phase Option Number	Phase Connection	1-pole	2-pole	3-pole
1	A	FJA140201	—	—
3	B	FJA140203	—	—
5	C	FJA140205	—	—
1	AB	—	QBA220701	—
2	AC	—	QBA220702	—
3	BA	—	QBA220703	—
4	BC	—	QBA220704	—
5	CA	—	QBA220705	—
6	CB	—	QBA220706	—
Standard *[1]*	ABC	—	—	QBA32070
6	CBA	—	—	QBA320706

Table 9.115: Example: FA, 30 A, 480 Vac. Use phase option letters for FA, FH, LA, and LH.

Phase Option Letter	1-pole	2-pole	3-pole
A	FA14035A	—	—
B	FA14035B	—	—
C	FA14035C	—	—
AB	—	FA24030AB	—
AC	—	FA24030AC	—
BC	—	FA24030BC	—
ABC	—	—	FA34030
CBA	—	—	FA34030CBA

Table 9.116: Interrupt Ratings (kA)

	FA (240 V)	FA (480 V)	FJ
240 V	10	18 (1P), 25 (2, 3P)	65
277 V	—	18	65
480 V	—	18	—
600 V	—	—	—

F-frame accessories starting on Supplemental Digest Section 3.

Table 9.117: F-frame—100 A, Thermal-magnetic (240 Vac)

40 A Ampere Rating	AC Magnetic Trip Settings Hold	AC Magnetic Trip Settings Trip	FA22040( ) Standard Interrupting Catalog Number	Terminal Wire Range
2-pole, 240 Vac *[2]*				
15 A	275	600	FA22015( )	AL50FA #14–#4 AWG Cu or #12–#4 AWG Al
20 A			FA22020( )	
25 A			FA22025( )	
30 A			FA22030( )	
35 A	400	850	FA22035( )	AL100FA #14–#1/0 AWG Cu or #12–#1/0 AWG Al
45 A			FA22045( )	
50 A			FA22050( )	
60 A	800	1450	FA22060( )	
70 A			FA22070( )	
80 A			FA22080( )	
90 A	900	1700	FA22090( )	
100 A			FA22100( )	
3-pole, 240 Vac				
15 A	275	600	FA32015	AL50FA #14–#4 AWG Cu or #12–#4 AWG Al
20 A			FA32020	
25 A			FA32025	
30 A			FA32030	
35 A	400	850	FA32035	AL100FA #14–#1/0 AWG Cu or #12–#1/0 AWG Al
40 A			FA32040	
45 A			FA32045	
50 A			FA32050	
60 A	800	1450	FA32060	AL100FA #14–#1/0 AWG Cu or #12–#1/0 AWG Al
70 A			FA32070	
80 A			FA32080	
90 A	900	1700	FA32090	AL100FA #14–#1/0 AWG Cu or #12–#1/0 AWG Al
100 A			FA32100	

Table 9.118: F-frame—100 A, Thermal-magnetic (480 Vac)

Ampere Rating	AC Magnetic Trip Settings Hold	AC Magnetic Trip Settings Trip	Standard Interrupting Catalog Number	Extra High Interrupting Catalog Number	Terminal Wire Range FY/FA Lugs	Terminal Wire Range FJ/FC Lugs
1-pole, 277 Vac, 125 Vdc *[3]*						
15 A	275	600	FY14015( ) *[4]*	FJA14015( )	AL50FA #14-#4 AWG Cu, or #12-#4 AWG Al	AL30FD #12–#6 AWG Al, or #14–#6 AWG Cu
20 A			FY14020( ) *[4]*	FJA14020( )		
25 A			FY14025( ) *[4]*	FJA14025( )		
30 A			FY14030( ) *[4]*	FJA14030( )		
35 A	400	850	FA14035( )	FJA14035( )	AL100FA #14–#1/0 AWG Cu or #12–#1/0 AWG Al	AL100FD #12–#2/0 AWG Al or
40 A			FA14040( )	FJA14040( )		

[1] The absence of a phase option number after a 3-pole catalog number will result in an ABC phase connection.
[2] 1- and 2-pole circuit breaker catalog numbers are completed by adding the required phase connection letters as a suffix.
[3] 1- and 2-pole circuit breaker catalog numbers are completed by adding the required phase connection letters as a suffix.
[4] Rated 277 Vac 15 and 20 A FY circuit breakers are rated for switching duty (SWD). 15, 20, 25, and 30 A FA I-Line circuit breakers are also available (no SWD rating).

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Table 9.118 F-frame—100 A, Thermal-magnetic (480 Vac) (cont'd.)

Ampere Rating	AC Magnetic Trip Settings		Standard Interrupting	Extra High Interrupting	Terminal Wire Range	
	Hold	Trip	Catalog Number	Catalog Number	FY/FA Lugs	FJ/FC Lugs
45 A			FA14045( )	FJA14045( )		#14–#2/0 AWG Cu
50 A			FA14050( )	FJA14050( )		
60 A	800	1450	FA14060( )	FJA14060( )		
70 A			FA14070( )	FJA14070( )		
80 A			FA14080( )	—		
90 A	900	1700	FA14090( )	—		
100 A			FA14100( )	—		
2-pole, 480 Vac, 250 Vdc *[5][6][7]*						
15 A	275	600	FA24015( )	—	AL50FA #14–#4 AWG Cu or #12–#4 AWG Al	CU30FA4 one #14–#10 AWG Cu only
20 A			FA24020( )	—		
25 A			FA24025( )	—		
30 A			FA24030( )	—		
35 A	400	850	FA24035( )	—	AL100FA #14–#1/0 AWG Cu or #12–#1/0 AWG Al	AL100FA4 one #14–#3 AWG Cu or one #12–#1 AWG Al
40 A			FA24040( )	—		
45 A			FA24045( )	—		
50 A			FA24050( )	—		
60 A	800	1450	FA24060( )	—		
70 A			FA24070( )	—		
80 A			FA24080( )	—		
90 A	900	1700	FA24090( )	—		
100 A			FA24100( )	—		
3-pole, 480 Vac, 250 Vdc *[5]*						
15 A	275	600	FA34015	—	AL50FA #14–#4 AWG Cu or #12–#4 AWG Al	CU30FA4 one #14–#10 AWG Cu only
20 A			FA34020	—		
25 A			FA34025	—		
30 A			FA34030	—		
35 A	400	850	FA34035	—	AL100FA #14–#1/0 AWG Cu or #12–#1/0 AWG Al	AL100FA4 one #14–#3 AWG Cu or one #12–#1 AWG Al
40 A			FA34040	—		
45 A			FA34045	—		
50 A			FA34050	—		
60 A	800	1450	FA34060	—		
70 A			FA34070	—		
80 A			FA34080	—		
90 A	900	1700	FA34090	—		
100 A			FA34100	—		

[5] 1- and 2-pole circuit breaker catalog numbers are completed by adding the required phase connection letters as a suffix.
[6] Rated 277 Vac 15 and 20 A FY circuit breakers are rated for switching duty (SWD). 15, 20, 25, and 30 A FA I-Line circuit breakers are also available (no SWD rating).
[7] Rated 277 Vac, 125 Vdc, except FY circuit breakers, which have no dc rating.
15–30 A circuit breakers suitable for use with 60 °C or 75 °C conductors. 35–100 A circuit breakers are suitable for use with 75 °C conductors.

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F-frame, PowerPact Q-frame for I-Line™ Panelboards and Switchboards

FI36100
2- and 3-pole
4.5 in (114 mm)
Mounting Height

QB/QD/QG/QJ
Mounting Height:
2-pole,Âî3 in (76 mm)
3-pole,Âî4.5 in (114 mm)

Table 9.119: F-frame—100 A, Thermal-magnetic (600 Vac)

Ampere Rating	AC Magnetic Trip Settings		Standard Interrupting	High Interrupting	Current Limiting	Terminal Wire Range
	Hold	Trip	Catalog Number	Catalog Number	Catalog Number	
1-pole, 277 Vac, 125 Vdc *[1]*						
15 A	275	600	—	FH16015( )	—	AL50FA #14–#4 AWG Cu or #12–#4 AWG Al
20 A			—	FH16020( )	—	
25 A			—	FH16025( )	—	
30 A			—	FH16030( )	—	
35 A	400	850	—	FH16035( )	—	AL100FA #14–#1/0 AWG Cu or #12–#1/0 AWG Al
40 A			—	FH16040( )	—	
45 A			—	FH16045( )	—	
50 A			—	FH16050( )	—	
60 A	800	1450	—	FH16060( )	—	
70 A			—	FH16070( )	—	
80 A			—	FH16080( )	—	
90 A	900	1700	—	FH16090( )	—	
100 A			—	FH16100( )	—	
2-pole, 600 Vac, 250 Vdc *[1]*						
15 A	275	600	FA26015( )	FH26015( )	—	AL50FA #14–#4 AWG Cu or #12–#4 AWG Al
20 A			FA26020( )	FH26020( )	FI26020( )	
25 A			FA26025( )	FH26025( )	—	
30 A			FA26030( )	FH26030( )	FI26030( )	
35 A	400	850	FA26035( )	FH26035( )	—	AL100FA #14–#1/0 AWG Cu or #12–#1/0 AWG Al
40 A			FA26040( )	FH26040( )	FI26040( )	
45 A			FA26045( )	FH26045( )	—	
50 A			FA26050( )	FH26050( )	FI26050( )	
60 A	800	1450	FA26060( )	FH26060( )	FI26060( )	
70 A			FA26070( )	FH26070( )	FI26070( )	
80 A			FA26080( )	FH26080( )	FI26080( )	
90 A	900	1700	FA26090( )	FH26090( )	FI26090( )	
100 A			FA26100( )	FH26100( )	FI26100( )	
3-pole, 600 Vac, 250 Vdc						
15 A	275	600	FA36015	FH36015	—	AL50FA #14–#4 AWG Cu or #12–#4 AWG Al
20 A			FA36020	FH36020	FI36020	
25 A			FA36025	FH36025	—	
30 A			FA36030	FH36030	FI36030	
35 A	400	850	FA36035	FH36035	—	AL100FA #14–#1/0 AWG Cu or #12–#1/0 AWG Al
40 A			FA36040	FH36040	FI36040	
45 A			FA36045	FH36045	—	
50 A			FA36050	FH36050	FI36050	
60 A	800	1450	FA36060	FH36060	FI36060	
70 A			FA36070	FH36070	FI36070	
80 A			FA36080	FH36080	FI36080	
90 A	900	1700	FA36090	FH36090	FI36090	
100 A			FA36100	FH36100	FI36100	

NOTE: As of January 1st, FI breakers will only fit on the wide side of I-Line panelboards.

Table 9.120: PowerPact™ Q-frame— 225 A, Thermal-magnetic (240 Vac)
(PowerPact Q-frame 2–pole branch circuit breakers utilize 3" of I-Line mounting space and 3–pole Q-frame circuit breakers utilize 4.5" of I-Line mounting space.)

Ampere Rating	AC Magnetic Trip Settings		"B" Interrupting	"D" Interrupting	"G" Interrupting	"J" Interrupting
	Hold	Trip	Catalog Number	Catalog Number	Catalog Number	Catalog Number
2-pole, 240 Vac *[2]*.						
70 A	1000	1800	QBA22070( )	QDA22070( )	QGA22070( )	QJA22070( )
80 A			QBA22080( )	QDA22080( )	QGA22080( )	QJA22080( )
90 A			QBA22090( )	QDA22090( )	QGA22090( )	QJA22090( )
100 A	1200	2400	QBA22100( )	QDA22100( )	QGA22100( )	QJA22100( )
110 A			QBA22110( )	QDA22110( )	QGA22110( )	QJA22110( )
125 A			QBA22125( )	QDA22125( )	QGA22125( )	QJA22125( )
150 A			QBA22150( )	QDA22150( )	QGA22150( )	QJA22150( )
175 A			QBA22175( )	QDA22175( )	QGA22175( )	QJA22175( )
200 A			QBA22200( )	QDA22200( )	QGA22200( )	QJA22200( )
225 A			QBA22225( )	QDA22225( )	QGA22225( )	QJA22225( )
3-pole, 240 Vac *[3]*						
70 A	1000	1800	QBA32070( )	QDA32070( )	QGA32070( )	QJA32070( )

[1] 1- and 2-pole circuit breaker catalog numbers are completed by adding the required connection letters as a suffix, see F-frame, page 9-40.
[2] 2-pole QB, QD, QG, and QJ circuit breakers are completed by adding the required phasing numbers as indicated in the parentheses, see F-frame, page 9-40
[3] 3-pole QB, QD, QG, and QJ circuit breakers for ABC phasing are complete without additional phasing number. For CBA phasing, complete the catalog number by inserting the number “6” in the parentheses.

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Table 9.120 PowerPact™ Q-frame— 225 A, Thermal-magnetic (240 Vac)(PowerPact Q-frame 2–pole branch circuit breakers utilize 3" of I-Line mounting space and 3–pole Q-frame circuit breakers utilize 4.5" of I-Line mounting space.) (cont'd.)

Ampere Rating	AC Magnetic Trip Settings		"B" Interrupting	"D" Interrupting	"G" Interrupting	"J" Interrupting
	Hold	Trip	Catalog Number	Catalog Number	Catalog Number	Catalog Number
80 A			QBA32080( )	QDA32080( )	QGA32080( )	QJA32080( )
90 A			QBA32090( )	QDA32090( )	QGA32090( )	QJA32090( )
100 A			QBA32100( )	QDA32100( )	QGA32100( )	QJA32100( )
110 A			QBA32110( )	QDA32110( )	QGA32110( )	QJA32110( )
125 A			QBA32125( )	QDA32125( )	QGA32125( )	QJA32125( )
150 A	1200	2400	QBA32150( )	QDA32150( )	QGA32150( )	QJA32150( )
175 A			QBA32175( )	QDA32175( )	QGA32175( )	QJA32175( )
200 A			QBA32200( )	QDA32200( )	QGA32200( )	QJA32200( )
225 A			QBA32225( )	QDA32225( )	QGA32225( )	QJA32225( )

See *[4]* below.

Table 9.121: Interrupt Ratings (kA)

	FA	FH	FI	QB	QD	QG	QJ *[5]*	HD/JD	HG/JG	HI/JJ	HL/JL
240 V	25	25 (1P 35–100 A), 65 (1P 15–30 A, 2P, 3P)	200	10	25	65	100	25	65	100	125
480 V	18	25 (2, 3P)		—	—	—	—	18	35	65	100
600 V	14	18 (2, 3P)	100	—	—	—	—	14	18	25	50

F-frame, see Supplemental Digest Section 3
Q-frame accessories Digest Section 7
Q-frame dimensions Digest Section 7
Q-frame optional lugs Supplemental Digest Section 3

H- and J-frame for I-Line™ Panelboards and Switchboards

Table 9.122: H-frame 150 A Thermal-Magnetic UL Current-Limiting *[6]* Circuit Breakers (600 Vac, 250 Vdc) With Factory Sealed Trip Unit *[7]* Suitable for Reverse Connection *[7]*

(PowerPact HD and HG 2–pole circuit breakers utilize 3" of I-Line mounting space, HJ and HL 2–pole circuit breakers utilize 4.5" of I-Line mounting space, all 3–pole H and J-frame circuit breakers utilize 4.5" of I-Line mounting space.)

Current Rating @ 40° C	Fixed AC Magnetic Trip		Cat. No. *[8]*	Terminal Wire Range
	Hold	Trip		
H-frame, 150A 2P, 600 Vac 50/60 Hz, 250 Vdc *[9]*				
15 A	350 A	750 A	H( )A26015( )	AL150HD 14–3/0 AWG Al or Cu
20 A	350 A	750 A	H( )A26020( )	
25 A	350 A	750 A	H( )A26025( )	
30 A	350 A	750 A	H( )A26030( )	
35 A	400 A	850 A	H( )A26035( )	
40 A	400 A	850 A	H( )A26040( )	
45 A	400 A	850 A	H( )A26045( )	
50 A	400 A	850 A	H( )A26050( )	
60 A	800 A	1450 A	H( )A26060( )	
70 A	800 A	1450 A	H( )A26070( )	
80 A	800 A	1450 A	H( )A26080( )	
90 A	800 A	1450 A	H( )A26090( )	
100 A	800 A	1700 A	H( )A26100( )	
110 A	900 A	1700 A	H( )A26110( )	
125 A	900 A	1700 A	H( )A26125( )	
150 A	900 A	1700 A	H( )A26150( )	
H-frame 150A 3P, 600 Vac 50/60 Hz, 250 Vdc				
15 A	350 A	750 A	H( )A36015	AL150HD 14–3/0 AWG Al or Cu
20 A	350 A	750 A	H( )A36020	
25 A	350 A	750 A	H( )A36025	
30 A	350 A	750 A	H( )A36030	
35 A	400 A	850 A	H( )A36035	
40 A	400 A	850 A	H( )A36040	
45 A	400 A	850 A	H( )A36045	
50 A	400 A	850 A	H( )A36050	
60 A	800 A	1450 A	H( )A36060	
70 A	800 A	1450 A	H( )A36070	
80 A	800 A	1450 A	H( )A36080	
90 A	800 A	1450 A	H( )A36090	
100 A	800 A	1700 A	H( )A36100	
110 A	900 A	1700 A	H( )A36110	
125 A	900 A	1700 A	H( )A36125	
150 A	900 A	1700 A	H( )A36150	

[4] Replacement lugs are not available on QB, QD, QG, or QJ circuit breakers. Lugs for QB, QD, QG, or QJ circuit breakers accept one #4 AWG–300 kcmil. No accessories are available for PowerPact Q Frame breakers.
[5] 3-pole QJ circuit breakers are rated at 208Y/120 Vac only.
[6] Circuit breakers with J, L, and R interrupting ratings are UL certified as current limiting.
[7] See Supplemental Digest Section 3 for circuit breakers with field-interchangeable trip units.
[8] To complete catalog number, replace the blank with the appropriate rating (D, G, J, L).
[9] 2 pole circuit breaker catalog numbers are completed by adding the required phase connection number as a suffix see Table 9.128, page 9-46.

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Table 9.123: J-frame 250 A Thermal-Magnetic UL Current-Limiting *[10]* Circuit Breakers (600 Vac, 250 Vdc) With Factory Sealed Trip Unit *[11]* Suitable for Reverse Connection *[11]*
(All PowerPact J-frame circuit breakers, both 2– and 3–pole, utilize 4.5" of I-Line mounting space.)

Current Rating @ 40°C	Adjustable AC Magnetic Trip		Cat. No. *[12]*	Terminal Wire Range
	Low	High		
J-frame 250A 2P, 600 Vac 50/60 Hz, 250 Vdc *[13]*				
150 A	750 A	1500 A	J( )A26150( )	AL175JD 4–4/0 AWG Al or Cu
175 A	875 A	1750 A	J( )A26175( )	
200 A	1000 A	2000 A	J( )A26200( )	AL250JD 3/0 AWG–350 kcmil Al or Cu
225 A	1125 A	2250 A	J( )A26225( )	
250 A	1250 A	2500 A	J( )A26250( )	
J-frame 250A 3P, 600 Vac 50/60 Hz, 250 Vdc				
150 A	750 A	1500 A	J( )A36150	AL175JD 4–4/0 AWG Al or Cu
175 A	875 A	1750 A	J( )A36175	
200 A	1000 A	2000 A	J( )A36200	AL250JD 3/0 AWG–350 kcmil Al or Cu
225 A	1125 A	2250 A	J( )A36225	
250 A	1250 A	2500 A	J( )A36250	

Table 9.124: H-frame 150 A and J-frame 250 A Electronic Trip UL Current-Limiting *[10]* Circuit Breakers
(600 Vac) With Factory Sealed Trip Unit *[11]* Suitable for Reverse Connection *[14]*
(PowerPact Electronic Trip H- and J-frame circuit breakers utilize 4.5" of I-Line mounting space.)

Electronic Trip Unit			Sensor Rating	Cat. No. *[12]*	Terminal
Type	Function	Trip Unit			
600 Vac, 50/60 Hz, 3P					
Micrologic Standard	LI	3.2 *[15]*	60 A	H( )A36060U31X	AL150HD *[16]*
			100 A	H( )A36100U31X	
			150 A	H( )A36150U31X	
			250 A	J( )A36250U31X	AL250JD *[17]*
	LSI	3.2S *[15]*	60 A	H( )A36060U33X	AL150HD *[16]*
			100 A	H( )A36100U33X	
			150 A	H( )A36150U33X	
			250 A	J( )A36250U33X	AL250JD *[17]*
Micrologic Ammeter	LSI	5.2A	60 A	H( )A36060U43X	AL150HD *[16]*
			100 A	H( )A36100U43X	
			150 A	H( )A36150U43X	
			250 A	J( )A36250U43X	AL250JD *[17]*
Micrologic Energy	LSI	5.2E	60 A	H( )A36060U53X	AL150HD *[16]*
			100 A	H( )A36100U53X	
			150 A	H( )A36150U53X	
			250 A	J( )A36250U53X	AL250JD *[17]*
Micrologic Ammeter	LSIG	6.2A	60 A	H( )A36060U44X	AL150HD *[16]*
			100 A	H( )A36100U44X	
			150 A	H( )A36150U44X	
			250 A	J( )A36250U44X	AL250JD *[17]*
Micrologic Energy	LSIG	6.2E	60 A	H( )A36060U54X	AL150HD *[16]*
			100 A	H( )A36100U54X	
			150 A	H( )A36150U54X	
			250 A	J( )A36250U54X	AL250JD *[17]*

Table 9.125: Interrupt Ratings (kA)

	D	G	J	L
240 V	25	65	100	125
480 V	18	35	65	100
600 V	14	18	25	50

[10] Circuit breakers with J, L, and R interrupting ratings are UL certified as current limiting.
[11] See Supplemental Digest Section 3 for circuit breakers with field-interchangeable trip units.
[12] To complete catalog number, replace the blank with the appropriate rating (D, G, J, L).
[13] 2 pole circuit breaker catalog numbers are completed by adding the required phase connection number as a suffix see Table 9.128, page 9-46.
[14] For applications requiring communications, see page 7-63.
[15] 3P circuit breakers with this trip unit can be used for 2P applications.
[16] AL150HD wire range is 14–3/0 AWG Al or Cu.
[17] AL250JD wire range is 3/0 AWG–350 kcmil Al or Cu. For smaller wire range (4–4/0 AWG Al or Cu), replace the lug's wire binding screws with the larger binding screws provided.

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J-frame Mission Critical Circuit Breaker

Table 9.126: J-frame 250 A Electronic Trip Mission Critical Circuit Breakers (480/277 Vac) With Factory Sealted Trip Units Suitable for Reverse Connection *[18]*

Electronic Trip Unit Type	Trip Function	Trip Unit	Continuous Current	D Interrupting	G Interrupting	J Interrupting	L Interrupting	Terminal
				Cat. No.	Cat. No.	Cat. No.	Cat. No.	
Standard	LI	3.2 W	250	JDA34250WU31X	JGA34250WU31X	JJA34250WU31X	JLA34250WU31X	AL250JD *[19]*
Standard	LSI	3.2S-W	250	JDA34250WU33X	JGA34250WU33X	JJA34250WU33X	JLA34250WU33X	AL250JD *[19]*
High Perf. Ammerter	LSI	5.2A-W	250	JDA34250WU43X	JGA34250WU43X	JJA34250WU43X	JLA34250WU43X	AL250JD *[19]*
High Perf. Energy	LSI	5.2E-W	250	JDA34250WU53X	JGA34250WU53X	JJA34250WU53X	JLA34250WU53X	AL250JD *[19]*
High perf. Ammerter	LSIG	6.2A-W	250	JDA34250WU44X	JGA34250WU44X	JJA34250WU44X	JLA34250WU44X	AL250JD *[19]*
High Perf. Energy	LSIG	6.2E-W	250	JDA34250WU54X	JGA34250WU54X	JJA34250WU54X	JLA34250WU54X	AL250JD *[19]*

L-frame Mission Critical Circuit Breaker

Table 9.127: L-frame 600 A Electronic Trip Mission Critical Circuit Breakers (480/277 Vac) With Factory Sealed Trip Units Suitable for Reverse Connection *[20]*

Electronic Trip Unit Type	Trip Function	Trip Unit	Continuous Current	D Interrupting	G Interrupting	J Interrupting	L Interrupting	Terminal
				Cat. No.	Cat. No.	Cat. No.	Cat. No.	
Standard	LI	3.3 W	250	LDA34250WU31X	LGA34250WU31X	LJA34250WU31X	LLA34250WU31X	AL400L61K3 *[21]*
			400	LDA34400WU31X	LGA34400WU31X	LJA34400WU31X	LLA34400WU31X	AL600LF52K3 *[22]*
			600	LDA34600WU31X	LGA34600WU31X	LJA34600WU31X	LLA34600WU31X	
Standard	LSI	3.3S-W	250	LDA34250WU33X	LGA34250WU33X	LJA34250WU33X	LLA34250WU33X	AL400L61K3 *[21]*
			400	LDA34400WU33X	LGA34400WU33X	LJA34400WU33X	LLA34400WU33X	AL600LF52K3 *[22]*
			600	LDA34600WU33X	LGA34600WU33X	LJA34600WU33X	LLA34600WU33X	
High Perf. Ammeter	LSI	5.3A-W	400	LDA34400WU43X	LGA34400WU43X	LJA34400WU43X	LLA34400WU43X	AL600LF52K3 *[22]*
			600	LDA34600WU43X	LGA34600WU43X	LJA34600WU43X	LLA34600WU43X	
High Perf. Energy	LSI	5.3E-W	400	LDA34400WU53X	LGA34400WU53X	LJA34400WU53X	LLA34400WU53X	AL600LF52K3 *[22]*
			600	LDA34600WU53X	LGA34600WU53X	LJA34600WU53X	LLA34600WU53X	
High Perf. Ammeter	LSIG	6.3A-W	400	LDA34400WU44X	LGA34400WU44X	LJA34400WU44X	LLA34400WU44X	AL600LF52K3 *[22]*
			600	LDA34600WU44X	LGA34600WU44X	LJA34600WU44X	LLA34600WU44X	
High Perf. Energy	LSIG	6.3E-W	400	LDA34400WU54X	LGA34400WU54X	LJA34400WU54X	LLA34400WU54X	AL600LF52K3 *[22]*
			600	LDA34600WU54X	LGA34600WU54X	LJA34600WU54X	LLA34600WU54X	

Table 9.128: PowerPact™ H-, J-, and L-frame Automatic Molded Case Switches, 600 Vac

Circuit Breaker	Poles	Ampere Rating	G Withstand		L Withstand		R Withstand		Terminal	Wire Range
			Cat. No.	Trip Point	Cat. No.	Trip Point	Cat. No.	Trip Point		
H-frame J-frame	2 *[23]*	150 A	HGA26000S15( )	2250 A	HLA26000S15	2250 A	—	—	—	—
		175 A	JGA26000S17( )	3125 A	JLA26000S17	3125 A	—	—	—	—
		250 A	JGA26000S25( )	3125 A	JLA26000S25	3125 A	—	—	—	—
	3	150 A	HGA36000S15	2250 A	HLA36000S15	2250 A	HRA36000S15	2250 A	AL150HD	14 AWG–3/0 AWG Al/Cu
		175 A	JGA36000S17	3125 A	JLA36000S17	3125 A	JRA36000S17	3125 A	AL175JD	4–4/0 AWG Al/Cu
		250 A	JGA36000S25	3125 A	JLA36000S25	3125 A	JRA36000S25	3125 A	AL250JD	3/0 AWG–350 kcmil Al/Cu
L-frame	3	400 A	LGA36000S40X	4800 A	LLA36000S40X	4800 A	LRA36000S40X	4800 A	AL150HD	AL600LS52K3 (2) 2/0 AWG–500 kcmil Al/Cu
		600 A	LGA36000S60X	6600A	LLA36000S60X	6600 A	LRA36000S60X	6600 A	AL250JD	

Table 9.129: KI Interrupt Ratings (kA)

V	KI
240	200
480	200
600	100

K-frame accessories starting on Supplemental Digest Section 3.
K-frame dimensions Supplemental Digest Section 3.
K-frame optional lugs Supplemental Digest Section 3.
H-, J-, and L-frame accessories starting on PowerPact Accessories, page 7-53.
H-, J-, and L-frame dimensions starting on Molded Case Circuit Breaker Dimensions, page 7-74.
H-, J-, and L-frame optional lugs Mechanical Lugs, page 7-58.

Table 9.130: Interrupt Ratings (kA)

	D	G	J	L
240 V	25	65	100	125
480 V	18	35	65	100

Table 9.131: Phase Options—Example HDA26150( )

Phase Option Number	Phase Connection	2-pole	3-pole
1	AB	HDA261501	—
2	AC	HDA261502	—
3	BA	HDA261503	—
4	BC	HDA261504	—
5	CA	HDA261505	—
6	CB	HDA261506	—
Standard	ABC	—	JDA34250WU31X
6	CBA	—	JDA34250WU31X6

[18] Standard rated (80%). Not available in 100% rated.
[19] AL250JD terminal wire range is (1) 3/0 AWG–350 kcmil Al or Cu.
[20] Standard rated (80%). Not available in 100% rated.
[21] AL400L61K3 terminal wire range is (1) #2 AWG–500 kcmil Al or #2 AWG–600 kcmil Cu..
[22] AL600LF52K3 terminal wire range is (2) #3/0 AWG–500 kcmil Al or Cu.
[23] 2-pole circuit breaker catalog numbers are completed by adding the required phase connection number as a suffix, see Table 9.128, page 9-46.

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FI36100
2- and 3-pole

4.5 in (114 mm)

Mounting Height

LA Circuit Breakers

Table 9.132: L-frame—400 A, Thermal-magnetic (600 Vac)

Ampere Rating	AC Magnetic Trip Settings		Standard Interrupting	Terminal Wire Range
	Low	High	Catalog Number	
2-pole, 600 Vac, 250 Vdc *[24]*				
125 A	625	1250	LA26125( )	AL400LA one #1 AWG–600 kcmil or two #1 AWG–250 kcmil AL or Cu
150 A	750	1500	LA26150( )	
175 A	875	1750	LA26175( )	
200 A	1000	2000	LA26200( )	
225 A	1125	2250	LA26225( )	
250 A	1250	2500	LA26250( )	
300 A	1500	3000	LA26300( )	
350 A	1750	3500	LA26350( )	
400 A	2000	4000	LA26400( )	
3-pole, 600 Vac, 250 Vdc				
125 A	625	1250	LA36125	AL400LA one #1 AWG–600 kcmil or two #1 AWG–250 kcmil AL or Cu
150 A	750	1500	LA36150	
175 A	875	1750	LA36175	
200 A	1000	2000	LA36200	
225 A	1125	2250	LA36225	
250 A	1250	2500	LA36250	
300 A	1500	3000	LA36300	
350 A	1750	3500	LA36350	
400 A	2000	4000	LA36400	

L-frame acccessories starting on Supplemental Digest Section 3.

L-frame dimensions Molded Case Circuit Breaker Dimensions, page 7-74.

L-frame optional lugs Mechanical Lugs, page 7-58.

Table 9.133: Interrupt Ratings (kA)

	LA	LC	LI
240 V	42	100	200
480 V	30	65	200
600 V	22	35	100

[24] 2-pole circuit breaker catalog numbers are completed by adding required phase connection letters as suffix to catalog number. See page 9-40.

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L- and PowerPact M-frame for I-Line™ Panelboards and Switchboards

Table 9.134: L-frame 600 A Circuit Breakers with Lugs and Factory-Sealed Electronic Trip Units Suitable for Reverse Connection *[25]*
(L-frame circuit breaker utilizes 6" of available I-Line bus)

Electronic Trip Unit			Sensor Rating	Catalog Number *[26]*	Terminal
Type	Function	Trip Unit			
600 Vac, 53/60 Hz, 3P					
Micrologic Standard	LI	3.3 *[27]*	250 A	L( )A36250U31X	AL400L61K3 *[28]*
			400 A 600 A	L( )A36400U31X L( )A36600U31X	AL600LF52K3 *[29]*
Micrologic Standard	LSI	3.3S *[27]*	250 A	L( )A36250U33X	AL400L61K3 *[28]*
			400 A 600 A	L( )A36400U33X L( )A36600U33X	AL600LF52K3 *[29]*
Micrologic Ammeter	LSI	5.3A	400 A 600 A	L( )A36400U43X L( )A36600U43X	
Micrologic Energy	LSI	5.3E	400 A 600 A	L( )A36400U53X L( )A36600U53X	
Micrologic Ammeter	LSIG	6.3A	400 A 600 A	L( )A36400U44X L( )A36600U44X	
Micrologic Energy	LSIG	6.3E	400 A 600 A	L( )A36400U54X L( )A36600U54X	

Table 9.135: Interrupt Ratings (kA) for PowerPact L and M Frames

	G	J	L *[30]*
240 V	65	100	125
480 V	35	65	100
600 V *[31]*	18	25	50

Table 9.136: PowerPact M-frame: with ET1.0 Factory – sealed trip unit (not field adjustable)—800 A *[32]*
(PowerPact M-frame circuit breakers utilize 9" of the available I-Line bussing.)

	Ampere Rating	Adjustable Instantaneous Trip Range *[33]*		G Interrupting	J Interrupting	Terminal Wire Range
		Low	High	Catalog Number *[34]*	Catalog Number *[34]*	
2-pole, 600 Vac, 50/60 Hz	300 A	600	3000	MGA26300( )	MJA26300( )	3–3/0 through 500 kcmil Al or Cu
	350 A	700	3500	MGA26350( )	MJA26350( )	
	400 A	800	4000	MGA26400( )	MJA26400( )	
	450 A	900	4500	MGA26450( )	MJA26450( )	
	500 A	1000	5000	MGA26500( )	MJA26500( )	
	600 A	1200	6000	MGA26600( )	MJA26600( )	
	700 A	1400	7000	MGA26700( )	MJA26700( )	
	800 A	1600	8000	MGA26800( )	MJA26800( )	
3-pole, 600 Vac, 50/60 Hz	300 A	600	3000	MGA36300	MJA36300	3–3/0 through 500 kcmil Al or Cu
	350 A	700	3500	MGA36350	MJA36350	
	400 A	800	4000	MGA36400	MJA36400	
	450 A	900	4500	MGA36450	MJA36450	
	500 A	1000	5000	MGA36500	MJA36500	
	600 A	1200	6000	MGA36600	MJA36600	
	700 A	1400	7000	MGA36700	MJA36700	
	800 A	1600	8000	MGA36800	MJA36800	

L-frame accessories, see Supplemental Digest Section 3.
L-frame dimensions, page 7-74.
L-frame optional lugs, page 7-58.
M-frame accessories, page 7-53.
M-frame dimensions, page 7-74.
M-frame optional lugs, page 7-58.

Table 9.137: Automatic Molded Case Switches—600 Vac, 50/60 Hz

Ampere Rating	2-pole	3-pole	Withstand Rating *[35]*			Trip Point Amperes	Terminal Wire Range
	Catalog Number *[36]*	Catalog Number	240 Vac	480 Vac	600 Vac	AC	
600 A	PJA26000S60( )	PJA36000S60	100	65	25	10000	3–3/0 through 500 kcmil Al or Cu
800 A	PJA26000S80( )	PJA36000S80	100	65	25	10000	
1000 A	PJA26000S10( )	PJA36000S10	100	65	25	10000	4–3/0 through 500 kcmil Al or Cu
1200 A	PJA26000S12( )	PJA36000S12	100	65	25	10000	

Table 9.138: PowerPact P- and R-frame Interrupt Ratings

Voltage	P-frame Interrupt Rating				R-frame Interrupt Rating			
	G	J	K	L	G	J	K	L
240 Vac	65 kA	100 kA	65 kA	125 kA	65 kA	100 kA	65 kA	125 kA
480 Vac	35 kA	65 kA	50 kA	100 kA	35 kA	65 kA	65 kA	100 kA

[25] See Supplemental Digest page 3-4 for circuit breakers with field-interchangeable trip units.
[26] For 100% rated circuit breakers (250 A and 400 A only), add a “C” in the 9th character place (for example, LRA36400CU31X).
[27] 3P circuit breakers with this trip unit can be used for 2P applications.
[28] AL400L61K3 terminal wire ranges are (1) 2 AWG–600 kcmil Cu or (1) 2 AWG–500 kcmil Al.
[29] AL600LFS52K3 terminal wire range is (2) 3/0 –500 kcmil.
[30] L interrupting rating is not available in M-frame.
[31] 600 V interrupt ratings not available for D-frame.
[32] The ET 1.0 trip unit cannot be field replaced, nor does it allow adjustment of the long-time trip point setting. It is considered an electronic equivalent of a thermal-magnet circuit breaker.
[33] UL magnetic trip setting tolerances are ±10% from the nominal values shown.
[34] Fill in parentheses with the following phase connection options: (2) for AC and (5) for CA.
[35] The withstand rating is the fault current, at rated voltage, that the molded case switch will withstand without damage when protected by a circuit breaker with an equal ampere rating.
[36] Fill in parentheses with the following phase connection options: (2) for AC or (5) for CA.

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Table 9.138 PowerPact P- and R-frame Interrupt Ratings (cont'd.)

Voltage	P-frame Interrupt Rating				R-frame Interrupt Rating			
	G	J	K	L	G	J	K	L
600 Vac	18 kA	25 kA	50 kA	25 kA	18 kA	25 kA	65 kA	50 kA

P- and R-frame accessories, page 7-53.
P- and R-frame dimensions, page 7-74.
P- and R-frame optional lugs, page 7-58.

PowerPact P- and R-frame for I-Line™ Panelboards and Switchboards

Table 9.139: PowerPact P-frame 1200 A (600 Vac, 50/60 Hz) 3P Circuit Breaker with Electronic Trip Unit (PowerPact P-frame circuit breakers utilize 9" of the available I-Line bussing.)

Electronic Trip Unit			Sensor Rating	Cat. No.*[37][38][39][40]*	Terminal Wire Range
Type	Function	Code			
Basic Electronic Trip Unit (Not Interchangeable)	Fixed long-time, Adjustable Instantaneous	ET1.0I	600 A	P( )A36060	(3) 3/0 AWG–500 kcmil Al or Cu AL800M23K
			800 A	P( )A36080	
			1000 A	P( )A36100	(4) 3/0 AWG–500 kcmil Al or Cu AL1200P24K
			1200 A	P( )A36120	
Micrologic Interchangeable Standard Trip Unit	LI	3.0	250 A	P( )A36025(C)U31A	(3) 3/0 AWG–500 kcmil Al or Cu AL800M23K
			400 A	P( )A36040(C)U31A	
			600 A	P( )A36060(C)U31A	
			800 A	P( )A36080(C)U31A	
			1000 A	P( )A36100U31A	(4) 3/0 AWG–500 kcmil Al or Cu AL1200P24K
			1200 A	P( )A36120U31A	
	LSI	5.0	250 A	P( )A36025(C)U33A	(3) 3/0 AWG–500 kcmil Al or Cu AL800M23K
			400 A	P( )A36040(C)U33A	
			600 A	P( )A36060(C)U33A	
			800 A	P( )A36080(C)U33A	
			1000 A	P( )A36100U33A	(4) 3/0 AWG–500 kcmil Al or Cu AL1200P24K
			1200 A	P( )A36120U33A	
Micrologic Interchangeable Ammeter Trip Unit	LI	3.0A	250 A	P( )A36025(C)U41A	(3) 3/0 AWG–500 kcmil Al or Cu AL800M23K
			400 A	P( )A36040(C)U41A	
			600 A	P( )A36060(C)U41A	
			800 A	P( )A36080(C)U41A	
			1000 A	P( )A36100U41A	(4) 3/0 AWG–500 kcmil Al or Cu AL1200P24K
			1200 A	P( )A36120U41A	
	LSI	5.0A	250 A	P( )A36025(C)U43A	(3) 3/0 AWG–500 kcmil Al or Cu AL800M23K
			400 A	P( )A36040(C)U43A	
			600 A	P( )A36060(C)U43A	
			800 A	P( )A36080(C)U43A	
			1000 A	P( )A36100U43A	(4) 3/0 AWG–500 kcmil Al or Cu AL1200P24K
			1200 A	P( )A36120U43A	
	LSIG	6.0A	250 A	P( )A36025(C)U44A	(3) 3/0 AWG–500 kcmil Al or Cu AL800M23K
			400 A	P( )A36040(C)U44A	
			600 A	P( )A36060(C)U44A	
			800 A	P( )A36080(C)U44A	
			1000 A	P( )A36100U44A	(4) 3/0 AWG–500 kcmil Al or Cu AL1200P24K
			1200 A	P( )A36120U44A	
Micrologic Interchangeable Power Trip Unit	LSI	5.0P	250 A	P( )A36025(C)U63AE1	(3) 3/0 AWG–500 kcmil Al or Cu AL800M23K
			400 A	P( )A36040(C)U63AE1	
			600 A	P( )A36060(C)U63AE1	
			800 A	P( )A36080(C)U63AE1	
			1000 A	P( )A36100U63AE1	(4) 3/0 AWG–500 kcmil Al or Cu AL1200P24K
			1200 A	P( )A36120U63AE1	
	LSIG	6.0P	250 A	P( )A36025(C)U64AE1	(3) 3/0 AWG–500 kcmil Al or Cu AL800M23K
			400 A	P( )A36040(C)U64AE1	
			600 A	P( )A36060(C)U64AE1	
			800 A	P( )A36080(C)U64AE1	
			1000 A	P( )A36100U64AE1	(4) 3/0 AWG–500 kcmil Al or Cu AL1200P24K
			1200 A	P( )A36120U64AE1	
Micrologic Interchangeable Harmonic Trip Unit	LSI	5.0H	250 A	P( )A36025(C)U73AE1	(3) 3/0 AWG–500 kcmil Al or Cu AL800M23K
			400 A	P( )A36040(C)U73AE1	
			600 A	P( )A36060(C)U73AE1	
			800 A	P( )A36080(C)U73AE1	
			1000 A	P( )A36100U73AE1	(4) 3/0 AWG–500 kcmil Al or Cu AL1200P24K
			1200 A	P( )A36120U73AE1	
	LSIG	6.0H	250 A	P( )A36025(C)U74AE1	(3) 3/0 AWG–500 kcmil Al or Cu AL800M23K
			400 A	P( )A36040(C)U74AE1	
			600 A	P( )A36060(C)U74AE1	
			800 A	P( )A36080(C)U74AE1	
			1000 A	P( )A36100U74AE1	(4) 3/0 AWG–500 kcmil Al or Cu AL1200P24K
			1200 A	P( )A36120U74AE1	

[37] To complete the catalog number, replace the blank ( ) with the appropriate interrupt rating (G, J, K, or L).
[38] For 100% rated circuit breakers add a "C" in the 9th character place. For example, the catalog number for a 100% standard-type trip unit with LI trip functions at 250 A would be PGA36025CU31A.
[39] The L interrupt rating is supplied in 480 V only. Change the 5th character (voltage rating) from a 6 (600 V) to a 4 (480 V); for example, PLA34025U31A.
[40] See Table 9.138 PowerPact P- and R-frame Interrupt Ratings, page 9-48 for interrupt ratings.

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Table 9.140: PowerPact R-frame 1200 A (600 Vac, 50/60 Hz) 3P Circuit Breaker with Electronic Trip Unit

Electronic Trip Unit			Sensor Rating	Cat. No. *[41][42][43][44]*	Terminal Wire Range
Type	Function	Code			
Basic Electronic Trip Unit (Not Interchangeable)	Fixed Long-Time, Adjustable Instantaneous	ET1.01	1200 A	R( )A36120	AL1200R53K (4) 3/0-600 kcmil Al or Cu
Micrologic Interchangeable Standard Trip Unit	LI	3.0	1000 A	R( )A36100CU31A	
			1200 A	R( )A36120CU31A	
	LSI	5.0	1000 A	R( )A36100CU33A	
			1200 A	R( )A36120CU33A	
Micrologic Interchangeable Ammeter Trip Unit	LI	3.0A	1000 A	R( )A36100CU41A	
			1200 A	R( )A36120CU41A	
	LSI	5.0A	1000 A	R( )A36100CU43A	
			1200 A	R( )A36120CU43A	
	LSI	6.0A	1000 A	R( )A36100CU44A	
			1200 A	R( )A36120CU44A	
Micrologic Interchangeable Power Trip Unit	LSI	5.0P	1000 A	R( )A36100CU63AE1	
			1200 A	R( )A36120CU63AE1	
	LSIG	6.0P	1000 A	R( )A36100CU64AE1	
			1200 A	R( )A36120CU64AE1	
Micrologic Interchangeable Harmonic Trip Unit	LSI	5.0H	1000 A	R( )A36100CU73AE1	
			1200 A	R( )A36120CU73AE1	
	LSIG	6.0H	1000 A	R( )A36100CU74AE1	
			1200 A	R( )A36120CU74AE1	

P- and R-frame accessories, Mechanical Lugs, page 7-58.
P- and R-frame dimensions, Molded Case Circuit Breaker Dimensions, page 7-74.
P- and R-frame trip unit options, Micrologic™ Electronic Trip Units, page 7-63.
P- and R-frame optional lugs, Mechanical Lugs, page 7-58.
P- and R-frame alternate rating plugs, Micrologic™ Electronic Trip Units, page 7-63.

I-Line™ Factory Assembled Panelboards

Table 9.141: I-Line 200% Rated Neutral—Standard Terminal Configuration

Panel Type	Ampacity	Type	Branch Space		Neutral Terminals Quantity and Size		Type 1 Enclosure					
							H		W		D	
			In.	mm	Main	Branch	In.	mm	In.	mm	In.	mm
HCM	600 A	MLO	72	1829	(8) 750 kcmil	(35) 350 kcmil, (9)#14-1/0, (17)#14-#4	91	2311	32	813	8.25	210
	600 A (MG, MJ)	M/B	72	1829	(8) 750 kcmil		91	2311	32	813	9.50	241
	800 A	MLO	72	1829	(8) 750 kcmil		91	2311	32	813	8.25	210
	800 A (MG, MJ)	M/B	72	1829	(8) 750 kcmil		91	2311	32	813	9.50	241
HCR-U *[1]*	1200A	M/B, MLO	108	2743	(8) 750 kcmil	(8) 600 kcmil, (15) 350 kcmil (9) #14-1/0, (17)#14-#4	86	2184	44	1118	9.50	241
HCP	600A	M/B, MLO	63	1600	(8) 750 kcmil	(35) 350 kcmil, (9)#14-1/0, (17)#14-#4	68	1727	42	1067	9.50	241
	800A	M/B, MLO	99	2515	(8) 750 kcmil	(35) 350 kcmil, (9)#14-1/0, (17)#14-#4	86	2184	42	1067	9.50	241
HCP-SU *[2]*	800A	M/B, MLO	54	1371	(8) 750 kcmil	(8) 750 kcmil, (21) 350 kcmil, (9) #14-1/0, (17) #14-#4	86	2184	26	660	9.5	241

[41] To complete the catalog number, replace the blank ( ) with the appropriate interrupt rating (G, J, K, or L).
[42] For 100% rated circuit breakers add a “C” in the 9th character place. For example, the catalog number for a 100% standard-type trip unit with LI trip functions at 250 A would be PGA36025CU31A.
[43] The L interrupt rating is supplied in 480 V only. Change the 5th character (voltage rating) from a 6 (600 V) to a 4 (480 V); for example, PLA34025U31A.
[44] See Table 9.138 PowerPact P- and R-frame Interrupt Ratings, page 9-48 for interrupt ratings.
[1] 6 in. enclosure extension is required for HCRU I-Line panelboard.
[2] 9 in. enclosure extension is required for HCP-SU I-Line panelboard.

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For QMB/QMJ Panelboards and Switchboards

Table 9.142: QMB Branch Switch Units

Unit Ampere Rating	Unit Height (In.)	Catalog Number	Class R Fuse Kits		Electrical Interlock Kit	Horsepower Ratings *[1]*												250 Vdc
			No. Kits Req'-d.	Catalog Number	Catalog Number *[2]*	240 Vac				480 Vac				600 Vac				
						Std.		Max.		Std.		Max.		Std.		Max.		
						1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	
2-pole, 240 Vac																		
30 A-30 A	4.5	QMB221TW	2	HRK30	QMB300EK(1 or 2)	1.5	3	3	7.5	—	—	—	—	—	—	—	—	5
30 A-Blank	4.5	QMB221HW *[3]*	1							—	—	—	—	—	—	—	—	5
60 A-60 A	4.5	QMB222TW	1	QMB36R	QMB300EK(1 or 2)	3	7.5	10	15	—	—	—	—	—	—	—	—	10
60 A-Blank	4.5	QMB222HW *[3]*								—	—	—	—	—	—	—	—	10
100 A-100 A	6	QMB223TW	1	QMB100R	QMB610EK(1 or 2)	7.5	15	15	30	—	—	—	—	—	—	—	—	20
100 A-Blank	6	QMB223HW *[3]*								—	—	—	—	—	—	—	—	20
200 A	9	QMB224W	1	HRK1020	QMB200EK(1 or 2)	—	25	15	60	—	—	—	—	—	—	—	—	40
400 A	15	QMB225W	1	QMB4060R	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	9	QMB225WT3 *[4]*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
600 A	Use 3-pole devices for 2-pole application.				—	—	—	—	—	—	—	—	—	—	—	—	—	—
						—	—	—	—	—	—	—	—	—	—	—	—	—
3-pole, 240 Vac																		
30 A-30 A	4.5	QMB321TW	2	HRK30	QMB300EK(1 or 2)	—	3	—	7.5	—	—	—	—	—	—	—	—	—
30 A-Blank	4.5	QMB321HW *[3]*	1			—	3	—	7.5	—	—	—	—	—	—	—	—	—
60 A-60 A	4.5	QMB322TW	1	QMB36R		—	7.5	—	15	—	—	—	—	—	—	—	—	—
60 A-Blank	4.5	QMB322HW *[3]*				—	7.5	—	15	—	—	—	—	—	—	—	—	—
100 A-100 A	6	QMB323TW	1	QMB100R	QMB610EK(1 or 2)	—	15	—	30	—	—	—	—	—	—	—	—	—
100 A-Blank	6	QMB323HW *[3]*				—	15	—	30	—	—	—	—	—	—	—	—	—
200 A	9	QMB324W	1	HRK1020	QMB200EK(1 or 2)	—	25	—	60	—	—	—	—	—	—	—	—	—
400 A	15	QMB325W	1	QMB4060R	—	—	50	—	125	—	—	—	—	—	—	—	—	—
	9	QMB325WT3 *[4]*	—	—	—	—	50	—	—	—	—	—	—	—	—	—	—	—
600 A	15	QMB326W	1	QMB4060R	—	—	75	—	150	—	—	—	—	—	—	—	—	—
	15	QMB326WT3 *[4]*	—	—	—	—	75	—	—	—	—	—	—	—	—	—	—	—
800 A	15	QMB327WT3 *[4]*	—	—	—	—	75	—	—	—	—	—	—	—	—	—	—	—
2-pole, 600 Vac, 250 Vdc *[5]*																		
30 A-30 A	4.5	QMB261TW	1	QMB36R	QMB300EK(1 or 2)	1.5	—	3	—	3	5	7.5	15	3	—	10	—	5
30 A-Blank	4.5	QMB261HW *[3]*					—		—						—		—	
60 A-60 A	6	QMB262TW	1	QMB60R	QMB610EK(1 or 2)	3	—	10	—	5	15	20	30	10	—	25	—	10
60 A-Blank	6	QMB262HW *[3]*					—		—						—		—	
100 A-100 A	7.5	QMB263TW	2	HRK1020		7.5	—	15	—	10	25	30	60	15	—	40	—	20
100 A-Blank	7.5	QMB263HW *[3]*	1				—		—						—		—	
200 A	9	QMB264W	1	HRK1020	QMB200EK(1 or 2)	15	—	—	—	25	50	50	125	30	—	50	—	40
400 A	Use 3-pole devices for 2-pole application.				—	—	—	—	—	—	—	—	—	—	—	—	—	—
600 A																		
3-pole, 600 Vac *[5]*																		
30 A-30 A	4.5	QMB361TW	1	QMB36R	QMB300EK(1 or 2)	—	3	—	7.5	—	5	—	15	—	7.5	—	20	—
	4.5	QMJ361T	—	—		—	—	—	—	—	—	—	—	—	—	—	20	5
30 A-Blank	4.5	QMB361HW *[3]*	1	QMB36R	QMB300EK(1 or 2)	—	3	—	7.5	—	5	—	15	—	7.5	—	20	—
60 A-60 A	6	QMB362TW	1	QMB60R	QMB610EK(1 or 2)	—	7.5	—	15	—	15	—	30	—	15	—	50	—
	6	QMJ362T	—	—		—	—	—	—	—	—	—	—	—	—	—	—	10
60 A-Blank	6	QMB362HW *[3]*	1	QMB60R	QMB610EK(1 or 2)	—	7.5	—	15	—	15	—	30	—	15	—	50	—
60 A-30 A	6	QMB362T21W	1 ea.	QMB60R and QMB36R	QMB610EK(1 or 2)	—	—	—	—	—	—	—	—	—	—	—	—	—
	6					—	—	—	—	—	—	—	—	—	—	—	—	—
100 A-100 A	7.5	QMB363TW	2	HRK1020	QMB610EK(1 or 2)	—	15	—	30	—	25	—	60	—	30	—	75	—
	6	QMJ363T	—	—		—	—	—	—	—	—	—	—	—	—	—	—	20
100 A-Blank	7.5	QMB363HW *[3]*	1	HRK1020	QMB610EK(1 or 2)	—	15	—	30	—	25	—	60	—	30	—	75	—
	6	QMJ363H *[3]*	—	—		—	—	—	—	—	—	—	—	—	—	—	—	20
100 A-30 A	7.5	QMB363T31W	1 ea.	HRK1020 and QMB36R	QMB610EK(1 or 2)	—	—	—	—	—	—	—	—	—	—	—	—	—
	7.5					—	—	—	—	—	—	—	—	—	—	—	—	—
100 A-60 A	7.5	QMB363T32W	1 ea.	HRK1020 and QMB60R	QMB610EK(1 or 2)	—	—	—	—	—	—	—	—	—	—	—	—	—
	7.5					—	—	—	—	—	—	—	—	—	—	—	—	—
200 A	9	QMB364W	1	HRK1020	QMB200EK(1 or 2)	—	25	—	60	—	50	—	125	—	60	—	150	—
200 A-200 A	7.5	QMJ364T	—	—	QMB610EK(1 or 2)	—	25	—	60	—	50	—	125	—	60	—	150	40
200 A-Blank	7.5	QMJ364H *[3]*	—	—		—	—	—	—	—	—	—	—	—	—	—	—	—
400 A *[6]*	15	QMB365W	1	QMB4060R	—	—	—	—	—	—	100	—	250	—	125	—	350	50
400 A	9	QMJ365	—	—	QMB200EK(1 or 2)	—	50	—	125	—	100	—	250	—	125	—	350	50
400 A *[6]*	9	QMB365WT6 *[7]*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
600 A *[6]*	15	QMB366W	1	QMB4060R	—	—	—	—	—	—	150	—	400	—	250	—	500	—
60 A0	15	QMJ366	—	—	—	—	75	—	150	—	—	—	—	—		—	—	—
800 A	15	QMB367W	—	—	—	—	—	—	—	—	150	—	400	—	250	—	500	—

NOTE: See the Supplemental Digest for merchandised motor starter units, QMB RTI panelboards, and replacement switches for Series 1–4 and D2 QMB panelboards.

NOTE: For series E1 and E2, QMJ switches may be used in 400 A–1200 A interiors in a NEMA 1 without door only. QMJ switches cannot be used in series E1 and E2, 225 A panelboards. QMJ switches cannot be used in NEMA 1 with door or any NEMA 3R/12 enclosure.

[1] Horsepower rating applicable to 480Y/277 V system only.
[2] "1" indicates one normally open and one normally closed contact.
"2" indicates two normally open and two normally closed contacts.
[3] Blank units cannot be modified to accept a switch interior.
[4] Use 300 Vac Class T fuses only.
[5] Class J fuse provisions—to field modify switch, move load side fuse base to position indicated in switch. Not available on 100-30, 100-60, or 800 A switch units.
[6] 250 Vdc rating.
[7] Use 600 Vac Class T fuses only.

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Fusible—600 Vac, 250 Vdc

Table 9.143: Available QMB Accessories

Electrical Interlocks
1 NO and 1NC Electrical Interlocks on Main Switches
2NO and 2NC Electrical Interlocks on Main Switchs
Equipment Ground Bars
Standard Ground Bar
Copper Ground Bar
Insulated/Isolated Ground Bar
Name Plates
Copper Neutral
Copper Neutral
125-400A
600A
800A
Enclsoure Modifications
Hinged Trim
Weatherproof - NEMA 3R
Lugs
Mechanical Lugs - Standard
Copper Mechanical Lugs
Copper Compression Lugs
Aluminum Compression Lugs
VCEL Lugs

UL Listed Short Circuit Ratings for QMB Starters		
Starter Size	**Fusible switch-600V Max. (with Class R or J Fuses) RMS Sym. Amps**	**Thermal-Magnetic Bircuit Breaker 600V Max. Rms Sym. Amps**
0	100,000	5,000
1	100,000	5,000
2	100,000	5,000
3	100,000	5,000

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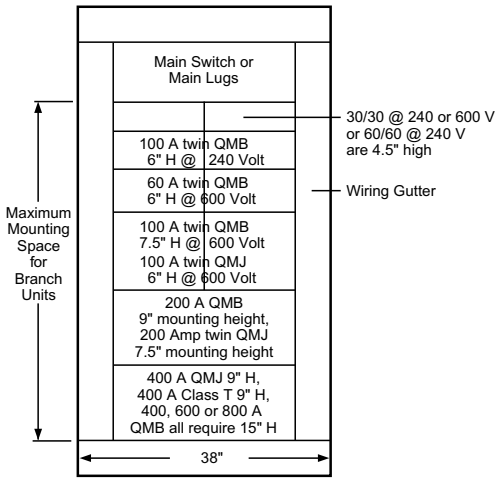

QMB Layout Information

To maximize the quantity of branch switches, use QMJ switches from page 9-51. Class J fuses are available in time delay construction suitable for motor and transformer loads.

Table 9.144: NQ and NF Lighting Contactors—Mechanically Held
(Furnish a one-line power and control voltage connection diagram.)

Ampacity	Mechanically Held	
	Type	Minimum Additional Box Height Required *[8]* H (In.)
Square D™ Brand PB		
30 A 2P	PBM10B	18
60 A 2P	PBP10B	18
75 A 2P	PBN10B	18
100 A 2P	PBQ10B	18
150 A 2P	PBR10B	18
200 A 2P	PBV10B	18
225 A 2P	PBW10B	18
30 A 3P	PBM11B	18
60 A 3P	PBP11B	18
75 A 3P	PBN11B	18
100 A 3P	PBQ11B	18
150 A 3P	PBR11B	18
200 A 3P	PBV11B	18
225 A 3P	PBW11B	18
ASCO Type 920		
30 A 2P	9202030	18
60 A 2P	9202060	18
75 A 2P	9202075	18
100 A 2P	9202100	18
150 A 2P	9202150	18
200 A 2P	9202200	18
225 A 2P	9202225	18
30 A 3P	9203030	18
60 A 3P	9203060	18
75 A 3P	9203075	18
100 A 3P	9203100	18
150 A 3P	9203150	18
200 A 3P	9203200	18
225 A 3P	9203225	18

Table 9.145: NQ and NF Panelboard Split Bus Bars

Maximum Ampacity MLO	Maximum Number of Pole Spaces Available		Box Height (ft.)
	Main	Split	
[9]			
225 A	18	30	44
	30	18	
		30	
[9]			
250 A	18	30	56
	30	18	
		30	62

Table 9.146: I-Line™ Panelboard Split Bus Bars

Ampacity MLO	Additional Mounting Height Required On Split Bus Section *[10]*
	Split Bus
225 A	7.5 in.
400 A	9 in.
600 A	12 in.
800 A	12 in.
1200 A	18 in.

NOTE: For applications with main circuit breaker panelboards, contact your local Schneider Electric representative or distributor.

[8] NF panels require 18 in. of additional box height regardless of contactor ampacity or manufacturer.
[9] When greater than 125 A lugs are required on the split section of the bus, contact your local Schneider Electric representative or distributor for the box height.
[10] For I-Line panelboards, dimension includes height of "SL" sub-feed lug kit from Digest, plus 3 in. from available branch mounting space.

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Main Circuit Breaker Without Overload Trip
(Automatic Molded Case Switch)

- (Not UL Listed)

Shunt Trip Circuit Breakers

- NOTE: For molded case switch and automatic molded case switch short circuit current ratings, see Short Circuit Current Ratings (SCCR), page 7-41.

Special Features

For information on the following special features, please see the Supplemental and Obsolescence Digest.

- Powerlogic™ metering *[1]*
- Customer equipment space (NQ and NF) *[1]*
- Increased box depth *[1]*
- Increased gutters–top, bottom, and sides *[1]*
- Non-standard paint *[1]*
- Welded base channel *[1]*
- Type 1 gasketed *[1]*
- Type 2 drip hood *[1]*
- Type 3R/4/4X/5/12 stainless steel enclosure *[1]*
- Type 4X fiberglass enclosure *[1]*
- Stainless steel trim front *[1]*
- Padlockable hasp *[1]*
- Special locks (Corbin, Yale, Best) *[1]*
- Equal height boxes *[1]*
- Common trim to cover two equal height boxes *[1]*
- Panelboard skirt—hides conduits feeding a panelboard *[1]*
- Panelboard wireway—for terminating conduit in wireway endwall *[1]*
- Keyed mechanical interlocking of two or more circuit breakers (I-Line and QMB) *[1]*
- Motor operators (I-Line only)
- Panelboard interiors and special fronts to fit existing boxes
- A standard panelboard box has one blank endwall and one with knockouts. Blank endwalls or knockouts in both endwalls are also available *[1]*

NQ and NF Terminal Data

Table 9.147: NQ Standard Aluminum Mechanical Lugs—Main Lugs

Panel Type	Ampere Rating	Lug Wire Range
NQ	100 A	one #6-2/0 Al or Cu
	225 A	one #6-350 kcmil Al or Cu
	400 A	one 1/0-750 kcmil or two 1/0-350 kcmil Al or Cu
	600 A	two 1/0-750 kcmil Al or Cu

Table 9.148: NQ Standard Aluminum Mechanical Lugs—Main Circuit Breaker

Panel Type	Ampere Rating	Circuit Breaker Type	Lug Wire Range *[1]*
NQ	100 A	QOB	one #4–#2/0 Al or Cu
		FI	one #14–#1/0 Al or Cu
	150 A	HD, HG, HJ, HL	one #14–#3/0 Al or Cu
	225 A	QB, QD, QG, QJ	one #4-300 kcmil Al or Cu
	250 A	JD, JG, JJ, JL	one #3/0–350 kcmil Al or Cu *[1]*
		DJ	one #2–600 Cu or #2–500 Al
		KI	one #1/0–350 kcmil Al or Cu
	400 A	LA, LH	one #1–600 kcmil Al or Cu or two #1–250 kcmil Al or Cu
	600 A	LC	two #4/0-500 kcmil Al or Cu

Table 9.149: NF Standard Mechanical Lugs—Main Lugs

Panel Type	Ampere Rating	Lug Wire Range
NF	125 A	one #6–2/0 Al or Cu
	250 A	one #6–350 kcmil Al or Cu
	400 A	one #1/0–750 kcmil or two #1/0–350 kcmil Al or Cu
	600 A	two #1/0–600 kcmil Al or Cu
	800 A	three #4/0–500 kcmil Al or Cu

Table 9.150: NF Standard Mechanical Lugs—Main Circuit Breaker

Panel Type	Ampere Rating	Circuit Breaker Type	Lug Wire Range *[1]*
NF	125 A	ED, EG, EJ	one #14–#2/0 Al or Cu
	100 A	FI	one #14–#1/0 Cu or one #12–#1/0 Al
	150 A	HD, HG, HJ, HL	one #14–#3/0 Al or Cu
	250 A	JD, JG, JJ, JL	one #3/0–350 kcmil Al or Cu *[1]*
		DJ	one #2–600 Cu or #2–500 Al
		KI	one #1/0–350 kcmil Al or Cu
	400 A	LA, LH	one #1–600 kcmil or two #1–250 kcmil Al or Cu
	600 A	LC, LI, LE, LX, LXI	two #4/0–500 kcmil Al or Cu

[1] Supported by the Panelboard Product Selector.
[1] The lug range shown is for the highest amperage of the circuit breaker frame shown in the table.

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Terminal Data

Table 9.151: Standard Mechanical Lugs—Main Lugs

Panel Type	Ampere Rating	Lug Wire Range *[1]*	Wire Range Wire Bending Space per NEC Table 312-6 *[1]*
I-Line	100 A	—	—
	225 A	one #6–300 kcmil Al or Cu	one #6–300 kcmil Al or Cu
	400 A	two #2–600 kcmil Al or Cu	one #2–600 kcmil Al or Cu two #2–500 kcmil Al or Cu
	600 A	two #2–600 kcmil Al or Cu	two #2–500 kcmil Al or Cu
	800 A	(4) 3/0–750 kcmil Al or Cu	(3) 3/0–500 kcmil Al or Cu
	1200 A	(4) 3/0–750 kcmil Al or Cu	(4) 3/0–500 kcmil Al or Cu

Table 9.152: Standard Mechanical Lugs—Main Circuit Breaker

Panel Type	Ampere Rating	Circuit Breaker Type	Lug Wire Range *[1]*	Wire Range Wire Bending Space per NEC Table 312-6 *[1]*
I-Line	100 A	FA, FH, FI	one #14-1/0 Al or Cu	one #14-1/0 Al or Cu
	150 A	HD, HG, HJ, HL	one #14-3/0 Al or Cu	one #14-3/0 Al or Cu
	225 A	KI	one #4-300 kcmil Al or Cu	one #4-300 kcmil Al or Cu
	250 A	JD, JG, JJ, JL	one #1/0-#4/0 Al or Cu	one #1/0-300 kcmil Al or Cu
		LX, LXI, LE	two #1-350 kcmil Al or Cu	two #1-350 kcmil Al or Cu
	400 A	LA, LH	one #1-600 or two #1-250 kcmil Al or Cu	one #1-600 kcmil Al or Cu
	600 A	LC, LI, LX, LXI, LE	two 4/0-500kcmil Al or Cu	two 4/0-500kcmil Al or Cu
	800 A	MG, MJ, PG, PJ, PL	three 3/0-500 kcmil Al or Cu	three 3/0-500 kcmil Al or Cu
	1200 A	PG, PJ, PL, RGC, RJC, RLC	four 3/0-500 kcmil Al or Cu	four 3/0-500 kcmil Al or Cu

Table 9.153: Standard Mechanical Lugs—Main Lugs

Panel Type	Mains Ampere Rating	Lug Wire Range *[1]*	Wire Range Wire Bending Space per NEC Table 312-6 *[1]*
QMB	225 A	one #6–300 kcmil Al or Cu	one #6–300 kcmil Al or Cu
	400 A	one #6–300 kcmil Al or Cu and, one 3/0–750 kcmil Al or Cu	one #6–300 kcmil Al or Cu and, one 3/0–750 kcmil Al or Cu
	600 A	two 3/0–500 kcmil Al or Cu	two 3/0–500 kcmil Al or Cu
	800 A	(4) 3/0–750 kcmil Al or Cu	(3) 3/0–500 kcmil Al or Cu or two 3/0–750 kcmil Al or Cu
	1200 A	(4) 3/0–750 kcmil Al or Cu	(4) 3/0–500 kcmil Al or Cu or (4) 3/0–750 kcmil Al or Cu
	1600 A	VCEL compression lugs Standard.	

Table 9.154: Standard Mechanical Lugs—Main Switch

Panel Type	Mains Ampere Rating	Lug Wire Range *[1]*	Wire Range Wire Bending Space per NEC Table 312-6 *[1]*
QMB	200 A	#4–300 kcmil Al or Cu	one #4–300 kcmil Al or Cu
	400 A	3/0–600 kcmil Al or Cu	3/0–600 kcmil Al or Cu
	600 A	3/0–600 kcmil Al or Cu	two 3/0–600 kcmil Al or Cu
	800 A	3/0–600 kcmil Al or Cu	(3) 3/0–500 kcmil Al or Cu

Table 9.155: Standard Mechanical Lugs—QMB Branch Switch Units

Panel Type	Switch Ampere Rating	Lug Wire Range *[1]*	Wire Range Wire Bending Space per NEC Table 312-6 *[1]*
QMB	30 A	one #14–#2 Al or Cu	one #14–#2 Al or Cu
	60 A	one #14–#2 Al or Cu	one #14–#2 Al or Cu
	100 A	one #14–1/0 Al or Cu	one #14–1/0 Al or Cu
	200 A	one #4–300 kcmil Al or Cu	one #4–300 kcmil Al or Cu
	400 A	two 3/0–600 kcmil Al or Cu	two 3/0–500 kcmil Al or Cu
	600 A	two 3/0–600 kcmil Al or Cu	two 3/0–500 kcmil Al or Cu
	800 A	(3) 3/0–600 kcmil Al or Cu	(3) 3/0–500 kcmil Al or Cu

Table 9.156: Standard Mechanical Lugs—QMJ Branch Switch Units *[2]*

Panel Type	Switch Ampere Rating	Lug Wire Range *[1]*	Wire Range Wire Bending Space per NEC Table 312-6 *[1]*
QMJ	30 A	one #14–#2 Al or Cu	one #14–#2 Al or Cu
	60 A	one #14–#2 Al or Cu	one #14–#2 Al or Cu
	100 A	one #14–1/0 Al or Cu	one #14–1/0 Al or Cu
	200 A	one #6–300 kcmil Al or Cu	one #6–300 kcmil Al or Cu
	400 A	one 1/0–750 kcmil Al or Cu	one 1/0–750 kcmil Al or Cu
	600 A	two 3/0–600 kcmil Al or Cu	two 3/0–600 kcmil Al or Cu

NQ Merchandised Accessories

Table 9.157: NQ SurgeLogic SurgeLoc Plug-on SPD *[1][2]*

Voltage		Part Number	Poles Occupied
120 / 240 V	80 kA	SSP01BIA08PBQ1	12
	100 kA	SSP01BIA10PBQ1	
	120 kA	SSP01BIA12PBQ1	
	160 kA	SSP01BIA16PBQ1	
	200 kA	SSP01BIA20PBQ1	
	240 kA	SSP01BIA24PBQ1	
208 Y / 120 V	80 kA	SSP02BIA08PBQ1	12
	100 kA	SSP02BIA10PBQ1	
	120 kA	SSP02BIA12PBQ1	
	160 kA	SSP02BIA16PBQ1	
	200 kA	SSP02BIA20PBQ1	
	240 kA	SSP02BIA24PBQ1	
240 / 120 HLD	80 kA	SSP03BIA08PBQ1	12
	100 kA	SSP03BIA10PBQ1	
	120 kA	SSP03BIA12PBQ1	
	160 kA	SSP03BIA16PBQ1	
	200 kA	SSP03BIA20PBQ1	
	240 kA	SSP03BIA24PBQ1	

[1] (#) = Number of conductors per phase.
[2] Use only 90 ºC insulated conductors based on an ampacity of 75 ºC conductors.
[1] When selecting a panelboard with SurgeLoc SPD, an additional 12 circuit positions (6 adjacent mounting spaces per side) are occupied. For example, if the desired number of circuits is 30, refer to page 9-11 and page 9-12 to select the NQ442L2/NQ442L2C interior and corresponding Box and Trim.
[2] SPD is only available up to 72 desired circuit counts.

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Section 10

Power Solutions Integrated Equipment

Power Solutions Integrated Equipment 10-2

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MPS

IPC

IPC2

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Power Solutions Integrated Equipment Overview

For over 30 years, the Schneider Electric Power Solutions business has been providing integrated equipment solutions for retail construction, commercial, and industrial projects. The Square D™ brand family of integrated equipment combines electrical distribution, building controls, and automation into a single, factory-assembled and pre-wired enclosure/lineup. Our innovative, cost-effective, integrated solutions save valuable floor space, shorten construction cycle times, and reduce installation and material handling costs.

Modular Panelboard System—Pre-Engineered Solution

The Modular Panelboard System (MPS) is tailored to customer specifications and may include panels and lighting control equipment. Special Powerlink™ lighting control and column-width panel interiors are available. Additional options include power and control cable wiring, contactors, terminal blocks, surge protective devices (SPDs), equipment spaces, and power metering/monitoring solutions. Seismically qualified MPS sections are also available.
Tailored to customer specifications, MPS sections are:

- 86 in. (2184 mm) high,
- 9.5 in. (241 mm) deep, and
- vary in width depending on customer specifications

Integrated Power Center—Custom-Designed Solution

For more complex applications, the Integrated Power Center (IPC) allows for the integration of a variety of components, including electrical distribution equipment, HVAC controls, lighting controls, power quality and power conditioning products, SPDs, building management systems and power metering/monitoring solutions. As with all Power Solutions Integrated Equipment products, the IPC is designed to meet applicable codes and standards and is available as seismically qualified. Factory-assembled, pre-wired (based on shipping splits), and tested in a controlled environment, IPC sections are:

- 84 in. (2134 mm) high,
- 10.5 in. (267 mm) deep, and
- vary in width depending on customer specifications

Standby Power Connection Solutions—UL Listed

The new family of Standby Power Connection Solutions are designed, tested, manufactured and listed to the UL standards providing you with a reliable solution to quickly and safely connect to a portable generator for standby power. The SPQ cam-lock (SPQCL) tap box design incorporates cam-lock receptacles for generator connection and the capabilities to be wired back to the standby power disconnect in the electrical distribution equipment. The SPQ lug-lug (SPQTB) tap box provides the capabilities to connect to a portable generator and the generator breaker cables using mechanical lugs in lieu of the cam-lock connectors.

The SPQ Cam-Lock Box is:

- 36 in. (915 mm) high
- 30 in. (762 mm) wide
- 16 in. (407 mm) deep

The SPQ Lug-Lug Box is:

- 36 in. (915 mm) high
- 30 in. (762 mm) wide
- 13 in. (330 mm) deep

Submetering Integrated Power Center

The Submetering Integrated Power Center (IPC) is an ideal solution for multi-tenant or departmental metering applications within office towers, condominiums, apartment buildings, shopping centers, and other multi-user environments. The Submetering IPC combines the panel with breakers, the PowerLogic EM4800 multi-circuit energy meter and the associated CTs in a factory-assembled and pre-wired solution saving significant space and on-site installation time. Submetering IPC sections are:

- 10.5 in. (267 mm) deep, and
- vary in width and height depending on the application

Integrated Power Center 2

The newest addition to the family of Integrated Equipment products, the Integrated Power Center 2 (IPC2™) provides maximum flexibility to meet customers' specifications. Features include those found in the IPC and are provided in a free-standing enclosure that can be front and rear aligned when transformers are included. The IPC2 family is available as seismically-qualified. Enclosure options include NEMA 1, NEMA 1 with driphood and NEMA 3R. IPC2 sections are:

- 91.5 in. (2324 mm) high, and
- vary in width and depth depending on customer specifications

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Integrated Power Center 2 Transformer Combo

Ideally suited for projects having both 480Y/277V and 208Y/120V requirements. Available as a stand-alone solution or can be incorporated into an MPS, IPC or IPC2 lineup. The standard 42" wide x 24" deep footprint will decrease space requirements by 40% or more. A typical IPC2 Transformer Combo includes two panels in the upper cells and a transformer in the bottom cell. Other upper cell options include contactors, individually mounted circuit breakers, ATS's, equipment spaces and power metering/ monitoring solutions. The IPC2 Transformer Combo is available as seismically qualified. Enclosure options include NEMA 1, NEMA 1 with driphood and NEMA 3R. IPC2 Transformer Combo sections are:

- 91.5 in. (2324 mm) high, and
- vary in width and depth depending on the transformer kVA

Additional savings are realized on installation, material costs and material handling, as shown in the table below.

Table 10.1: IPC2 Transformer Combo—Estimated Savings *[1]*

	Stick-Built	Transformer Combo	Savings Realized
Estimated Installation Hours	26–32	3–6	23–26
Materials	Associated pipe, wire and fittings	—	Associated pipe, wire and fittings
No. of Pieces Handled	20–30	1	19–29

The IPC2 Transformer Combo has been recognized by the electrical industry by winning the following awards:

- 2006 INNOVATION Award given by the *Electrical Contracting Products* magazine
- 2006 Product of the Year Gold Medal Award given by the *Consulting/Specifying Engineer* magazine

Modular Panelboard System

The pre-engineered Modular Panelboard System (MPS) bundles electrical distribution equipment into a single factory-assembled and wired integrated system. This approach replaces the traditional method of independently mounting each panelboard and lighting control system. MPS allows for the integration of a variety of components including:

- Panelboards: I-Line, NF, NQ, and Column-width
- Surge Suppression: SPD integral to panel and/or separately mounted
- Lighting Controls: Powerlink™ or lighting contactors
- Monitoring/Metering: Powerlogic™ power meters, circuit monitors, branch circuit monitoring, and system display meters

Equipment spaces including factory-installed lighting contactors are available in three configurations:

1. Unwired: Mounted in cell only
2. Line side wired: Line side of each pole is wired to a branch circuit breaker
3. Fully wired: Line side of each pole is wired to a branch circuit breaker, load side of each pole is wired to a terminal block

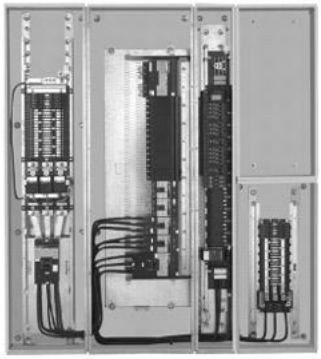
Built on a panelboard platform, Modular Panelboard System sections are NEMA 1-rated and meet the requirements of UL 67. Individual MPS configurations include panel sections in full-height, stacked or side-by-side arrangements. Individual sections measure:

- 86 in. (2184 mm) high
- 10–44 in. (254–1118 mm) wide
- 9.5 in. (241 mm) deep

Typical applications for MPS equipment include:

- Restaurants / Food service
- Office buildings / Public buildings
- Warehouses
- Schools / Universities

Modular Panelboard System



MPS Interior

[1] Based on an NF 480 V panel, 75 kVA transformer, NQ 240 V panel installation.

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Integrated Power Center

IPC Interior

Integrated Power Center

The custom-designed Integrated Power Center (IPC) combines electrical distribution equipment and building management controls into a single factory-assembled and wired integrated system. IPC has much greater design flexibility for producing a fully customized solution integrating a variety of distribution and control components, including:

- Panelboards: I-Line, NF, NQ, and Column-width
- Surge Suppression: SPD integral to panel and/or separately mounted
- Lighting Controls: Powerlink™ or lighting contactors
- Monitoring/Metering: Powerlogic™ power meters, circuit monitors, branch circuit monitoring, and system display meters
- Power quality and power conditioning
- Building automation
- HVAC controls

Equipment spaces including factory-installed lighting contactors are available in three configurations:

1. Unwired: Mounted in cell only
2. Line side wired: Line side of each pole is wired to a branch circuit breaker
3. Fully wired: Line side of each pole is wired to a branch circuit breaker, load side of each pole is wired to a terminal block

Integrated Power Centers are NEMA 1 rated and meet the requirements of UL 891. As with all integrated solutions, IPCs are shipped to the site fully assembled, completely pre-tested and ready-to-install. Individual IPC configurations include panel sections in full height, stacked, or side-by-side arrangements. IPC sections measure:

- 84 in. (2134 mm) High
- 10.25 (260 mm) Deep
- Widths vary, depending upon customer specifications

Typical applications for IPC equipment include:

- Retail stores / Grocery stores
- Office buildings / Public buildings
- Shopping malls / Strip malls
- Schools/Universities
- Restaurants / Food service
- Hotels/Motels
- Warehouses
- Equipment rooms

MPS and IPC Layout, Lead Time, and Pricing

Contact your local Schneider Electric representative or distributor.

MPS and IPC Shipping

MPS and IPC lineups are shipped factory-assembled and pre-wired. Customers may specify single- or multiple-section shipping splits (some limitations apply). In addition, lineups may be ordered with or without factory-installed power cables.

Standby Power Connection Solutions

The Standby Power Quick-Connect (SPQ) Tap Box provides a reliable solution to quickly and safely connect to a portable standby power generator. Two versions of the SPQ Tap Box have been designed and tested to the required UL standard and offer a wider range of solutions for our customers. All SPQ Tap Boxes are NEMA 3R-rated.

SPQ Cam-Lock Tap Box

SPQ Cam-Lock Tap Box

- UL listed - UL 1008 SB
- NEMA Type 3R enclosure
  (can be used for NEMA Type 1 installations)
- Lockable door for safety and control access
- Mechanical lugs to standby power disconnect
- Color-coded cam-lock connectors for generator connection
- Hinged bottom access door for cam-lock connection
- Barriers over mechanical lugs for safety
- Application:
  - 400 A and 600 A available
  - 240 V and 480 V versions available
  - Three-phase + neutral + ground

- **SPQCL204RS** – 400 A, 208Y/120 V 3-phase, 4-wire + ground wire
- **SPQCL404RS** – 400 A, 480Y/277 V 3-phase, 4-wire + ground wire
- **SPQCL206RS** – 600 A, 208Y/120 V 3-phase, 4-wire + ground wire
- **SPQCL406RS** – 600 A, 480Y/277 V 3-phase, 4-wire + ground wire

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SPQ Lug-Lug Tap Box

SPQ Lug-Lug Tap Box

- UL listed—UL 1773 (cUL listed also)
- NEMA Type 3R enclosure
  (can be used for NEMA Type 1 installations)
- Lockable door for safety and control access
- Mechanical lugs to standby power disconnect
- Generator connection lugs rated for Type W cable
- Application:
  - 400 A and 800 A available
  - 600 V maximum
  - Three-phase + neutral + ground

- **SPQTB604RS** – 400 A, 600 V max. 3-phase, 4-wire + ground wire
- **SPQTB608RS** – 800 A, 600 V max. 3-phase, 4-wire + ground wire

Submetering Integrated Power Center

Submetering Integrated Power Center

The Submetering Integrated Power Center (IPC) is an ideal solution for multi-tenant or departmental metering applications. It combines the ability to meter multiple feeder breakers inside a pre-wired enclosure. The Submetering IPC offers significant space and labor savings by replacing individually enclosed, mounted, and wired panels and metering components and providing an integrated solution in one enclosure/lineup including:

- Panelboards
- PowerLogic™ EM4800 Multi-Circuit Energy Meters and associated CTs
- Surge Suppression
- Factory-installed wiring between components

Submetering IPC width and height dimensions vary depending on the application. All sections are 10.5 in. (266.7 mm) deep.

Typical applications for Submetering IPC equipment include:

- Office towers
- Condominiums
- Apartment buildings
- Shopping centers
- Other multi-user environments
- Configurations with 2-PowerLogic EM4800 meters plus Ethernet switch when required based on the number of metered points

Integrated Power Center 2

Integrated Power Center 2

The Integrated Power Center 2 (IPC2™) provides maximum design flexibility. In addition to the features found in the Integrated Power Center (IPC), IPC2 lineups are free-standing enclosures that can be front and rear-aligned. IPC2 has the ability to incorporate:

- Panelboards: I-Line, NF, and NQ
- Transformers: 300 kVA(max)
  - K-rated also available; may limit max kVA size of transformer
- Individually mounted circuit breakers
- Surge Suppression: SPD integral to panel and/or separately mounted
- Automatic Transfer Switch: Open type 400 A 3-pole maximum including a variety of options
- Lighting Controls: Powerlink™ or lighting contactors
- PowerLogic™ Monitoring / Metering: power meters, circuit monitors, branch circuit monitoring, and system display meters
- Building Management Systems

As a stand-alone solution, the IPC2 family provides the flexibility to enter and/or exit the section from either the top or bottom. IPC2 is offered in a variety of widths and depths:

- 24–48 in. (610–1219 mm) Wide
- 24–36 in. (610–915 mm) Deep

Typical applications for IPC2 equipment include:

- Schools/Universities
- Office buildings
- Data centers
- Industrial facilities
- Casinos
- Hotels
- Any project with panels and transformers

ICP2 Layout, Lead Time, and Pricing

Contact your local Schneider Electric representative or distributor.

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IPC2 Transformer Combo

IPC2 Shipping

IPC2 lineups are shipped fully assembled and ready-to-install. Customers may specify single- or multiple-section shipping splits (some limitations apply). In addition, lineups may be ordered with or without factory-installed power cables.

Integrated Power Center 2 Transformer Combo

For projects having both 480Y/277 V and 208Y/120 V requirements, the Integrated Power Center 2 (IPC2) Transformer Combo is the perfect solution. One of the most popular members of the IPC2 product family, the IPC2 Transformer Combo has been recognized by the industry multiple times for its innovative design.

As a stand-alone solution, the IPC2 Transformer Combo is appropriate when panelboards and transformers are installed in close proximity to each other. It provides the flexibility to enter and/or exit the section from either the top or the bottom. Catalog numbers have been created for some of the more typical configurations.

All IPC2 sections can be close-coupled to QED switchboard, MPS, and IPC products. Enclosure options for IPC2 include NEMA 1, NEMA 1 with driphood, and NEMA 3R-rated, and all meet the requirements of UL 891. These sections are also seismically qualified to meet IBC and ASCE7 requirements.

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Section 11

Switchboards and Switchgear

QED-2 Switchboard

Metalclad and HVL/cc Switchgear

Unit Substation

Model III Package Unit Substation

Power-Style™ Switchboards 11-2

Power-Style QED-2 Switchboards (UL Listed) 11-2
Power-Style QED-6 Switchboards (UL Listed) 11-3
Power-Style Commercial Multi-Metering Switchboards (UL Listed) 11-5

Speed-D™ Switchboards 11-6

Speed-D SB/SF Switchboards (UL Listed) 11-6

Low Voltage Switchgear 11-9

Power-Zone™ 4 Low Voltage Switchgear with Masterpact™ Circuit Breakers 11-9
Power-Zone™ 4 Arc Resistant Switchgear with ArcBlok Technology 11-10
Micrologic™ Trip Units 11-10

Medium Voltage Metal-Enclosed Switchgear 11-11

MiniBreak™ Compact Height Switches— 5.5 kV, 200 A 11-11
HVL/cb Vacuum Circuit Breaker Switchgear—5-15 kV, 1200 A 11-13
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Automatic Circuit Recloser 11-40
Load Break Switch/Sectionalizer 11-40
ADVC Controller 11-41

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QED-2 Switchboard

Power-Style QED-2 Switchboards (UL Listed)

For solutions that bring people, products, and information together, Square D™ brand Power-Style QED-2 low voltage switchboards from Schneider Electric are built to last and feature design innovations that make these products easier to install and maintain. Supported by one of the largest distributor, sales, and service organizations in the industry, QED-2 switchboards are readily available to meet the needs of contractors, consultants, and end-users.

Q = Quality—Built to Last

As one of the most trusted names in electrical distribution, Square D™ brand QED-2 switchboards are designed with the highest standards of quality. From sturdy frames, securely fastened thread-forming screws, and standard bolted, base channels, users will see the difference during installation, operation, maintenance, and expansion projects.

E = Efficient and Innovative Designs

In 2010, Schneider Electric launched QED-2, Series 2 switchboard designs. Series 2 designs represent the next generation of our QED-2 switchboard offering, with new features based on extensive customer feedback. From improved branch neutral and ground bar access, to enhanced instrument compartments, Series 2 designs provide easier access for performing equipment installation and maintenance procedures.

QED-2 switchboards feature Schneider Electric's unique I-Line™ plug-on connections in group-mounted construction. With the I-Line design, a screwdriver is the only tool required to firmly ratchet the line end of a molded-case circuit breaker directly onto the I-Line bus assembly. This plug-on design allows quick installation and mounting flexibility of circuit breakers up to 1200 A.

D = Delivery—Ready When You Are

To meet tight project schedules and budgets, our Square D™ brand QED-2 switchboard offering brings together standard designs for the most frequently requested ratings and options, providing immediate pricing for quick shipments from 11 to 30 business days.

Features

- QED-2 Switchboards are designed, listed, and built to UL 891
- Switchboard ratings through 6000 A, 200 kA; higher amperages available
- Front accessible load connections
- Front and rear alignment standard
- Cable, busway, transformer, or remote QED switchboard incoming fed
- Hot or cold sequence utility metering
- Thermal-magnetic, PowerPact™ electronic, or Masterpact™ NW stored energy fixed or drawout circuit breakers used as mains and feeders
- Group-mounted circuit breaker and fusible switch mains and feeders
- Fixed-mounted fusible switch mains and feeders
- Powerlogic customer metering, including option for custom communications capability and interwiring
- Networked communications capabilities provide direct access to energy management at main and feeder level
- Internally-mounted Surgelogic™ surge protective devices
- Quick Connect Generator option available
- Main devices in six sub-division or single main configurations
- Main and branch devices in single section configuration
- Multiple individual devices in single section configurations
- Custom engineering, including main-tie-mains, multiple sets of thru-bus, reduced heights, and engineered houses

Additional Information:

See Table 9.99 Circuit Breaker / Sub-feed Lug Kit Mounting Space Requirement, page 9-35 for circuit breaker mounting height requirements.

Where Utility compartments are required, contact your local Schneider Electric representative.

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QED-6 Switchboard
(Class 2746)

Table 11.1: Circuit Breaker Selection

Rating (A) (Frame)	Circuit Breakers
150–250	PowerPact H, J
800–1200	Masterpact NT
800–6000	Masterpact NW

Power-Style QED-6 Switchboards (UL Listed)

Masterpact™ NW and NT, and PowerPact™ H and J Circuit Breakers

The QED-6 switchboard is designed to provide excellent distribution, protection, and power quality management in commercial electrical equipment. The circuit protection components of the switchboard are the Masterpact NW circuit breakers in 800–6000 A frame sizes, Masterpact NT circuit breakers in 800–1200 A frame sizes, and PowerPact H and J circuit breakers in 150–250 A frame sizes. These circuit breakers deliver maximum system uptime, system selectivity, ease of maintenance, and reliable circuit protection.

QED-6 switchboard features include: Masterpact NW UL 489 Listed circuit breakers for main and feeder devices, Masterpact NT UL 489 Listed circuit breakers for feeder devices, PowerPact H and J UL 489 Listed circuit breakers for feeder devices, and a wide range of designs and options. Highly flexible drawout/plug-in circuit breakers can meet a wide variety of power distribution requirements. Choices include plug-in or drawout construction in PowerPact H and J circuit breakers, and optional prepared drawout or plug-in spaces that are equipped with all specified control functions. This capability allows quick additions for load upgrades.

- QED-6 switchboards are designed, listed, and built to UL 891; Masterpact and PowerPact circuit breakers are designed, listed, and built to UL 489
- Circuit breakers are individually mounted, rear connected; Masterpact NW and NT circuit breakers are drawout; PowerPact H and J breakers are plug-in as standard, drawout as an option
- Family of field installable and upgradeable Micrologic™ trip units with optional Powerlogic™ data communications features
- Switchboard ratings up to 150 kA short-circuit current rating for services 1600–6000 A at 480 V and 100 kA at 600 V
- Up to (12) 250 A PowerPact H and J circuit breakers in a single 30-inch wide section
- Up to (8) 1200 A frame Masterpact NT circuit breakers in a single 30-inch wide section
- Flexible branch circuit breaker locations: Masterpact NW and NT and PowerPact H and J circuit breakers can be mixed in a single 30-inch wide section (15–2000 A)
- Compartmentalization: separate compartments for circuit breakers, bussing, and load cabling
- Available in 54-, 60-, 72-, and 80-inch deep construction
- Available in NEMA 3R outdoor walk-in enclosures
- Masterpact and PowerPact circuit breakers are field maintainable

QED-6 switchboards are reliable power protection equipment when working with telecommunication facilities, e-business servers, or mainframes that perform critical business transactions. These types of facilities cannot afford downtime.

QED-6 rear-connected switchboards are designed as standalone switchboards or as an integral part of the low voltage equipment lineup in a user's power unit substation.

Specify QED-6 Switchboards

When drawout construction is required for quick circuit breaker changeout; system requirements call for circuit breakers to close within five cycles; stored energy circuit breakers are required; front access to control wires is desired; ease of installation, maintenance, and upgrade of circuit breaker compartmentalization is required; system integrity and segregation of circuit breaker compartments from bus and cable compartments is required; equipment isolation is required.

Benefits/Values of Circuit Breaker Performance

Masterpact NW and NT circuit breakers are designed to provide maximum protection and reliable operation with a long service life. They exceed all UL 489 endurance testing requirements and are certified to a minimum of 10,000 operations through the 3000 A frame.

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System Coordination
Short-time ratings are high, giving users excellent system coordination and selectivity with downstream breakers.

High Short-Circuit Current Ratings (SCCR)
Up to 200 k AIR at 240 V, 150 k AIR at 480 V, and 100 k AIR at 600 V, which allows customers to design systems with high fault current and paralleling schemes.

Arc Flash Limiting (LF) Feeder Breakers
High speed operation of Masterpact NW and NT circuit breakers (150 k AIR at 480 V) helps reduce arc flash incident energy (cal/cm2) on downstream equipment.

Ease of Installation and Maintenance
Thru-the-door construction, an easy to operate drawout mechanism, and front access to all control wiring make this equipment easy to install, maintain, and upgrade. Load connections in the cable compartment are easily accessible in the rear of the switchboard. Remote racking of the Masterpact NW circuit breaker is also available with the optional remote racking tool, which, if required, is field installable.

Ability to Upgrade
UL Listed, field-installable accessories include: motor operators, shunt trips, under voltage devices, trip units, and communication modules for trip units. Manually operated circuit breakers are field convertible to electrical operation.

Open Communication System
The Micrologic trip units in Masterpact NW and NT circuit breakers use the Ethernet TCP/IP or Modbus™ serial protocol. These are widely accepted protocols which allow QED-6 to be integrated into new or many existing communication systems.

Adaptable
Drawout and bolt-in circuit breakers, front access control wiring, and expandable lineups are quickly adaptable to changing load and control requirements.

Expandable
Masterpact NW and NT circuit breakers have many control termination points, giving the equipment extensive flexibility and expandability for sophisticated control schemes.

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Power-Style Commercial Multi-Metering Switchboards (UL Listed)

- Designed, built, and listed to UL 891
- Lever bypass and EUSERC non-lever bypass
- Hot or cold sequence metering—EUSERC, NEMA, LOCAL
- Front and rear alignment standard
- Switchboard ratings through 4000 A, 100 kA
- Meter sections in either three- or six-socket section configuration
- Tenant mains either circuit breaker or fusible
- 60–200 A without lever bypass with self-contained meter sockets, 5- or 7-jaw, ring type and test block where required
- 60–200 A lever bypass with self-contained meter sockets, 7-jaw, ringless
- Factory-installed devices with completely wired from meter socket to disconnect
- Provisions for adding future tenants available, as well as future sections
- Sections in either NEMA 1 or NEMA 3R construction
- For use on 120/240 V, 120/208 V, and 277/480 V systems
- Integrated, front-accessible wireway for top exiting load cables
- Customer access area for top exiting load cables

Lever Bypass
Class 2755

EUSERC
Class 2756

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EUSERC UCT
Single Main Circuit Breaker with I-Line Distribution Panel

EUSERC UCT
Fusible Multiple Mains

Speed-D SB/SF Switchboards (UL Listed)

- UL Listed
- Hot sequence utility compartment per EUSERC requirements
- Two types:
  - Utility–Service disconnect–distribution
  - Utility–Up to six service disconnects
- Single service disconnect, either circuit breaker or fusible rated 400, 600, or 800 A with either type of distribution interiors, NQ up to 240 Vac, I-Line™ through 480 Vac
- Six service disconnects, group-mounted fusible, QMB/QMJ, 30–400 A; utility compartment—400, 600, and 800 A
- Meter doors can be 15 inches high with one meter socket and test block, or 30 inches high with two meter sockets and test block
- Meter sockets can be 6-, 8-, 13-, or 15-jaw meter sockets with test block, based on application
- Accessories include:
  - Underground pull sections with and without lug landing
  - Loadside wireway
  - Bus links for donut-type current transformers
  - Double padlock hasp attachments
  - Plug-on distribution panel
  - Subfeed circuit breakers
- Full height add-on I-Line distribution section
- Stand-alone I-Line distribution section

Application

Suitable for use as service entrance equipment on ac systems. Sections contain metering compartment, barriers, main disconnects, distribution panel, neutral bus, and grounding provisions.

Metering

C/T compartment with two 15-inch blank meter doors. (Order doors with meter socket from Table 11.6 Meter Door Selection, page 11-8.) Incoming cable lugs are for top feed with one twin conductor 2 AWG–600 kcmil lug per phase and neutral, suitable for aluminum or copper cables. Optional single conductor lug is available. Refer to Table 11.7 Accessories, page 11-8.

Mains

Main circuit breaker types are either LH or MJ. Main fusible device is supplied with Class T fuses. Multiple main devices use plug-on fusible switches.

Branches

NQ distribution bus is rated 400 A and provides mounting space for QO™/QOB Type (150 A maximum) circuit breakers. Panel provides space for mounting 42 single pole circuit breakers. One or two individually mounted 225 A maximum circuit breakers can be added with bus connectors. (Order subfeed circuit breakers from Table 11.8 Subfeed Circuit Breakers (Series E4) , page 11-8.)

I-Line™ distribution bus is rated 400, 600, or 800 A and will accept 27 inches of I-Line circuit breakers on the left side with a maximum frame size of “J” . The right side will accept either a QO plug-on distribution panel (240 V only) or LA or LH I-Line circuit breaker.

Enclosure

Totally enclosed front accessible with ANSI 49 gray baked enamel finish. Dimensions are 90 in. (H) x 36 in. (W) x 14 in. (D) for indoor and 90 in. (H) x 36 in. (W) x 24.5 in. (D) for outdoor enclosures.

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EUSERC Utility Metering, Main Disconnects and Distribution Panel (UL Listed)

Table 11.2: Single Main Circuit Breaker with Distribution (Series E4)

System	Service Voltage	Mains Ratings (A)	Distribution Interior	SCCR 240 V Max.	SCCR 480 V Max.	Circuit Breaker Catalog No.	
						Indoor	Outdoor
1Ø3W	120/240	400	NQ	65	—	SB124QS	SB124QR
			I-Line	65	—	SB124IS	SB124IR
			None	65	—	SB124WS	SB124WR
		600	I-Line	65	—	SB126IS	SB126IR
			None	65	—	SB126WS	SB126WR
3Ø4W *[1]*	208Y/120 240/120	400	NQ	65	—	SB324QS	SB324QR
3Ø4W *[1]*	208Y/120 240/120	400	None	65	—	SB324WS	SB324WR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	400	I-Line	65	35	SB344IS	SB344IR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	400	None	65	35	SB344WS	SB344WR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	600	I-Line	65	50	SB346IS	SB346IR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	600	None	65	65	SB346WS	SB346WR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	800	I-Line	65	50	SB348IS	SB348IR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	800	None	65	65	SB348WS	SB348WR

Table 11.3: Single Main Fusible Disconnect with Distribution (Series E4)

System	Service Voltage	Mains Ratings (A)	Distribution Interior	SCCR 240 V Max.	SCCR 480 V Max.	Fusible Disconnect Catalog No.	
						Indoor	Outdoor
1Ø3W	120/240	400	NQ	65	—	SF124QS	SF124QR
			I-Line	100	—	SF124IS	SF124IR
			None	200	—	SF124WS	SF124WR
		600	I-Line	100	—	SF126IS	SF126IR
			None	200	—	SF126WS	SF126WR
3Ø4W *[1]*	208Y/120 240/120	400	NQ	65	—	SF324QS	SF324QR
3Ø4W *[1]*	208Y/120 240/120	400	None	200	—	SF324WS	SF324WR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	400	I-Line	100	65	SF344IS	SF344IR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	400	None	200	200	SF344WS	SF344WR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	600	I-Line	100	65	SF346IS	SF346IR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	600	None	200	200	SF346WS	SF346WR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	800	I-Line	100	65	SF348IS	SF348IR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	800	None	200	200	SF348WS	SF348WR

Table 11.4: Multiple Mains—Fusible (Series E4)

System	Service Voltage	Mains Rating (A)	240 V or 480 V Max. *[2]*	Multiple Mains (6) Fusible Catalog No. *[3]*	
				Indoor	Outdoor
1Ø3W	120/240	400	200	SF124FS	SF124FR
1Ø3W	120/240	600	200	SF126FS	SF126FR
3Ø4W *[1]*	208Y/120 240/120 408Y/277	400	200	SF344FS	SF344FR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	600	200	SF346FS	SF346FR
3Ø4W *[1]*	208Y/120 240/120 480Y/277	800	200	SF348FS	SF348FR

[1] Can be used on 3Ø3W Delta voltage systems (for example, 240 V Delta or 480 V Delta).
[2] QMB/QMJ fusible switches, maximum 400 A, SCCR based on Class J, R, or T fuses. QMB plug-in circuit breaker rating is equal to the lowest rating of the circuit breaker.
[3] Multiple mains—provisions for mounting 30 inches of fusible devices. No more than six main devices permitted per NEC.

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Table 11.5: I-Line™ Distribution Section (Series E4)

System	Service Voltage	Mains Ratings (A)	Distribution Interior	SCCR 240 V Max.	SCCR 480 V Max.	Distribution Type	Catalog No.	
							Indoor	Outdoor
3Ø4W	208Y/120 240/120 480Y/277	800	I-Line	65 k	65 k	Add-on distribution section, must be connected to an SB UCT and main section without distribution panel, such as SB348WS. An I-Line plug-on subfeed lug kit must be ordered to terminate the distribution section.	SBAD800	SBAD800R
3Ø4W	208Y/120 240/120 480Y/277	800	I-Line	125 k	100 k	Stand-alone distribution section not connected to an SB section. A back-fed main circuit breaker or I-Line plug-on subfeed lug kit must be ordered to terminate the distribution section. (Non-ULSE)	SBSAD800	SBSAD800R

Table 11.6: Meter Door Selection

Meter Socket Jaws	15-inch High Door With One Meter Socket and Test Block	30-inch High Door With Two Meter Sockets and Test Blocks
	Catalog No.	Catalog No.
6 *[4]*	SBA15D6MS	—
8	SBA15D8MS	—
13	SBA15D13MS	SBA30D13MS
15	SBA15D15MS	SBA30D15MS
Blank	SBA15DBC	—
[5]	SBA15DMS	—

NOTE: To order structure with meter door factory-installed, add door catalog number as suffix to structure (for example, SF344IS-15D13MS).

Table 11.7: Accessories

Description				Catalog No.
Indoor underground pull section (w/o lug landing)—26-in. (W) Order separate SA8LL lug kit below if required.				SA26PS
Outdoor (3R) underground pull section (w/o lug landing)—26 in. (W) x 24.5 in. (D) Order separate SA8LL lug landing kit below when required.				SA26PSR
Lug landing kit—800 A max. For terminating utility service cables in indoor or outdoor underground pull sections.				SA8LL *[6]*
Single barrel lug kit —Kit provides single barrel lugs and pad in lieu of twin barrel lug provided with service section. Mechanical lugs provided are sized to fit 1-3/0–750 kcmil cable. Two lugs per phase are supplied.				SA7PL
Loadside wireway—11.5 in. (W) x 14 in. (D)—indoor only				SA10LW
Bus link kit—800 A max.—Order one kit per phase for 400, 600, and 800 A.				SA10BL
Double padlock hasp attachment—For mounting two padlocks on door handle of rainproof enclosure. Padlocks not included.				SS2PL
Plug-On Distribution Panel—mounts on right side of I-Line interior. Cannot be used with LA/LH branch circuit breaker. Panel rated 225 A for 240 V applications. For QO™ type plug-on circuit breakers only.	System	Phase	Pole Spaces	
	1Ø	AC	12	SS212AC
	3Ø	ABC		SS312
	3Ø	AB		SS212AB *[7]*

Table 11.8: Subfeed Circuit Breakers (Series E4)

Description	Rating (A)	2-Pole Catalog No. *[8]*		3-Pole Catalog No.	
		Left	Right	Left	Right
Subfeed Circuit Breaker Kit *[9]* Includes circuit breaker, connectors and mounting hardware. The complete kit, mounting hardware, circuit breaker and connectors will be shipped direct from plant. Delivery is stock to three days.	100	SASFBH100L( )	SASFBH100R( )	SASFBH100L	SASFBH100R
	110	SASFBH110L( )	SASFBH110R( )	SASFBH110L	SASFBH110R
	125	SASFBH125L( )	SASFBH125R( )	SASFBH125L	SASFBH125R
	150	SASFBH150L( )	SASFBH150R( )	SASFBH150L	SASFBH150R
	175	SASFBJ175L( )	SASFBJ175R( )	SASFBJ175L	SASFBJ175R
	200	SASFBJ200L( )	SASFBJ200R( )	SASFBJ200L	SASFBJ200R
	225	SASFBJ225L( )	SASFBJ225R( )	SASFBJ225L	SASFBJ225R

Ordering Information

1. **Service section:** Order service section from Table 11.2 Single Main Circuit Breaker with Distribution (Series E4), page 11-7 , Table 11.3 Single Main Fusible Disconnect with Distribution (Series E4), page 11-7 , or Table 11.4 Multiple Mains—Fusible (Series E4) , page 11-7, as determined by mains rating, voltage, and system.
2. **Meter doors:** Order meter door from Table 11.6 Meter Door Selection, page 11-8 as determined by the height and utility metering requirements.
3. **Accessories and subfeeds:** Order as required from Table 11.7 Accessories, page 11-8 and/or Table 11.8 Subfeed Circuit Breakers (Series E4) , page 11-8.
4. **Circuit breakers and switches:** Order devices from pages listed below as determined by voltage, trip rating, AIR, and mounting space.

Multiple Mains and Branch Devices

- QO, QOB, QO-VH, QOB-VH: page 7-11 and page 9-16
- I-Line: page 9-43 to page 9-49
- QMB Switches: page 9-51

[4] 6-jaw meter socket can also be used on 4- and 5-jaw applications.
[5] Door with provisions for mounting meter socket.
[6] All EUSERC Utilities (except Arizona Public Service and Salt River Project) require a lug landing kit SA8LL.
[7] To be used on 120/240 V, 3Ø4W delta applications.
[8] Two pole circuit breaker catalog numbers are completed by adding required phase connection letters as suffix (for example, SASFBH100LAC).
[9] Cannot use subfeed circuit breaker kit with multiple mains service section switchboards.

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Power-Zone 4
Low Voltage Switchgear
(Class 6037)

Power-Zone™ 4 Low Voltage Switchgear with Masterpact™ Circuit Breakers

Square D™ brand Power-Zone™ 4 low voltage, metal-enclosed, drawout switchgear is designed to provide superior electrical distribution, protection, and power quality management. The prime components of the switchgear are the Masterpact™ NW and NT ANSI rated circuit breaker. Power-Zone 4 switchgear is designed to maximize the functionality of the Masterpact circuit breakers, which, in turn, deliver maximum uptime, system selectivity, ease of maintenance, and reliable circuit protection. All of these features are packed into the smallest footprint available for low voltage drawout switchgear.

- Power-Zone 4 is designed and built to ANSI® C37.20.1 and is Listed to UL 1558
- Masterpact NW and NT drawout low voltage power circuit breakers are designed and built to ANSI C37.13 and C37.16. Listed to UL 1066
- Short-circuit current rating up to 200 kA at 240 V and 480 V without fuses
- High short-time withstand ratings up to 100 kA for 1 second, minimum
- Arc flash limiting (L1F) Masterpact NW feeder breakers available in 800, 1600, and 2000 A ratings
- Family of field installable and upgradeable Micrologic™ trip units with optional Powerlogic™ data communications features
- Power-Zone 4 switchgear can offer optional data communications capability
- Smallest equipment footprint available in this product class
- Front access to all control and communications wire connections
- Bolted copper bus provided as standard (up to 6000 A maximum)
- Large rear cable compartment pull area allowing maximum room for power cables
- Horizontal bus provision for future equipment expansion
- System designed for maximum uptime with low maintenance
- Modular circuit breaker designed for easy addition of control accessories
- Available in NEMA 3R outdoor walk-in enclosures
- Available Arc Resistant construction certified to ANSI C37.20.7. See Power-Zone™ 4 Arc Resistant Switchgear with ArcBlok Technology, page 11-10.

Masterpact NW circuit breakers are available in various levels of interrupting ratings from 42–200 kA at 480 V and 130 kA at 600 V.

The Masterpact NT circuit breaker is available in an 800 A frame size and 42 kA at 480 V interrupting rating. Up to 8 Masterpact NT circuit breakers can be mounted in a 30-inch wide section. (Not available for 600 V.)

Circuit breakers of like frame sizes and interrupting ratings are interchangeable.

Table 11.9: Masterpact Circuit Breaker Selection

Rating (A)	Catalog No.	Rating (A)	Catalog No.
Masterpact NW			
800	NW08N1 NW08H1 NW08H2 NW08H3 NW08L1 NW08L1F	4000	NW40H2 NW40H3 NW40L1
1600	NW16N1 NW16H1 NW16H2 NW16H3 NW16L1 NW16L1F	5000	NW50H2 NW50H3 NW50L1
2000	NW20H1 NW20H2 NW20H3 NW20L1 NW20L1F	6000	NW60H2 NW60H3 NW60L1
3200	NW32H1 NW32H2 NW32H3 NW32L1		
Masterpact NT			
800	NT08N1		

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Arc Resistant Power-Zone 4
Low Voltage Switchgear
(Class 6037)

New!

Power-Zone™ 4 Arc Resistant Switchgear with ArcBlok Technology

Protecting Your Personnel and Equipment from an Arc Flash

Power-Zone 4 arc resistant switchgear with Masterpact NW ArcBlok technology offers patented, superior arc flash protection for operators and maintenance personnel. The arc flash containment features are unique to the industry in both the circuit breaker compartment and the structure.

Power-Zone 4 Arc Resistant Switchgear with ArcBlok Technology is certified to comply with *ANSI C37.20.7 IEEE Guide for Testing Metal-Enclosed Switchgear Rated Up to 38 kV for Internal Arcing Faults*, and third-party (UL) witnessed as arc resistant switchgear. Refer to Data Bulletin 6037DB1302 for the complete UL Witness Certification Summary.

Features

- Masterpact NW circuit breakers with patented ArcBlok technology (up to 5000 A)
- Rated for systems with up to 100kA, 635V fault current
- 60 in. (1524 mm) deep x 22 in. (559 mm) wide (smallest arc resistant footprint in the industry)
- 22 in. (559 mm), 36 in. (914 mm) section widths
- 60 in. (1524 mm), 72 in. (1829 mm), 80 in. (2032 mm) section depths
- Internal arc gas management system for optimized cooling
- ANSI Type 2B Rating
- NEMA 1 enclosures

Available Options

- Insulated copper bus
- Zone selective interlocking
- High-resistance grounding
- Energy reduction maintenance switch
- Section barriers (rear, cable, and side)
- Circuit breaker remote racking
- ANSI Type 2B rated arc plenum exhaust

Micrologic™ Trip Units

A modern family of field-installable trip units is available with Masterpact NW and NT circuit breakers. The circuit breaker overcurrent protection consists of a microprocessor-based tripping device that requires no external power source. The complete tripping system has three main components: the air-core sensors, the trip device (with rating plug), and the trip actuator. The microprocessor-based trip unit uses true RMS current level sensing.

The Metering and Communications system is used in conjunction with Micrologic Type A, Type P, and Type H trip units (see Digest page 7-65 and page 7-67) for the Masterpact NW and NT circuit breakers. Modbus™ industry standard data communications allow this system to replace discrete meters, multiple transducers, analog wires, and analog-to-digital conversion equipment. Extensive information can be transmitted over a single communications cable to a Powerlogic system display, a personal computer, programmable logic controller, or other host system.

Basic circuit information, such as amperes, can be monitored using Micrologic Type A trip unit. Circuit breaker remote operation is available using the Micrologic Type P and Type H trip units with Powerlogic functionality. In addition to its metering capabilities, the Micrologic trip unit system is available with optional status inputs and relay outputs for monitoring discrete contacts and remote control of devices by way of the data communications channel.

Micrologic trip unit metering functions include:

- Amperes and volts
- Frequency
- Power
- Power demand
- Energy
- Energy demand
- Power factor
- Power quality measurements
- Communications
- Waveform capture
- Data logging
- Programmable contacts
- Current unbalance
- Over/under voltage
- Over/under frequency
- Voltage unbalance
- Phase sequence
- Reverse power
- Long time imaging
- Contact wear indicator
- Masterpact circuit breaker maintenance information

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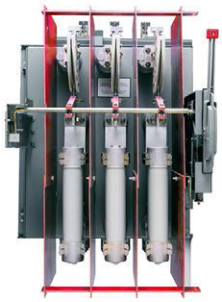
MiniBreak Switch Enclosure with Door (Class 6042)



MiniBreak Switch Interior Showing Fuses (Class 6042)

MiniBreak™ Compact Height Switches— 5.5 kV, 200 A

The Square D™ brand MiniBreak compact height switch enclosure is only 66-inches high and contains a single 3-pole load interrupter switch, rated 5.5 kV and 200 A. Enclosures are free-standing and suitable for both indoor (NEMA 1) and outdoor (NEMA 3R) applications. These switches are available unfused or with provisions for ANSI-style, 3-inch-barrel fuses rated from 10E A to 200E A. Factory-installed accessories include an auxiliary switch, strip heaters, and provisions for a “lock open” only key interlock. The door is mechanically interlocked with the switch operating handle. Set screw cable lugs for #14 solid—2/0 stranded aluminum or copper cable are provided for two line and one load connections. **Fuses are not furnished with this equipment.** For fuse information, see Table 11.12 Current-Limiting Fuses, Non-Disconnect Type. The Fused switches and many of the fuses listed in this table are available from stock.

Table 11.10: Ratings

Max. design voltage (kV)	5.5
BIL (kV)	60
Frequency (Hz)	60
Continuous amperes	200
Interrupting amperes	200
Momentary (amperes asymmetrical)	20,000
Fault close (amperes asymmetrical)	20,000
Capacitor switching (kVAR)	None
Short time, 2 seconds (amperes symmetrical)	12,500
Low frequency withstand (kV)	19
Fuse integrated (symmetrical)	63,000

NOTE: 1200 hp maximum.

Ordering Information

Table 11.11: 5 kV—200 A Switch

Type	Switch Catalog No.
Unfused	HVMB305200U
Fused	HVMB305200

Listed Metal-Enclosed Interrupter Switchgear

1. Select switch catalog number based on fused or unfused.
2. Select catalog numbers for modifications from Factory Modifications table.
3. If fused, select 5 kV, 200 A maximum current-limiting fuse from table below.
4. Price switch and fuses separately. Switches are furnished with provisions only for fuses.
5. Weight 450 lbs (204 kg).

Table 11.12: Current-Limiting Fuses, Non-Disconnect Type

Continuous Current	Fuse Mounting Clip		Catalog Number *[1] [2]*
	Size	Centers	
5 kV Fuse			
10E	D	12”	5GS010
15E			5GS015
20E			5GS020
25E			5GS025
30E	D	12”	5GS030
40E			5GS040
50E			5GS050
65E			5GS065
80E			5GS080
100E			5GS100
125E	D	12”	5GS125
150E			5GS150
175E			5GS175
200E			5GS200

Table 11.13: Factory Modifications

Catalog No.	Description
HVMX1	Auxiliary switch, 1-N.O. and 1-N.C. contacts
HVMK1	Provisions for lock open only key interlock—Type KFL Kirk key lock with a 0-inch bolt projection (Kirk item master number KFL000010SH)
HVMH1	Strip heater 100 W @ 120 V
HVMH2	Strip heater with thermostat 100 W @ 120 V
HVMSA3	Distribution class surge arrester (set of three arresters) 3 kV, 2.55 MCOV *[3]*
HVMSA6	Distribution class surge arrester (set of three arresters) 6 kV, 5.10 MCOV *[3]*

[1] Contact your Schneider Electric representative for current stock quantities.
[2] Includes one set of three fuses, packed in a single box.
[3] Arresters are line side connected.

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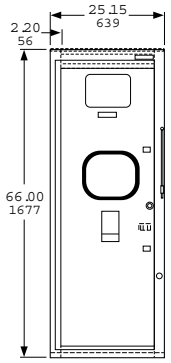
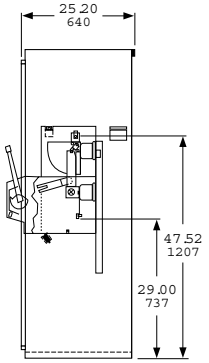
Ordering Example

Order one (1), 5 kV, 200 A switch with 65E current-limiting fuses. Provide one auxiliary switch with 1-N.O. and 1-N.C. contact and with provision for installing a “lock open” key interlock on the switch operating mechanism.

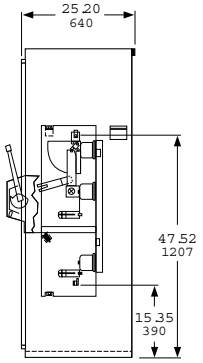
Order:	Catalog No.
Switch with enclosure	HVMB305200
Auxiliary switch	HVMX1
Key interlock adapter	HVMK1
Fuses (set of three, from Table 11.12 Current-Limiting Fuses, Non-Disconnect Type, page 11-11. *[4] [5]*	5GS065



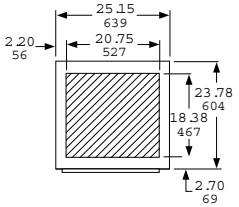
Front View



Section View
(unfused)



Section View
(fused)



Bottom View
Selected Area Recommended
(bottom conduit entrance)

[4] For fuses produced by other manufacturers, contact your nearest Schneider Electric sales office or your local Schneider Electric distributor.

[5] Current-limiting fuses will increase the integrated short-circuit ratings beyond the non-fusible units. Contact your nearest Schneider Electric sales office or your local Schneider Electric distributor.

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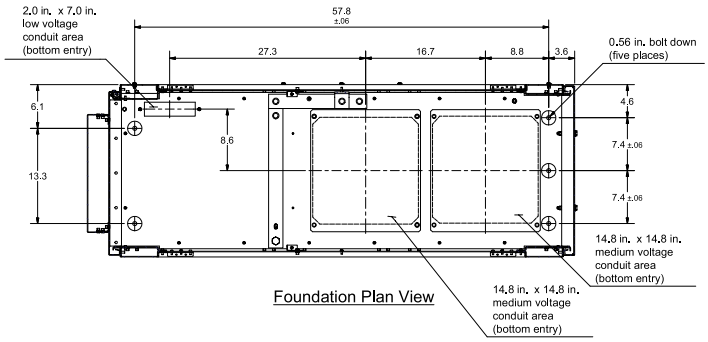
HVL/cb Vacuum Circuit Breaker Switchgear—5-15 kV, 1200 A

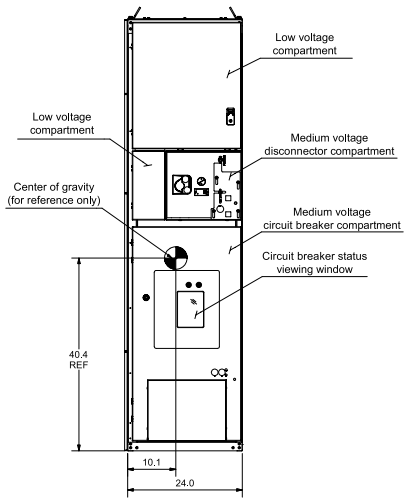
Square D™ brand metal-enclosed switchgear has become an industry standard for its superior system performance, low maintenance cost, easy system expansion, and reduced system expense.

Square D™ brand HVL/cb vacuum interrupter switchgear offers a small footprint, reduced capital and operational expenditures, longer maintenance cycles, and initial low cost offer for the market. With the incorporation of the Evolis vacuum circuit breaker, the switchgear is able to operate at up to 10,000 operations.

Standing at 24 in. wide, 90 in. inches high, and 65 in.deep, this equipment is NEMA 1 rated and adheres to the ANSI IEEE standard. Additional features include switchgear ratings up to 1200 A for the main bus, 15 kV for the system voltage, a 25 kA interrupting rating, and up to 95 kV BIL.

HVL/cb switchgear is designed for front-only or front or rear access, which allows the switchgear be placed against a wall without an NEC-governed rear aisle. The “Type 2b” arc resistant option has a plenum behind the low voltage compartment that does not require any additional height space to be added to the switchgear. Designed for top and bottom cable entry, the units can be equipped with either the over-toggle mechanism (OTM) or the stored-energy mechanism (SEM), making this switchgear ideal for most applications.





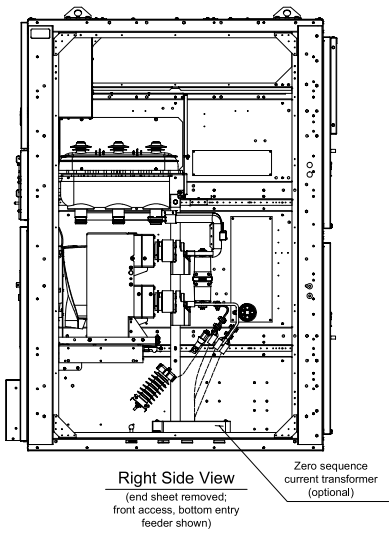


Table 11.14: HVL/cb Vacuum Circuit Breaker Switches—600/1200 A Ratings

Switch (kV)—maximum design		5.5	17.5
BIL (kV)		60	95
Frequency (Hz)		50/60	50/60
Withstand (kV)		19	36
Continuous current (A)		600/1200	600/1200
Interrupting current (A)		600/1200	600/1200
Fault close (kA asymmetrical)		40	40
Momentary current (kA asymmetrical)		40	40
Short time current (kA symmetrical)		25	25
Mechanical endurance (number of operations)	Load break switch	1000	1000
	Evolis circuit breaker	10,000	10,000

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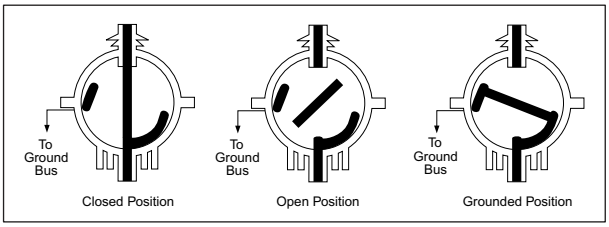
Switch Disconnector Standard Features

- Switch Positions: Closed, open, and internally grounded (optional) (connects switch contacts to ground)
- Enclosure: Epoxy
- Medium: Sulphur hexalfluoride
- Maintenance: Maintenance free sealed for life
- Pressure:
  - 5.8 PSI (≤ 17.5 kV)
  - 22 PSI (25.8–38 kV)
- View ports to show switch blade position



Options

- Internal ground switch: Has full fault making capability
- Connections to HVL/cc load interrupter switchgear and Motorpact motor controllers
- Service entrance available
- Voltage transformers
- Control power transformer
- Fast auto transfers
- Dual main configurations
- Powerlogic™ metering

Switchgear Standard Features

- Compartments: Switch, bus, circuit breaker, mechanism, and optional low voltage/ control
- 11 gauge steel enclosure
- Epoxy insulators
- Circuit breaker door interlocking available
- Front and rear access available
- Animated mechanism mimic bus
- Padlocking provision—open or closed (OTM); open-only (SEM)
- Top or bottom cable entry
- UL/CUL Listed, IEEE C37.20.3
- Tin plated copper bus for lineups
- Insulated bus

Listed Metal-Enclosed Interrupter Switchgear

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Shielded Solid Insulation System (2SIS)

Listed Metal-Enclosed Interrupter Switchgear

Premset Compact Vacuum Circuit Breaker Switchgear with Shielded Solid Insulation System (2SIS)

Premset represents the new generation of medium voltage switchgear. It is 15 kV vacuum circuit breaker switchgear technology that takes advantage of the innovative shielded solid insulated system (2SIS). 2SIS creates a three-layered system (medium voltage conductive layer, epoxy insulating layer, and grounded shield layer) throughout the entire switchgear that optimizes performance and increases life expectancy. Premset reduces the opportunity of arc flash or contact with live parts by insulating and screening all live parts in an epoxy dielectric molding. In addition, a grounded shield layer helps reduce the likelihood of exposure to electrical hazards while at the same time better protecting the insulating material from harsh environmental conditions such as moisture, dust, chemicals, and vermin.

Premset delivers a compact architecture that is both modular and flexible. It allows for front-only accessibility (bottom incoming cables) and the smallest 15 kV vacuum circuit breaker footprint on the market. Plug-and-play design of accessories and auxiliaries makes even last minute or field modifications possible. Modular design improves cost savings and optimizes delivery times. Premset's modular architecture makes it easy to use in design and intuitive to learn for operators.

Table 11.15: Premset Ratings

Voltage Class	5 and 15 kV			
Bus Current Rating	600 and 1200 A			1200 A
Circuit Breaker Current Rating	100 A	200 A	600 A	1200 A
Maximum Short-Time Interrupting Current	25 kA (2 seconds)			
Rated BIL Withstand Voltage	95 kV			
Base Dimensions (inches)	14.75 W x 36 D x 65 H			29.5 W x 36 D x 65 H

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HVL/cc Metal-Enclosed Load Interrupter Switchgear—Full Range

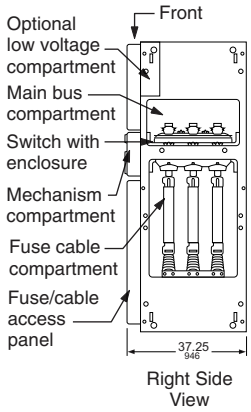
Square D™ brand HVL/cc metal-enclosed load interrupter switchgear provides switching, metering, and interrupting capabilities for medium voltage electrical power distribution systems and is designed and tested per applicable ANSI/IEEE and NEMA standards.

Made up of modular units, the HVL/cc is easy to expand. Two main bus positions allow future extensions and connections to existing equipment.

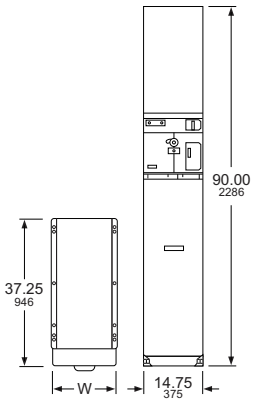
HVL/cc switchgear is available in either single or multiple bay units. The design is compact, with front-only accessibility.

The HVL/cc switch can be equipped with either an over-toggle mechanism (OTM), which is standard, or an optional stored energy mechanism (SEM). An option with both mechanisms is the Fuselogic™ system. The Fuselogic system offers fuse tripping (with SEM) to provide protection against single phasing loads when a fuse has blown.

The HVL/cc enclosure is designed for front access only and can be positioned against walls, in small rooms or in pre-fabricated buildings. The small footprint can result in considerable cost savings from the reduction of building or room sizes.



Right Side View



Plan View

Front View

Table 11.16: HVL/cc Load Interrupter Switches— Full Range 600/1200 A Ratings

Switch (kV)—maximum design	5.5	17.5	17.5	25.8	38
BIL (kV)	60	95	110	125	150
Frequency (Hz)	50/60	50/60	50/60	50/60	50/60
Withstand (kV)	19	36	36	50	80
Continuous current (A)	600/1200	600/1200	600/1200	600	600
Interrupting current (A)	600/1200	600/1200	600/1200	600	600
Fault close (kA asymmetrical)	40	40	40	32	32
Momentary current (kA asymmetrical)	40	40	40	32	32
Short time current (kA symmetrical)	25	25	25	25	25
Electrical endurance (number of operations at 80% P.F.)	100/600 A 26/1200 A	100/600 A 26/1200 A	100/600 A 26/1200 A	100	100
Mechanical endurance (number of operations)	1000	1000	1000	1000	1000

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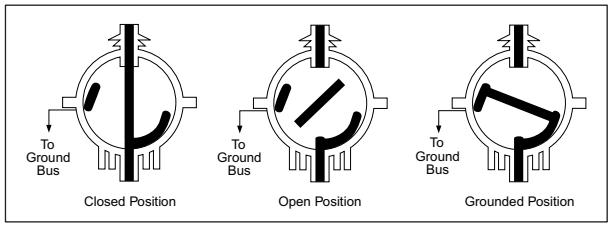
Switch Standard Features

- Switch Positions: Closed, open, and internally grounded (optional) (connects switch contacts to ground)
- Enclosure: Epoxy
- Medium: Sulphur hexalfluoride
- Maintenance: Maintenance free sealed for life
- Pressure:
  - 5.8 PSI (≤ 17.5 kV)
  - 22 PSI (25.8–38 kV)
- View ports to show switch blade position



Options

- Internal ground switch: Has full fault making capability
- Fuselogic™ system
- Infrared viewing windows
- Class I, Division 2
- Fast auto transfers
- Duplex configurations
- Powerlogic™ metering
- 20-inch or 29.5-inch wide enclosures

Fuselogic™

Fuselogic is a protection system that provides the ultimate in medium voltage fuse protection. This patented system utilizes Square D™ brand current-limiting fuses with mechanical sensors that function without any auxiliary power requirements. Several combinations of Fuselogic functions can be combined to provide simple blown fuse indication contacts with mechanical lockout to anti-single phasing protection. Anti-single phasing requires the optional stored energy mechanism. Fuselogic is available on both HVL/cc and HVL switches.

Switchgear Standard Features

- Compartments: Switch, bus, fuse/cable, mechanism, and optional low voltage/control
- 11 gauge steel enclosure
- Epoxy insulators
- Fuse/cable access panel interlocked with switch
- Front access only
- Animated mechanism mimic bus
- Padlocking provision—open or closed (OTM); open-only (SEM)
- Top or bottom cable entry
- UL/CUL Listed, IEEE C37.20.3
- Live line indicators on all incoming switch bays and outgoing feeder circuits
- Cable lugs included for one cable per phase
- Tin plated copper bus for lineups

Listed Metal-Enclosed Interrupter Switchgear

Table 11.17: Surge Arresters

System L-L Voltage kV		Arrester MCOV-kV	
Nominal	Maximum	Effectively Grounded Neutral Circuits	Impedance Grounded and Ungrounded Circuits
2.4	2.54	—	2.55
4.16	4.4	2.55	5.1
4.8	5.08	—	5.1
6.9	7.26	—	7.65
12.0	12.7	7.65	12.70
12.47	13.2	7.65	12.70
13.2	13.97	8.4	—
13.8	14.52	8.4	—

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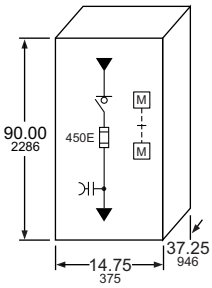
HVL/cc Switchgear Quick Ship Program—5–15 kV, 600 A

The HVL/cc quick ship program provides basic fused and unfused load interrupter switch configurations for standalone or transformer primary applications. The Quick Ship program offers faster delivery, but with fewer options.

Three-pole, 600 A individual HVL/cc switches are available in free-standing indoor (NEMA 1) enclosures. These switches are available unfused or with provisions for Square D™ brand current-limiting DIN/E fuses. Factory optional accessories include auxiliary bays, main bus, auxiliary switches, and distribution class surge arresters. The fuse access panel is mechanically interlocked with the switch mechanism. Key interlocks are not an available option with Digest-listed HVL/cc switches. (1) Set screw type lugs for (2) #2–350 kcmil copper or aluminum cables are provided for line and load connections. **Fuses are not furnished with this equipment.** For fuse information, refer to General Purpose E-Rated Current-Limiting Fuses:Type DIN/E for HVL/cc Switches, page 11-21.

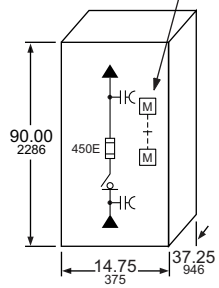
NOTE: Cable entry and exit must be opposite to maintain the minimum sections shown.



5 kV Indoor N1
Top Cable In/Bottom Cable Out Switch in Position A

Mechanical interlock between switch and fuse access panel.

NOTE: Mechanical interlock is standard on switches.



5 kV Indoor N1
Top Cable In/Bottom Cable Out Switch in Position B

Provisions for Future Expansion

- All “single” HVL/cc switches have provisions for future expansion on either side
- Order main bus kits for copper 600 A bus

600 A Single Switch Unfused

- Manual over-toggle mechanism, no grounding switch
- Includes (1) set screw for (2) #2–350 kcmil Cu or Al conductors per phase
- Application A = Top entry (incoming—cable or main bus), bottom exit (load—cable or main bus)
- Application B = Bottom entry (incoming—cable or main bus), top exit (load—cable or main bus)

Table 11.18: Unfused Switch Selection

Catalog No.	kV Rating	Fuse Range	Application	Width	
				in	mm
HVLCCA14305N	4.76	—	A	14.75	375
HVLCCA20305N	4.76	—	A	20.00	508
HVLCCA14315N	15	—	A	14.75	375
HVLCCA20315N	15	—	A	20.00	508
HVLCCB14305N	4.76	—	B	14.75	375
HVLCCB20305N	4.76	—	B	20.00	508
HVLCCB14315N	15	—	B	14.75	375
HVLCCB20315N	15	—	B	20.00	508

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600 A Single Switch Fused

- Provisions only for Square D™ brand current-limiting DIN/E fuses—order separately
- Manual over-toggle mechanism, no grounding switch
- Includes (1) set screw lug for (2) #2–350 kcmil Cu or Al conductor per phase
- Application A = Top entry (incoming—cable or main bus), bottom exit (load—cable or main bus)
- Application B = Bottom entry (incoming—cable or main bus), top exit (load—cable or main bus)

Table 11.19: Fused Switch Selection

Catalog No.	kV Rating	Fuse Range	Application	Width	
				in	mm
HVLCCA14305D	4.76	10–450E	A	14.75	375
HVLCCA20305D	4.76	10–450E	A	20.00	508
HVLCCA14315D	15	10–200E	A	14.75	375
HVLCCA20315D	15	10–200E	A	20.00	508
HVLCCB14305D	4.76	10–450E	B	14.75	375
HVLCCB20305D	4.76	10–450E	B	20.00	508
HVLCCB14315D	15	10–200E	B	14.75	375
HVLCCB20315D	15	10–200E	B	20.00	508

600 A Incoming Line Auxiliary Bay

For bottom incoming cable to application A (bottom cable exit) switch(es), order 600 A tin plated Cu main bus to adjacent section from bus table. Includes (1) set screw lug for (2) #2–350 kcmil Cu or Al conductor per phase.

Table 11.20: Bays for Bottom Entry/Bottom Exit Cables

Catalog No.	kV Rating	Fuse Range	Application	Width	
				in	mm
HVLCCA14A	4.76/15	—	A	14.75	375
HVLCCA20A	4.76/15	—	A	20.00	508

For top incoming cable to application B (top cable exit) switch(es), order 600 A tin plated Cu main bus to adjacent section from main bus kits table. Includes (1) set screw lug for (2) #2–350 kcmil Cu or Al conductor per phase.

Table 11.21: Bays for Top Entry/Top Exit Cables

Catalog No.	kV Rating	Fuse Range	Application	Width	
				in	mm
HVLCCB14A	4.76/15	—	B	14.75	375
HVLCCB20A	4.76/15	—	B	20.00	508

600 A Tin Plated Copper Main Bus Kits

Table 11.22: Bus Kits

Catalog No.	Left (From) Application	Width		Right (To) Application	Width	
		in	mm		in	mm
HVLCCMBA14A14	A	14.75	375	A	14.75	375
HVLCCMBA14A20	A	14.75	375	A	20.00	508
HVLCCMBA20A14	A	20.00	508	A	14.75	375
HVLCCMBA20A20	A	20.00	508	A	20.00	508
HVLCCMBB14B14	B	14.75	375	B	14.75	375
HVLCCMBB14B20	B	14.75	375	B	20.00	508
HVLCCMBB20B14	B	20.00	508	B	14.75	375
HVLCCMBB20B20	B	20.00	508	B	20.00	508

Ratings

HVL/cc Switch with manually operated type OTM mechanism in cubicle enclosure (does not include internal ground switch). Ratings are based on an X/R ratio of 1.6.

Table 11.23: HVL/cc Switch Ratings

Switch (kV)—maximum design	5.5	17.5
BIL (kV)	60	95
Frequency (Hertz)	50/60	50/60
Withstand (kV)	19	36
Continuous current (amperes)	600	600
Interrupting current (amperes)	600	600
Fault close (amperes asymmetrical)	40,000	40,000
Integrated switch and fuse rating (amperes symmetrical)*[1]*	65,000	65,000
Momentary current (amperes asymmetrical)	40,000	40,000
Short time current, 2 seconds (amperes symmetrical)	25,000	25,000
Operations at Full Load	100	100
Mechanical Endurance (number of operations)	1000	1000

[1] 50,000 for 630 A fuse.

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Factory Modifications

Table 11.24: Factory Modifications

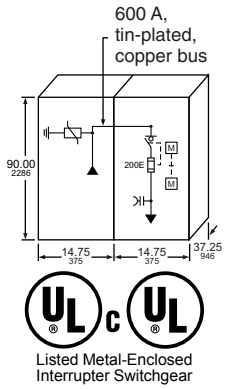
Catalog No.	Description
HVLCC-X3	Auxiliary switch 2 N.O.–2 N.C. contact

Distribution Class Surge Arresters

(One Set of Three) Switch Load Side Connected or Incoming Line Bay)

Table 11.25: Surge Arresters

Catalog No.	kV Rating	Section Width Minimum Required	
		in	mm
HVLCCDSA3	3 kV, 2.55 kV MCOV	14.75	375
HVLCCDSA6	6 kV, 5.10 kV MCOV	14.75	375
HVLCCDSA9	9 kV, 7.65 kV MCOV	14.75	375
HVLCCDSA10	10 kV, 8.40 kV MCOV	14.75	375
HVLCCDSA12	12 kV, 10.20 kV MCOV	14.75	375
HVLCCDSA15	15 kV, 12.70 kV MVOV	20.00	508
HVLCCDSA18	18 kV, 15.3 kV MCOV	20.00	508



Listed Metal-Enclosed Interrupter Switchgear

600 A "Single" HVL/cc Switch with PROVISIONS ONLY for Square D™ brand Current-Limiting, Non-Disconnect Type Fuses for Cable Connection to Power-Dry™, Power-Cast™, and Uni-Cast™ Transformers

(FLC = 300 A MAXIMUM)
RH—Transformer on right, LH—Transformer on Left
Application A = Top Entry (Incoming Cables)
Application B = Bottom Entry (Incoming Cables)

Table 11.26: 600 A "Single" HVL/cc Switch Selection

Catalog No.	kV Rating	Fuse Range	Application	Width		RH / LH
				in	mm	
HVLCCA14405DGR	4.76	10–450E	A	14.75	375	RH
HVLCCA20405DGR	4.76	10–450E	A	20.00	508	RH
HVLCCA14405DGL	4.76	10–450E	A	14.75	375	LH
HVLCCA20405DGL	4.76	10–450E	A	20.00	508	LH
HVLCCA14415DGR	15	10–200E	A	14.75	375	RH
HVLCCA20415DGR	15	10–200E	A	20.00	508	RH
HVLCCA14415DGL	15	10–200E	A	14.75	375	LH
HVLCCA20415DGL	15	10–200E	A	20.00	508	LH
HVLCCB14405DGR	4.76	10–450E	B	14.75	375	RH
HVLCCB20405DGR	4.76	10–450E	B	20.00	508	RH
HVLCCB14405DGL	4.76	10–450E	B	14.75	375	LH
HVLCCB20405DGL	4.76	10–450E	B	20.00	508	LH
HVLCCB14415DGR	15	10–200E	B	14.75	375	RH
HVLCCB20415DGR	15	10–200E	B	20.00	508	RH
HVLCCB14415DGL	15	10–200E	B	14.75	375	LH
HVLCCB20415DGL	15	10–200E	B	20.00	508	LH

NOTE: Switches with transformer connections are painted ANSI 49. Standalone switches are painted ANSI 61. Transformer connections in HVL/cc switches are based on standard Square D™ brand transformer connections. If these switches are used to connect to other manufacturers' transformers, then connections must match standard Square D™ brand transformer connections. (Cable connections are furnished with the transformer.)

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General Purpose E-Rated Current-Limiting Fuses: Type DIN/E for HVL/cc Switches

- Integrated rating for 600 A HVL/cc switches with Square D™ brand DIN/E fuses listed below is 65 kA rms symmetrical amperes.
- Current-limiting fuses increase the integrated short-circuit current rating because of their energy-limiting capabilities.
- To increase the short-circuit current rating of the entire lineup of switchgear, current-limiting fuses must be used in the entrance sections.

Table 11.27: Fuse Selection

Catalog No.	kV Rating	Fuse Rating	Set of Fuses *[2]*	Fuse Size	Section Width Required	
					in	mm
55DE010	5.5	10E	1	Actual	14.75	375
55DE015	5.5	15E	1	Actual	14.75	375
55DE020	5.5	20E	1	Actual	14.75	375
55DE025	5.5	25E	1	Actual	14.75	375
55DE030	5.5	30E	1	Actual	14.75	375
55DE040	5.5	40E	1	Actual	14.75	375
55DE050	5.5	50E	1	Actual	14.75	375
55DE065	5.5	65E	1	Actual	14.75	375
55DE080	5.5	80E	1	Actual	14.75	375
55DE100	5.5	100E	1	Actual	14.75	375
55DE125	5.5	125E	1	Actual	14.75	375
55DE150	5.5	150E	1	Actual	14.75	375
55DE175	5.5	175E	1	Actual	14.75	375
55DE200	5.5	200E	1	Actual	14.75	375
55DE250	5.5	250E	1	Actual	14.75	375
55DE300	5.5	300E	1	Actual	14.75	375
55DE350	5.5	350E	1	Actual	14.75	375
55DE400	5.5	400E	1	Actual	14.75	375
55DE450	5.5	450E	1	Actual	14.75	375
175DE010	15.5	10E	1	Actual	14.75	375
175DE015	15.5	15E	1	Actual	14.75	375
175DE020	15.5	20E	1	Actual	14.75	375
175DE025	15.5	25E	1	Actual	14.75	375
175DE030	15.5	30E	1	Actual	14.75	375
175DE040	15.5	40E	1	Actual	14.75	375
175DE050	15.5	50E	1	Actual	14.75	375
175DE065	15.5	65E	1	Actual	14.75	375
175DE080	15.5	80E	1	Actual	14.75	375
175DE100	15.5	100E	1	Actual	14.75	375
175DE125	15.5	125E	1	Actual	14.75	375
175DE150	15.5	150E	1	Actual	14.75	375
155DE175	15.5	175E	1	Actual	14.75	375
155DE200	15.5	200E	1	Actual	14.75	375

600 A "Duplex" HVL/cc Switch with PROVISIONS ONLY for Square D™ brand Current-Limiting, Non-Disconnect Type Fuses for Cable Connection to Power-Dry, Power-Cast, and Uni-Cast Transformers

- FLC = 300 A **maximum**
- RH—Transformer on right
- LH—Transformer on left includes mechanical interlock to prevent paralleling of sources
- Application A = top entry (incoming cables)
- Application B = bottom entry (incoming cables)

Table 11.28: 600 A "Duplex" HVL/cc Switch Selection

Catalog No.	kV Rating	Fuse Range	Appli-ca-tion	Width		RH / LH
				in	mm	
HVLCCA14505DGR	4.76	10–450E	A	14.75	375	RH
HVLCCA20505DGR	4.76	10–450E	A	20.00	508	RH
HVLCCA14505DGL	4.76	10–450E	A	14.75	375	LH
HVLCCA20505DGL	4.76	10–450E	A	20.00	508	LH
HVLCCA14515DGR	15	10–200E	A	14.75	375	RH
HVLCCA20515DGR	15	10–200E	A	20.00	508	RH
HVLCCA14515DGL	15	10–200E	A	14.75	375	LH
HVLCCA20515DGL	15	10–200E	A	20.00	508	LH
HVLCCB14505DGR	4.76	10–450E	B	14.75	375	RH
HVLCCB20505DGR	4.76	10–450E	B	20.00	508	RH
HVLCCB14505DGL	4.76	10–450E	B	14.75	375	LH
HVLCCB20505DGL	4.76	10–450E	B	20.00	508	LH
HVLCCB14515DGR	15	10–200E	B	14.75	375	RH
HVLCCB20515DGR	15	10–200E	B	20.00	508	RH
HVLCCB14515DGL	15	10–200E	B	14.75	375	LH
HVLCCB20515DGL	15	10–200E	B	20.00	508	LH

[2] Each set of fuses contains three fuses, so, for example, two sets of fuses yield a total of six fuses.

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Ordering Information

1. Select switch catalog number based on fused or unfused and cable entry locations (top or bottom) from Table 11.18 Unfused Switch Selection, page 11-18, or Table 11.19 Fused Switch Selection, page 11-19.
2. Select incoming line auxiliary bay from Table 11.20 Bays for Bottom Entry/Exit Cables, page 11-19, or Table 11.21 Bays for Top Entry/Exit Cables, page 11-19, if required.
3. Select main bus from Table 11.22 Bus Kits, page 11-19, if required.
4. Select catalog numbers for factory modifications from Table 11.24 Factory Modifications, page 11-20, if required.
5. If fused, select DIN/E fuses from Table 11.27 Fuse Selection, page 11-21.

Ordering Example

Order indoor 600 A, 5 kV, HVL/cc switch with bottom incoming and bottom outgoing cables (1) #2 AWG per phase, (1) set 200E fuses, and (1) set 6 kV surge arresters.

Order:	Catalog. No.
Switch w/fuse provisions and bottom exit load cables	HVLCCA14305D
600 incoming line auxiliary bay (Application A—bottom entry)	HVLCCA14A
Main Bus (Application A—14 in. to Application A–14 in.)	HVLCCMBA14A14
6 kV LAs	HVLCCDSA6
Set 200E fuses	55DE200

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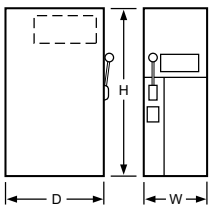
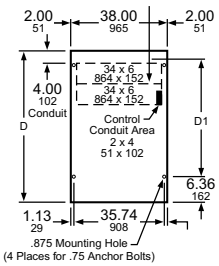
Listed Metal-Enclosed Interrupter Switchgear



Side view Front view

Recommended power cable conduit area



HVL Metal-Enclosed Load Interrupter Switchgear—Full Range

HVL™ 5–38 kV Load Interrupter is the most popular ANSI-rated switchgear in its class in America. Among medium voltage interrupter switchgear, both the switch and the enclosure stand as industry benchmarks in the areas of design, manufacturing, and performance. Load interrupter switchgear must perform a number of critical functions in a unit substation - protecting equipment and disconnecting faulted lines and transformers. Designed and tested to the latest applicable standards, HVL has been engineered to provide superior protection for your distribution system.

HVL switchgear is available for various applications and configurations, including:

- Individual service entrance bays
- Multiple-bay lineups incorporating HVL load interrupters
- Substation primaries

Square D™ brand metal-enclosed switchgear has become an industry standard for its better system performance, lower maintenance cost, easier system expansion, and reduced system expense.

A full range of ratings and options are available but not listed in this publication. Contact your nearest Schneider Electric sales office or your local Schneider Electric distributor.

Table 11.29: Ratings

Maximum design voltage (kV)	4.76	15	17	25.8	29	38
BIL (kV)	60	95	95	125	125	150
Frequency (Hz)	50/60	50/60	50/60	50/60	50/60	50/60
Continuous amperes	600/1200	600/1200	600	600/1200	600/1200	600
Interrupting amperes	600/1200	600/1200	600	600	400	400
Momentary (kA asymmetrical)	40/61/80	40/61/80	61	40/61	40/61	40
Fault close (kA asymmetrical)	40/61	40/61	40	28	28	20
Capacitor switching (kVAR)	2400	2400	–	–	–	–
Short time rating 2 seconds (kA symmetrical)	25/38/50	25/38/50	25	25	25	25
Low frequency withstand (kV)	19	36	36	60	60	80

Standard Features

- 11 gauge steel enclosure
- Direct drive mechanism
- Permanently attached operating handle
- Visible isolation viewing window
- Mechanical interlocked fuse access door
- Provision for padlock and key interlock
- Highly flexible design
- ANSI 61 paint

Options

- Outdoor construction
- Square D™ brand DIN-style current-limiting fuses
- Boric acid fuses
- Silver or tin plated copper bus
- 600, 1200, or 2000 A main bus
- Heat shrink insulated bus
- Motor operator
- Shunt trip
- Fuselogic™ tripping system
- Roof bushings
- Key interlocks
- Surge arresters
- Utility metering bays
- Duplex switch
- Transformer connections
- Infrared windows for thermal scanning of connections

Fuselogic™

Fuselogic is a protection system that provides the ultimate in medium voltage fuse protection. This patented system utilizes the Square D™ brand current-limiting fuses with mechanical sensors that function without any auxiliary power requirements. Several combinations of Fuselogic functions can be combined to provide simple blown fuse indication contacts with mechanical lockout to anti-single phasing protection. Anti-single phasing requires the optional stored energy mechanism (SEM). Fuselogic is available on both HVL/cc™ and HVL switches.

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HVL Switchgear Quick Ship Program—5 kV–15 kV, 600 A

The HVL quick ship program provides basic fused and unfused load interrupter switch configurations for stand-alone or transformer primary applications. The Quick Ship program offers faster delivery, but with fewer options.

Three-pole, 600 A individual HVL switches are available in free-standing indoor (NEMA 1) or outdoor (NEMA 3R) enclosures. The switches used in these enclosures are UL Recognized and are listed under Category WIQG2 in File E140591(M). These switches are available unfused or with provisions for DIN—style, Square D™ brand current-limiting fuses or for boric acid fuses. Factory optional accessories include auxiliary switches, extra cable terminating lugs and distribution class surge arresters. The door is mechanically interlocked with the switch operating handle and provisions for key interlocks are standard. Set screw type lugs for one #2 solid—600 kcmil copper or aluminum cables are provided for line and load connections. Other standard features include a bolted enclosure with a viewing window, ground pad, and space heater (NEMA 3R only). Control power for heater must be from external source. **Fuses are not furnished with this equipment.** For fuse information, refer to Table 11.41 DIN/E Current-Limiting Fuses, Non-Disconnecting Type , page 11-27, or Table 11.42 Boric Acid Fuses, page 11-28. Many of the fuses listed in these tables are available from stock. Switches are listed in the tables below and on page 11-25.

Table 11.30: 600 A “Single” Switch Unfused

Catalog No.	kV Rating	Fuse Range	Enclosure Type
HVL305NG	4.76	—	NEMA 1
HVL305NW	4.76	—	NEMA 3R
HVL315NG	15	—	NEMA 1
HVL315NW	15	—	NEMA 3R

Table 11.31: 600 A “Single” Switch with PROVISIONS ONLY for Square D™ brand Current-Limiting, Non-Disconnect Type Fuses

Catalog No.	kV Rating	Fuse Range	Enclosure Type
HVL305DEG	4.76	10–450E	NEMA 1
HVL305DEW	4.76	10–450E	NEMA 3R
HVL315DEG1	15	10–100E	NEMA 1
HVL315DEG2	15	125–200E	NEMA 1
HVL315DEW1	15	10–100E	NEMA 3R
HVL315DEW2	15	125-200E	NEMA 3R

Table 11.32: 600 A “Single” Switch with PROVISIONS ONLY for S&C Boric Acid Non-Disconnect Type Fuses *[3]*

Catalog No.	kV Rating	Fuse Range	Enclosure Type
HVL305BG	4.76	10E–400E	NEMA 1
HVL305BW	4.76	10E–400E	NEMA 3R
HVL315BG	15	10E–400E	NEMA 1
HVL315BW	15	10E–400E	NEMA 3R
HVL317BG	17	10E–400E	NEMA 1
HVL317BW	17	10E–400E	NEMA 3R

Table 11.33: Ratings

Max. Design Voltage (kV)	4.76	15.0
BIL (kV)	60	95
Frequency (Hz)	50/60	50/60
Continuous amperes	600	600
Interrupting amperes	600	600
Momentary (amperes asymmetrical)	40,000	40,000
Fault close (amperes asymmetrical)	40,000	40,000
Capacitor switching (kVAR)	2,400	2,400
Short-time rating, 2 seconds (amperes symmetrical)	25,000	25,000
Low frequency withstand (kV)	19	36

Table 11.34: Distribution Class Surge Arresters

System L-L Voltage kV		Arrester MCOV-kV	
Nominal	Maximum	Effectively Grounded Neutral Circuits	Impedance Grounded and Ungrounded Circuits
2.4	2.54	—	2.55
4.16	4.4	2.55	5.1
4.8	5.08	—	5.1
6.9	7.26	—	7.65
12.0	12.7	7.65	12.70
12.47	13.2	7.65	12.70
13.2	13.97	8.4	—
13.8	14.52	8.4	—

Table 11.35: Enclosure Type

Type	W		D		H		Weight	
	in	mm	in	mm	in	mm	lbs	kg
Indoor	38.00	965	54.50	1384	90.00	2286	1200	545
Outdoor	38.00	965	60.00	1524	97.50	2477	1400	636

[3] Boric acid fuses may increase lead times. Contact the factory for availability.

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Provisions for Future Expansion

All "single" Digest switches have provisions for future expansion on either side. Order kits HVMB for top crossover copper 600 A bus and HVLC for line connections to the top bus. (See Table 11.40 Factory Modifications, page 11-26.)

HVL Switches for Power-Dry II ™, Power-Cast II ™, and Uni-Cast II ™ Transformer Connections

HVL switches can be configured for close coupling cable connections to listed dry type transformers for primary main switches of unit substations. These are listed in the tables below with current-limiting or boric acid fuses. Both single and duplex switch mains are included in this selection. Transformers are listed on page 14-21 and may not be suitable for close coupling. For transformer availability and specific configurations, contact your local Schneider Electric sales office. All connections in this digest are based on standard Square D™ brand transformer connections. If these switches are used to connect to other manufacturers' transformers, then connections must coordinate with standard Square D™ brand transformer connections. (Cable connections are furnished with the transformer.)

Table 11.36: 600 A "Single" Switch with PROVISIONS ONLY for Square D™ brand Current-Limiting, Non-Disconnect Type Fuses for Cable Connection to Power-Dry II, Power-Cast II, and Uni-Cast II Transformers
(FLC = 300 A max.) RH—Transformer on Right, LH—Transformer on Left

Catalog No.	kV Rating	Fuse Range	Enclosure Type	RH / LH
HVL405DEGR	4.76	10–450E	NEMA 1	RH
HVL405DEGL	4.76	10–450E	NEMA 1	LH
HVL405DEWRH	4.76	10–450E	NEMA 3R	RH
HVL405DEWLH	4.76	10–450E	NEMA 3R	LH
HVL415DEGR1	15	10–100E	NEMA 1	RH
HVL415DEGR2	15	125–200E	NEMA 1	RH
HVL415DEGL1	15	10–100E	NEMA 1	LH
HVL415DEGL2	15	125–200E	NEMA 1	LH
HVL415DEWR1H	15	10–100E	NEMA 3R	RH
HVL415DEWR2H	15	125-200E	NEMA 3R	RH
HVL415DEWL1H	15	10–100E	NEMA 3R	LH
HVL415DEWL2H	15	125-200E	NEMA 3R	LH

Table 11.37: 600 A "Duplex" Switch with PROVISIONS ONLY for Square D™ brand Current-Limiting, Non-Disconnect Type Fuses for Cable Connection to Power-Dry II, Power-Cast II, and Uni-Cast II Transformers
(FLC = 300 A max.) RH—Transformer on Right, LH—Transformer on Left

Catalog No.	kV Rating	Fuse Range	Enclosure Type	RH / LH
HVL505DEGR	4.76	10–450E	NEMA 1	RH
HVL505DEGL	4.76	10–450E	NEMA 1	LH
HVL505DEWRH	4.76	10–450E	NEMA 3R	RH
HVL505DEWLH	4.76	10–450E	NEMA 3R	LH
HVL515DEGR1	15	10–100E	NEMA 1	RH
HVL515DEGR2	15	125–200E	NEMA 1	RH
HVL515DEGL1	15	10–100E	NEMA 1	LH
HVL515DEGL2	15	125–200E	NEMA 1	LH
HVL515DEWR1H	15	10–100E	NEMA 3R	RH
HVL515DEWR2H	15	125–200E	NEMA 3R	RH
HVL515DEWL1H	15	10–100E	NEMA 3R	LH
HVL515DEWL2H	15	125-200E	NEMA 3R	LH

Table 11.38: 600 A "Single" Switch with PROVISIONS ONLY for S&C Boric Acid Non-Disconnect Type Fuses for Cable Connection to Power-Dry II, Power-Cast II, and Uni-Cast II Transformers *[4]*
(FLC = 300 A max.) RH—Transformer on Right, LH—Transformer on Left

Catalog No.	kV Rating	Fuse Range	Enclosure Type	RH / LH
HVL405BGR	4.76	10E–400E	NEMA 1	RH
HVL405BGL	4.76	10E–400E	NEMA 1	LH
HVL405BWRH	4.76	10E–400E	NEMA 3R	RH
HVL405BWLH	4.76	10E–400E	NEMA 3R	LH
HVL415BGR	15	10E–400E	NEMA 1	RH
HVL415BGL	15	10E–400E	NEMA 1	LH
HVL415BWRH	15	10E–400E	NEMA 3R	RH
HVL415BWLH	15	10E–400E	NEMA 3R	LH

[4] Includes fuse holder only. See Table 11.42 Boric Acid Fuses , page 11-28for fuse refills. Boric acid fuses may increase lead times. Contact the factory for availability.

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Table 11.39: 600 A "Duplex" Switch with PROVISIONS ONLY for S&C Boric Acid Non-Disconnect Type Fuses for Cable Connection to Power-Dry II, Power-Cast II, and Uni-Cast II Transformers *[5]*

(FLC = 300 A max.) RH—Transformer on Right, LH—Transformer on Left

Catalog No.	kV Rating	Fuse Range	Enclosure Type	RH / LH
HVL505BGR	4.76	10E–400E	NEMA 1	RH
HVL505BGL	4.76	10E–400E	NEMA 1	LH
HVL505BWRH	4.76	10E–400E	NEMA 3R	RH
HVL505BWLH	4.76	10E–400E	NEMA 3R	LH
HVL515BGR	15	10E–400E	NEMA 1	RH
HVL515BGL	15	10E–400E	NEMA 1	LH
HVL515BWRH	15	10E–400E	NEMA 3R	RH
HVL515BWLH	15	10E–400E	NEMA 3R	LH

NOTE: Switches with transformer connections are painted ANSI 49. Standalone switches are painted ANSI 61.

Fuse Selection

The rule of thumb method for selecting fuses for transformer protection is 1.33 times the self-cooled full load current of the transformer or the next higher fuse rating. Selection of the fuse is the customer's responsibility and should be based on transformer and system characteristics.

- **Maximum Fuse Size:**
  Maximum fuse size should be determined by comparing the fuse total clearing curve to the transformer damage curve. Contact Schneider Electric for transformer overload and short-circuit withstand capability.
- **Minimum Fuse Size:**
  Minimum fuse size shall carry the transformer magnetizing inrush current of 12 times full load amperes for 0.1 second.

Table 11.40: Factory Modifications

Catalog No.	Description
HVMB	Main Bus Kit, 600 A copper
HVLC	Line side connector kit (main bus) 600 A with 2–1/0=500 MCM lugs (bottom entry only)
	Provisions for key interlocks—Type KFL Kirk key lock with a 0-inch bolt projection (Kirk item master number KFL000010SH)
HVLX3	Auxiliary switch 2 N.O.—2 N.C. contact
HVLC2	Set screw type lugs 1/0—500 kcmil (qty. 3)
Distribution Class Surge Arresters *[6]*	
HVDSA3	3 kV, 2.55 MCOV
HVDSA6	6 kV, 5.10 MCOV
HVDSA9	9 kV, 7.65 MCOV
HVDSA10	10 kV, 8.40 MCOV
HVDSA12	12 kV, 10.20 MCOV
HVDSA15	15 kV, 12.70 MCOV

Standard Features

- Switches for transformer primaries are cable connected only.
- Key interlocks must be ordered and coordinated by customer.
- Standard color is ANSI 61 for standalone units; ANSI 49 for switches connecting to transformers.
- If switches are purchased to coordinate with Square D™ brand transformers, composite drawings and shipment coordination will not be available.
- Switches are not designed for any special dimensions for retrofit purposes. For dimensions other than shown, contact your nearest Schneider Electric sales office or your local Schneider Electric distributor.

Ordering Information

1. Select switch catalog number based on fused or unfused and enclosure type.
2. Select catalog numbers for factory modifications from the table above.
3. If fused, select fuse from Table 11.41 DIN/E Current-Limiting Fuses, Non-Disconnecting Type (Extended Travel Blown Fuse Indicator), page 11-27 or Table 11.42 Boric Acid Fuses, page 11-28.
4. Price switch and fuses separately. Switches are furnished with provisions only for current-limiting fuse or boric acid fuse.

[5] Includes fuse holder only. See Table 11.42 Boric Acid Fuses , page 11-28for fuse refills. Boric acid fuses may increase lead times. Contact the factory for availability.
[6] Load side connected

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Square D™ Brand DIN/E Fuse Selection Tables—HVL

Table 11.41: DIN/E Current-Limiting Fuses, Non-Disconnecting Type *[7][8][9]* (Extended Travel Blown Fuse Indicator)

Continuous Current	Fuse Mounting Clip *[10]*		Catalog No. *[11][12]*
	Centers (in)	Diameter (mm)	
5 kV Fuse			
10E	17.4	51	55DE010
15E	17.4	51	55DE015
20E	17.4	51	55DE020
25E	17.4	51	55DE025
30E	17.4	51	55DE030
40E	17.4	51	55DE040
50E	17.4	51	55DE050
65E	17.4	51	55DE065
80E	17.4	51	55DE080
100E	17.4	51	55DE100
125E	17.4	76	55DE125
150E	17.4	76	55DE150
175E	17.4	76	55DE175
200E	17.4	76	55DE200
250E	17.4	76	55DE250
300E	17.4	76	55DE300
350E	17.4	76	55DE350
400E	17.4	76	55DE400
450E	17.4	76	55DE450
15 kV Fuse			
10E	17.4	51	175DE010
15E	17.4	51	175DE015
20E	17.4	51	175DE020
25E	17.4	51	175DE025
30E	17.4	51	175DE030
40E	17.4	76	175DE040
50E	17.4	76	175DE050
65E	17.4	76	175DE065
80E	17.4	76	175DE080
100E	17.4	88	175DE100
125E	21.14	88	175DE125
150E	21.14	88	175DE150
175E	21.14	88	155DE175
200E	21.14	88	155DE200

[7] Square D™ brand DIN/E fuses are shown in this table. For fuses produced by other manufacturers, contact your nearest Schneider Electric sales office or your local Schneider Electric distributor.

[8] Current-limiting fuses will increase the integrated short-circuit ratings beyond the non-fusible units. Contact your nearest Schneider Electric sales office or your local Schneider Electric distributor.

[9] Caution—These fuses will not work for the MiniBreak. See Table 11.12 Current-Limiting Fuses, page 11-11 for the appropriate MiniBreak fuses.

[10] All fuses are single barrel arrangement with ferrule diameters per the chart.

[11] Contact your Schneider Electric representative for current stock quantities.

[12] Includes one set of three fuses, packed in a single box.

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Boric Acid Fuse Selection Tables—HVL

Table 11.42: Boric Acid Fuses *[13]*

Continuous Current	Fuse Type*[14]*	Catalog No.	Fuse Type *[15]*	Catalog No. *[16][17]*
5 kV Fuse Refill				
10E	SM-5S	5SM5010	RBA400	405WBAF010
15E	SM-5S	5SM5015	RBA400	405WBAF015
20E	SM-5S	5SM5020	RBA400	405WBAF020
25E	SM-5S	5SM5025	RBA400	405WBAF025
30E	SM-5S	5SM5030	RBA400	405WBAF030
40E	SM-5S	5SM5040	RBA400	405WBAF040
50E	SM-5S	5SM5050	RBA400	405WBAF050
65E	SM-5S	5SM5065	RBA400	405WBAF065
80E	SM-5S	5SM5080	RBA400	405WBAF080
100E	SM-5S	5SM5100	RBA400	405WBAF100
125E	SM-5S	5SM5125	RBA400	405WBAF125
150E	SM-5S	5SM5150	RBA400	405WBAF150
175E	SM-5S	5SM5175	—	—
200E	SM-5S	5SM5200	RBA400	405WBAF200
250E	SM-5S	5SM5250	RBA400	405WBAF250
300E	SM-5S	5SM5300	RBA400	405WBAF300
400E	SM-5S	5SM5400	RBA400	405WBAF400
15 kV Fuse Refill				
10E	SM-5S	15SM5010	RBA400	415WBAF010
15E	SM-5S	15SM5015	RBA400	415WBAF015
20E	SM-5S	15SM5020	RBA400	415WBAF020
25E	SM-5S	15SM5025	RBA400	415WBAF025
30E	SM-5S	15SM5030	RBA400	415WBAF030
40E	SM-5S	15SM5040	RBA400	415WBAF040
50E	SM-5S	15SM5050	RBA400	415WBAF050
65E	SM-5S	15SM5065	RBA400	415WBAF065
80E	SM-5S	15SM5080	RBA400	415WBAF080
100E	SM-5S	15SM5100	RBA400	415WBAF100
125E	SM-5S	15SM5125	RBA400	415WBAF125
150E	SM-5S	15SM5150	RBA400	415WBAF150
175E	SM-5S	15SM5175	—	—
200E	SM-5S	15SM5200	RBA400	415WBAF200
250E	SM-5S	15SM5250	RBA400	415WBAF250
300E	SM-5S	15SM5300	RBA400	415WBAF300
400E	SM-5S	15SM5400	RBA400	415WBAF400

[13] S&C Boric Acid Fuses
Type SM-5S fuses are manufactured by the S&C Electric Company. SM-5S has a 25.0 kA symmetrical short-circuit rating from 2.4 kV to 17.0 kV. For 16.5 kV ratings, only S&C boric acid fuses can be used.

[14] Cutler-Hammer - Westinghouse Fuses
Type RBA-400 fuses are manufactured by Cutler-Hammer - EATON Corporation. RBA-400 has a 37.5 kA symmetrical ampere short-circuit rating from 2.4 kV to 4.8 kV and 29.4 kA symmetrical from 12 kV to 13.8 kV.

[15] Caution—These fuses will not work for the MiniBreak. See Table 11.12 Current-Limiting Fuses, page 11-11 for the appropriate MiniBreak fuses.

[16] Contact your Schneider Electric representative for current stock quantities.

[17] Includes one set of three fuses, packed in a single box.

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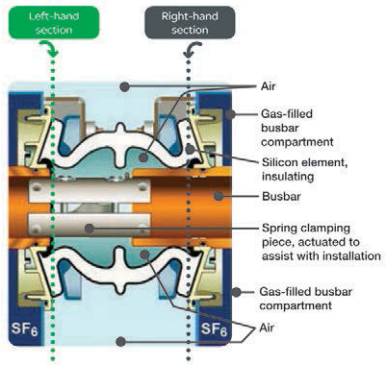
Listed Metal-Enclosed Interrupter Switchgear



GHA Gas-Insulated Switchgear (UL Listed)

Easy, innovative, and economical **up to 38kV**

GHA Medium Voltage (MV) switchgear is an ideal solution for a variety of applications and requirements. GHA is well suited for public and industrial distribution networks, infrastructure projects, petrochemical oil and gas industries, and container substations to name a few. This compact and modular switchgear offers both flexibility and a long, low-maintenance service life.

Each section consists of sealed-for-life SF_6 modules, which contain the fixed vacuum circuit breaker, disconnect switch, and innovative busbar system. By design, there is no gas handling throughout the service life of the equipment, from installation until recycling at the end of life of the switchgear. Utilize the cutting-edge B-link busbar to easily install, extend, or replace gear in the middle of a lineup, without handling SF_6. Like the gas-filled modules, the B-link system does not require any maintenance.

Front accessible and ideal for a variety of applications, GHA represents the new generation of robust, extremely compact, and low maintenance MV switchgear.

Table 11.43: Ratings

Rated Voltage (kV)	Rated Lightning Impulse Withstand Voltage (kV)	Rated Power Frequency Withstand Voltage (kV)	Rated Short-Time Withstand Current (kA)	Rated Busbar Current (A)	Rated Current of Outgoing Feeders with Natural Cooling (A)	Arc Resistant per IEEE C37.20.7
12	75	28	40	2500	2500	40 ka duration for 0.5 seconds
15	95	38	40	2500	2500	
27	125	50	40	2500	2500	
38	170	80	40	2500	2500	

Table 11.44: Dimensions

Electrical Characteristics		Dimensions (in./mm)				
		Cubical Width				
Rated Voltage (kV)	Rated nominal current (A)	Main/Feeder	Bus Tie with Circuit Breaker	Bus Sectionalizer	Depth	Section Height
12 17.5 24 38	≤ 1200	23.6/600	31.5/800	23.6/600	62.8/1595	94.5/2400 (with 31.5/800 LV compartment)
	2500	35.5/900	39.4/1000	23.6/600	62.8/1595	

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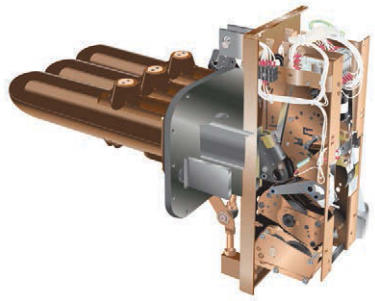
Listed Metal-Enclosed Interrupter Switchgear



CBGS-0 Circuit Breaker

CBGS-0 Gas-Insulated Switchgear (UL Listed)

Easy innovative and economical **up to 38kV**

CBGS-0 Medium Voltage (MV) switchgear is compact and easy to install and operate. Due to the insulating gas as well as the solidly insulated busbar and cable connections the medium voltage circuit is protected from environmental influences reducing the risk of arc flash events.

Each section consists of a sealed-for-life SF_6 tank which contains the fixed SF range circuit breaker and disconnect switch. By design there is no gas handling throughout the service life of the equipment from installation until recycling at the end of life of the switchgear.

Front accessible and ideal for a variety of applications from transformer substations to primary power distribution in markets ranging from mining and metals renewable installations container substations and heavy industry where space is at a premium.

Table 11.45: Ratings

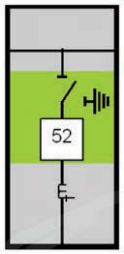
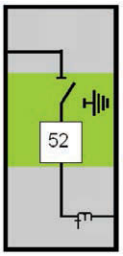
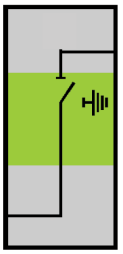
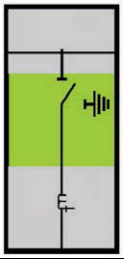
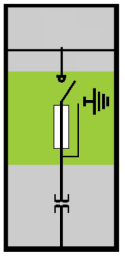
Rating	Main/Feeder	Bus Section	Bus Riser	Disconnecting Switch	Auxiliary Services
					
Nominal voltage (kV)	15 27 38	15 27 38	15 27 38	15 27 38	15 27 38
Busbar system rated current (A)	1200/2000	1200/2000	1200/2000	1200/2000	1200/2000
Outgoing rated current (A)	1200/2000	1200/2000	1200/2000	1200/2000	—
Short-time withstand current (kA)	25–31.5	25–31.5	25–31.5	25–31.5	Limited by the fuse

Table 11.46: General Electrical Characteristics

Rated Voltage		kV Rating	
		27	38
Rated Insulation Level	Power frequency 60 Hz. (efficient kV)	60	70
	Lightning impulse withstand voltage (kV peak)	125	150
Rated normal current (A)	Busbar system	1200/2000	
	Incoming/outgoing	1200/2000	
Short circuit breaking current (kA)		25/31.5	
Short circuit breaking current (kA peak)		63/80	
Short time withstand current (kA/s)		Max 25/2–31.5/2	
Gas pressure at 200 °C (psi)		18.85	
Standard degrees of protection	High voltage compartment	IP65	
	Low voltage compartment	IP3X–IP41	

Table 11.47: Dimensions and Weights

Modular Functional Unit (s)	Continuous Current Rating (A)	Dimensions Inches (mm)			Weight lbs. (kg)
		Width	Depth	Height	
Main/feeder bus section	1200	23.5 (598)	55.1 (1400)	92.5 (2350)	1598 (725)
	2000	47.2 (1198)			2249 (1020)
Bus riser disconnecting switch	1200	23.5 (598)			1058 (480)
	2000	47.2 (1198)			2052 (930)
VT auxiliary section	Not applicable	23.5 (598)			926 (420)

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DVCAS Switchgear for Wind Farm Applications

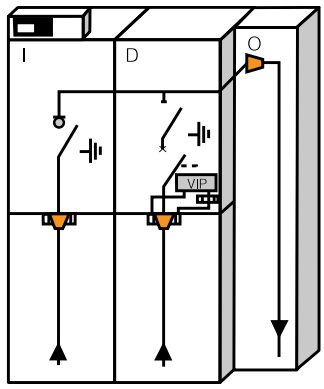
DVCAS medium voltage (MV) switchgear from Schneider Electric is designed to meet the electrical switching, protection, and connection needs of wind farm applications up to 38 kV. Three different modules are available:

- Transformer protection module D
- Outgoing line module O
- Incoming line module I

For standard wind power applications, a maximum of four modules can be connected in various configurations to provide the most commonly used wind power functions.

DVCAS switchgear is designed, manufactured, and tested in accordance with the following standards:

- C37.20.3
- C37.54
- CAN/CSA C22.2 No.31-M89
- UL Listed
- IEEE Cable Bushings

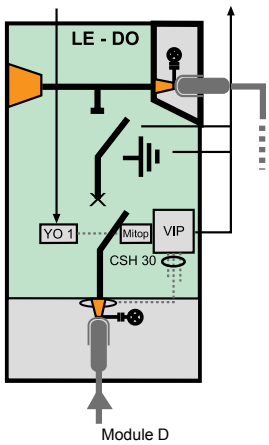


Typical IDO Configuration

Transformer Protection Module D

DVCAS switchgear module D provides transformer protection. Construction features include:

- Metal base frame
- Operating mechanism and relay compartment
  - disconnector operating mechanism
  - operating mechanism of the circuit breaker
  - protection relay VIP, Sepam, or Micom
  - zero sequence current transformer CSH 30
- MV cable compartment
  - bushings for cable connection
  - Three CRc current sensors per phase
- Stainless steel, gas-tight tank
  - busbar system
  - three position disconnector
  - circuit breaker



Module D

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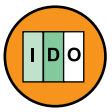
Outgoing Line Module O

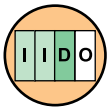
DVCAS switchgear module O functions as an outgoing line to a downstream wind generator. There are two medium voltage cables per phase. Construction features include:

- Metal base frame
- Voltage presence indicator
- MV cable compartment
  - bushings for cable connection
  - clamps for MV cable connection

D + O
Transformer protection + Outgoing line



(I + D + O)
Incoming line + Transformer protection + Outgoing line



(I + I + D + O)
Two Incoming lines + Transformer protection + Outgoing line

Recommended Configurations

Incoming Line Module I

DVCAS switchgear module I is a three-position switch-disconnector. It is recommended for the incoming line function from an upstream wind generator for the following reasons:

- Reduces downtime caused by faults
- Helps with fault detection
- Reduces interruptions due to maintenance work
- Improves energization works

Module I is always connected to module D on the right with single-phase, coupling bushings. Construction features include:

- Metal base frame
- Operating mechanism compartment
  - operating mechanism of the switch-disconnector
  - motor for the operating mechanism (optional)
- MV cable compartment
  - bushings for cable connection
- Stainless steel, gas-tight tank
  - busbar system
  - three position disconnector

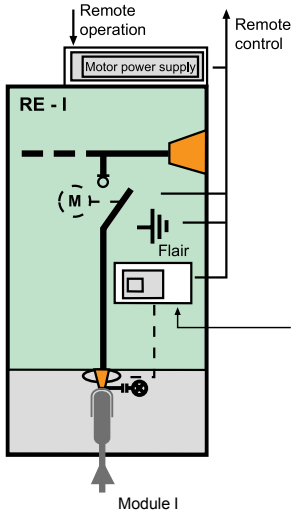


Table 11.48: Ratings

Type	Rating
Frequency (Hz)	50/60
Rated voltage (kV)	38
Insulation level	
Power frequency withstand voltage (kV)	70
Lightning impulse withstand voltage, peak (kV)	170
Rated current of the main busbar (A)	600
Short time withstand current (kA/s)	20/3 *[1]*
Short circuit breaking current capacity (kA)	20 *[1]*
Short circuit making capacity, peak (kA)	50
Internal arc withstand IAC AFL (kA/1s)	20 *[1]*
Degree of protection (NEMA/IP)	
HV compartment	6/67
LV and operating mechanism compartment	6P/3X
SF6 gas pressure at 20 ºC (PSI/bar)	4.35/0.3

[1] 25 kA for circuit breaker switchgear module D.

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Listed Metalclad Switchgear

Two-high Masterclad 5–27 kV Indoor, Metalclad Switchgear

Vacuum VR Circuit Breaker for Masterclad Switchgear

Masterclad 27 kV, Outdoor Non Walk-in, Metalclad Switchgear

Masterclad™ Medium Voltage Metalclad Switchgear (UL Listed)

The Reliability of a Quality Design

The quality of Square D™ brand Masterclad medium voltage metalclad switchgear stems from a design and manufacturing process that focuses on long-term switchgear performance with the highest degree of reliability.

Based on specific customer application needs, Schneider Electric engineers and technicians select the appropriate standard sections and bus configurations, with the ability to customize where needed. After the specified circuit breakers, instrument and control power transformers, relays, meters and other components are selected and approved. All are factory-assembled, wired, and tested as a complete assembly.

Table 11.49: Ratings

Nominal voltage (kV)	4.16			7.2	13.8				24.9	
Maximum voltage (kV)	4.76			8.25	15.0				27.0	
BIL (kV)	60			95	95				125	
Frequency (Hz)	50/60									
Continuous amperes (A)	1200–4000								1200–2000	
MVA (reference only)	250	350	500	500	500	750	1000	1500	1250	2000
Short-time rating (kA) 3 seconds	40	50	63	50	25	40	50	63	25	40
Close and latch rating (kA) (peak)	104	130	164	130	65	104	130	164	68	108

Type VR Vacuum Circuit Breaker

The VR breaker is a horizontal drawout type designed to provide long life, reduced maintenance, and ease of handling. The Type RI advanced design motor-charged stored energy mechanism is a model of reliability with simplicity-with an operating life exceeding ANSI requirements. The VR circuit breaker is UL labeled and includes a permanently mounted manual charging handle.

Standard features include:

- 3-cycle interrupting rating
- Rated per ANSI/IEEE C37.06, C37.09, C37.013, C37.54
- UL Listed
- Motor operated, spring-charged, stored-energy operating mechanism
- Permanently mounted manual charging handle
- Five normally open and normally closed auxiliary contacts
- Wheels that roll directly to floor level from lower cell

Switchgear Construction

- High-speed operation—3–cycles
- Removable (draw-out) circuit breaker
- Grounded metal barriers enclose all live parts
- Automatic shutters driven by breaker racking mechanism
- Closed door breaker position indication
- Closed door breaker racking mechanism
- Insulated main bus—aluminum or copper
- Standard glass polyester insulators or optional epoxy and porcelain insulators
- Mechanical interlocks
- Disconnect type CPT and VT trucks
- Grounded breaker truck in and between test/disconnected and connected positions
- Low voltage instrument/control compartment isolated from primary voltage areas
- Compliance to ANSI/IEEE standards C37.20.2 and C37.55 (designed and tested to comply with or exceed ANSI and IEEE standards)
- ISO 9001 Certification (Designed and manufactured in a facility that is Quality Systems Certified by Underwriters Laboratories, Inc.® to ISO 9001)
- Indoor NEMA 1 enclosure
- Outdoor NEMA 3R enclosure
  - Walk-in enclosure
  - Non walk-in enclosure

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Arc Terminator ™
Arc Extinguishing System

Active, Arc-Resistant
Arc Terminator™ Arc Extinguishing System

Active system detects and controls the effects of internal arcing faults. It complies with ANSI C37.20.7 requirements for arc-resistant switchgear for Type 1, Type 2B, and Type 2C enclosures, even with the switchgear doors open.

In the event of a confirmed arcing fault inside a Masterclad switchgear or Motorpact equipment lineup containing an Arc Terminator (AT) system, the AT system provides a low impedance parallel path to effectively transfer the fault current from the arc to the 3-phase main bus assembly of the switchgear.

The AT system consists of the following components:

- A high-speed closing, or shorting, switch is designed to close on the main bus of the switchgear. This creates a three-phase short circuit fault confined to the main bus. Upstream protective device must clear fault within allowed time per applicable standard.
- The controller box is the central processing device that responds to the signals given by the current sensors and the optical sensors. The current sensor module and the control logic process incoming current and optical signals and send a signal to the output triggering circuit. The output triggering circuit releases stored energy to initiate closing of the mechanical switch and provides optical isolation to prevent false triggering
- Optical sensors are located in each medium voltage compartment within switchgear structures. A dedicated, properly sized set of current transformers is located at the incoming power source(s).

Benefits

- Prevents pressure buildup
- Reduces release of toxic materials
- Eliminates need for reinforced switchgear
- Elimnates special requirements for buildings or plenums
- Minimizes equipment damage
- Reduces operating downtime

Two-high, Masterclad 5–15 kV
Metalclad, Arc-Resistant Switchgear

Passive, Arc-Resistant
Masterclad™ Medium Voltage Switchgear

This switchgear and all its components meet the IEEE C37.20.7 arc-resistant test guideline for Type 2B enclosures as well as all other applicable ANSI, UL, and CSA standards for metalclad switchgear.

Switchgear Construction:

- Arc exhaust options: vented, arc shield, arc planum and duct
- High-speed operation—3–cycles
- Removable (draw-out) circuit breaker
- Fully compartmentalized construction
- Grounded metal barriers enclose all live parts
- Automatic shutters driven by breaker racking mechanism
- Closed door breaker position indication
- Closed door breaker racking mechanism
- Insulated copper main bus
- Standard glass polyester supports
- Mechanical interlocks
- Disconnect type CPT and VT trucks
- Grounded breaker truck in and between test/disconnected and connected positions
- Low voltage instrument/control compartment isolated from primary voltage areas
- Compliance to ANSI standards C37.06, C37.09, C37.013, C37.54 and C37.55 (designed and tested to comply with or exceed ANSI and IEEE standards)

Ratings

- Up to 63 kA arc containment for 0.5 seconds
- Voltage ratings from 2.4 kV to 15 kV up to 4,000 A
- Type 2B construction, one- and two-high structures

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Unit Substation

Power-Zone Load Center Unit Substations

Table 11.50: Complete Close Coupled Unit Substations Available

Product Type	Class Nos.	Digest Section No.
Primary Section		
Medium voltage load interrupter switchgear	6040, 6045	11
Metalclad switchgear	6055	
Low voltage Power-Style™ QED switchboard	2741–2744	
Air terminal chamber	7240, 7310, 7320, 7421–23	
Transformer Section		
Open, ventilated dry—Power-Dry™	7421–23	14
Open, ventilated dry/cast resin combination—Uni-Cast™	7320	
Open, ventilated cast resin—Power-Cast™	7310	
Mineral oil or high fire point fluid—liquid	7240	
Secondary Section		
Medium voltage load interrupter switchgear	6040	11
Metalclad switchgear	6055	
Medium voltage motor control center	8198	
Low voltage Power-Style QED switchboard	2741–2744	
Air terminal chamber	7240, 7310, 7320, 7421–23	
Low voltage drawout switchgear	6037	
Low voltage Model 6 motor control centers	8998	17

Power-Zone Model III Package Unit Substations

General

Power-Zone Model III package unit substations combine a primary switch, dry-type transformer, and I-Line™ distribution section into a single, compact unit. All components are engineered, manufactured, and tested by Schneider Electric. The substation is available with a UL listing.

The Model III is only 49 inches deep and 90 inches high, which allows the entire substation to pass through standard size doorways and narrow hallways.

The Model III is front accessible; the transformer taps are accessible from the side. For proper ventilation, a minimum distance of 12 inches should be maintained on the transformer side of the equipment.

Model III package unit substations are ideal for renovations and high rise applications requiring increased customer electrical demand as well as new construction requiring multiple zones and a small footprint.

Model III Package Unit Substation
with HVL/cc Load Interrupter Switch (on left)

75–1000 kVA at 480 V; 75–500 kVA at 240 V

Available with primary voltages of 2400–13800 V. Forced air cooling (AA/FA) provides an additional 33%. Features 220 °C insulation and 150 °C, 115 °C, or 80 °C temperature rise. Largest 80 °C or 115 °C rise unit available is 750 kVA.

The secondary circuit breaker distribution section may be equipped with an individually mounted secondary main breaker or an I-Line distribution panelboard. Branch circuit breakers from 15 A FY to PowerPact RLC 1200 A may be installed. PowerPact™ molded case circuit breakers M, P, and R frame are available with electronic trip units.

Additional options include CM 3000 and CM 4000 series circuit monitors, PM-800 series power meters, surge arresters, and I-Line plug-on unit with a Surgelogic™ Surge Protective Device (SPD).

Incoming Line Section

Most Model IIIs are supplied with a Square D™ brand fused HVL/cc 600 A load interrupter switch. The HVL/cc offers the smallest footprint in the industry and is an exclusive sealed interruption type compartmentalized switch. Where switching and overcurrent protection are provided elsewhere, a full-height air-filled terminal chamber can be provided in place of the switch.

Table 11.51: Primary Switch Ratings, Type HVL/cc

Nominal Voltage	4.16	13.8
BIL	60	95
Continuous amperes	600	600
Interrupting amperes	600	600
Fault close (kA asymmetrical)	40	40
Momentary current (kA asymmetrical 10 cycles)	40	40
Duty-cycle-fault-close (number of operations)	4	4
Grounding switch fault close (kA asymmetrical)	40	40
Short-time rating (kA asymmetrical 2 seconds)	25	25
Dielectric withstand (kV 1 minute)	19	36
Electrical endurance (close-open)	100	100
Mechanitcal endurance (close-open)	1000	1000

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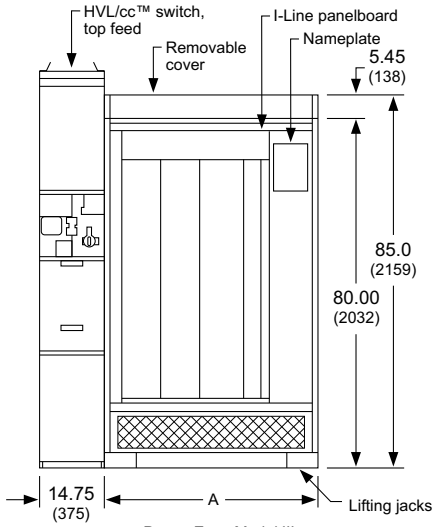
Transformer Section

Special barrel wound dry-type transformers employing resin encapsulated VPI (Vacuum Pressure Impregnation) techniques are used to achieve the low-loss, compact design necessary for the space-saving package substation concept. Class H, 220 °C insulation is used throughout. Temperature rise is 150 °C as standard, although 80°C or 115 °C low temperature premium transformers are available through 750 kVA. Aluminum windings are standard with copper as an option. Four full capacity 2-1/2 percent taps are provided-two above nominal voltage and two below.

Fan cooling is optional. When selected, it increases the capacity rating of the transformer an additional 33 percent. The Model 98 digital controller is employed. This system provides precision control through the use of three high accuracy thermocouple type sensors—one in each phase of the windings.

The controller has a membrane front panel for displaying the temperature of all three phases with individual readings. The hottest phase is automatically displayed. The Model 98 digital controller features simple three-button operation with fan, alarm and trip function settings and is Powerlogic™ compatible.



Power-Zone Model III
Front View

Table 11.52: Transformer Basic Insulation Levels

KV Class	Primary Voltages	BIL	600 Hz Test
1.2	< 600 V Secondary	10	4 kV
2.5	2400	20	10 kV
5.0	4160, 4800	30	12 kV
7.2	6900, 7200	30	12 kV
8.7	8320	45	19 kV
15.0	12, 12.47, 13.2, 13.8	60	31 kV

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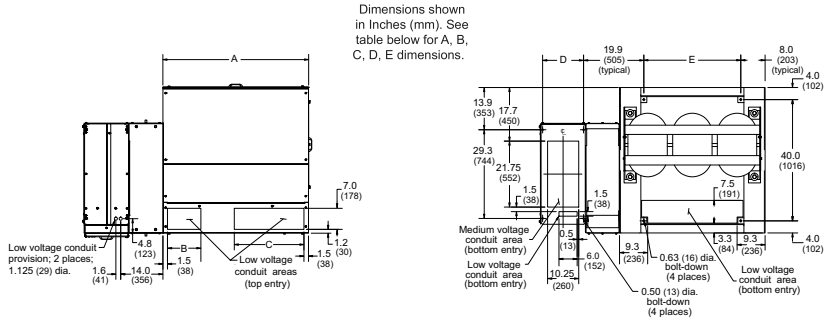
Distribution Section

I-Line™ Mounted Molded Case Circuit Breakers

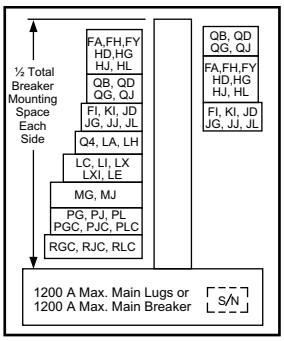
Molded case circuit breakers are group mounted in an I-Line panelboard section offering the inherent ease of installation for which the plug-on I-Line circuit breaker has become known. All circuit breakers are quick-make, quick-break, thermal magnetic, permanent trip type and are factory-calibrated and sealed for accurate overcurrent response and maximum short-circuit strength. PowerPact™ P and R circuit breakers are available with solid-state Micrologic™ trip units. Current limiting high interrupting capacity FI, KI, and LI circuit breakers are also available. Circuit breakers may be safely back-fed for use as main circuit breakers. All circuit breakers are UL listed and carry integrated equipment rating when used exclusively with other Square D™ brand circuit breakers in intended assemblies.

I-Line panel is available in 1200 A. Maximum mounting space is 108 inches. Tin-plated copper bus is standard.



Top Conduit Entrances

Bottom Conduit Entrances



HCR-U 1200 A I-Line panelboards can be used for up to 600 Vac. They are UL Listed under File E33139.

Table 11.53: Substation Dimensions and Approximate Weights

kVA	Temperature Rise °C	Dimensions (for above drawings)					Estimated Weight
		A	B	C	D	E	
75	80, 115, 150	48	11.0	23.0	13.5	32.0	3600
112.5							
150							
225	80, 115, 150						4500
300							
500	150						6000
500	80, 115	60	18.5	27.0	18.75	44.0	6200
750	80, 115, 150						6700
1000	150						7500

Contact your nearest Schneider Electric sales office for ordering assistance.

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Listed Controllers

Motorpact™ Medium Voltage Motor Controllers (UL Listed)

Square D™ brand Motorpact medium voltage motor controllers from Schneider Electric are designed and manufactured to tackle the toughest power and process control challenges. Our motor controllers feature industry-first innovations that provide unmatched performance, high reliability, low maintenance and exclusive technologies. Motorpact medium voltage motor controllers are designed to provide the most efficient means to control and protect a wide range of applications and may be configured for motor starting, transformer feeders, capacitor feeders, or future spaces. The design has fewer losses inside the controller, providing more efficient use of power for the connected load.

Motorpact controllers are designed to meet or exceed the standards for NEMA ICS3 Part 2, UL Standard 347, and IEC 60470. UL and cULus labels are standard.

Starting application for squirrel cage induction motors:

- Full voltage non-reversing
- Full voltage reversing
- 2-speed, 2-winding, 2-speed, 1-winding
- Reduced voltage non-reversing
  - Auto transformers
  - Solid state soft start
  - Sequential soft start (S3) multi-motor starting

Enclosures are available in NEMA Type 1, 1A, and 3R and feature the smallest footprint in the industry at 14.75 inches wide. Enclosures that are 20 inches and 29.5 inches wide are also available for FVNR.

Optional arc resistant enclosures are available that meet IEEE C37.20.7.

Units are designed as one-high construction for ease of use with a optimum height for the operator controls and isolation switch disconnect handle.

Full front and or front and rear accessibility are provided. A full height cable pulling area is standard.

Controller voltage ratings range from 2.3–7.2 kV vacuum contactors feature a drawout design and have ratings of 200, 400, 450, and 720 A.

Options include live line indicators, blown fuse tripping, solid state protective relays, power factor correction capacitors, surge arresters, surge capacitors and a cable grounding switch.

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Vacuum Substation Circuit Breakers—Types FVR, EOX, VOX (Not UL Listed)

By combining the latest developments in circuit breaker technology with world-renowned quality, vacuum substation circuit breakers from Schneider Electric are the most advanced medium voltage circuit breakers available. Type FVR Powersub™ circuit breakers include arc-resistant construction and are built to comply with ANSI standards. Type EOX substation circuit breakers are available with a magnetic or spring actuator. Type VOX includes a vacuum circuit breaker housed in a tank filled with SF6 (sulfur hexafluoride) for added environmental benefits and reduced space requirements.

Table 11.54: Vacuum Substation Circuit Breaker Ratings

Type	Voltage (kV)	Amperage (A)	BIL	Short-time Rating kA (3 seconds)
EOX *[1]*	15	1200, 2000	110	12–31.5 *[2]*
FVR		600–4000	110	12–40
EOX *[3]*	27	1200, 2000	125 (150)	25–31.5
FVR		1200, 2000	125 (150)	12–25@125; 31.5@150
VOX	38	1200, 2000	150 (200)	12–40
FVR		1200, 2000	150	12–31.5
		1200	200	12–25

Type FVR

The arc-resistant design of Type FVR circuit breakers takes safety to the next level. In the event of an arc, the arc-resistant construction provides increased safety for personnel working in proximity of the breaker by venting resultant arc by-products and ionized gases upward and away from exterior panels that otherwise may not remain intact and in place. Type FVR circuit breakers also provide superior protection as a result of their high speed operation. You can expect long life from the product as the vacuum interrupter contacts are protected from corroding elements and contamination.

Type EOX magnetic circuit breakers contain a magnetic actuator, electronic controller, and capacitors to store energy for circuit breaker operation. Our innovative design uses only one coil for opening and closing the circuit breaker. There are no critical friction parts, which increases the reliability and life of the mechanism. The tripping energy required is also lower than that of other products available on the market. In emergency situations, the circuit breaker can be easily tripped mechanically.

Type VOX circuit breaker vacuum interrupters are housed in a fully welded, sealed-for-life, stainless steel tank, providing a controlled gas insulated environment totally immune to external ambient conditions. A spring-charged mechanism provides manual or motorized circuit breaker operation.

Type EOX

Type VOX

[1] Spring- and magnetic-actuated.
[2] 31.5 for spring-actuated; maximum magnetic-actuated = 25.
[3] Spring- actuated.

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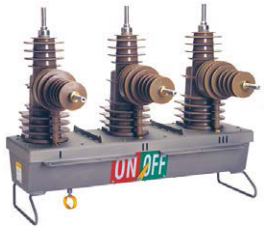
Automatic Circuit Recloser

Overview

The Automatic Circuit Recloser combines state-of-the-art vacuum arc interruption with integrated voltage and current measurement. These features are encased in a fully welded and sealed, 316 grade, stainless steel tank. Three types of reclosers are available: N-series (three-phase), U-series (three-phase), and W-series (single phase).

N-series



U-series

W-series

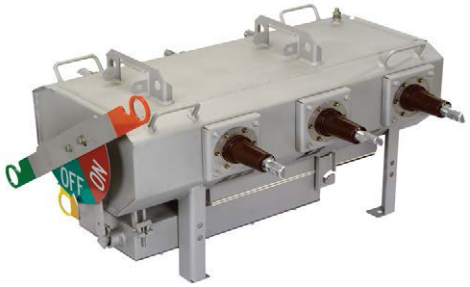
Applications

- Feeder automatic circuit recloser
- Substation automatic circuit recloser
- Loop automation
- Automatic change-over
- Smart grid

Load Break Switch/Sectionalizer

Overview

The RL-series Load Break Switch/Sectionalizer is a switch used in conjunction with an upstream recloser or circuit breaker. It counts the interruptions created by a recloser during a fault sequence. On a preset count, the sectionalizer trips during the dead time of the up stream recloser and isolates the faulty network section.



RL-series

Applications

- Manual load-break switch
- Motorized load-break switch
- Fully automated sectionalizer
- Normally-open tie point

Table 11.55: Ratings

Attribute	Automatic Circuit Recloser			Load Break Switch/ Sectionalizer
	N-series	U-series	W-series	RL-series
Phases	3		1	3
Nominal Voltage (kV)	15, 27, 38	15, 27	15, 24	15, 27, 38
Continuous amperes (A)	800	630	400	630
Short-time rating (kA)	12.5/16	12.5	6	12.5/16
Insulation	Gas	Epoxy	Epoxy	Gas
Interruption	Vacuum			Gas
Operations (elec/mech)	10000/10000			600/5000

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ADVC Controller

Overview

The ADVC controller offers advanced protection, measurement, diagnostic, and communication features in a reliable package. Designed around the user, the controller offers flexibility and choice. Users have a choice of two cubicle sizes (ULTRA and COMPACT) and two operator interfaces (flexVUE and setVUE).

All the protection, monitoring, communication, diagnostic, and automation features are included as standard in all models:

- ULTRA—large 316SS controller cubicle with two accessory mounting areas
- COMPACT—smaller 304SS controller cubicle with one accessory mounting area
- flexVUE—interface with 20 configurable status lamps and 12 quick action keys
- setVUE—large 4 x 40 LCD with familiar menu-driven operation

ADVC ULTRA Controller

Applications

The ADVC controller interfaces with the following:

- N-series recloser
- U-series recloser
- W-series recloser
- RL-series load break switch/sectionalizer

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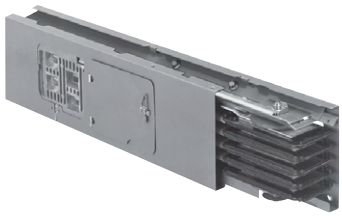
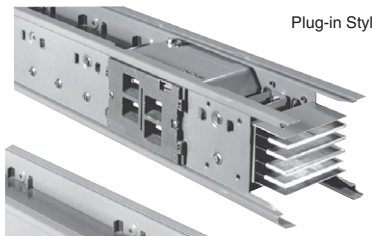
Section 12

Busway

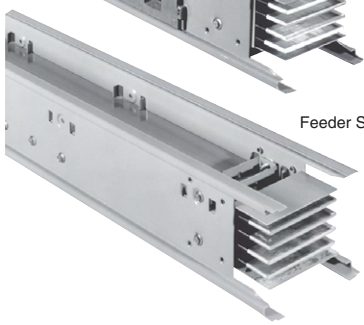
Powerbus 100-400 A



I-Line Plug-in Busway 225-600 A



Plug-in Style



Feeder Style

I-Line II Busway 800-5000 A

I-Line Plug-in Units

Power-Zone Busway

Powerbus™ Busway 12-2

Powerbus™ Busway 12-2
Powerbus Plug-In Units 12-3
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PowerPact™ P-Frame Plug-in Units 12-16
PowerPact™ R-Frame Plug-in Units 12-17

Power-Zone™ Busway 12-18

Non-Segregated Bus 12-18

Distinct service advantages make your Busway installation “hassle-free”

- **Missing Link** program guarantees shipment in a maximum of 5 working days of a small quantity of indoor feeder straight lengths and fittings. Orders for outdoor busway or for international destinations may require 2 extra days for processing.
- **Measurement Services** are offered for your critical and complex projects. Schneider Electric will assist with field measurement and assume responsibility for the layout and exact fit of all components. Contact your local Schneider Electric sales office for exact details.
- **Emergency Service;** we are on call 24 hours a day, 7 days a week, 365 days a year. For emergencies, call 1-888-SquareD (1-888-778-2733).
- **Quick Ship** program provides product availability for time sensitive orders. The program is available through the product selectors and offers a limited selection of I-Line busway footage and fittings. Contact your local Schneider Electric sales office for exact details.

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Powerbus Busway

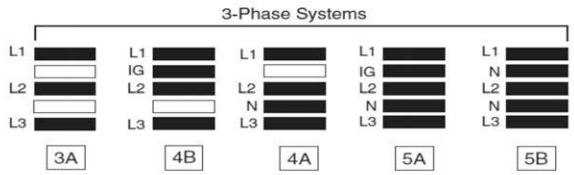
Construction

Powerbus busway construction consists of a light-weight electrical grade all-aluminum housing with up to five (5) silver-plated copper conductor bars for maximum electrical efficiency. The total product offer includes straight sections, fittings, accessories, and plug-in units for a total installation. This busway is available in 400 A, 225 A and 100 A ratings. A 50% integral ground is standard.

Straight Sections

Straight sections of busway are available in 10 ft. and 4 ft. lengths in a painted black finish. The Enhanced busway offer includes 10 plug-in openings on each side of a 10 ft. section and 3 plug-in openings on each side of a 4 ft. section.

Metering and Communications Options



Single phase systems and DC systems are also available. Contact your local Schneider Electric representative.

Powerbus busway tap boxes and plug-in units are available with optional metering and communication capabilities, which include an integrated display and the ability to remotely monitor the busway.

Table 12.1: 3Ø3W—Powerbus Straight Lengths and Fittings—600 V Maximum

Amperage	Component	Configuration 3A–Catalog No.*[1]*	Configuration 4B–Catalog No.*[1]*
100 A	Enhanced Straight 10 ft.	PBCE3A100AST120B	PBCE4B100AST120B
	Enhanced Straight 4 ft.	PBCE3A100AST048B	PBCE4B100AST048B
	Elbow – Left	PBCF3A100ALLB	PBCF4B100ALLB
	Elbow – Right	PBCF3A100ALRB	PBCF4B100ALRB
	Cross Fitting	PBCF3A100ACRB	PBCF4B100ACRB
	Tap Box	PBCF3A100ATBB	PBCF4B100ATBB
	Tap Box w/Meter*[2][3]*	PBCF3A100ATBM( )B	PBCF4B100ATBM( )B
225 A	Enhanced Straight 10 ft.	PBCE3A225AST120B	PBCE4B225AST120B
	Enhanced Straight 4 ft.	PBCE3A225AST048B	PBCE4B225AST048B
	Elbow – Left	PBCF3A225ALLB	PBCF4B225ALLB
	Elbow – Right	PBCF3A225ALRB	PBCF4B225ALRB
	Cross Fitting	PBCF3A225ACRB	PBCF4B225ACRB
	Tap Box	PBCF3A225ATBB	PBCF4B225ATBB
	Tap Box w/Meter*[3]*	PBCF3A225ATBM( )B	PBCF4B225ATBM( )B
400 A	Enhanced Straight 10 ft.	PBCE3A400AST120B	PBCE4B400AST120B
	Enhanced Straight 4 ft.	PBCE3A400AST048B	PBCE4B400AST048B
	Elbow – Left	PBCF3A400ALLB	PBCF4B400ALLB
	Elbow – Right	PBCF3A400ALRB	PBCF4B400ALRB
	Cross Fitting	PBCF3A400ACRB	PBCF4B400ACRB
	Tap Box	PBCF3A400ATBB	PBCF4B400ATBB
	Tap Box w/Meter*[3]*	PBCF3A400ATBM( )B	PBCF4B400ATBM( )B

Table 12.2: 3Ø4W—Straight Lengths and Fittings—600 V Maximum

Amperage	Component	Configuration 4A–Catalog No.*[1]*	Configuration 5A–Catalog No.*[1]*	Configuration 5B–Catalog No.*[1]*
100 A	Enhanced Straight 10 ft.	PBCE4A100AST120B	PBCE5A100AST120B	PBCE5B100AST120B
	Enhanced Straight 4 ft.	PBCE4A100AST048B	PBCE5A100AST048B	PBCE5B100AST048B
	Elbow – Left	PBCF4A100ALLB	PBCF5A100ALLB	PBCF5B100ALLB
	Elbow – Right	PBCF4A100ALRB	PBCF5A100ALRB	PBCF5B100ALRB
	Cross Fitting	PBCF4A100ACRB	PBCF5A100ACRB	PBCF5B100ACRB
	Tap Box	PBCF4A100ATBB	PBCF5A100ATBB	PBCF5B100ATBB
	Tap Box w/Meter*[2][3]*	PBCF4A100ATBM( )B	PBCF5A100ATBM( )B	PBCF5B100ATBM( )B
225 A	Enhanced Straight 10 ft.	PBCE4A225AST120B	PBCE5A225AST120B	PBCE5B225AST120B
	Enhanced Straight 4 ft.	PBCE4A225AST048B	PBCE5A225AST048B	PBCE5B225AST048B
	Elbow – Left	PBCF4A225ALLB	PBCF5A225ALLB	PBCF5B225ALLB
	Elbow – Right	PBCF4A225ALRB	PBCF5A225ALRB	PBCF5B225ALRB
	Cross Fitting	PBCF4A225ACRB	PBCF5A225ACRB	PBCF5B225ACRB
	Tap Box	PBCF4A225ATBB	PBCF5A225ATBB	PBCF5B225ATBB
	Tap Box w/Meter*[3]*	PBCF4A225ATBM( )B	PBCF5A225ATBM( )B	PBCF5B225ATBM( )B
400 A	Enhanced Straight 10 ft.	PBCE4A400AST120B	PBCE5A400AST120B	PBCE5B400AST120B
	Enhanced Straight 4 ft.	PBCE4A400AST048B	PBCE5A400AST048B	PBCE5B400AST048B
	Elbow – Left	PBCF4A400ALLB	PBCF5A400ALLB	PBCF5B400ALLB
	Elbow – Right	PBCF4A400ALRB	PBCF5A400ALRB	PBCF5B400ALRB
	Cross Fitting	PBCF4A400ACRB	PBCF5A400ACRB	PBCF5B400ACRB
	Tap Box	PBCF4A400ATBB	PBCF5A400ATBB	PBCF5B400ATBB

[1] Busway catalog numbers shown include a black painted finish. Contact your local Schneider Electric representative for a natural aluminum finish option.
[2] For 100 A busway only, add an (L), for top cable access, or a (U), for bottom cable access, before the last letter in the catalog no., which is (B).
[3] Replace the ( ) in the Tap Box w/Meter catalog number with the meter suffix number in Table 12.3 Meter Suffix Number, page 12-3. The meter will be configured based on the system voltage.

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Table 12.2 3Ø4W—Straight Lengths and Fittings—600 V Maximum (cont'd.)

Amperage	Component	Configuration 4A–Catalog No.[4]	Configuration 5A–Catalog No.[4]	Configuration 5B–Catalog No.[4]
	Tap Box w/Meter[4]	PBCF4A400ATBM( )B	PBCF5A400ATBM( )B	PBCF5B400ATBM( )B

Table 12.3: Meter Suffix Number

Meter Suffix	System Voltage
1	208Y/120 V 3Ø4W
2	240 V 3Ø3W
4	415/240 V 3Ø4W
5	480Y/277 V 3Ø4W

Table 12.4: Accessories[5]

Description	100 A Catalog No.	225 A Catalog No.	400 A Catalog No.
Standard Hanger	PB100FH	PB225FH	PB400FH
Side Mount Hanger	PB100HFW	PB225HFW	PB400HFW
Vertical Sway Brace	PB100VSB	PB225VSB	PB400VSB
End Closure	PB100AEC	PB225AEC	PB400AEC
Wall Flange	PB100WF	PB225WF	PB400WF
Plug-in Opening Cover	PBPIOCVR	PBPIOCVR	PBPIOCVR

Table 12.5: Hooksticks

Length	Catalog No.
8'	515608
14'	515614
4'—8' extension pole[6]	PBHS0408
8'—15' extension pole[6]	PBHS0815

Powerbus Plug-In Units

Powerbus plug-in units are rated maximum 100 A and may be offered as field installable or factory assembled units. All units conform to NEMA type 1. An optional kit is available for FA and QO units to raise the protection to IP54. This kit raises the QOR unit to moisture protection of IPX3.

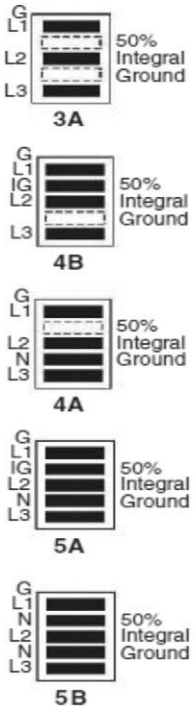
Table 12.6: Plug-In Units—Circuit breakers not included

Busbar Configuration		Space for One (1) 3 Phase FA Circuit Breaker	3 Spaces for QO/QOB Circuit Breakers	3 Spaces for QO/QOB Circuit Breakers 3 Openings for Receptacles[7]
	Tap Box[8] Catalog Number	FA Unit Catalog Number	QO Unit Catalog Number	QOR Unit Catalog Number
4B	PBPTB4B100	PBPFA4B100	PBPQO4B100	PBPQOR4B100
3A	PBPTB3A100	PBPFA3A100	PBPQO3A100	PBPQOR3A100
4A	PBPTB4A100	PBPFA4A100	PBPQO4A100	PBPQOR4A100
5A	PBPTB5A100	PBPFA5A100	PBPQO5A100	PBPQOR5A100

Table 12.7: Factory Assembled Units with FA Circuit Breakers—600 V max[9]

Circuit Breaker Rating	3A Configuration Catalog Number	4A Configuration [10] Catalog Number	5A Configuration Catalog Number	5B Configuration Catalog Number
15	PBPFA3A100A015	PBPFA4A100A015	PBPFA5A100A015	PBPFA5B100A015
20	PBPFA3A100A020	PBPFA4A100A020	PBPFA5A100A020	PBPFA5B100A020
30	PBPFA3A100A030	PBPFA4A100A030	PBPFA5A100A030	PBPFA5B100A030
40	PBPFA3A100A040	PBPFA4A100A040	PBPFA5A100A040	PBPFA5B100A040
50	PBPFA3A100A050	PBPFA4A100A050	PBPFA5A100A050	PBPFA5B100A050
60	PBPFA3A100A060	PBPFA4A100A060	PBPFA5A100A060	PBPFA5B100A060
70	PBPFA3A100A070	PBPFA4A100A070	PBPFA5A100A070	PBPFA5B100A070
80	PBPFA3A100A080	PBPFA4A100A080	PBPFA5A100A080	PBPFA5B100A080
90	PBPFA3A100A090	PBPFA4A100A090	PBPFA5A100A090	PBPFA5B100A090
100	PBPFA3A100A100	PBPFA4A100A100	PBPFA5A100A100	PBPFA5B100A100

Three-Phase Systems



[4] Busway catalog numbers shown include a black painted finish. Contact your local Schneider Electric representative for a natural aluminum finish option.
[4] Replace the ( ) in the Tap Box w/Meter catalog number with the meter suffix number in Table 12.3 Meter Suffix Number, page 12-3. The meter will be configured based on the system voltage.
[5] For the NetShelter ™ IT Rack-Mounting Bracket, refer to **5600CT9101**.
[6] For single-pole operation on QO and ED circuit breakers.
[7] Certain NEMA receptacles can be field installed in this unit. Consult your local Schneider Electric representative.
[8] Plug-in tap box to be installed on 100 A and 225 A busways only.
[9] See Digest Section 7, Table 7.149 QB, QD, QG, QJ, Q4, FA, LA, Circuit Breakers, page 7-73 for FA circuit breaker information.
[10] The 4B configuration catalog numbers are also available.

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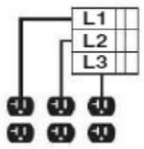
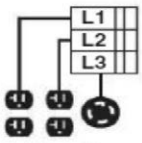
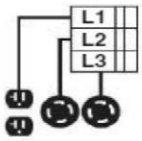


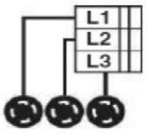
Type 1



Type 2



Type 3



Type 4

Table 12.8: 120 V Factory Assembled Units: 1-pole QO/QOB circuit breakers with NEMA 5-15R or 5-20R receptacles *[11][12]*

Circuit Breaker		4A Configuration	5A Configuration	5B Configuration
Rating	Type	Catalog Number	Catalog Number	Catalog Number
Type 1		**(3 circuit breakers w. 3 duplex receptacles)**		
15	QO	PBPQOR4A100M115	PBPQOR5A100M115	PBPQOR5B100M115
15	QOB	PBPQOR4A100M115B	PBPQOR5A100M115B	PBPQOR5B100M115B
20	QO	PBPQOR4A100M120	PBPQOR5A100M120	PBPQORBA100M120
20	QOB	PBPQOR4A100M120B	PBPQOR5A100M120B	PBPQOR5B100M120B
Type 2		**(3 circuit breakers w. 2 duplex/1 locking recpt.)**		
15	QO	PBPQOR4A100M215	PBPQOR5A100M215	PBPQOR5B100M215
15	QOB	PBPQOR4A100M215B	PBPQOR5A100M215B	PBPQOR5B100M215B
20	QO	PBPQOR4A100M220	PBPQOR5A100M220	PBPQOR5B100M220
20	QOB	PBPQOR4A100M220B	PBPQOR5A100M220B	PBPQOR5B100M220B
Type 3		**(3 circuit breakers w. 1 duplex/2 locking recpt.)**		
15	QO	PBPQOR4A100M315	PBPQOR5A100M315	PBPQOR5B100M315
15	QOB	PBPQOR4A100M315B	PBPQOR5A100M315B	PBPQOR5B100M315B
20	QO	PBPQOR4A100M320	PBPQOR5A100M320	PBPQOR5B100M320
20	QOB	PBPQOR4A100M320B	PBPQOR5A100M320B	PBPQOR5B100M320B
Type 4		**(3 circuit breakers w. 3 locking receptacles)**		
15	QO	PBPQOR4A100M415	PBPQOR5A100M415	PBPQOR5B100M415
15	QOB	PBPQOR4A100M415B	PBPQOR5A100M415B	PBPQOR5B100M415B
20	QO	PBPQOR4A100M420	PBPQOR5A100M420	PBPQOR5B100M420
20	QOB	PBPQOR4A100M420B	PBPQOR5A100M420B	PBPQOR5B100M420B

Table 12.9: Factory Assembled Units: One (1) QOU circuit breaker and one (1) drop cord with connector *[13][14]*

Circuit Breaker		NEMA Connector	Drop Cord Length (ft)	4A Configuration	5A Configuration	5B Configuration
Rating	Poles			Catalog Number	Catalog Number	Catalog Number
15 A	1	L5-15	3	PBPQOU4A100COOL515	PBPQOU5A100COOL515	PBPQOU5B100COOL515
20 A	1	L5-20	3	PBPQOU4A100COOL520	PBPQOU5A100COOL520	PBPQOU5B100COOL520
30 A	1	L5-30	3	PBPQOU4A100COOL530	PBPQOU5A100COOL530	PBPQOU5B100COOL530
15 A	2	L6-15	3	PBPQOU4A100COOL615	PBPQOU5A100COOL615	PBPQOU5B100COOL615
20 A	2	L6-20	3	PBPQOU4A100COOL620	PBPQOU5A100COOL620	PBPQOU5B100COOL620
30 A	2	L6-30	3	PBPQOU4A100COOL630	PBPQOU5A100COOL630	PBPQOU5B100COOL630
20 A	3	L21-20	3	PBPQOU4A100COOL2120	PBPQOU5A100COOL2120	PBPQOU5B100COOL2120
30 A	3	L21-30	3	PBPQOU4A100COOL2130	PBPQOU5A100COOL2130	PBPQOU5B100COOL2130
15 A	1	L5-15	6	PBPQOU4A100FOOL515	PBPQOU5A100FOOL515	PBPQOU5B100FOOL515
20 A	1	L5-20	6	PBPQOU4A100FOOL520	PBPQOU5A100FOOL520	PBPQOU5B100FOOL520
30 A	1	L5-30	6	PBPQOU4A100FOOL530	PBPQOU5A100FOOL530	PBPQOU5B100FOOL530
15 A	2	L6-15	6	PBPQOU4A100FOOL615	PBPQOU5A100FOOL615	PBPQOU5B100FOOL615
20 A	2	L6-20	6	PBPQOU4A100FOOL620	PBPQOU5A100FOOL620	PBPQOU5B100FOOL620
30 A	2	L6-30	6	PBPQOU4A100FOOL630	PBPQOU5A100FOOL630	PBPQOU5B100FOOL630
20 A	3	L21-20	6	PBPQOU4A100FOOL2120	PBPQOU5A100FOOL2120	PBPQOU5B100FOOL2120
30 A	3	L21-30	6	PBPQOU4A100FOOL2130	PBPQOU5A100FOOL2130	PBPQOU5B100FOOL2130

[11] Many more factory assembled units are available using combinations of 1P/2P/3P circuit breakers with other NEMA receptacles. Maximum of 3 breaker spacess available. Consult your local Schneider Electric representative.

[12] See Digest Section 7, QO and QOU Miniature Circuit Breakers, page for QOU circuit breaker information.

[13] Factory assembled units are available using combinations of 1P/2P/3P circuit breakers with other NEMA and IEC type receptacles. Maximum of three drop cords with six breaker spaces available. Consult your local Schneider Electric representative.

[14] See Digest Section 7, QO and QOU Miniature Circuit Breakers, page for QOU circuit breaker information. Catalog numbers shown have the breaker in the top slot in the front cover and the drop cord in the left position in the base of the unit. Other combinations are available.

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Powerbus Plug-in Units with Metering

Powerbus plug-in units with metering are rated maximum 100 A and are offered as factory assembled units. All units conform to NEMA type 1.

Table 12.10: Factory Assembled Units with NEMA Connectors and Metering*[15][16]*

Circuit Breaker		NEMA Connector	Drop Cord Length (ft)	Catalog Number*[17][18]*		
Rating	Poles			4A Configuration	5A Configuration	5B Configuration
15 A	1	L5-15	3	PBPEDU4A100COOL515M( )	PBPEDU5A100COOL515M( )	PBPEDU5B100COOL515M( )
20 A	1	L5-20	3	PBPEDU4A100COOL520M( )	PBPEDU5A100COOL520M( )	PBPEDU5B100COOL520M( )
30 A	1	L5-30	3	PBPEDU4A100COOL530M( )	PBPEDU5A100COOL530M( )	PBPEDU5B100COOL530M( )
15 A	2	L6-15	3	PBPEDU4A100COOL615M( )	PBPEDU5A100COOL615M( )	PBPEDU5B100COOL615M( )
20 A	2	L6-20	3	PBPEDU4A100COOL620M( )	PBPEDU5A100COOL620M( )	PBPEDU5B100COOL620M( )
30 A	2	L6-30	3	PBPEDU4A100COOL630M( )	PBPEDU5A100COOL630M( )	PBPEDU5B100COOL630M( )
20 A	3	L21-20	3	PBPEDU4A100COOL2120M( )	PBPEDU5A100COOL2120M( )	PBPEDU5B100COOL2120M( )
30 A	3	L21-30	3	PBPEDU4A100COOL2130M( )	PBPEDU5A100COOL2130M( )	PBPEDU5B100COOL2130M( )
15 A	1	L5-15	6	PBPEDU4A100FOOL515M( )	PBPEDU5A100FOOL515M( )	PBPEDU5B100FOOL515M( )
20 A	1	L5-20	6	PBPEDU4A100FOOL520M( )	PBPEDU5A100FOOL520M( )	PBPEDU5B100FOOL520M( )
30 A	1	L5-30	6	PBPEDU4A100FOOL530M( )	PBPEDU5A100FOOL530M( )	PBPEDU5B100FOOL530M( )
15 A	2	L6-15	6	PBPEDU4A100FOOL615M( )	PBPEDU5A100FOOL615M( )	PBPEDU5B100FOOL615M( )
20 A	2	L6-20	6	PBPEDU4A100FOOL620M( )	PBPEDU5A100FOOL620M( )	PBPEDU5B100FOOL620M( )
30 A	2	L6-30	6	PBPEDU4A100FOOL630M( )	PBPEDU5A100FOOL630M( )	PBPEDU5B100FOOL630M( )
20 A	3	L21-20	6	PBPEDU4A100FOOL2120M( )	PBPEDU5A100FOOL2120M( )	PBPEDU5B100FOOL2120M( )
30 A	3	L21-30	6	PBPEDU4A100FOOL2130M( )	PBPEDU5A100FOOL2130M( )	PBPEDU5B100FOOL2130M( )

Table 12.11: Factory Assembled Units with IEC Connectors and Metering*[15][16]*

Circuit Breaker		IEC 60309 Connector*[19]*	Drop Cord Length (ft)	Catalog Number*[18][20]*		
Rating	Poles			4A Configuration	5A Configuration	5B Configuration
20	2	2-Pole, 3-Wire Grounding	3	PBPEDU4A100COOS3420M( )	PBPEDU5A100COOS3420M( )	PBPEDU5B100COOS3420M( )
30	2	2-Pole, 3-Wire Grounding	3	PBPEDU4A100COOS3430M( )	PBPEDU5A100COOS3430M( )	PBPEDU5B100COOS3430M( )
60	2	2-Pole, 3-Wire Grounding	3	PBPEDU4A100COOS3460M( )	PBPEDU5A100COOS3460M( )	PBPEDU5B100COOS3460M( )
20	3	3-Pole, 4-Wire Grounding	3	PBPEDU4A100COOS4420M( )	PBPEDU5A100COOS4420M( )	PBPEDU5B100COOS4420M( )
30	3	3-Pole, 4-Wire Grounding	3	PBPEDU4A100COOS4430M( )	PBPEDU5A100COOS4430M( )	PBPEDU5B100COOS4430M( )
60	3	3-Pole, 4-Wire Grounding	3	PBPEDU4A100COOS4460M( )	PBPEDU5A100COOS4460M( )	PBPEDU5B100COOS4460M( )
20	3	4-Pole, 5-Wire Grounding	3	PBPEDU4A100COOS5420M( )	PBPEDU5A100COOS5420M( )	PBPEDU5B100COOS5420M( )
30	3	4-Pole, 5-Wire Grounding	3	PBPEDU4A100COOS5430M( )	PBPEDU5A100COOS5430M( )	PBPEDU5B100COOS5430M( )
60	3	4-Pole, 5-Wire Grounding	3	PBPEDU4A100COOS5460M( )	PBPEDU5A100COOS5460M( )	PBPEDU5B100COOS5460M( )

Table 12.12: Meter Suffix Number

Meter Suffix*[21]*	System Voltage
1	208Y/120 V 3Ø4W
2	240 V 3Ø3W
4	415/240 V 3Ø4W
5	480Y/277 V 3Ø4W

Table 12.13: EGX Plug-in Unit (480 V Max)*[22]*

4A Configuration	5A Configuration	5B Configuration
Catalog No.	Catalog No.	Catalog No.
PBPEGX4A100T	PBPEGX5A100T	PBPEGX5B100T

Table 12.14: NEMA Receptacles and Connectors*[23]*

Wiring	Voltage	NEMA Non-Locking			NEMA Locking		
		15 A	20 A	30 A	15 A	20 A	30 A
2-pole, 3-wire grounding	120	5–15	5–20	5–30	L5–15	L5–20	L5–30
2-pole, 3-wire grounding	240	6–15	6–20	6–30	L6–15	L6–20	L6–20
3-pole, 4-wire grounding	120/240	14–15	14–20	14–30	—	L14–20	L14–30
3-pole, 4-wire grounding	3Ø 240	15–15	15–20	15–30	—	L15–20	L15–30
4-pole, 5-wire grounding	3ØY 120/208	—	—	—	—	L21–20	L21–30

Table 12.15: Short Circuit Current Rating*[24]*

Product	Short-Circuit Current Rating KA, RMS Symmetrical
	UL 3–Cycle Test
100 A	14 kA
225 A	22 kA
400 A	35 kA

[15] See Digest Section 9, For NF Merchandised Panelboards, page 9-22 for ED circuit breaker information. Catalog numbers shown have the breaker in the top slot in the front cover and the drop cord in the left position in the base of the unit. Other combinations are available. The Power Meter display will be located below the breaker space. For remote monitoring capabilities, an EGX gateway is required. The EGX is located in the tap box with metering or in a separate EGX plug-in unit listed below. The units with metering can be daisy-chained together back to the EGX gateway. A maximum of 30 units should be daisy-chained together to one EGX.

[16] Factory assembled units are available using combinations of 1P/2P/3P circuit breakers with other NEMA and IEC type receptacles. Maximum of three drop cords with three breaker spaces available. Consult your local Schneider Electric representative.

[17] For IP54 splash resistant construction, add an "M54" suffix.

[18] For metering, replace ( ) in catalog number with the appropriate number in Table 12.12 Meter Suffix Number, page 12-5. Connectors must be rated for appropriate voltages.

[19] Other IEC Connectors are available.

[20] For the offer without metering, do not use the suffix “M” or any numbers following.

[21] Replace ( ) in above tables with the appropriate meter suffix number. Connectors must be rated for appropriate voltages.

[22] For remote monitoring capabilities, an EGX gateway is required. The EGX is located in the tap box with metering or in a separate EGX plug-in unit listed above. Units with metering can be daisy-chained together back to the EGX gateway. A maximum of 30 units should be daisy-chained together to one EGX.

[23] Additional NEMA, IEC, and California Standard type receptacles and connectors are available.

[24] See **5600CT9101** for fuse and circuit breaker series connected ratings.

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I-Line™ Standard Components and Accessories

Table 12.16: Standard Components—Aluminum

Aluminum

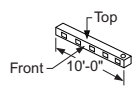
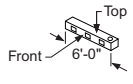
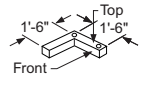
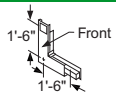
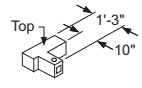
Number of Poles and Voltage	Rating (A)	G PH PH PH N	G PH PH PH N	G PH PH PH N	G PH PH PH N	G PH PH PH N	G PH PH PH N
							
		10'-0" Length	6'-0" Length	Front Elbow[1]	Top Elbow[1]	Plug-In Tee	Plug-In Tap Box
		Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.
3Ø3W	225 400 600	AP30210 AP30410 AP30610	AP3026 AP3046 AP3066	AP302LF ( ) AP304LF ( ) AP306LF ( )	AP302LT( ) AP304LT( ) AP306LT( )	PTT23W PTT33W PTT43W	PTB302 PBTB306 PBTB306
3Ø4W	225 400 600	AP50210 AP50410 AP50610	AP5026 AP5046 AP5066	AP502LF ( ) AP504LF ( ) AP506LF ( )	AP502LT( ) AP504LT( ) AP506LT( )	PTT24W PTT34W PTT44W	PTB502 PBTB506 PBTB506
3Ø3W + Integral Ground Bus	225 400 600	AP302G10 AP304G10 AP306G10	AP302G6 AP304G6 AP306G6	AP302GLF ( ) AP304GLF ( ) AP306GLF ( )	AP302GLT( ) AP304GLT( ) AP306GLT( )	PTT23WG PTT33WG PTT43WG	PTB302G PBTB306G PBTB306G
3Ø4W + Integral Ground Bus	225 400 600	AP502G10 AP504G10 AP506G10	AP502G6 AP504G6 AP506G6	AP502GLF ( ) AP504GLF ( ) AP506GLF ( )	AP502GLT( ) AP504GLT( ) AP506GLT( )	PTT24WG PTT34WG PTT44WG	PTB502G PBTB506G PBTB506G

Table 12.17: Standard Components—Copper

Copper

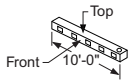
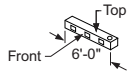
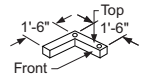
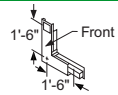
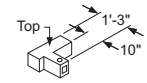
Number of Poles and Voltage	Rating (A)	G PH PH PH N	G PH PH PH N	G PH PH PH N	G PH PH PH N	G PH PH PH N	G PH PH PH N
							
		10'-0" Length	6'-0" Length	Front Elbow[1]	Top Elbow[1]	Plug-In Tee	Plug-In Tap Box
		Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.
3Ø3W	225 400 600	CP30210 CP30410 CP30610	CP3026 CP3046 CP3066	CP302LF ( ) CP304LF ( ) CP306LF ( )	CP302LT( ) CP304LT( ) CP306LT( )	PTT23W PTT33W PTT33W	PTB302 PBTB306 PBTB306
3Ø4W	225 400 600	CP50210 CP50410 CP50610	CP5026 CP5046 CP5066	CP502LF ( ) CP504LF ( ) CP506LF ( )	CP502LT( ) CP504LT( ) CP506LT( )	PTT24W PTT34W PTT34W	PTB502 PBTB506 PBTB506
3Ø3W + Integral Ground Bus	225 400 600	CP302G10 CP304G10 CP306G10	CP302G6 CP304G6 CP306G6	CP302GLF ( ) CP304GLF ( ) CP306GLF ( )	CP302GLT( ) CP304GLT( ) CP306GLT( )	PTT23WG PTT33WG PTT33WG	PTB302G PBTB306G PBTB306G
3Ø4W + Integral Ground Bus	225 400 600	CP502G10 CP504G10 CP506G10	CP502G6 CP504G6 CP506G6	CP502GLF ( ) CP504GLF ( ) CP506GLF ( )	CP502GLT( ) CP504GLT( ) CP506GLT( )	PTT24WG PTT34WG PTT34WG	PTB502G PBTB506G PBTB506G

Table 12.18: Common Accessories

Ampere Rating		Hanger[2]				End Closure	Wall Flange	Floor Flange
Aluminum	Copper	Flatwise	Vertical	Edgewise	Seismic	Catalog No.	Catalog No.	Catalog No.
225	225	HP2F	HP2V	HP3E	HP2SH	ACP2EC	ACP2WF	ACP2FF
400	400	HP3F	HP3V	HP3E	HP3SH	ACP3EC	ACP3WF	ACP3FF
—	600	HP3F	HP3V	HP3E	HP3SH	ACP3EC	ACP3WF	ACP3FF
600	—	HP5F	HP4V	HP5E	HP5SH	ACP4EC	ACP4WF	ACP4FF

[1] Add "I" for inside elbow; add "O" for outside elbow.
[2] For seismic applications, seismic hangers must be used with horizontal mount flatwise or edgewise busway. Vertical mount busway may use standard fixed or spring hangers.

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I-Line™ II Straight Lengths, Fittings, and Accessories

Table 12.19: Straight Lengths (10 ft.) and Plug-in Tap Box

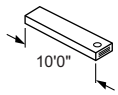
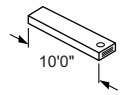
Number of Poles	Ampere Rating	Aluminum		Both Aluminum and Copper	Copper	
		G PH PH PH N	G PH PH PH N	G PH PH PH N	G PH PH PH N	G PH PH PH N
						
		10'0" Length		Plug-In Tap Box[1][2]	10'0" Length	
		Feeder Style[3]	Plug-In Style[4]		Feeder Style[3]	Plug-In Style[4]
		Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.
3Ø3W + Integral Ground Bus	800	AF2308G10ST	AP2308G10ST	PTB316G ( )	CF2308G10ST	CP2308G10ST
	1000	AF2310G10ST	AP2310G10ST	PTB316G ( )	CF2310G10ST	CP2310G10ST
	1200	AF2312G10ST	AP2312G10ST	PTB316G ( )	CF2312G10ST	CP2312G10ST
	1350	AF2313G10ST	AP2313G10ST	PTB316G ( )	CF2313G10ST	CP2313G10ST
	1600	AF2316G10ST	AP2316G10ST	PTB316G ( )	CF2316G10ST	CP2316G10ST
	2000	AF2320G10ST	AP2320G10ST	—	CF2320G10ST	CP2320G10ST
	2500	AF2325G10ST	AP2325G10ST	—	CF2325G10ST	CP2325G10ST
	3000	AF2330G10ST	AP2330G10ST	—	CF2330G10ST	CP2330G10ST
	3200	—	—	—	CF2332G10ST	CP2332G10ST
	4000	AF2340G10ST	AP2340G10ST	—	CF2340G10ST	CP2340G10ST
	5000	—	—	—	CF2350G10ST	CP2350G10ST
3Ø4W + Integral Ground Bus	800	AF2508G10ST	AP2508G10ST	PTB516G ( )	CF2508G10ST	CP2508G10ST
	1000	AF2510G10ST	AP2510G10ST	PTB516G ( )	CF2510G10ST	CP2510G10ST
	1200	AF2512G10ST	AP2512G10ST	PTB516G ( )	CF2512G10ST	CP2512G10ST
	1350	AF2513G10ST	AP2513G10ST	PTB516G ( )	CF2513G10ST	CP2513G10ST
	1600	AF2516G10ST	AP2516G10ST	PTB516G ( )	CF2516G10ST	CP2516G10ST
	2000	AF2520G10ST	AP2520G10ST	—	CF2520G10ST	CP2520G10ST
	2500	AF2525G10ST	AP2525G10ST	—	CF2525G10ST	CP2525G10ST
	3000	AF2530G10ST	AP2530G10ST	—	CF2530G10ST	CP2530G10ST
	3200	—	—	—	CF2532G10ST	CP2532G10ST
	4000	AF2540G10ST	AP2540G10ST	—	CF2540G10ST	CP2540G10ST
	5000	—	—	—	CF2550G10ST	CP2550G10ST

Table 12.20: Fittings (All Feeder Style)

Number of Poles	Ampere Rating	Aluminum			Copper		
		End Tap Box	Edgewise Elbow	Flatwise Elbow	End Tap Box	Edgewise Elbow	Flatters Elbow
		Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.
3Ø3W with Integral Ground Bus	800	AF2308GETBMB	AF2308GLEM11	AF2308GLFM11	CF2308GETBMB	CF2308GLEM11	CF2308GLFM11
	1000	AF2310GETBMB	AF2310GLEM11	AF2310GLFM12	CF2310GETBMB	CF2310GLEM11	CF2310GLFM11
	1200	AF2312GETBMB	AF2312GLEM11	AF2312GLFM12	CF2312GETBMB	CF2312GLEM11	CF2312GLFM12
	1350	AF2313GETBMB	AF2313GLEM11	AF2313GLFM13	CF2313GETBMB	CF2313GLEM11	CF2313GLFM12
	1600	AF2316GETBMB	AF2316GLEM11	AF2316GLFM13	CF2316GETBMB	CF2316GLEM11	CF2316GLFM12
	2000	AF2320GETBMB	AF2320GLEM11	AF2320GLFM15	CF2320GETBMB	CF2320GLEM11	CF2320GLFM13
	2500	AF2325GETBMB	AF2325GLEM11	AF2325GLFM17	CF2325GETBMB	CF2325GLEM11	CF2325GLFM15
	3000	AF2330GETBMB	AF2330GLEM11	AF2330GLFM18	CF2330GETBMB	CF2330GLEM11	CF2330GLFM16
	3200	—	—	—	CF2332GETBMB	CF2332GLEM11	CF2332GLFM17
	4000	AF2340GETBMB	AF2340GLEM11	AF2340GLFM22	CF2340GETBMB	CF2340GLEM11	CF2340GLFM21
	5000	—	—	—	CF2350GETBMB	CF2350GLEM11	CF2350GLFM21
3Ø4W with Integral Ground Bus	800	AF2508GETBMB	AF2508GLEM11	AF2508GLFM11	CF2508GETBMB	CF2508GLEM11	CF2508GLFM11
	1000	AF2510GETBMB	AF2510GLEM11	AF2510GLFM12	CF2510GETBMB	CF2510GLEM11	CF2510GLFM11
	1200	AF2512GETBMB	AF2512GLEM11	AF2512GLFM12	CF2512GETBMB	CF2512GLEM11	CF2512GLFM12
	1350	AF2513GETBMB	AF2513GLEM11	AF2513GLFM13	CF2513GETBMB	CF2513GLEM11	CF2513GLFM12
	1600	AF2516GETBMB	AF2516GLEM11	AF2516GLFM13	CF2516GETBMB	CF2516GLEM11	CF2516GLFM12
	2000	AF2520GETBMB	AF2520GLEM11	AF2520GLFM15	CF2520GETBMB	CF2520GLEM11	CF2520GLFM13
	2500	AF2525GETBMB	AF2525GLEM11	AF2525GLFM17	CF2525GETBMB	CF2525GLEM11	CF2525GLFM15
	3000	AF2530GETBMB	AF2530GLEM11	AF2530GLFM18	CF2530GETBMB	CF2530GLEM11	CF2530GLFM16
	3200	—	—	—	CF2532GETBMB	CF2532GLEM11	CF2532GLFM17
	4000	AF2540GETBMB	AF2540GLEM11	AF2540GLFM22	CF2540GETBMB	CF2540GLEM11	CF2540GLFM21
	5000	—	—	—	CF2550GETBMB	CF2550GLEM11	CF2550GLFM21

Table 12.21: Accessories

Ampere Rating		Hangers[5]					End Closure	Wall Flange
Al	Cu	Horizontal Mount Busway		Vertical Mount Busway		Seismic	Catalog No.	Catalog No.
		Flatwise	Edgewise	Fixed	Spring			
—	800	HF38F	HF43E	HFV	HFVS1	HF38SH	ACF38EC	ACF38WF
800	1000	HF43F	HF43E	HFV	HFVS1	HF43SH	ACF43EC	ACF43WF
1000	1200	HF53F	HF58E	HFV	HFVS1	HF53SH	ACF53EC	ACF53WF
—	1350	HF58F	HF58E	HFV	HFVS2	HF58SH	ACF58EC	ACF58WF
1200	—	HF63F	HF67E	HFV	HFVS1	HF63SH	ACF63EC	ACF63WF

[1] To complete the catalog number, replace the blank with an "H" for the plug-in unit to be mounted on horizontally—oriented busway and "V" for the plug-in unit to be mounted on vertically-oriented busway.
[2] Cannot be used for 800 A copper busway.
[3] Feeder style available in lengths from 16 to 120 inches.
[4] Plug-in style also available in 4, 6, and 8 foot lengths.
[5] For seismic applications, seismic hangers must be used with horizontal mount flatwise or edgewise busway. Vertical mount busway may use standard fixed or spring hangers.

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Table 12.21 Accessories (cont'd.)

Ampere Rating		Hangers[5]					End Closure	Wall Flange
Al	Cu	Horizontal Mount Busway		Vertical Mount Busway		Seismic	Catalog No.	Catalog No.
		Flatwise	Edgewise	Fixed	Spring			
—	1600	HF67F	HF67E	HFV	HFVS2	HF67SH	ACF67EC	ACF67WF
1350	—	HF73F	HF78E	HFV	HFVS1	HF73SH	ACF73EC	ACF73WF
—	2000	HF78F	HF78E	HFV	HFVS2	HF78SH	ACF78EC	ACF78WF
1600	—	HF88F	HF88E	HFV	HFVS1	HF88SH	ACF88EC	ACF88WF
2000	—	HF13F	HF13E	HFV	HFVS2	HF13SH	ACF13EC	ACF13WF
—	2500	HF13F	HF13E	HFV	HFVS8	HF13SH	ACF13EC	ACF13WF
2500	—	HF16F	HF16E	HFV	HFVS2	HF16SH	ACF17EC	ACF17WF
—	3000	HF15F	HF15E	HFV	HFVS8	HF15SH	ACF15EC	ACF15WF
—	3200	HF16F	HF16E	HFV	HFVS8	HF16SH	ACF17EC	ACF17WF
3000	—	HF19F	HF19E	HFV	HFVS8	HF19SH	ACF19EC	ACF19WF
4000	—	HF26F	HF26E	HFV	HFVS8	HF26SH	ACF26EC	ACF26WF
—	4000	HF24F	HF24E	HFV	HFVS8	HF24SH	ACF24EC	ACF24WF
—	5000	HF25F	HF26E	HFV	HFVS8	HF25SH	ACF25EC	ACF25WF

[5] For seismic applications, seismic hangers must be used with horizontal mount flatwise or edgewise busway. Vertical mount busway may use standard fixed or spring hangers.

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Standard Straight Lengths

The basic component of a busway system is a straight section with a "joint pak" factory-affixed to one end. Plug-in busway is available in standard lengths of 4, 6, 8, and 10 feet. Feeder busway is available in lengths from 16" to 120" in increments of 1".

Riser Busway

We also offer a "Riser" Plug-In busway with openings on one side only for riser installations. This busway offers the same short circuit ratings as our standard plug-in busway.

Indoor Drip Resistant and IP54 Splash Resistant Busway

These water resistant features are available as an option for indoor plug-in and feeder busway.

Outdoor Construction

Outdoor construction is only available in feeder busway. It prevents the entry of rain and can be installed in any mounting position.

High Short Circuit Bracing

I-Line busway is available with either standard short circuit bracing or high short circuit bracing. Electrical Data for I-Line II Busway, page 12-10 lists maximum short circuit ratings for each busway type and rating.

Hangers

Indoor horizontal busway requires one hanger for every 10 feet of busway. Vertical indoor busway requires one hanger for every 16 feet. Outdoor feeder busway requires one hanger for every 5 feet in horizontal mounting and one hanger for every 10 feet in vertical mounting.

Elbows

90° elbows are standard. 91° elbows to 179° elbows in 1° increments are also available.

Tee

90° flatwise tees fittings are standard. Edgewise tees and crosses are also available.

Indoor Tap Boxes

Feeder cable tap boxes are used at the end (-ETBMB) or center (-CTB) of a busway run and incorporate a short section of busway into their construction. See **5600CT9101** for the length of the tap box.

Plug-in cable tap boxes are plugged into the side of the busway (at any opening except the very last opening of a run).

Lugs other than standard mechanical lugs are available.

Service Heads

Service heads are of outdoor construction and include Square D™ brand standard lugs.

Unfused Reducer

Unfused reducers are used to reduce from a higher amperage busway to a lower amperage.

NOTE: The National Electric Code does not allow the use of unfused reducers in vertical riser installations. Refer to the NEC for restrictions in industrial installations.

Fused or Circuit Breaker Cubicle

These are used as in-line overcurrent protection devices. They can be used in conjunction with an unfused reducer to offer a device which reduces a run of busway in ampacity and offers overcurrent protection.

I-Line to I-Line II Adapter

This adapter is used to join I-Line II busway (800 A–5000 A) to existing installations of original I-Line busway. If connecting to an existing "slot end" of original I-Line, use a "bolt end" adapter (-12B), and vice versa.

Expansion Fittings

The expansion fitting is built into a 3 ft. – 4 in. straight length for 800 A–5000 A and a 5 feet – 0 inch straight length for 225 A–600 A. Limit of expansion or contraction is ±1-1/2 inches. Not available in outdoor construction.

Bussed Transformer Connection

A bussed transformer connection is used when the busway physically attaches (other than cable) to a three phase transformer. For power company vault termination information, consult the factory.

Transformer Taps

Transformer taps are used to make cable connection to transformers. Lugs other than standard Square D brand lugs are available. Note that taps need **NOT** be located directly above transformers for cable connections.

Finger Protection to IP2X

This feature provides improved protection from accidental contact with live parts during insertion and removal of plug-in units. This feature meets the IP2X rating as defined by IEC529 standard.

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Connection to Competitive Busway

Consult your nearest Schneider Electric sales office.

Electrical Data for I-Line II Busway

Standards:	UL857 (File Number E22182); CSA C22.2 No. 27-1994 (File Number LL-61778); IEC 61439–6
Systems:	AC–3Ø3W, 3Ø4W, 1Ø2W, 1Ø3W. DC–2-pole. All neutrals are 100% capacity.
Voltage:	600 volts AC/DC, 50 Hz and 60 Hz
Integral Ground:	50% capacity as standard for 800 A to 5000 A, as an option on 225 A to 600 A
Enclosure:	Indoor, indoor drip resistant, indoor splash resistant (IP54), and outdoor (indoor drip resistant, indoor splash resistant (IP54), and outdoor are available in I-Line II [800–5000 A] busway only)

Table 12.22: Short Circuit Ratings: UL 3 Cycle Test (KA, RMS Symmetrical) *[6]*

Ampere Rating	Aluminum				Copper			
	AOF2 AF2	AOFH AFH2	AP AP2/AR2	APH APH2/ ARH2	COF2 CF2	COFH CFH2	CP CP2/CR2	CPH CPH2/ CRH2
225	—	—	22	—	—	—	22	—
400	—	—	22	42	—	—	22	42
600	—	—	22	42	—	—	22	42
800	50	85	50	75	50	85	50	75
1000	50	100	50	100	50	85	50	75
1200	50	100	50	100	50	100	50	100
1350	50	100	50	100	50	100	50	100
1600	50	100	50	100	50	100	50	100
2000	100	150	125	150	50	100	65	100
2500	100	150	125	150	100	150	125	150
3000	100	150	125	150	100	150	125	150
3200	—	—	—	—	100	150	125	150
4000	150	200	200	—	150	200	200	—
5000	—	—	—	—	150	200	200	—

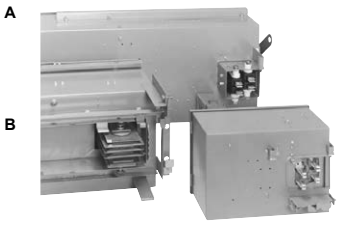
Fusible Plug-In Units, Class R Fuse Kits, and Hooksticks

Table 12.23: Fusible Plug-In Units *[7]*

Ampere Rating	Type of Connection	240 Vac 3-Pole, 3 Fuse + G	120/208 Vac, (240 Vac Max.) 4-Pole, 3 Fuse + G	600 Vac 3-Pole, 3 Fuse + G	277/480 Vac, (600 Vac Max.) 4-Pole, 3 Fuse + G
		Catalog No.	Catalog No.	Catalog No.	Catalog No.
30	Plug-in	PQ3203G	PQ4203G	PQ3603G	PQ4603G
60		PQ3206G	PQ4206G	PQ3606G	PQ4606G
100		PQ3210G	PQ4210G	PQ3610G	PQ4610G
200		PQ3220G	PQ4220G	PQ3620G	PQ4620G
200 *[8]*		PS3220G *[8]*	PS4220G *[8]*	PS3620G *[8]*	PS4620G *[8]*
400		PBQ3640G *[9]*	PBQ4640G *[9]*	PBQ3640G *[9]*	PBQ4640G *[9]*
600		PBQ3660G *[9]*	PBQ4660G *[9]*	PBQ3660G *[9]*	PBQ4660G *[9]*
800	Bolt-on	—	—	PTQ36080G ( ) *[10]*	PTQ46080G ( ) *[10]*
1000		—	—	PTQ36100G ( ) *[10]*	PTQ46100G ( ) *[10]*
1200		—	—	PTQ36120G ( ) *[10]*	PTQ46120G ( ) *[10]*

Class J Fuses – Provisions for installing Class J fuses are included in 30 through 600 A fusible devices. Conversion to Class J fuse spacing requires relocating the load side fuse base assembly from standard Class H fuse location to an alternate position in the enclosure.

"Hook-Swing" Mounting



A–High Ampere Plug-In Connection
B– High Ampere Bolt-On Connection
C– Low Ampere Plug-In Connection

There are three different types of plug-in connections:

- High Ampere Bolt-On Connection (catalog numbers that begin with "PT")—bolted "joint pack" type connection
  - Used on I-Line/I-Line II busway amperages 800 A aluminum and greater.
  - Used on I-Line/I-Line II busway amperages 1000 A copper and greater.
- High Ampere Plug-In Connection (catalog numbers that begin with "PB")—individual bolted jaws for connections
- Low Ampere Plug-In Connection (catalog numbers that begin with "P," except for "PB" and "PT")—spring pressure jaws for connection

Table 12.24: Class R Fuse Kits *[11]*

Switch Size (A)	Voltage Rating	Kit *[11]* Catalog No.
30	250 V *[12]* 600 V *[12]*	QMB30R QMB36R
60	250 V *[12]* 600 V *[12]*	QMB36R QMB60R
100 200	All	HRK1020
400 600	All	QMB4060R

Class R Fuse Kits when installed reject all but class R fuses.

[6] 6–cycle and 30–cycle, and fuse/circuit breaker series connected ratings are available. Please reference **5600CT9101**.
[7] For IP54 splash resistant construction, add an "M54" suffix.
[8] For use on vertical riser applications only.
[9] For vertical riser applications, order auxiliary mounting kit—Catalog Number PBQ4060RMK.
[10] This device uses bolt-on connection. It may be used only on plug-in busway with same number of poles. To complete the catalog number, replace the blank with an "H" for the plug-in unit to be mounted on horizontally—oriented busway and "V" for the plug-in unit to be mounted on vertically-oriented busway. Not for use on 800 A copper busway.
[11] Kit must be field installed.
[12] Contains parts to convert two units.

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Table 12.25: Hooksticks

Length	Catalog No.
8'	515608
14'	515614

Surge Protective Device Plug-In Units

All Busway SPD Plug-In Units include as standard:

- Individually Fused Modules
- Circuit Breaker Disconnect
- Cover Mounted Diagnostic Panel
- EMI/RFI Filter
- Audible Alarm with Test/Disable/Enable

Table 12.26: Surge Capacity

System Voltage	160,000 Amperes Per Phase	240,000 Amperes Per Phase
	Catalog Number*[13]*	Catalog Number*[13]*
208Y/120 Vac, 3Ø4W/Grd.	PIU2IMA16	PIU2IMA24
240Y/120 Vac, 3Ø4W/Grd.	PIU3IMA16	PIU3IMA24
480Y/277 Vac, 3Ø4W/Grd.	PIU4IMA16	PIU4IMA24
600Y/347 Vac, 3Ø4W/Grd.	PIU8IMA16	PIU8IMA24

Table 12.27: Options

Description	When Required Add Suffix to Catalog Number
Surge Counter and Dry Contacts	—
Remote Monitor with Dry Contacts	M

[13] For IP54 splash resistant construction, add an "M54" suffix.

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H- and J-Frame Plug-In Units

Table 12.28: H-Frame Circuit Breaker Plug-in Units—Standard (80%) Rated—3Ø3W

Trip Rating Ampere	D Interrupting	G Interrupting	J Interrupting	L Interrupting
	Catalog No. *[14]*	Catalog No. *[14]*	Catalog No. *[14]*	Catalog No. *[14]*
3Ø3W + G, 600 Vac 50/60 Hz				
15	PHD36015G	PHG36015G	PHJ36015G	PHL36015G
20	PHD36020G	PHG36020G	PHJ36020G	PHL36020G
30	PHD36030G	PHG36030G	PHJ36030G	PHL36030G
40	PHD36040G	PHG36040G	PHJ36040G	PHL36040G
50	PHD36050G	PHG36050G	PHJ36050G	PHL36050G
60	PHD36060G	PHG36060G	PHJ36060G	PHL36060G
70	PHD36070G	PHG36070G	PHJ36070G	PHL36070G
80	PHD36080G	PHG36080G	PHJ36080G	PHL36080G
90	PHD36090G	PHG36090G	PHJ36090G	PHL36090G
100	PHD36100G	PHG36100G	PHJ36100G	PHL36100G
125	PHD36125G	PHG36125G	PHJ36125G	PHL36125G
150	PHD36150G	PHG36150G	PHJ36150G	PHL36150G

Table 12.29: H-Frame Circuit Breaker Plug-in Units—Standard (80%) Rated—3Ø4W

Trip Rating Ampere	D Interrupting	G Interrupting	J Interrupting	L Interrupting
	Catalog No. *[14]*	Catalog No. *[14]*	Catalog No. *[14]*	Catalog No. *[14]*
3Ø4W + G, 600 Vac Max. 50/60 Hz				
15	PHD36015GN	PHG36015GN	PHJ36015GN	PHL36015GN
20	PHD36020GN	PHG36020GN	PHJ36020GN	PHL36020GN
30	PHD36030GN	PHG36030GN	PHJ36030GN	PHL36030GN
40	PHD36040GN	PHG36040GN	PHJ36040GN	PHL36040GN
50	PHD36050GN	PHG36050GN	PHJ36050GN	PHL36050GN
60	PHD36060GN	PHG36060GN	PHJ36060GN	PHL36060GN
70	PHD36070GN	PHG36070GN	PHJ36070GN	PHL36070GN
80	PHD36080GN	PHG36080GN	PHJ36080GN	PHL36080GN
90	PHD36090GN	PHG36090GN	PHJ36090GN	PHL36090GN
100	PHD36100GN	PHG36100GN	PHJ36100GN	PHL36100GN
125	PHD36125GN	PHG36125GN	PHJ36125GN	PHL36125GN
150	PHD36150GN	PHG36150GN	PHJ36150GN	PHL36150GN

Table 12.30: J-Frame Circuit Breaker Plug-in Units—Standard (80%) Rated—3Ø3W

Trip Rating Ampere	D Interrupting	G Interrupting	J Interrupting	L Interrupting
	Catalog No. *[14]*	Catalog No. *[14]*	Catalog No. *[14]*	Catalog No. *[14]*
3Ø3W + G, 600 Vac 50/60 Hz				
175	PJD36175G	PJG36175G	PJJ36175G	PJL36175G
200	PJD36200G	PJG36200G	PJJ36200G	PJL36200G
225	PJD36225G	PJG36225G	PJJ36225G	PJL36225G
250	PJD36250G	PJG36250G	PJJ36250G	PJL36250G

Table 12.31: J-Frame Circuit Breaker Plug-in Units—Standard (80%) Rated—3Ø4W

Trip Rating Ampere	D Interrupting	G Interrupting	J Interrupting	L Interrupting
	Catalog No. *[14]*	Catalog No. *[14]*	Catalog No. *[14]*	Catalog No. *[14]*
3Ø4W + G, 600 Vac Max. 50/60 Hz				
175	PJD36175GN	PJG36175GN	PJJ36175GN	PJL36175GN
200	PJD36200GN	PJG36200GN	PJJ36200GN	PJL36200GN
225	PJD36225GN	PJG36225GN	PJJ36225GN	PJL36225GN
250	PJD36250GN	PJG36250GN	PJJ36250GN	PJL36250GN

Table 12.32: Circuit Breaker Interrupting Ratings

Interrupting Ratings (kA)	D	G	J	L	R
240 V	25	65	100	125	200
480 V	18	35	65	100	200
600 V	14	18	25	50	100

[14] For IP54 splash resistant construction, add an "M54" suffix.

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H-, J-, and L-Frame Plug-In Units with Electronic Trip

Table 12.33: H- and J-Frame Circuit Breaker Plug-in Units with Electronic Trip—Standard (80%) Rated—3Ø3W

Trip Rating Ampere	Trip Function[15]	Trip Unit [16]	D Interrupting	G Interrupting	J Interrupting	L Interrupting
			Catalog Number[17][18][19]	Catalog Number[17][18][19]	Catalog Number[17][18][19]	Catalog Number[17][18][19]
Micrologic Standard Trip Unit						
3Ø3W + G, 600 Vac 50/60 Hz						
60	LI	3.2	PHD36060GU31X	PHG36060GU31X	PHJ36060GU31X	PHL36060GU31X
100			PHD36100GU31X	PHG36100GU31X	PHJ36100GU31X	PHL36100GU31X
150			PHD36150GU31X	PHG36150GU31X	PHJ36150GU31X	PHL36150GU31X
250			PJD36250GU31X	PJG36250GU31X	PJJ36250GU31X	PJL36250GU31X
60	LSI	3.2 S	PHD36060GU33X	PHG36060GU33X	PHJ36060GU33X	PHL36060GU33X
100			PHD36100GU33X	PHG36100GU33X	PHJ36100GU33X	PHL36100GU33X
150			PHD36150GU33X	PHG36150GU33X	PHJ36150GU33X	PHL36150GU33X
250			PJD36250GU33X	PJG36250GU33X	PJJ36250GU33X	PJL36250GU33X
Micrologic Ammeter Trip Unit						
3Ø3W + G, 600 Vac 50/60 Hz						
60	LSI	5.2 A	PHD36060GU43X	PHG36060GU43X	PHJ36060GU43X	PHL36060GU43X
100			PHD36100GU43X	PHG36100GU43X	PHJ36100GU43X	PHL36100GU43X
150			PHD36150GU43X	PHG36150GU43X	PHJ36150GU43X	PHL36150GU43X
250			PJD36250GU43X	PJG36250GU43X	PJJ36250GU43X	PJL36250GU43X
Micrologic Energymeter Trip Unit						
3Ø3W + G, 600 Vac 50/60 Hz						
60	LSI	5.2 E	PHD36060GU53X	PHG36060GU53X	PHJ36060GU53X	PHL36060GU53X
100			PHD36100GU53X	PHG36100GU53X	PHJ36100GU53X	PHL36100GU53X
150			PHD36150GU53X	PHG36150GU53X	PHJ36150GU53X	PHL36150GU53X
250			PJD36250GU53X	PJG36250GU53X	PJJ36250GU53X	PJL36250GU53X

Table 12.34: H- and J-Frame Circuit Breaker Plug-in Units with Electronic Trip—Standard (80%) Rated—3Ø4W

Trip Rating Ampere	Trip Function [15]	Trip Unit [16]	D Interrupting	G Interrupting	J Interrupting	L Interrupting
			Catalog Number[17][18][19]	Catalog Number[17][18][19]	Catalog Number[17][18][19]	Catalog Number[17][18][19]
Micrologic Standard Trip Unit						
3Ø4W + G, 600 Vac 50/60 Hz						
60	LI	3.2	PHD36060GNU31X	PHG36060GNU31X	PHJ36060GNU31X	PHL36060GNU31X
100			PHD36100GNU31X	PHG36100GNU31X	PHJ36100GNU31X	PHL36100GNU31X
150			PHD36150GNU31X	PHG36150GNU31X	PHJ36150GNU31X	PHL36150GNU31X
250			PJD36250GNU31X	PJG36250GNU31X	PJJ36250GNU31X	PJL36250GNU31X
60	LSI	3.2 S	PHD36060GNU33X	PHG36060GNU33X	PHJ36060GNU33X	PHL36060GNU33X
100			PHD36100GNU33X	PHG36100GNU33X	PHJ36100GNU33X	PHL36100GNU33X
150			PHD36150GNU33X	PHG36150GNU33X	PHJ36150GNU33X	PHL36150GNU33X
250			PJD36250GNU33X	PJG36250GNU33X	PJJ36250GNU33X	PJL36250GNU33X
Micrologic Ammeter Trip Unit						
3Ø4W + G, 600 Vac 50/60 Hz						
60	LSI	5.2 A	PHD36060GNU43X	PHG36060GNU43X	PHJ36060GNU43X	PHL36060GNU43X
100			PHD36100GNU43X	PHG36100GNU43X	PHJ36100GNU43X	PHL36100GNU43X
150			PHD36150GNU43X	PHG36150GNU43X	PHJ36150GNU43X	PHL36150GNU43X
250			PJD36250GNU43X	PJG36250GNU43X	PJJ36250GNU43X	PJL36250GNU43X
60	LSIG	6.2 A	PHD36060GNU44X	PHG36060GNU44X	PHJ36060GNU44X	PHL36060GNU44X
100			PHD36100GNU44X	PHG36100GNU44X	PHJ36100GNU44X	PHL36100GNU44X
150			PHD36150GNU44X	PHG36150GNU44X	PHJ36150GNU44X	PHL36150GNU44X
250			PJD36250GNU44X	PJG36250GNU44X	PJJ36250GNU44X	PJL36250GNU44X
Micrologic Energymeter Trip Unit						
3Ø4W + G, 600 Vac 50/60 Hz						
60	LSI	5.2 E	PHD36060GNU53X	PHG36060GNU53X	PHJ36060GNU53X	PHL36060GNU53X
100			PHD36100GNU53X	PHG36100GNU53X	PHJ36100GNU53X	PHL36100GNU53X
150			PHD36150GNU53X	PHG36150GNU53X	PHJ36150GNU53X	PHL36150GNU53X
250			PJD36250GNU53X	PJG36250GNU53X	PJJ36250GNU53X	PJL36250GNU53X
60	LSIG	6.2 E	PHD36060GNU54X	PHG36060GNU54X	PHJ36060GNU54X	PHL36060GNU54X
100			PHD36100GNU54X	PHG36100GNU54X	PHJ36100GNU54X	PHL36100GNU54X
150			PHD36150GNU54X	PHG36150GNU54X	PHJ36150GNU54X	PHL36150GNU54X
250			PJD36250GNU54X	PJG36250GNU54X	PJJ36250GNU54X	PJL36250GNU54X

[15] If alternate trip functions are required, contact your local Schneider Electric field office for pricing.
[16] For Trip Unit information, refer to Micrologic Trip Units, page 7-63.
[17] For communication capabilities, add the communication suffix as shown in Communication Suffix, page . The communication package will be configured based on the system voltage specified by the communication suffix.
[18] For availability on 100% rated, see **5600CT9101**.
[19] For IP54 splash resistant construction, add an "M54" suffix.

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Table 12.35: L-Frame Circuit Breaker Plug-in Units with Electronic Trip—Standard (80%) Rated—3Ø3W

Trip Rating Ampere	Trip Function[20]	Trip Unit[21]	D Interrupting Catalog Number[22][23][24][25]	G Interrupting Catalog Number[22][23][24][25]	J Interrupting Catalog Number[22][23][24][25]	L Interrupting Catalog Number[22][23][24][25]	R Interrupting Catalog Number[22][23][24][25]
Micrologic Standard Trip Unit							
3Ø3W + G, 600 Vac 50/60 Hz							
250	LI	3.3	PBLD36250GU31X	PBLG36250GU31X	PBLJ36250GU31X	PBLL36250GU31X	PBLR36250GU31X
400			PBLD36400GU31X	PBLG36400GU31X	PBLJ36400GU31X	PBLL36400GU31X	PBLR36400GU31X
600			PBLD36600GU31X	PBLG36600GU31X	PBLJ36600GU31X	PBLL36600GU31X	PBLR36600GU31X
250	LSI	3.3 S	PBLD36250GU33X	PBLG36250GU33X	PBLJ36250GU33X	PBLL36250GU33X	PBLR36250GU33X
400			PBLD36400GU33X	PBLG36400GU33X	PBLJ36400GU33X	PBLL36400GU33X	PBLR36400GU33X
600			PBLD36600GU33X	PBLG36600GU33X	PBLJ36600GU33X	PBLL36600GU33X	PBLR36600GU33X
Micrologic Ammeter Trip Unit							
3Ø3W + G, 600 Vac 50/60 Hz							
400	LSI	5.3 A	PBLD36400GU43X	PBLG36400GU43X	PBLJ36400GU43X	PBLL36400GU43X	PBLR36400GU43X
600			PBLD36600GU43X	PBLG36600GU43X	PBLJ36600GU43X	PBLL36600GU43X	PBLR36600GU43X
Micrologic Energymeter Trip Unit							
3Ø3W + G, 600 Vac 50/60 Hz							
400	LSI	5.3 E	PBLD36400GU53X	PBLG36400GU53X	PBLJ36400GU53X	PBLL36400GU53X	PBLR36400GU53X
600			PBLD36600GU53X	PBLG36600GU53X	PBLJ36600GU53X	PBLL36600GU53X	PBLR36600GU53X

Table 12.36: L-Frame Circuit Breaker Plug-in Units with Electronic Trip—Standard (80%) Rated—3Ø4W

Trip Rating Ampere	Trip Function[20]	Trip Unit[21]	D Interrupting Catalog Number[22][23][24][25]	G Interrupting Catalog Number[22][23][24][25]	J Interrupting Catalog Number[22][23][24][25]	L Interrupting Catalog Number[22][23][24][25]	R Interrupting Catalog Number[22][23][24][25]
Micrologic Standard Trip Unit							
3Ø4W + G, 600 Vac 50/60 Hz							
250	LI	3.3	PBLD36250GNU31X	PBLG36250GNU31X	PBLJ36250GNU31X	PBLL36250GNU31X	PBLR36250GNU31X
400			PBLD36400GNU31X	PBLG36400GNU31X	PBLJ36400GNU31X	PBLL36400GNU31X	PBLR36400GNU31X
600			PBLD36600GNU31X	PBLG36600GNU31X	PBLJ36600GNU31X	PBLL36600GNU31X	PBLR36600GNU31X
250	LSI	3.3 S	PBLD36250GNU33X	PBLG36250GNU33X	PBLJ36250GNU33X	PBLL36250GNU33X	PBLR36250GNU33X
400			PBLD36400GNU33X	PBLG36400GNU33X	PBLJ36400GNU33X	PBLL36400GNU33X	PBLR36400GNU33X
600			PBLD36600GNU33X	PBLG36600GNU33X	PBLJ36600GNU33X	PBLL36600GNU33X	PBLR36600GNU33X
Micrologic Ammeter Trip Unit							
3Ø4W + G, 600 Vac 50/60 Hz							
400	LSI	5.3 A	PBLD36400GNU43X	PBLG36400GNU43X	PBLJ36400GNU43X	PBLL36400GNU43X	PBLR36400GNU43X
600			PBLD36600GNU43X	PBLG36600GNU43X	PBLJ36600GNU43X	PBLL36600GNU43X	PBLR36600GNU43X
400	LSIG	6.3 A	PBLD36400GNU44X	PBLG36400GNU44X	PBLJ36400GNU44X	PBLL36400GNU44X	PBLR36400GNU44X
600			PBLD36600GNU44X	PBLG36600GNU44X	PBLJ36600GNU44X	PBLL36600GNU44X	PBLR36600GNU44X
Micrologic Energymeter Trip Unit							
3Ø4W + G, 600 Vac 50/60 Hz							
400	LSI	5.3 E	PBLD36400GNU53X	PBLG36400GNU53X	PBLJ36400GNU53X	PBLL36400GNU53X	PBLR36400GNU53X
600			PBLD36600GNU53X	PBLG36600GNU53X	PBLJ36600GNU53X	PBLL36600GNU53X	PBLR36600GNU53X
400	LSIG	6.3 E	PBLD36400GNU54X	PBLG36400GNU54X	PBLJ36400GNU54X	PBLL36400GNU54X	PBLR36400GNU54X
600			PBLD36600GNU54X	PBLG36600GNU54X	PBLJ36600GNU54X	PBLL36600GNU54X	PBLR36600GNU54X

[20] If alternate trip functions are required, contact your local Schneider Electric field office for pricing.

[21] For Trip Unit information, refer to Micrologic Trip Units, page 7-63.

[22] For communication capabilities, add the communication suffix as shown in Communication Suffix, page . The communication package will be configured based on the system voltage specified by the communication suffix.

[23] For availability on 100% rated, see **5600CT9101**.

[24] For IP54 splash resistant construction, add an "M54" suffix.

[25] For vertical riser applications, order auxiliary mounting kit—Catalog Number PBQ4060RMK.

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New!

H- , J-, and L-Frame Plug-In Units with Electronic Trip and Communication

Hardware communication packages are now available on Powerpact H-, J-, and L-Frame Plug-in Units with Electronic Trip. These hardware communication packages will provide you the capability to access and monitor circuit breaker data from these plug-in units. The packages are available in Modbus and Ethernet.

Add the appropriate communication system voltage suffix to the end of the associated H-, J-, or L-Frame breaker with electronic trip, for example: PHD36060GNU31X**IFE4**.

Table 12.37: Communication Suffix*[26]*

System Voltage	Communication	Communication Type Suffix	System Voltage Suffix
Up to 480Y/277 V	Ethernet	IFE	4
	Modbus	IFM	
480 V only	Ethernet	IFE	5
	Modbus	IFM	
600Y/347 V, 600 V	Ethernet	IFE	6
	Modbus	IFM	

M-Frame Plug-In Units

Table 12.38: M-Frame Circuit Breaker Plug-in Units with Basic Electronic Trip Unit (ET 1.0)—3Ø3W*[27][28]*

Trip Rating Ampere	G Interrupting	J Interrupting
	Catalog Number*[29]*	Catalog Number*[29]*
3Ø3W + G, 600 Vac 50/60 Hz		
300	PTMG36300G( )	PTMJ36300G( )
350	PTMG36350G( )	PTMJ36350G( )
400	PTMG36400G( )	PTMJ36400G( )
450	PTMG36450G( )	PTMJ36450G( )
500	PTMG36500G( )	PTMJ36500G( )
600	PTMG36600G( )	PTMJ36600G( )
700	PTMG36700G( )	PTMJ36700G( )
800	PTMG36800G( )	PTMJ36800G( )

Table 12.39: M-Frame Circuit Breaker Plug-in Units with Basic Electronic Trip Unit (ET 1.0)—3Ø4W*[27][28]*

Trip Rating Ampere	G Interrupting	J Interrupting
	Catalog Number*[29]*	Catalog Number*[29]*
3Ø4W + G, 600 Vac 50/60 Hz		
300	PTMG36300GN( )	PTMJ36300GN( )
350	PTMG36350GN( )	PTMJ36350GN( )
400	PTMG36400GN( )	PTMJ36400GN( )
450	PTMG36450GN( )	PTMJ36450GN( )
500	PTMG36500GN( )	PTMJ36500GN( )
600	PTMG36600GN( )	PTMJ36600GN( )
700	PTMG36700GN( )	PTMJ36700GN( )
800	PTMG36800GN( )	PTMJ36800GN( )

[26] Communication packages are housed in a separate enclosure mounted adjacent to the plug-in units.
[27] The ET 1.0 trip unit cannot be field replaced or have the long-time trip point setting adjusted.
[28] All these devices use bolt-on connection. It may be used only on busway with same number of poles. Not for use on 800 A copper busway. To complete the catalog number, replace the blank with an “H” for horizontal applications and “V” for vertical applications.
[29] For IP54 splash resistant construction, add an "M54" suffix.

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P-Frame Plug-In Units

Table 12.40: P-Frame Circuit Breaker Plug-in Units—3Ø3W*[30]*

Trip Rating Ampere	Trip Function*[31]*	Trip Unit*[32]*	Interrupting Rating	
			G	J
			Catalog Number*[33][34][35][36]*	Catalog Number*[33][34][35][36]*
Micrologic Standard Trip Unit				
3Ø3W + G, 600 Vac 50/60 Hz				
400	LI	3.0	PTPG36040G( )U31A	PTPJ36040G( )U31A
600			PTPG36060G( )U31A	PTPJ36060G( )U31A
800			PTPG36080G( )U31A	PTPJ36080G( )U31A
1000			PTPG36100G( )U31A	PTPJ36100G( )U31A
1200			PTPG36120G( )U31A	PTPJ36120G( )U31A
400	LSI	5.0	PTPG36040G( )U33A	PTPJ36040G( )U33A
600			PTPG36060G( )U33A	PTPJ36060G( )U33A
800			PTPG36080G( )U33A	PTPJ36080G( )U33A
1000			PTPG36100G( )U33A	PTPJ36100G( )U33A
1200			PTPG36120G( )U33A	PTPJ36120G( )U33A
Micrologic Ammeter Trip Unit				
3Ø3W + G, 600 Vac 50/60 Hz				
400	LI	3.0 A	PTPG36040G( )U41A	PTPJ36040G( )U41A
600			PTPG36060G( )U41A	PTPJ36060G( )U41A
800			PTPG36080G( )U41A	PTPJ36080G( )U41A
1000			PTPG36100G( )U41A	PTPJ36100G( )U41A
1200			PTPG36120G( )U41A	PTPJ36120G( )U41A
400	LSI	5.0 A	PTPG36040G( )U43A	PTPJ36040G( )U43A
600			PTPG36060G( )U43A	PTPJ36060G( )U43A
800			PTPG36080G( )U43A	PTPJ36080G( )U43A
1000			PTPG36100G( )U43A	PTPJ36100G( )U43A
1200			PTPG36120G( )U43A	PTPJ36120G( )U43A
400	LSIG	6.0 A	PTPG36040G( )U44A	PTPJ36040G( )U44A
600			PTPG36060G( )U44A	PTPJ36060G( )U44A
800			PTPG36080G( )U44A	PTPJ36080G( )U44A
1000			PTPG36100G( )U44A	PTPJ36100G( )U44A
1200			PTPG36120G( )U44A	PTPJ36120G( )U44A

Table 12.41: P-Frame Circuit Breaker Plug-in Units—3Ø4W

Trip Rating Ampere	Trip Function	Trip Unit	Interrupting Rating	
			G	J
			Catalog Number*[33][34][35]*	Catalog Number*[33][34][35]*
Micrologic Standard Trip Unit				
3Ø4W + G, 600 Vac 50/60 Hz				
400	LI	3.0	PTPG36040GN( )U31A	PTPJ36040GN( )U31A
600			PTPG36060GN( )U31A	PTPJ36060GN( )U31A
800			PTPG36080GN( )U31A	PTPJ36080GN( )U31A
1000			PTPG36100GN( )U31A	PTPJ36100GN( )U31A
1200			PTPG36120GN( )U31A	PTPJ36120GN( )U31A
400	LSI	5.0	PTPG36040GN( )U33A	PTPJ36040GN( )U33A
600			PTPG36060GN( )U33A	PTPJ36060GN( )U33A
800			PTPG36080GN( )U33A	PTPJ36080GN( )U33A
1000			PTPG36100GN( )U33A	PTPJ36100GN( )U33A
1200			PTPG36120GN( )U33A	PTPJ36120GN( )U33A
Micrologic Ammeter Trip Unit				
3Ø4W + G, 600 Vac 50/60 Hz				
400	LI	3.0 A	PTPG36040GN( )U41A	PTPJ36040GN( )U41A
600			PTPG36060GN( )U41A	PTPJ36060GN( )U41A
800			PTPG36080GN( )U41A	PTPJ36080GN( )U41A
1000			PTPG36100GN( )U41A	PTPJ36100GN( )U41A
1200			PTPG36120GN( )U41A	PTPJ36120GN( )U41A
400	LSI	5.0 A	PTPG36040GN( )U43A	PTPJ36040GN( )U43A
600			PTPG36060GN( )U43A	PTPJ36060GN( )U43A
800			PTPG36080GN( )U43A	PTPJ36080GN( )U43A
1000			PTPG36100GN( )U43A	PTPJ36100GN( )U43A
1200			PTPG36120GN( )U43A	PTPJ36120GN( )U43A
400	LSIG	6.0 A	PTPG36040GN( )U44A	PTPJ36040GN( )U44A
600			PTPG36060GN( )U44A	PTPJ36060GN( )U44A
800			PTPG36080GN( )U44A	PTPJ36080GN( )U44A
1000			PTPG36100GN( )U44A	PTPJ36100GN( )U44A
1200			PTPG36120GN( )U44A	PTPJ36120GN( )U44A

[30] The 250 A is available as a special device. Contact your local Schneider Electric field office for ordering information.
[31] If alternate trip functions are required, contact your local Schneider Electric field office for pricing.
[32] For Trip Unit information, refer to Micrologic Trip Units, page 7-63.
[33] Listed catalog numbers are for 80% rated circuit breakers. For 100% rated circuit breakers, replace the blank with an “HC” for horizontal applications and “VC” for vertical applications. For example, the catalog number for a 100% standard trip unit with standard LI trip functions at 800 A 3Ø3W for a horizontal application would be PTPG36080GHCU31A.
[34] The standard rating plug supplied with a trip unit will be the "A" rating plug. To specify an alternative rating plug, replace the "A" at the end of the catalog number with the applicable suffix letter. See Table 7.134 Rating Plugs, page 7-67 for rating plug catalog suffix letters.
[35] All these devices use bolt-on connection. It may be used only on busway with same number of poles. Not for use on 800 A copper busway. To complete the catalog number, replace the blank with an “H” for horizontal applications and “V” for vertical applications.
[36] For IP54 splash resistant construction, add an "M54" suffix.

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R-Frame Plug-In Units

Table 12.42: R-Frame Circuit Breaker Plug-in Units—3Ø3W[37]

Trip Rating Ampere	Trip Function	Trip Unit	Interrupting Rating		
			G	J	L
			Catalog Number[38][39][40][41]	Catalog Number[38][39][40][41]	Catalog Number[38][39][40][41]
Micrologic Standard Trip Unit					
3Ø3W + G, 600 Vac 50/60 Hz					
800	LI	3.0	PTRG36080G( )U31A	PTRJ36080G( )U31A	PTRL36080G( )U31A
1000			PTRG36100G( )U31A	PTRJ36100G( )U31A	PTRL36100G( )U31A
1200			PTRG36120G( )U31A	PTRJ36120G( )U31A	PTRL36120G( )U31A
1600			PTRG36160G( )U31A	PTRJ36160G( )U31A	PTRL36160G( )U31A
800	LSI	5.0	PTRG36080G( )U33A	PTRJ36080G( )U33A	PTRL36080G( )U33A
1000			PTRG36100G( )U33A	PTRJ36100G( )U33A	PTRL36100G( )U33A
1200			PTRG36120G( )U33A	PTRJ36120G( )U33A	PTRL36120G( )U33A
1600			PTRG36160G( )U33A	PTRJ36160G( )U33A	PTRL36160G( )U33A
Micrologic Ammeter Trip Unit					
3Ø3W + G, 600 Vac 50/60 Hz					
800	LI	3.0 A	PTRG36080G( )U41A	PTRJ36080G( )U41A	PTRL36080G( )U41A
1000			PTRG36100G( )U41A	PTRJ36100G( )U41A	PTRL36100G( )U41A
1200			PTRG36120G( )U41A	PTRJ36120G( )U41A	PTRL36120G( )U41A
1600			PTRG36160G( )U41A	PTRJ36160G( )U41A	PTRL36160G( )U41A
800	LSI	5.0 A	PTRG36080G( )U43A	PTRJ36080G( )U43A	PTRL36080G( )U43A
1000			PTRG36100G( )U43A	PTRJ36100G( )U43A	PTRL36100G( )U43A
1200			PTRG36120G( )U43A	PTRJ36120G( )U43A	PTRL36120G( )U43A
1600			PTRG36160G( )U43A	PTRJ36160G( )U43A	PTRL36160G( )U43A
800	LSIG	6.0 A	PTRG36080G( )U44A	PTRJ36080G( )U44A	PTRL36080G( )U44A
1000			PTRG36100G( )U44A	PTRJ36100G( )U44A	PTRL36100G( )U44A
1200			PTRG36120G( )U44A	PTRJ36120G( )U44A	PTRL36120G( )U44A
1600			PTRG36160G( )U44A	PTRJ36160G( )U44A	PTRL36160G( )U44A

Table 12.43: R-Frame Circuit Breaker Plug-in Units—3Ø4W[37]

Trip Rating Ampere	Trip Function	Trip Unit	Interrupting Rating		
			G	J	L
			Catalog Number[38][39][40][41]	Catalog Number[38][39][40][41]	Catalog Number[38][39][40][41]
Micrologic Standard Trip Unit					
3Ø4W + G, 277/480 Vac (600 Vac Max.) 50/60 Hz					
800	LI	3.0	PTRG36080GN( )U31A	PTRJ36080GN( )U31A	PTRL36080GN( )U31A
1000			PTRG36100GN( )U31A	PTRJ36100GN( )U31A	PTRL36100GN( )U31A
1200			PTRG36120GN( )U31A	PTRJ36120GN( )U31A	PTRL36120GN( )U31A
1600			PTRG36160GN( )U31A	PTRJ36160GN( )U31A	PTRL36160GN( )U31A
800	LSI	5.0	PTRG36080GN( )U33A	PTRJ36080GN( )U33A	PTRL36080GN( )U33A
1000			PTRG36100GN( )U33A	PTRJ36100GN( )U33A	PTRL36100GN( )U33A
1200			PTRG36120GN( )U33A	PTRJ36120GN( )U33A	PTRL36120GN( )U33A
1600			PTRG36160GN( )U33A	PTRJ36160GN( )U33A	PTRL36160GN( )U33A
Micrologic Ammeter Trip Unit					
3Ø4W + G, 277/480 Vac (600 Vac Max.) 50/60 Hz					
800	LI	3.0 A	PTRG36080GN( )U41A	PTRJ36080GN( )U41A	PTRL36080GN( )U41A
1000			PTRG36100GN( )U41A	PTRJ36100GN( )U41A	PTRL36100GN( )U41A
1200			PTRG36120GN( )U41A	PTRJ36120GN( )U41A	PTRL36120GN( )U41A
1600			PTRG36160GN( )U41A	PTRJ36160GN( )U41A	PTRL36160GN( )U41A
800	LSI	5.0 A	PTRG36080GN( )U43A	PTRJ36080GN( )U43A	PTRL36080GN( )U43A
1000			PTRG36100GN( )U43A	PTRJ36100GN( )U43A	PTRL36100GN( )U43A
1200			PTRG36120GN( )U43A	PTRJ36120GN( )U43A	PTRL36120GN( )U43A
1600			PTRG36160GN( )U43A	PTRJ36160GN( )U43A	PTRL36160GN( )U43A
800	LSIG	6.0 A	PTRG36080GN( )U44A	PTRJ36080GN( )U44A	PTRL36080GN( )U44A
1000			PTRG36100GN( )U44A	PTRJ36100GN( )U44A	PTRL36100GN( )U44A
1200			PTRG36120GN( )U44A	PTRJ36120GN( )U44A	PTRL36120GN( )U44A
1600			PTRG36160GN( )U44A	PTRJ36160GN( )U44A	PTRL36160GN( )U44A

[37] The 600 A is available as a special device. Contact your local Schneider Electric field office for ordering information.
[38] Listed catalog numbers are for 80% rated circuit breakers. For 100% rated circuit breakers, replace the blank with an “HC” for horizontal applications and “VC” for vertical applications. For example, the catalog number for a 100% standard trip unit with standard LI trip functions at 800 A 3Ø3W for a horizontal application would be PTPG36080GHCU31A.
[39] The standard rating plug supplied with a trip unit will be the "A" rating plug. To specify an alternative rating plug, replace the "A" at the end of the catalog number with the applicable suffix letter. See Table 7.134 Rating Plugs, page 7-67 for rating plug catalog suffix letters.
[40] All these devices use bolt-on connection. It may be used only on busway with same number of poles. Not for use on 800 A copper busway. To complete the catalog number, replace the blank with an “H” for horizontal applications and “V” for vertical applications.
[41] For IP54 splash resistant construction, add an "M54" suffix.

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Non-Segregated Bus

- Non-segregated phase bus
- 600 V through 15 kV (1200 A–6000 A)
- Aluminum, steel or stainless steel housing
- Aluminum or copper bus bars
- Insulated with fluidized bed epoxy (5 kV–15 kV)
- Complete line of fittings provides for any configuration
- Indoor trapeze and outdoor column supports
- For use in utilities, industrial and commercial facilities

Power-Zone bus is custom designed, manufactured and tested per ANSI C37.23 standards to meet customer specifications. The 600 V product is also UL Listed. It is a completely coordinated package of equipment with all the auxiliary material and supports for connecting transformers, switchgear, MCCs, and motors, in all types of utility, industrial, and commercial facilities.

Bus Options

Some available options are special momentary rating, special housing material and/or finish, special conductor supports, heaters and thermostats, and ground bus.

Weatherproof Bus

All weatherproof runs must be equipped with strip heaters to eliminate condensation and, if applicable, a thermostat. A heater should be used for every seven (7) foot of bus and no more than 20 heaters can be controlled by one thermostat. Also, each bus run should have its own thermostat. The heaters are rated 240 V, 500 watts and operate at 120 V, 125 watts.

Flanged Ends

A flanged end is used to terminate the bus into switchgear, motor control centers, switchboards, or any rigid bus-to-bus connection. It consists of a gasketed equipment flange, up to 1'-0" of 3Ø3W conductor (3Ø4W as applicable), necessary insulation tapes, and required bolting hardware.

Cable Tap Box

A cable tap box includes a gasketed and accessible termination box, lugs, necessary insulation tape (between bus and lugs only), and required bolting hardware. Lug sizes and quantity should be specified by purchaser.

Transformer/Generator Connection

This type of termination should be used whenever the bus is connecting to a transformer, generator, motor, switch or any connection where the bus bars are connecting to porcelain mounted equipment terminals. It will include the same components as a flanged end plus one set of flexible braid type connectors and a terminal box (if required).

Bushing Box (Weatherhead)

A bushing box is used on service entrance run where the cable connection to the bus must be made via porcelain bushings. It is comprised of the same components as a transformer connection plus 3 through stud type apparatus bushings, bushing stud connectors (lug pads) and a strip heater.

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Ground Bus

The bus housing is designed and constructed to provide an electrically continuous ground path. The side rails of the bus housings are capable of carrying the full rated phase current continuously and, under short circuit conditions, are capable of carrying up to 60 kA RMS asymmetrical fault current for 3 seconds. Consequently, a separate ground bus is not necessary unless specified.

Wall Entrance Seal

A wall entrance seal consists of a wall throat, wall flange (one side of wall only), and a barrier which prevents air or vapor from passing from one room to another or from outdoors to indoors. It also carries a 1/2 hour fire rating. Consult factory for higher fire ratings.

Table 12.44: Wall Flange

Description
Optional (in addition to wall entrance seal) Aluminum 14 Gauge Steel 14 Gauge 304 Stainless Steel 14 Gauge 316 Stainless Steel

Equipment Entrance Seal

An equipment entrance seal should be used whenever a barrier is required to prevent the passing of flame and/or gasses between the bus housing and the terminating equipment.

Expansion Fittings

An expansion fitting is used to counteract the strain placed on the bus due to the expansion and contraction of the building or the bus itself. One should be used whenever the bus run crosses a building expansion joint and whenever a straight run of bus exceeds 60 feet.

Flexible Housing (Misalignment) Collar

Required at terminations or wall penetrations when vibrations due to seismic forces may cause damage to the bus. It may also be used to adjust for the “settling” of terminating equipment after installation.

Supporting Steel (Hangers)

Supports should be added on the basis of one for every 10 ft. for indoor and one for every 12 ft. for outdoor. Indoor supports are a trapeze type hanger while outdoor supports are a single or double column type support. Consult factory for other type supports.

Table 12.45: Hangers/Supports

Support Description	Maximum Height Options
Indoor Trapeze Hanger	—
Outdoor, Single Column Support	12 feet
Outdoor, Double Column Support	22 feet

Hazardous or Seismic Locations

Consult factory for bus runs which are to be installed in a location which is classified as hazardous or in a seismic location.

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Standard Construction

Standard construction is as follows:

- Conductor (plating): Copper (silver) or Aluminum (tin)
- Conductor Insulation (5 kV and 15 kV only): epoxy
- Conductor Supports: Glass reinforced polyester blocks
- Housing Material: Extruded Aluminum (1/8-inch Nominal)
- Housing Construction: Totally Enclosed Non-ventilated
- Joint Insulation: EPR and PVC tape
- BIL Rating: 25 kV (600 V), 60 kV (5 kV) and 95 kV (15 kV)
- Momentary (Short Circuit) Rating: 75 kA (600 V) and 60 kA (5 kV, 15 kV)
- Ground Conductor: Housing (100% rated)

Table 12.46: Bus Enclosures

Material and Finish
Painted Aluminum (1/8” Nominal)
Painted 14 Gauge Steel
Painted 11 Gauge Steel
Unpainted 14 Gauge 304 Stainless Steel
Unpainted 14 Gauge 316 Stainless Steel

Table 12.47: Momentary (Asymmetrical Short Circuit) Ratings

Voltage Class	Ampere Options
600 V	75 KA 100 KA 150 KA
5 kV	60 KA 80 KA 100 KA
15 kV	60 KA 80 KA 100 KA 150 KA

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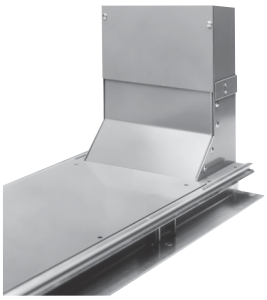
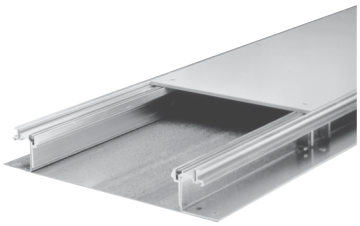
Section 13

Wire Management

Wireway



Wall Duct



Trench Duct

Wireway 13-2

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- Oiltight—NEMA Type 12 13-3
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Wall Duct 13-4

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Trench Duct 13-7

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Painted Hinge-Cover
Type LDB—ANSI 61 Gray
Polyester Powder Finish

General Purpose—NEMA Type 1

Standards

Square-Duct wireway is Underwriters Laboratories listed as steel enclosed wireway and auxiliary gutter. CSA listing is also available.

Sizes

2-1/2", 4", and 6" sizes are manufactured from 16 gauge steel. Straight lengths are available with or without knockouts. Knockouts are of various sizes in sides and bottom of wireway. 8", 10", and 12" sizes are made of 14 gauge steel and are furnished without knockouts.

Table 13.1: General Purpose (Connectors not supplied; order separately)*[1][2]*

Component	2-1/2" x 2-1/2"		4" x 4"		6" x 6"		8" x 8"	10" x 10"	12" x 12"*[3]*
	Catalog Number		Catalog Number		Catalog Number		Cat. No.	Cat. No.	Cat. No.
	With Knockouts	Without Knockouts	With Knockouts	Without Knockouts	With Knockouts	Without Knockouts	Without Knockouts	Without Knockouts	Without Knockouts
1' Length	LDB21KO	LDB21	LDB41KO	LDB41	LDB61KO	LDB61	LDB81	LDB101	LDB121
2' Length	LDB22KO	LDB22	LDB42KO	LDB42	LDB62KO	LDB62	LDB82	LDB102	LDB122
3' Length	LDB23KO	LDB23	LDB43KO	LDB43	LDB63KO	LDB63	LDB83	LDB103	LDB123
4' Length	LDB24KO	LDB24	LDB44KO	LDB44	LDB64KO	LDB64	LDB84	LDB104	LDB124
5' Length	LDB25KO	LDB25	LDB45KO	LDB45	LDB65KO	LDB65	LDB85	LDB105	LDB125
6' Length	—	—	LDB46KO	LDB46	LDB66KO	LDB66	LDB86	LDB106	—
10' Length	LDB210KO	LDB210	LDB410KO	LDB410	LDB610KO	LDB610	LDB810	LDB1010	LDB1210
90º L	—	LDB290L	—	LDB490L	—	LDB690L	LDB890L	LDB1090L	LDB1290L
90º Sweep L	—	LDB290LS	—	LDB490LS	—	LDB690LS	LDB890LS	LDB1090LS	LDB1290LS
45º L	—	LDB245L	—	LDB445L	—	LDB645L	LDB845L	LDB1045L	LDB1245L
Tee	—	LDB2T	—	LDB4T	—	LDB6T	LDB8T	LDB10T	LDB12T
Junction Box	—	LDB2J	—	LDB4J	—	LDB6J	LDB8J	LDB10J	LDB12J
Telescope Ftg.	—	LDB2TF	—	LDB4TF	—	LDB6TF	LDB8TF	LDB10TF	LDB12TF
Connector*[2]*	—	LDB2C	—	LDB4C	—	LDB6C	LDB8C	LDB10C	LDB12C
Drop/Brkt Hgr.	—	LDB2H	—	LDB4H	—	LDB6H	LDB8H	LDB10H	LDB12H
Support Hanger	—	LDB2SH	—	LDB4SH	—	LDB6SH	LDB8SH	LDB10SH	LDB12SH
Closing Plate	LDB2CPKO	LDB2CP	LDB4CPKO	LDB4CP	LDB6CPKO	LDB6CP	LDB8CP*[4]*	LDB10CP*[4]*	LDB12CP*[4]*
Panel Adapter	—	LDB2A	—	LDB4A	—	LDB6A	LDB8A	LDB10A	LDB12A
Open Adapter	—	LDB2OA	—	LDB4OA	—	LDB6OA	LDB8OA	LDB10OA	LDB12OA
Reducer	—	—	—	LDB42R	—	LDB64R	LDB86R	LDB108R	LDB1210R
	—	—	—	—	—	—	—	—	LDB128R
Adapter to "LD"*[5]*	—	LDB2GASK	—	LDB4GAS	—	LDB6GAS	LDB8GASK	LDB10GASK	—
Barrier Kit—5 ft. long w/hardware	—	—	—	LJB45B	—	LJB65B	LJB85B	—	—
5 pc. Barrier Pack—5 ft. long	—	—	—	LJB45BKM	—	LJB65BKM	—	—	—
5 pc. Barrier Bracket—2 compartment	—	—	—	LJB4BB2C	—	LJB6BB2C	—	—	—
5 pc. Barrier Bracket—3 compartment	—	—	—	LJB4BB3C	—	LJB6BB3C	—	—	—

[1] For wireway fill information, see NEC 376.
[2] Add connectors for all lengths and fittings, except closing plates, reducers, and adapters.
[3] Painted 12" x 12" wireway is not furnished with hinge-cover (screw-cover only).
[4] These closing plates also available with knockout. Add "KO" to cat #.
[5] Adapters to competitors' wireways also available. Contact your nearest Schneider Electric sales office for availability.

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Oiltight—NEMA Type 12

Type LJB Oiltight lay-in wireway is fully gasketed and used to protect runs of electrical wiring from oil, water, coolants, dirt, or dust as well as physical damage. This wireway is manufactured to exceed oiltight and NFPA standards for industrial control equipment. Lengths and fittings are made of 14 gauge steel with 10 gauge end flanges. Straight lengths and fittings have hinged covers with oil resistant gasket all around and are held closed with pull-down latches. All lengths and fittings are without knockouts. Type LJB lay-in Wireway is finished with ANSI-61 gray polyester powder finish over a corrosion resistant phosphate preparation. All Type LJB oiltight wireway is UL listed as steel enclosed wireway and auxiliary gutter. Conforms to NEMA Type 12.

Table 13.2: Type LJB Lay-in *[6]*

Description	2-1/2" x 2-1/2" Catalog No.	4" x 4" Catalog No.	6" x 6" Catalog No.	8" x 8" Catalog No.	12" x 6" Catalog No.
1" Nipple	LJB201	LJB401	LJB601	—	—
2" Nipple	LJB202	LJB402	LJB602	—	—
3" Nipple	LJB203	LJB403	LJB603	—	—
6" Length	LJB206	LJB406	LJB606	LJB806	LJB12606
1' Length	LJB21	LJB41	LJB61	LJB81	LJB1261
2' Length	LJB22	LJB42	LJB62	LJB82	LJB1262
3' Length	LJB23	LJB43	LJB63	LJB83	LJB1263
4' Length	LJB24	LJB44	LJB64	LJB84	LJB1264
5' Length	LJB25	LJB45	LJB65	LJB85	LJB1265
10' Length *[7]*	LJB210	LJB410	LJB610	LJB810	LJB12610
45º Top Opening	LJB245LT	LJB445LT	LJB645LT	LJB845LT	LJB12645LT
45º Inside Opening	LJB245LI	LJB445LI	LJB645LI	LJB845LI	—
45º Outside Opening	LJB245LO	LJB445LO	LJB645LO	LJB845LO	—
90º Inside Opening	LJB290LI	LJB490LI	LJB690LI	LJB890LI	LJB12690LI
90º Outside Opening	LJB290LO	LJB490LO	LJB690LO	LJB890LO	LJB12690LO
90º Outside Top Opening	—	LJB490LOT	LJB690LOT	LJB890LOT	—
90º Top Opening	LJB290LT	LJB490LT	LJB690LT	LJB890LT	LJB12690LT
Tee—Top Opening	LJB2TT	LJB4TT	LJB6TT	LJB8TT	LJB126TT
Tee—Outside Opening	LJB2TO	LJB4TO	LJB6TO	LJB8TO	—
Cross	LJB2X	LJB4X	LJB6X	LJB8X	LJB126X
Junction Box	LJB2JB	LJB4JB	LJB6JB	LJB8JB	—
Telescopic Fitting	LJB2TF	LJB4TF	LJB6TF	LJB8TF	LJB126TF
Closing Plate	LJB2CP	LJB4CP	LJB6CP	LJB8CP	LJB126CP
Panel Adapter	LJB2A	LJB4A	LJB6A	LJB8A	LJB126A
Bracket Hanger	LJB2BH	LJB4BH	LJB6BH	LJB8BH	—
Drop Hanger	LJB2DH	LJB4DH	LJB6DH	LJB8DH	—
Extra Connector Kit *[6]*	LJB2C	LJB4C	LJB6C	LJB8C	LJB126C
90º Connector	LJB290C	LJB490C	LJB690C	LJB890C	LJB12690C
Reducer to 2"	—	LJB42R	—	—	—
Reducer to 4"	—	—	LJB64R	—	LJB1264R
Reducer to 6"	—	—	—	LJB86R	LJB1266R
Cut-off fitting—not Lay-in	LJB2CF	LJB4CF	LJB6CF	LJB8CF	LJB126CF
Cut-off fitting—Lay-in	LJB2CFL	LJB4CFL	LJB6CFL	LJB8CFL	LJB126CFL
Transposition Fitting—CCW (Str)	LJB21CCW	LJB41CCW	LJB61CCW	—	—
Transposition Fitting—CW (Str)	LJB21CW	LJB41CW	LJB61CW	—	—
Transposition Elbow—CCW	LJB290LCCW	LJB490LCCW	LJB690LCCW	LJB890LCCW	—
Transposition Elbow—CW	LJB290LCW	LJB490LCW	LJB690LCW	LJB890LCW	—
Swivel fitting—Wireway to Wireway	LJB2S	LJB4S	LJB6S	LJB8S	—
Swivel fitting—Wireway to Box	LJB2SB	LJB4SB	LJB6SB	LJB8SB	—
Flex Fitting—Feed Through	LJB2FF	LJB4FF	LJB6FF	LJB8FF	—
Barrier Kit—5 ft. long w/hardware	—	LJB45B	LJB65B	LJB85B	LJB65B
5 pc. Barrier Pack—5 ft. long	—	LJB45BKM	LJB65BKM	—	—
5 pc. Barrier Bracket—2 compartment	—	LJB4BB2C	LJB6BB2C	—	—
5 pc. Barrier Bracket—3 compartment	—	LJB4BB3C	LJB6BB3C	—	—

[6] Connector kit furnished with each length and fitting.
[7] 10 foot straight lengths UL listed for up to 10 foot hanger spacing.

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Raintight Wireway—NEMA Type 3R

Outdoor raintight wireway is used to protect electrical wiring against rain, sleet, and physical damage. Unique drip shield cover protects wiring from weather and maintains the “lay-in” feature for ease of wiring installation. Lengths and fittings are constructed of 16 gauge galvanized steel with ANSI-61 gray polyester powder finish over a corrosion resistant phosphate preparation. Underwriters Laboratories Listed as steel enclosed wireway and auxiliary gutter *(horizontal mounting only)*. Conforms to NEMA Type 3R.

Table 13.3: Raintight Wireway

Description*[8]*	4" x 4" Catalog Number	6" x 6" Catalog Number	8" x 8" Catalog Number
1' Length	LDRB41M	LDRB61M	LDRB81M
5' Length	LDRB45M	LDRB65M	LDRB85M
10' Length	LDRB410M	LDRB610M	LDRB810M
90º L	LDRB490L	LDRB690L	LDRB890L
30º Sweep L	LDRB430SE	LDRB630SE	LDRB830SE
Tee	LDRB4T	LDRB6T	LDRB8T
Junction Box	LDRB4J	LDRB6J	LDRB8J
Panel Adapter	LDRB44A	LDRB66A	LDRB88A
Connector*[8]*	LDRB4C	LDRB6C	LDRB8C
Closing Plate	LDRB4CP	LDRB6CP	LDRB8CP
Drop Hanger	LDRB4DH	LDRB6DH	LDRB8DH
Wall Hanger	LDRB4WH	LDRB6WH	LDRB8WH
Reducer	—	LDRB64R	LDRB86R

Raintight Trough—NEMA Type 3R

Raintight trough is designed for ganging meter devices, panelboards, switches, and circuit breaker enclosures. Each length is a completely enclosed section with a removable cover that has provisions for sealing.

Design: 4” and 6” wireway is constructed of 16 gauge galvanized steel. 8”, 10”, and 12” wireway is constructed of 14 gauge galvanized steel. All raintight troughs conform to NEMA Type 3R.

Finish: ANSI-61 gray polyester powder finish over a corrosion resistant phosphate preparation. All raintight troughs are Underwriters Laboratories listed as steel enclosed wireway and auxiliary gutter *(horizontal mounting only)*.

Table 13.4: Raintight Trough

Length	4" x 4" Cat. No.	6" x 6" Cat. No.	8" x 8" Cat. No.	10" x 10" Cat. No.	12" x 12" Cat. No.
1'	RDB41	RDB61	—	—	—
2'	RDB42	RDB62	RDB82	RDB102	RDB122
3'	RDB43	RDB63	RDB83	RDB103	RDB123
4'	RDB44	RDB64	RDB84	—	—
5'	RDB45	RDB65	RDB85	RDB105	RDB125
6'	—	RDB66	RDB86	RDB106	RDB126

Typical Surface Mount, Straight-Length Wall Duct

Wall Duct General Description

UL Listed, File E65247, for Enclosure of Wiring to X-Ray Machines. Also available in aluminum for MRI application.

Wall duct is used as the continuation for standard trench duct in the floor. Wall duct can be routed up the wall and across the ceiling or under the finished floor (in ceiling space below) to provide a continuous lay-in raceway system from control consoles and floor equipment to overhead apparatus. Devices are furnished complete with covers and are available for either flush or surface mounted installations.

General Notes:

- Standard construction is 14 gauge steel with gray electrodeposition paint. Alternate construction is painted aluminum.
- Covers and coupling devices are furnished with each device.
- Wire retainers are furnished with each device.
- Straight lengths are field cut to length.
- Partitions and tunnels are to be field modified and installed where required.
- Hangers or other mounting devices to be furnished by others.

[8] Add connectors for all lengths and fittings.

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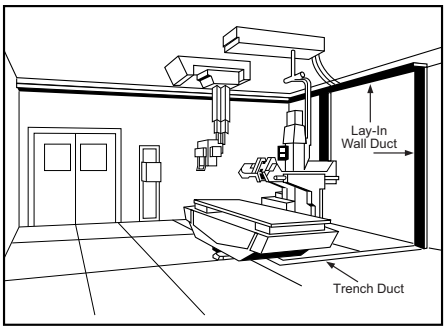
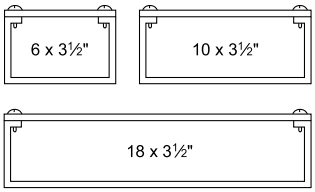
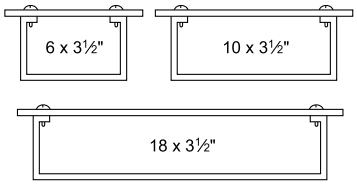


With SURFACE Covers (Matching Width)



With FLUSH Covers (2" Oversize)



Components and Accessories

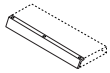
Horizontal Elbow

Edgewise Elbow

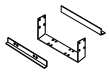
Tee

Cross

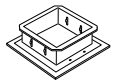
Flanged Cabinet Connector


Wall Duct Dust Cover

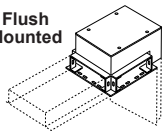
Sweep Edgewise Tee Kit


Edgewise Tee Kit

Reverse Edgewise Elbow


Ceiling Drop-out (Depth Adj. 4" to 7")

Sweep Edgewise Elbow Cabinet Connector


Flush Mounted

Surface Mounted

Sweep Edgewise Elbow

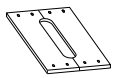
18" to 10" Reducer

Cabinet Connector

End Cap

Flush to Surface Adaptor

Floor Trench Vertical Elbow


Split Cover with Grommet

Sweep Wall Duct To Trench Duct Adaptor

Table 13.5: Lay-In Wall Duct Components *[1]*

Component	Flush Cover		Surface Cover	
	Catalog Number	Weight Lbs.	Catalog Number	Weight Lbs.
5'–0" Straight Length With Cover 6"W	RWT06S60	22.5	RWT06S60S	20.4
10"W	RWT10S60	39.2	RWT10S60S	36.4
18"W	RWT18S60	62.2	RWT18S60S	59.4
1'–6" Straight Length With Cover 6"W	RWT06S18	12.6	RWT06S18S	12.6
10"W	RWT10S18	16.4	RWT10S18S	16.3
18"W	RWT18S18	23.3	RWT18S18S	23.3
Horizontal Elbow With Cover—90° 6"W	RWT06HE	6.5	RWT06HES	6.0
10"W	RWT10HE	9.3	RWT10HES	8.1
18"W	RWT18HE	24.9	RWT18HES	23.7
Horizontal Elbow With Cover—45° 6"W	—	—	RWT06HE45S	6.0
10"W	—	—	RWT10HE45S	8.1
18"W	—	—	RWT18HE45S	23.7
Edgewise Elbow With Cover 6"W	RWT06EE	5.5	RWT06EES	5.5
10"W	RWT10EE	7.5	RWT10EES	7.4
18"W	RWT18EE	11.1	RWT18EES	11.0
Tee With Cover 6"W	RWT06TE	6.2	RWT06TES	5.9
10"W	RWT10TE	8.5	RWT10TES	7.3
18"W	RWT18TE	24.1	RWT18TES	22.9
Cross With Cover 10"W	RWT10XE	1.3	RWT10XES	6.2
18"W	RWT18XE	1.8	RWT18XES	21.8
Flanged Cabinet Connector With Cover 10"W	RWT10CUC	8.0	RWT10CUCS	7.8
Reverse Edgewise Elbow With Cover 6"W	RWT06REE	5.8	RWT06REES	5.7
10"W	RWT10REE	7.5	RWT10REES	7.4
18"W	RWT18REE	11.1	RWT18REES	11.0
Sweep Edgewise Elbow With Cover 6"W	—	10.0	RWT06SSEES	4.8
10"W	RWT10SFEE	12.0	RWT10SSEES	11.8
18"W	RWT18SFEE	16.5	RWT18SSEES	16.3
Sweep Edgewise Elbow Cabinet Connector 10"W	—	—	RWT10SWEECC	14.0
18"W	—	—	RWT18SWEECC	20.0

[1] All devices available in aluminum. Add "A" suffix to the catalog number.

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Wall Duct Accessories

Table 13.6: Lay-In Wall Duct Accessories *[2]*

Accessories	Catalog Number	Weight Lbs.
5'–0" Partition	RWTP60	5.4
Straight through tunnel for tees *[3]* 10"W 18"W	RWT10ST RWT18ST	2.9 3.8
90º Elbow tunnel for crosses *[3]* 10"W 18"W	RWT10ET RWT18ET	3.2 5.1
3 compartment tunnel for tees 10"W 18"W	RWT10PTE RWT18PTE	5.0 6.0
3 compartment tunnel for crosses 10"W 18"W	RWT10PXE RWT18PXE	8.0 9.0
Edgewise Tee Kit 10"W 18"W	RWT10ETK RWT18ETK	1.3 2.1
Sweep Edgewise Tee Kit 10"W 18"W	RWT10SWET RWT18SWET	8.0 8.0
Flush to Surface Adaptor 10"W 18"W	RWT10FS RWT18FS	11.9 16.4
Ceiling Drop-Out 12x12 Flush Cover 8"x8"	RWTCDO	15.0
Extra Coupling Device 10"W 18"W	RWT10COUP RWT18COUP	.4 .5
Extra Straight Cover—30" long (Order 2 pcs. for 5 ft. of duct.) Flush 10"W 18"W Surface 10"W 18"W	 RWT10SCOV RWT18SCOV RWT10SCOVS RWT18SCOVS	 7.2 13.0 6.1 11.8

Table 13.7: Wall Duct Accessories *[2]*

Accessories	Catalog Number	Weight Lbs.
Reducer Coupling— 18" to 10" 10" to 6"	RWTRC RWT06RC	2.1 1.6
Cabinet Connector 6"W 10"W 18"W	RWT06CC RWT10CC RWT18CC	1.0 1.3 2.4
End Cap 6"W 10"W 18"W	RWT06EC RWT10EC RWT18EC	1.0 1.3 1.8
Vertical Elbows for: 6" Trench to 6" Wall Duct 12" Trench to 10" Wall Duct 12" Trench to 18" Wall Duct 18" Trench to 10" Wall Duct 18" Trench to 18" Wall Duct	 RWT06FTVE06 RWT10FTVE12 RWT18FTVE12 RWT10FTVE18 RWT18FTVE18	 1.1 1.2 1.2 1.3
Sweep Trench Duct to Wall Duct Adapter (available in surface cover only) 12" Trench to 10" Wall Duct 18" Trench to 18" Wall Duct	 RWT10SWFTVE12 RWT18SWFTVE18	 10.0 14.0
Split Cover with Grommet 12" long–3"x 8" Opening Flush 6"W 10"W 18"W Surface 6"W 10"W 18"W	 RWT06ACP RWT10ACP RWT18ACP RWT06ACPS RWT10ACPS RWT18ACPS	 2.6 3.1 4.8 2.0 2.7 4.0
Dust Cover—5 ft. long	RWTDCOV60	5.5
Grommet—100 ft. roll	RWTBG100	

[2] All devices available in aluminum. Add "A" suffix to the catalog number.
[3] Tunnels form a 3" wide compartment.

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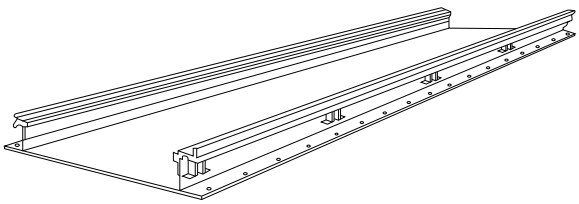
Trench Duct General Description

- STANDARD LENGTH of trench duct is 10 ft. Gasketed cover plates are ordered and shipped separately.
- FEATURES of trench duct:
  - Trench duct width is cover plate width.
  - Tub width is trench duct width less 1.8".
  - Overall width (bottom flange to flange) is 3" wider than trench duct width.
  - Standard depth is adjustable from 2-3/8" to 3-3/8". Also available as standard is depth adjustable from 3" to 4". To order, change “2” to “3”. Ex. RSV063100120. Applies to trench duct, elbows, crosses, tees, and reducers. Other depths available.
  - Tees, crosses, horizontal elbows, and reducers are shipped complete with cover plates assembled.
  - Grey vinyl tile trim is furnished as standard. Aluminum is available when requested.
  - All compartments over 17" wide must be supported with dividers or posts.



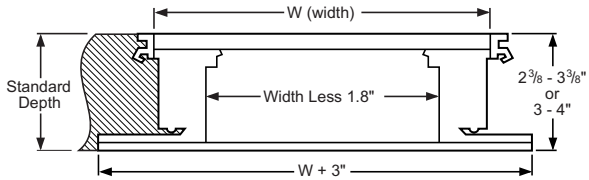
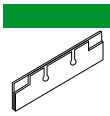
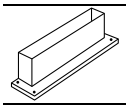
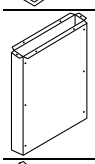
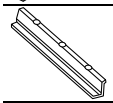


Table 13.8: Assembled Trench Duct

Straight Sections	Trench Duct		
	Length	Width	Catalog Number
Full Length	10'-0"	6"	RSV062100120
		9"	RSV092100120
		12"	RSV122100120
		18"	RSV182100120
		24"	RSV242100120
		30"	RSV302100120
	Covers Only (5 Plates per 10' Length) *[1]*		
	24"	6"	RCP0624
		9"	RCP0924
		12"	RCP1224
		18"	RCP1824
		24"	RCP2424
		30"	RCP3024
	12"	12"	RCP1212
		18"	RCP1812
Factory Cut-to-Length (12" Wide Only)	6'-0"L	12"	RSV122100072
	4'-3- 1/2"L	12"	RSV122100051.5
	3'-3- 1/2"L	12"	RSV122100039.5
	2'-0"L	12"	RSV122100024
	1'-0"L	12"	RSV122100012
	0'-3-1/2"L	12"	RSV122100003.5
	3–24" Long Covers *[2]* 2–24" Long Covers & 1 – Wall Duct Vertical Elbow *[2]* 1–24" & 1–12" Long Cover & 1—Wall Duct Vertical Elbow *[2]* 1–24" Long Cover *[2]* 1–12" Long Cover *[2]* 1–Wall Duct Vertical Elbow *[2]*		

Trench Duct Fittings

Table 13.9: Trench Duct Fittings

Item		Width *[3]*	Catalog No.
	End Closures *[4]*	6"	REC06
		9"	REC09
		12"	REC12
		18"	REC18
		24"	REC24
		30"	REC30
	Vertical Elbows	6"	RVE06
		9"	RVE09
		12"	RVE12
		18"	RVE18
		24"	RVE24
		30"	RVE30
	Riser and Cabinet Connector (Removable Front)	6"	RRC06
		9"	RRC09
		12"	RRC12
		18"	RRC18
		24"	RRC24
		30"	RRC30
	Z-Divider 5'-0" *[4]* Adjustable Barrier and Support Strip		RZD60

[1] Straight length cover plates are shipped separately and must be ORDERED SEPARATELY.
[2] Covers and/or vertical elbows for connecting trench duct to lay-in wall duct—ORDER SEPARATELY.
[3] All devices through 18" width are available in aluminum. Height is factory-set to customer specifications from 2-1/2 to 4 inches. (Non-Adjustable)
[4] For 3" to 4" trench duct, add a “3” to end of catalog number.

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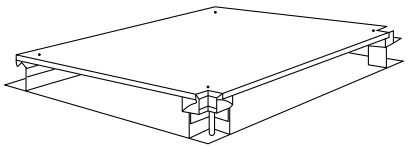
Table 13.9 Trench Duct Fittings (cont'd.)

Item	Width *[3]*	Catalog No.
Tape for Trench Duct (180 ft. rolls)		G1414
Marker for Cellular Floor		G1426



Tee

Table 13.10: Trench Duct Elbows, Tees, and Crosses

Item	Complete Device	
	Width	Catalog Number
90º Horizontal *[5]* Elbows	6" 9" 12" 18" 24" 30"	RHV062100009 RHV092100012 RHV122100015 RHV182100021 RHV242100027 RHV302100033
45º Horizontal Elbow *[5]*	12"	RHV12245
Tees *[5]*	6" 9" 12" 18" 24" 30"	RTV062100011 RTV092100014 RTV122100017 RTV182100023 RTV242100029 RTV302100035
Crosses *[5]*	6" 9" 12" 18" 24" 30"	RXV062100012 RXV092100015 RXV122100018 RXV182100024 RXV242100030 RXV302100036

Accessories and Components

Table 13.11: Trench Duct Accessories

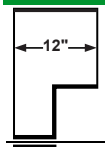
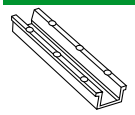
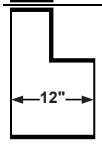
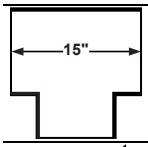
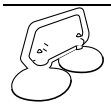
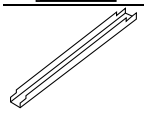
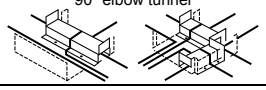
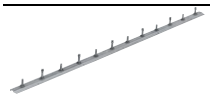
Item/Catalog Number			Item/Catalog Number		
	Right Hand Reducer 18" to 12" Cover Included	RRV182100012RR		U-Compartment 5'-0" Long x 3 -1/2" Wide with Adjustable Height Sides	RUC60
	Left Hand Reducer 18" to 12" Cover Included	RRV182100012LR	Leveling Legs	9" and 12" wide trench 18" and 24" wide trench 30" wide trench Support Channel Leveling Legs Not Included	G1500T12 G1500T24 G1500T36
				5/16 x 18 x 3"	G19103
	Reducing Tee 18" to 12" Cover Included	RTV182100017		Cover Lifter (Suction Cup Device)	G1735S
	Spacer Bar and Barrier Adjustment Gage	6" 9" 12" 18" 24" 30"	Tunnels for Trench Duct Elbows (Tee or Cross) Straight through tunnel 90° elbow tunnel 	90º tunnel for 12" trench 90º tunnel for 18" trench Straight tunnel for 12" trench Straight tunnel for 18" trench	RSV122ET RSV182ET RSV122ST RSV182ST
	Support Post Strips 5'	RSP60			

Table 13.12: Grommets

Grommet Material (50 ft. rolls)	RG50

[3] All devices through 18" width are available in aluminum. Height is factory-set to customer specifications from 2-1/2 to 4 inches. (Non-Adjustable)
[5] Includes cover; shipped attached. All coverplate corner notches are 1–1/2" deep.

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Section 14
Transformers

General Purpose Dry Type
600 Volts and Below

Type T and Type TF

Medium Voltage
Distribution Transformer

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General Purpose Dry Type 600 Volts and Below Overview

The Energy Policy and Conservation Act of 1975 (EPCA), update in the Energy Policy Act of 2005, authorized the Department of Energy (DOE) to evaluate and set minimum efficiency levels for Low Voltage Distribution Ttransformers. The DOE published a final rule prescribing new energy conservation standards for distribution transformers. 78 FR 23335 (April 18, 2013).

10 CFR 431.196: The efficiency of a low-voltage dry-type distribution transformer manufactured on or after January 1, 2016, shall be no less than that required for their kVA rating in the table below. Low-voltage dry-type distribution transformers with kVA ratings not appearing in the table shall have their minimum efficiency level determined by linear interpolation of the kVA and efficiency values immediately above and below that kVA rating. All efficiency values are at thirty-five percent of nameplate-rated load temperature corrected to 75°C, determined according to the DOE Test Method for Measuring the Energy Consumption of Distribution Transformers under Appendix A to Subpart K of 10 CFR part 431.

Energy Conservation Standards for Low-Voltage Dry-Type Distribution Transformers			
Single phase		Three phase	
kVA	Efficiency % [1]	kVA	Efficiency % [1]
15	97.70	15	97.89
25	98.00	30	98.23
37.5	98.20	45	98.40
50	98.30	75	98.60
75	98.50	112.5	98.74
100	98.60	150	98.83
167	98.70	225	98.94
250	98.80	300	99.02
333	98.90	500	99.14
—	—	750	99.23
—	—	1000	99.28

Distribution transformer means a transformer that (1) has an input voltage of 34.5 kV or less; (2) has an ouput voltage of 600 V or less; (3) is rated for operation at a frequency of 60 Hz; and (4) has a capacity of 10 to 2500 kVA for liquid-immersed units and 15 to 2500 kVA for dry-type units.

Low voltage dry-type distribution transformer means a distribution transformer that: has an input voltage of 600 V or less, is air-cooled, and not used oil as a coolant.

The following product offering must comply with the table above:

- Three- and single-phase
- Step up and step down transformers
- General purpose ventilated transformers (isolation transformers)
- Watchdog general purpose ventilated transformers (low temperature rise)
- Transformers designed for harmonic applications (K-rated, harmonic mitigating, data center transformers, etc.)
- General purpose open core and coil transformers

The following low voltage transformers do not need to comply with the table above:

- Auto-transformers
- Drive isolation transformers
- Non-ventilated transformers
- Resin encapsulated transformers
- Buck boost transformers
- Control transformers (machine tool)
- Medical isolation panel transformers compliance with UL 1047 (tables 30.1 and 30.2) (SPECIAL IZ — LOW LEAKAGE)

New Three-Phase Offering from Square D — DOE 2016 EX

- Exceed the efficiency levels from 10 CFR 431.196
- Terminals sized to handle wire ranges to match Square D circuit breakers, switches, panelboards, etc.
  Located to meet NEC bending radius and layout to simplifiy connections
- IZ Levels to allow for designing with the minimum AIC Panels available
- In-rush current limited to expand the Square D circuit breaker options at both 125 and 250% sizing
- Sound level at 3 dB for all designs, but up to 6–10 dB below on certain units—QUIET QUALITY
- 1/2 in. clearance from the rear and side, UL 1561 ALCOVE TESTING ALL ENCLOSURES TO NOT EXCEED 90°C ON ADJACENT WALLS
- Four product families of the DOE 2016 EX: General purpose, aluminum and copper windings, 150°C rise; Watchdog, low temperature rise, aluminum and coover windings, 115 or 80°C rise; Two solutions for harominic loads: K-13 Wye secondary, harmonic mitigating transformers and K-9 ZigZag secondary, harmonic mitigating transformers.

[1] Efficiencies are determined at the following reference conditions:
(1) for no-load losses, at the temperature of 20°C; (2) for load-losses, at the temperature of 75°C and 35% of nameplate load. (Source: Table 4–2 of National Electrical Manufacturers Association (NEMA) Standard TP–1–2002, *Guide for Determining Energy Efficiency for Distribution Transformers*.)

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New! Energy Efficient Three Phase

Table 14.1: EX Three-Phase 60 Hz, 208Y/120 Vac Secondary; UL Listed

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%IZ	Sound Level dB	Weight (lbs) *[2]*	Enclosure*[3]*
480 Vac Delta Primary, Aluminum Windings									
15	EX15T3H	97.89%	6–2.5%2+4–	150	220	4.9%	42 dB	245	17K
30	EX30T3H	98.23%	6–2.5%2+4–	150	220	4.2%	42 dB	400	18K
45	EX45T3H	98.40%	6–2.5%2+4–	150	220	4.1%	42 dB	490	18K
75	EX75T3H	98.60%	6–2.5%2+4–	150	220	5.8%	47 dB	710	20K
112.5	EX112T3H	98.74%	6–2.5%2+4–	150	220	4.5%	47 dB	920	21K
150	EX150T3H	98.83%	6–2.5%2+4–	150	220	4.1%	47 dB	1170	22K
225	EX225T3H	98.94%	6–2.5%2+4–	150	220	4.5%	52 dB	1825	25J
300	EX300T3H	99.02%	6–2.5%2+4–	150	220	5.2%	52 dB	1975	25J
500	EX500T68H	99.14%	4–2.5%2+2–	150	220	4.9%	57 dB	3100	30J
750	EX750T68H	99.23%	4–2.5%2+2–	150	220	4.5%	61 dB	4125	31J
600 Vac Delta Primary, Aluminum Windings									
15	EX15T65H	97.89%	6–2.5%2+4–	150	220	—	42 dB	240	17K
30	EX30T65H	98.23%	6–2.5%2+4–	150	220	—	42 dB	400	18K
45	EX45T65H	98.40%	6–2.5%2+4–	150	220	—	42 dB	490	18K
75	EX75T65H	98.60%	6–2.5%2+4–	150	220	—	47 dB	710	20K
112.5	EX112T65H	98.74%	6–2.5%2+4–	150	220	—	47 dB	920	21K
150	EX150T65H	98.83%	6–2.5%2+4–	150	220	—	47 dB	1170	22K
225	EX225T65H	98.94%	6–2.5%2+4–	150	220	—	52 dB	1825	25J
300	EX300T65H	99.02%	6–2.5%2+4–	150	220	—	52 dB	1970	25J
500	EX500T79H	99.14%	4–2.5%2+2–	150	220	—	57 dB	3095	30J
750	EX750T79H	99.23%	4–2.5%2+2–	150	220	—	61 dB	4120	31J
208 Vac Delta Primary, Aluminum Windings									
15	EX15T211H	97.89%	3–5%1+2–	150	220	—	42 dB	240	17K
30	EX30T211H	98.23%	3–5%1+2–	150	220	—	42 dB	410	18K
45	EX45T211H	98.40%	3–5%1+2–	150	220	—	42 dB	495	18K
75	EX75T211H	98.60%	3–5%1+2–	150	220	—	47 dB	650	20K
112.5	EX112T211H	98.74%	3–5%1+2–	150	220	—	47 dB	920	21K
150	EX150T211H	98.83%	3–5%1+2–	150	220	—	47 dB	1170	22K
225	EX225T211H	98.94%	3–5%1+2–	150	220	—	52 dB	1825	25J
300	EX300T211H	99.02%	3–5%1+2–	150	220	—	52 dB	1970	25J
500	EX500T211H	99.14%	3–5%1+2–	150	220	—	57 dB	3095	30J
240 Vac Delta Primary, Aluminum Windings									
15	EX15T239H	97.89%	3–5%1+2–	150	220	—	42 dB	235	17K
30	EX30T239H	98.23%	3–5%1+2–	150	220	—	42 dB	410	18K
45	EX45T239H	98.40%	3–5%1+2–	150	220	—	42 dB	495	18K
75	EX75T239H	98.60%	3–5%1+2–	150	220	—	47 dB	650	20K
112.5	EX112T239H	98.74%	3–5%1+2–	150	220	—	47 dB	920	21K
150	EX150T239H	98.83%	3–5%1+2–	150	220	—	47 dB	1170	22K
225	EX225T239H	98.94%	3–5%1+2–	150	220	—	52 dB	1825	25J
300	EX300T239H	99.02%	3–5%1+2–	150	220	—	52 dB	1970	25J
500	EX500T239H	99.14%	3–5%1+2–	150	220	—	57 dB	3095	30J
480 Vac Delta Primary, Copper Windings									
15	EX15T3HCU	97.89%	6–2.5%2+4–	150	220	4.4%	42 dB	250	17K
30	EX30T3HCU	98.23%	6–2.5%2+4–	150	220	4.0%	42 dB	435	18K
45	EX45T3HCU	98.40%	6–2.5%2+4–	150	220	4.4%	42 dB	515	18K
75	EX75T3HCU	98.60%	6–2.5%2+4–	150	220	3.8%	47 dB	770	20K
112.5	EX112T3HCU	98.74%	6–2.5%2+4–	150	220	4.1%	47 dB	1065	21K
150	EX150T3HCU	98.83%	6–2.5%2+4–	150	220	3.7%	47 dB	1325	22K
225	EX225T3HCU	98.94%	6–2.5%2+4–	150	220	6.9%	52 dB	1810	25J
300	EX300T3HCU	99.02%	6–2.5%2+4–	150	220	5.4%	52 dB	2100	25J
500	EX500T68HCU	99.14%	4–2.5%2+2–	150	220	4.8%	57 dB	3975	30J
750	EX750T68HCU	99.23%	4–2.5%2+2–	150	220	4.8%	61 dB	4670	31J

Table 14.2: EX Three-Phase 60 Hz, 480Y/277 Vac Secondary; UL Listed

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%IZ	Sound Level	Weight (lbs) *[2]*	Enclosure*[3]*
208 Vac Delta Primary, Aluminum Windings									
15	EX15T212H	97.89%	3–5%1+2–	150	220	—	42 dB	235	17K
30	EX30T212H	98.23%	3–5%1+2–	150	220	—	42 dB	410	18K
45	EX45T212H	98.40%	3–5%1+2–	150	220	—	42 dB	495	18K
75	EX75T212H	98.60%	3–5%1+2–	150	220	—	47 dB	650	20K
112.5	EX112T212H	98.74%	3–5%1+2–	150	220	—	47 dB	920	21K
150	EX150T212H	98.83%	3–5%1+2–	150	220	—	47 dB	1170	22K
225	EX225T212H	98.94%	3–5%1+2–	150	220	—	52 dB	1825	25J
300	EX300T212H	99.02%	3–5%1+2–	150	220	—	52 dB	1970	25J
500	EX500T212H	99.14%	3–5%1+2–	150	220	—	57 dB	3100	30J
480 Vac Delta Primary, Aluminum Windings									
15	EX15T1814H	97.89%	6–2.5%2+4–	150	220	—	42 dB	235	17K
30	EX30T1814H	98.23%	6–2.5%2+4–	150	220	—	42 dB	410	18K
45	EX45T1814H	98.40%	6–2.5%2+4–	150	220	—	42 dB	495	18K
75	EX75T1814H	98.60%	6–2.5%2+4–	150	220	—	47 dB	660	20K
112.5	EX112T1814H	98.74%	6–2.5%2+4–	150	220	—	47 dB	925	21K
150	EX150T1814H	98.83%	6–2.5%2+4–	150	220	—	47 dB	1175	22K
225	EX225T1814H	98.94%	6–2.5%2+4–	150	220	—	52 dB	1830	25J
300	EX300T1814H	99.02%	6–2.5%2+4–	150	220	—	52 dB	1975	25J
500	EX500T76H	99.14%	4–2.5%2+2–	150	220	—	57 dB	3100	30J

[2] Not for construction, Contact your local Schneider Electric representative for certified prints.
[3] For enclosure styles, see Table 14.9 Enclosure Dimensions and Accessories, page 14-8

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Table 14.3: EX Three-Phase 60 Hz, 240 Vac Delta Secondary; UL Listed

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%IZ	Sound Level dB	Weight (lbs) *[4]*	Enclosure*[5]*
120 Volt Center Tap - Limited to 7.5% Loading, Design for Ground Reference and Light Maintenance Loading.									
480 Vac Delta Primary, Aluminum Windings									
15	EX15T6HCT	97.89%	6–2.5%2+4–	150	220	4.9%	42 dB	235	17K
30	EX30T6HCT	98.23%	6–2.5%2+4–	150	220	4.2%	42 dB	405	18K
45	EX45T6HCT	98.40%	6–2.5%2+4–	150	220	4.1%	42 dB	480	18K
75	EX75T6HCT	98.60%	6–2.5%2+4–	150	220	5.8%	47 dB	640	20K
112.5	EX112T6HCT	98.74%	6–2.5%2+4–	150	220	4.5%	47 dB	910	21K
150	EX150T6HCT	98.83%	6–2.5%2+4–	150	220	4.1%	47 dB	1140	22K
225	EX225T6HCT	98.94%	6–2.5%2+4–	150	220	4.5%	52 dB	1820	25J
300	EX300T6HCT	99.02%	6–2.5%2+4–	150	220	5.2%	52 dB	1960	25J
500	EX500T63HCT	99.14%	4–2.5%2+2–	150	220	4.9%	57 dB	3090	30J
750	EX750T63HCT	99.23%	4–2.5%2+2–	150	220	4.9%	61 dB	4120	31J

Watchdog transformers, by design, reduct energy consumption at loads greater than 50% loading, giving fewer BTUs/hour at those loading levels. The life expectancy is greater than that of 150°C rise General Purpose units.

- Aluminum or copper windings
- Two temperature rise options: 115°C rise on 220°C insulation systems (15% continuous emergency overload capacity); 80°C rise on 220°C insulation systems (30% continuous emergency overload capacity)

Table 14.4: EX Three Phase 60 Hz, 480Y/277 Vac Secondary; UL Listed

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%IZ	Sound Level	Weight (lbs) *[4]*	Enclosure*[5]*
480 V Delta Primary, 208Y/120 Secondary, Aluminum Windings									
15	EX15T3HF	97.89%	6–2.5%2+4–	115	220	4.5%	39 dB	245	17K
30	EX30T3HF	98.23%	6–2.5%2+4–	115	220	3.5%	39 dB	400	18K
45	EX45T3HF	98.40%	6–2.5%2+4–	115	220	5.1%	39 dB	490	18K
75	EX75T3HF	98.60%	6–2.5%2+4–	115	220	4.3%	44 dB	920	20K
112.5	EX112T3HF	98.74%	6–2.5%2+4–	115	220	4.4%	47 dB	1170	21K
150	EX150T3HF	98.83%	6–2.5%2+4–	115	220	3.8%	49 dB	825	22K
225	EX225T3HF	98.94%	6–2.5%2+4–	115	220	4.5%	49 dB	1825	24J
300	EX300T3HF	99.02%	6–2.5%2+4–	115	220	30.0%	49 dB	1975	25J
500	EX500T68HF	99.14%	4–2.5%2+2–	115	220	4.9%	56 dB	3100	30J
750	EX750T68HF	99.23%	4–2.5%2+2–	115	220	5.0%	58 dB	4125	31J
480 V Delta Primary, 208Y/120 Secondary, Copper Windings									
15	EX15T3HFCU	97.89%	6–2.5%2+4–	115	220	4.1%	39 dB	250	17K
30	EX30T3HFCU	98.23%	6–2.5%2+4–	115	220	3.5%	39 dB	410	18K
45	EX45T3HFCU	98.40%	6–2.5%2+4–	115	220	4.3%	39 dB	495	18K
75	EX75T3HFCU	98.60%	6–2.5%2+4–	115	220	4.6%	44 dB	755	20K
112.5	EX112T3HFCU	98.74%	6–2.5%2+4–	115	220	4.1%	47 dB	1025	21K
150	EX150T3HFCU	98.83%	6–2.5%2+4–	115	220	3.9%	49 dB	1270	22K
225	EX225T3HFCU	98.94%	6–2.5%2+4–	115	220	6.8%	49 dB	1545	24J
300	EX300T3HFCU	99.02%	6–2.5%2+4–	115	220	5.0%	49 dB	1975	25J
500	EX500T68HFCU	99.14%	4–2.5%2+2–	115	220	4.8%	56 dB	3705	30J
750	EX750T68HFCU	99.23%	4–2.5%2+2–	115	220	5.3%	58 dB	4400	31J
480 V Delta Primary, 208Y/120 Secondary, Aluminum Windings									
15	EX15T3HB	97.89%	6–2.5%2+4–	80	220	4.7%	39 dB	400	18K
30	EX30T3HB	98.23%	6–2.5%2+4–	80	220	3.8%	39 dB	490	18K
45	EX45T3HB	98.40%	6–2.5%2+4–	80	220	3.9%	44 dB	920	20K
75	EX75T3HB	98.60%	6–2.5%2+4–	80	220	5.2%	47 dB	1170	21K
112.5	EX112T3HB	98.74%	6–2.5%2+4–	80	220	4.3%	49 dB	1825	22K
150	EX150T3HB	98.83%	6–2.5%2+4–	80	220	4.2%	49 dB	1825	24J
225	EX225T3HB	98.94%	6–2.5%2+4–	80	220	4.6%	49 dB	1975	25J
300	EX300T68HB	99.02%	4–2.5%2+2–	80	220	4.4%	56 dB	3100	30J
500	EX500T68HB	99.14%	4–2.5%2+2–	80	220	4.9%	58 dB	4125	31J
480 V Delta Primary, 208Y/120 Secondary, Copper Windings									
15	EX15T3HBCU	97.89%	6–2.5%2+4–	80	220	4.4%	39 dB	400	18K
30	EX30T3HBCU	98.23%	6–2.5%2+4–	80	220	3.7%	39 dB	495	18K
45	EX45T3HBCU	98.40%	6–2.5%2+4–	80	220	4.4%	44 dB	755	20K
75	EX75T3HBCU	98.60%	6–2.5%2+4–	80	220	3.6%	47 dB	1025	21K
112.5	EX112T3HBCU	98.74%	6–2.5%2+4–	80	220	4.2%	49 dB	1270	22K
150	EX150T3HBCU	98.83%	6–2.5%2+4–	80	220	3.8%	49 dB	1545	24J
225	EX225T3HBCU	98.94%	6–2.5%2+4–	80	220	6.9%	49 dB	1975	25J
300	EX300T68HBCU	99.02%	4–2.5%2+2–	80	220	5.0%	56 dB	3705	30J
500	EX500T68HBCU	99.14%	4–2.5%2+2–	80	220	4.8%	58 dB	4400	31J

DOE 2016 Low Voltage Distribution Transformers designed for applications with harmonic loads.

Square D offers Wye and ZigZag secondaries, both of which reconfigure the harmonic models and mitigate the harmful effects of triplens. Designed to feed 208/120 three-phase panels the primary terminals have harmonic profiles of 5th, 7th, 11th, 13th, etc. after reconfiguring via the transformer. UL Listed with the following K-ratings to handle excess heat created by harmonic wave forms, Wye secondary is available with a K13 rating, and the ZigZag secondaries are available with a K9 rating. Aluminum or copper windings available.

Table 14.5: EX Three Phase 60 Hz, Wye and ZigZag and 208/120 Vac Secondaries; UL Listed

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Phase Shift	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%IZ	Sound Level	Weight (lbs) *[4]*	Enclosure*[5]*
208Y/120 Secondary, Aluminum Windings, K13 Listed										
15	EX15T3HNLP	97.89%	30°	6–2.5%2+4–	150	220	—	39 dB	400	18K

[4] Not for construction, Contact your local Schneider Electric representative for certified prints.
[5] For enclosure styles, see Table 14.9 Enclosure Dimensions and Accessories, page 14-8

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Table 14.5 EX Three Phase 60 Hz, Wye and ZigZag and 208/120 Vac Secondaries; UL Listed (cont'd.)

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Phase Shift	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%IZ	Sound Level	Weight (lbs) *[6]*	Enclosure*[7]*
30	EX30T3HNLP	98.23%	30°	6–2.5%2+4–	150	220	—	39 dB	490	18K
45	EX45T3HNLP	98.40%	30°	6–2.5%2+4–	150	220	—	44 dB	920	20K
75	EX75T3HNLP	98.60%	30°	6–2.5%2+4–	150	220	—	47 dB	1170	21K
112.5	EX112T3HNLP	98.74%	30°	6–2.5%2+4–	150	220	—	49 dB	1825	22K
150	EX150T3HNLP	98.83%	30°	6–2.5%2+4–	150	220	—	49 dB	1825	24J
225	EX225T3HNLP	98.94%	30°	6–2.5%2+4–	150	220	—	49 dB	1975	25J
208Y/120 Secondary, Copper Windings, K13 Listed										
15	EX15T3HCUNLP	97.89%	0°	6–2.5%2+4–	150	220	4.4%	39 dB	400	18K
30	EX30T3HCUNLP	98.23%	0°	6–2.5%2+4–	150	220	3.7%	39 dB	495	18K
45	EX45T3HCUNLP	98.40%	0°	6–2.5%2+4–	150	220	4.4%	44 dB	755	20K
75	EX75T3HCUNLP	98.60%	0°	6–2.5%2+4–	150	220	3.6%	47 dB	1025	21K
112.5	EX112T3HCUNLP	98.74%	0°	6–2.5%2+4–	150	220	4.2%	49 dB	1270	22K
150	EX150T3HCUNLP	98.83%	0°	6–2.5%2+4–	150	220	3.8%	49 dB	1545	24J
225	EX225T3HCUNLP	98.94%	0°	6–2.5%2+4–	150	220	6.9%	49 dB	1975	25J
NP Series for Typical Non-Linear Load Services, K-9 Rated, Aluminum Windings										
15	EX15T208HNP	97.89%	0°	6–2.5%2+4–	115	220	—	—	—	17K
30	EX30T208HNP	98.23%	0°	6–2.5%2+4–	115	220	—	—	—	18K
45	EX45T208HNP	98.40%	0°	6–2.5%2+4–	115	220	—	—	—	20K
75	EX75T208HNP	98.60%	0°	6–2.5%2+4–	115	220	—	—	—	21K
112.5	EX112T208HNP	98.74%	0°	6–2.5%2+4–	115	220	—	—	—	22K
150	EX150T208HNP	98.83%	0°	6–2.5%2+4–	115	220	—	—	—	24K
225	EX225T208HNP	98.94%	0°	6–2.5%2+4–	115	220	—	—	—	25K
300	EX300T209HNP	99.02%	0°	6–2.5%2+4–	115	220	—	—	—	30K
500	EX500T209HNP	99.14%	0°	4–2.5%2+2–	115	220	—	—	—	31K
NL Series for Typical Non-Linear Load Services, K-9 Rated, Copper Windings										
15	EX15T208HCUNP	97.89%	0°	6–2.5%2+4–	115	220	—	—	—	18K
30	EX30T208HCUNP	98.23%	0°	6–2.5%2+4–	115	220	—	—	—	18K
45	EX45T208HCUNP	98.40%	0°	6–2.5%2+4–	115	220	—	—	—	20K
75	EX75T208HCUNP	98.60%	0°	6–2.5%2+4–	115	220	—	—	—	21K
112.5	EX112T208HCUNP	98.74%	0°	6–2.5%2+4–	115	220	—	—	—	22K
150	EX150T208HCUNP	98.83%	0°	6–2.5%2+4–	115	220	—	—	—	24J
225	EX225T208HCUNP	98.94%	0°	6–2.5%2+4–	115	220	—	—	—	25J
300	EX300T209HCUNP	99.02%	0°	6–2.5%2+4–	115	220	—	—	—	30J
NP Series for Typical Non-Linear Load Services, K-9 Rated, Aluminum Windings										
15	EX15T255HNP	97.89%	30°	6–2.5%2+4–	115	220	—	—	—	17K
30	EX30T255HNP	98.23%	30°	6–2.5%2+4–	115	220	—	—	—	18K
45	EX45T255HNP	98.40%	30°	6–2.5%2+4–	115	220	—	—	—	20K
75	EX75T255HNP	98.60%	30°	6–2.5%2+4–	115	220	—	—	—	21K
112.5	EX112T255HNP	98.74%	30°	6–2.5%2+4–	115	220	—	—	—	22K
150	EX150T255HNP	98.83%	30°	6–2.5%2+4–	115	220	—	—	—	24K
225	EX225T255HNP	98.94%	30°	6–2.5%2+4–	115	220	—	—	—	25K
300	EX300T255HNP	99.02%	30°	6–2.5%2+4–	115	220	—	—	—	30K
NL Series for Typical Non-Linear Load Services, K-9 Rated, Copper Windings										
15	EX15T255HCUNP	97.89%	30°	6–2.5%2+4–	115	220	—	—	—	17K
30	EX30T255HCUNP	98.23%	30°	6–2.5%2+4–	115	220	—	—	—	18K
45	EX30T255HCUNP	98.40%	30°	6–2.5%2+4–	115	220	—	—	—	20K
75	EX75T255HCUNP	98.60%	30°	6–2.5%2+4–	115	220	—	—	—	20K
112.5	EX112T255HCUNP	98.74%	30°	6–2.5%2+4–	115	220	—	—	—	22K
150	EX150T255HCUNP	98.83%	30°	6–2.5%2+4–	115	220	—	—	—	24K
225	EX225T255HCUNP	98.94%	30°	6–2.5%2+4–	115	220	—	—	—	24K
300	EX300T255HCUNP	99.02%	30°	6–2.5%2+4–	115	220	—	—	—	25K
500	EX500T255HCUNP	99.14%	30°	4–2.5%2+2–	115	220	—	—	—	31K

[6] Not for construction, Contact your local Schneider Electric representative for certified prints.
[7] For enclosure styles, see Table 14.9 Enclosure Dimensions and Accessories, page 14-8

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Table 14.6: EX Three Phase 60 Hz 480 Vac Primary, 208Y/120 Vac Secondary; UL Listed

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Phase Shift	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%IZ	Sound Level dB	Weight (lbs) *[6]*	Enclosure *[7]*
NP Series for Typical Non-Linear Load Services, K-9 Rated, Aluminum Windings										
15	EX15T208HNP	97.89%	0°	6–2.5%2+4–	150	220	—	—	—	—
30	EX30T208HNP	98.23%	0°	6–2.5%2+4–	150	220	—	—	—	—
45	EX45T208HNP	98.40%	0°	6–2.5%2+4–	150	220	—	—	—	—
75	EX75T208HNP	98.60%	0°	6–2.5%2+4–	150	220	—	—	—	—
112.5	EX112T208HNP	98.74%	0°	6–2.5%2+4–	150	220	—	—	—	—
150	EX150T208HNP	98.83%	0°	6–2.5%2+4–	150	220	—	—	—	—
225	EX225T208HNP	bc 98.94%	0°	6–2.5%2+4–	150	220	—	—	—	—
300	EX300T209HNP	99.02%	0°	4–2.5%2+2–	150	220	—	—	—	—
500	EX500T209HNP	99.14%	0°	4–2.5%2+2–	150	220	—	—	—	—
NL Series for Typical Non-Linear Load Services, K-9 Rated, Copper Windings										
15	EX15T208HCUNP	97.89%	0°	6–2.5%2+4–	150	220	—	—	—	—
30	EX30T208HCUNP	98.23%	0°	6–2.5%2+4–	150	220	—	—	—	—
45	EX45T208HCUNP	98.40%	0°	6–2.5%2+4–	150	220	—	—	—	—
75	EX75T208HCUNP	98.60%	0°	6–2.5%2+4–	150	220	—	—	—	—
112.5	EX112T208HCUNP	98.74%	0°	6–2.5%2+4–	150	220	—	—	—	—
150	EX150T208HCUNP	98.83%	0°	6–2.5%2+4–	150	220	—	—	—	—
225	EX225T208HCUNP	98.94%	0°	6–2.5%2+4–	150	220	—	—	—	—
300	EX300T209HCUNP	99.02%	0°	4–2.5%2+2–	150	220	—	—	—	—
500	EX500T209HCUNP	99.14%	0°	4–2.5%2+2–	150	220	—	—	—	—
NP Series for Typical Non-Linear Load Services, K-9 Rated, Aluminum Windings										
15	EX15T255HNP	97.89%	30°	3–5%1+2–	150	220	—	—	—	—
30	EX30T255HNP	98.23%	30°	3–5%1+2–	150	220	—	—	—	—
45	EX45T255HNP	98.40%	30°	3–5%1+2–	150	220	—	—	—	—
75	EX75T255HNP	98.60%	30°	3–5%1+2–	150	220	—	—	—	—
112.5	EX112T255HNP	98.74%	30°	3–5%1+2–	150	220	—	—	—	—
150	EX150T255HNP	98.83%	30°	3–5%1+2–	150	220	—	—	—	—
225	EX225T255HNP	98.94%	30°	3–5%1+2–	150	220	—	—	—	—
300	EX300T255HNP	99.02%	30°	3–5%1+2–	150	220	—	—	—	—
500	EX500T255HNP	99.14%	30°	3–5%1+2–	150	220	—	—	—	—
NL Series for Typical Non-Linear Load Services, K-9 Rated, Copper Windings										
15	EX15T255HCUNP	97.89%	30°	3–5%1+2–	150	220	—	—	—	—
30	EX30T255HCUNP	98.23%	30°	3–5%1+2–	150	220	—	—	—	—
45	EX45T255HCUNP	98.40%	30°	3–5%1+2–	150	220	—	—	—	—
75	EX75T255HCUNP	98.60%	30°	3–5%1+2–	150	220	—	—	—	—
112.5	EX112T255HCUNP	98.74%	30°	3–5%1+2–	150	220	—	—	—	—
150	EX150T255HCUNP	98.83%	30°	3–5%1+2–	150	220	—	—	—	—
225	EX225T255HCUNP	98.94%	30°	3–5%1+2–	150	220	—	—	—	—
300	EX300T255HCUNP	99.02%	30°	3–5%1+2–	150	220	—	—	—	—
500	EX500T255HCUNP	99.14%	30°	3–5%1+2–	150	220	—	—	—	—

Energy Efficient Single Phase and Single Phase Watchdog

Table 14.7: EE Single-Phase 60 Hz, 120/240 Vac Secondary; cULus Listed

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Full Capacity Taps *[8]*	Degree C Temp. Rise	Insulation Class	%IZ	Sound Level dB	Weight (lbs) *[9]*	Enclosure *[10]*
240 x 480 Vac Primary, Aluminum Windings									
15	EE15S3H	97.70%	480 Vac 6-2.5% 2+4- 240 Vac 3-5% 1+2-	150	220	6.1%	45dB	215	17D
25	EE25S3H	98.00%		150	220	5.9%	45dB	275	17H
37.5	EE37S3H	98.20%		150	220	6.1%	45dB	340	18H
50	EE50S3H	98.30%		150	220	5.1%	45dB	395	18H
75	EE75S3H	98.50%		150	220	5.7%	50dB	619	21D
100	EE100S3H	98.60%		150	220	4.7%	50dB	682	22D
167	EE167S3H	98.70%		150	220	3.9%	55dB	982	24D
250	EE250S3H	98.80%		150	220	5.7%	55dB	1060	25D
333	EE333S3H	98.90%		150	220	6.3%	60dB	1854	31D
600 Vac Primary, Aluminum Windings									
15	EE15S3534H	97.70%	6–2.5%2+4–	150	220	4.0	45dB	215	17D
25	EE25S3534H	98.00%	6–2.5%2+4–	150	220	4.3	45dB	275	17H
37.5	EE37S3534H	98.20%	6–2.5%2+4–	150	220	3.8	45dB	400	18H
50	EE50S3534H	98.30%	6–2.5%2+4–	150	220	4.2	45dB	450	18H
75	EE75S3534H	98.50%	6–2.5%2+4–	150	220	3.2	50dB	605	21D
100	EE100S3534H	98.60%	6–2.5%2+4–	150	220	2.9	50dB	795	22D
167	EE167S3534H	98.70%	6–2.5%2+4–	150	220	4.7	55dB	985	24D
250	EE250S3534H	98.80%	6–2.5%2+4–	150	220	—	55dB	1065	25D
333	EE333S3534H	98.90%	6–2.5%2+4–	150	220	—	60dB	1865	31D
208 Vac Primary, Aluminum Windings									
15	EE15S60H	97.70%	2 - 5% FCBN	150	220	4.3	45dB	200	17D
25	EE25S60H	98.00%	2 - 5% FCBN	150	220	4.1	45dB	275	17H
37.5	EE37S60H	98.20%	2 - 5% FCBN	150	220	3.6	45dB	397	18H
50	EE50S60H	98.30%	2 - 5% FCBN	150	220	5.7	45dB	420	18H
75	EE75S60H	98.50%	2 - 5% FCBN	150	220	3.6	50dB	621	21D
100	EE100S60H	98.60%	2 - 5% FCBN	150	220	6.3	50dB	795	22D
167	EE167S60H	98.70%	2 - 5% FCBN	150	220	4.2	55dB	985	24D
277 Vac Primary, Aluminum Windings									
15	EE15S61H	97.70%	2 - 5% FCBN	150	220	5.8	45dB	225	17D
25	EE25S61H	98.00%	2 - 5% FCBN	150	220	5.8	45dB	285	17H
37.5	EE37S61H	98.20%	2 - 5% FCBN	150	220	5.7	45dB	410	18H
50	EE50S61H	98.30%	2 - 5% FCBN	150	220	5.1	45dB	460	18H
75	EE75S61H	98.50%	2 - 5% FCBN	150	220	5.6	50dB	630	21D

[6] Not for construction, Contact your local Schneider Electric representative for certified prints.
[7] For enclosure styles, see Table 14.9 Enclosure Dimensions and Accessories, page 14-8
[8] FCBN = Full Capacity Below Normal.
[9] Not for construction, Contact your local Schneider Electric representative for certified prints.
[10] For enclosure styles, see Table 14.9 Enclosure Dimensions and Accessories, page 14-8

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Table 14.7 EE Single-Phase 60 Hz, 120/240 Vac Secondary; cULus Listed (cont'd.)

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Full Capacity Taps *[8]*	Degree C Temp. Rise	Insulation Class	%IZ	Sound Level dB	Weight (lbs) *[9]*	Enclosure*[10]*
100	EE100S61H	98.60%	2 - 5% FCBN	150	220	6.5	50dB	795	22D
167	EE167S61H	98.70%	2 - 5% FCBN	150	220	4.9	55dB	995	24D

Table 14.8: EE Single Phase Watchdog Transformers: 60 Hz, cULus Listed

kVA	Catalog No.	Minimum Efficiency @ 35% 75°C	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%IZ	Sound Level dB	Weight (lbs)*[9]*	Enclosure*[10]*
240 x 480 Vac Primary, 120/240 Vac Secondary, Aluminum Windings									
15	EE15S3HF	97.70%	480 Vac 6-2.5% 2+4- 240 Vac 3-5% 1+2-	115	220	3.5%	45dB	275	17D
25	EE25S3HF	98.00%		115	220	4.0%	45dB	340	18H
37.5	EE37S3HF	98.20%		115	220	3.7%	45dB	395	18H
50	EE50S3HF	98.30%		115	220	3.7%	45dB	620	21D
75	EE75S3HF	98.50%		115	220	3.5%	50dB	685	22D
100	EE100S3HF	98.60%		115	220	3.5%	50dB	985	24D
15	EE15S3HB	97.70%		80	220	1.7%	45dB	280	17D
25	EE25S3HB	98.00%		80	220	3.9%	45dB	345	18H
37.5	EE37S3HB	98.20%		80	220	3.7%	45dB	400	18H
50	EE50S3HB	98.30%		80	220	3.6%	45dB	625	21D
75	EE75S3HB	98.50%		80	220	3.4%	50dB	690	22D
100	EE100S3HB	98.60%		80	220	3.4%	50dB	995	24D

Other Primary and Secondary combinations are available via the Schneider Electric Product Configurator. Contact your local Schnedier Electric representative for more information.

[8] FCBN = Full Capacity Below Normal.
[9] Not for construction, Contact your local Schneider Electric representative for certified prints.
[10] For enclosure styles, see Table 14.9 Enclosure Dimensions and Accessories, page 14-8

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Enclosures and Accessories

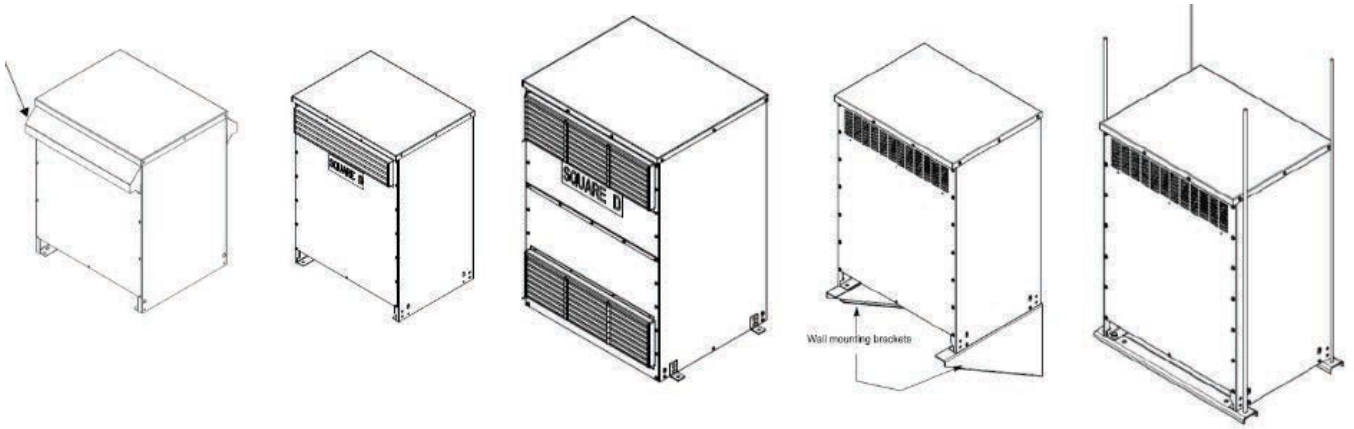
Style D and H—Type 2 Rated
Converts to Type 3R with Weathershield

Style K—Type 2 Rated
Converts to Type 3R with Weathershield

Style J—Type 2 Rated
Converts to Type 3R with Weathershield

Table 14.9: Enclosure Dimensions and Accessories

Enclosure Number/Style		Height		Width[11]		Depth		Mounting	Weather-shield	Wall Mounting Bracket [12]	Ceiling Mounting Bracket [13]	Insulation Class° C
		in.	mm	in.	mm	in.	mm					
17	D	27	686	20	508	16	406	Floor	WS363	WMB361362	CMB363	220
	H	37	940	20	508	16	406	Floor	WS363	WMB361362	CMB363	220
18	D	30	762	20	508	20	508	Floor	WS363	WMB363364	CMB363	220
	H	37	940	20	508	20	508	Floor	WS363	WMB363364	CMB363	220
19	D	30	762	30	762	20	508	Floor	WS364	WMB363364	CMB364	220
20	D	37	940	30	762	20	508	Floor	WS364	WMB363364	CMB364	220
21	D	37	940	30	762	24	610	Floor	WS364	—	CMB364	220
22	D	43.8	1111	32	813	27	686	Floor	WS380	—	CMB380	220
24	D	49.5	1257	35	889	28.5	724	Floor	WS381	—	CMB381	220
25	D	49.5	1257	41	1041	32	813	Floor	WS382	—	—	220
26	D	57.5	1461	41	1041	32	813	Floor	WS382	—	—	220
28	D	60	1524	56	1422	36	914	Floor	WS370A	—	—	220
29	D	68	1727	56	1422	36	914	Floor	WS370A	—	—	220
30	D	71	1803	48	1219	36	914	Floor	WS383	—	—	220
31	D	74	1880	56	1422	40.5	1029	Floor	WS384	—	—	220
17	K	27	686	20.5	521	17.25	438	Floor	7400WS17K	7400WMB17K	7400CMB17K	220
18	K	35.32	897	25.5	648	21	533	Floor	7400WS18K	7400WMB18K20K	7400CMB18K20K	220
19	K	—	—	—	—	—	—	Floor	7400WS19K	7400WMB19K	7400CMB19K	220
20	K	42	1067	30.06	778	22.75	578	Floor	7400WS20K	7400WMB18K20K	7400CMB18K20K	220
21	K	46	1168	31.32	796	24	610	Floor	7400WS21K	—	7400CMB21K	220
22	K	49.1	1247	33.65	855	28.45	723	Floor	7400WS22K	—	7400CMB22K	220
24	—	—	—	—	—	—	—	Floor	factory	—	—	220
25	J	57.5	1461	40.1	1019	32.75	832	Floor	factory	—	—	220
30	J	71	1803	48.25	1226	37.9	963	Floor	factory	—	—	220
31	J	76	1930	56	1422	44.5	1130	Floor	factory	—	—	220



New Optional Floor Mounting Kit — Enclosures K and J

[11] These dimensions are not for construction. Contact your local Schneider Electric.
[12] Wall mounting brackets are used with units weighing no more than 700 lbs.
[13] Ceiling mounting brackets are used with units weighing no more than 1200 lbs.

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Table 14.10: Mechanical Lug Kits

Catalog No.	Lugs Per Kit	Wire Range	Cap Screws	Current Range	Grounding Lugs per Kit	Wire Range	Bonding Lugs per Kit	Wire Range
Single-Phase Primary, Single-Phase Secondary, Three-Phase Delta Primary, Three-Phase Delta Secondary								
DASKP100	3	1/0–14 STR.	1/4 x 1 in	Up to 100 A	Not applicable	Not applicable	Not applicable	Not applicable
DASKP250	3	350 kcmil–6 STR.	3/8 x 2 in	101 to 250 A				
DASKP400	3	600 kcmil–4 STR. (2) 250 kcmil–1/0 STR.	3/8 x 2 in	201 to 400 A				
DASKP600	6	600 kcmil–4 STR. (2) 250 kcmil–1/0 STR.	3/8 x 2 in	601 to 800 A				
DASKP1000	9	600 kcmil–2 STR.	3/8 x 2 in	601 to 800 A				
DASKP1200	12	600 kcmil–2 STR.	3/8 x 2 in	801 to 1200 A				
Single-Phase Primary and Secondary, Three-Phase Wye Secondary, Three-Phase Delta with Center Tap								
DASKGS100	5	1/0–14 STR.	1/4 x 1 in	Up to 100 A	1	(4) 2/0 to 14 STR	1	2 to 14 STR
DASKGS250	5	350 kcmil–6 STR.	3/8 x 2 in	101 to 250 A	1	(4) 2/0 to 14 STR	1	2 to 14 STR
DASKGS400	5	600 kcmil–4 STR. (2) 250 kcmil–1/0 STR.	3/8 x 2 in	201 to 400 A	1	(4) 2/0 to 14 STR	1	1/0 to 14 STR
DASKGS600	10	600 kcmil–2 STR.	3/8 x 2 in	601 to 800 A	1	(4) 350 kcmil to 6 STR.	1	250 kcmil to 6 STR.
DASKGS1000	15	600 kcmil–2 STR.	3/8 x 2 in	601 to 800 A	1	(4) 350 kcmil to 6 STR.	1	250 kcmil to 6 STR.
DASKGS1200	20	600 kcmil–2 STR.	3/8 x 2 in	801 to 1200 A	1	(4) 350 kcmil to 6 STR.	1	250 kcmil to 6 STR.
DASKGS2000	25	600 kcmil–2 STR.	3/8 x 2 in	1201 to 2000 A	1	(4) 350 kcmil to 6 STR.	1	250 kcmil to 6 STR.

Lugs are not supplied with transformer units. They must be purchased separately.

Table 14.11: Compression Lug Kits

Transformer kVA Sizes	Kit Catalog No.	Terminal Lugs		Aluminum or Copper Conductor Range (AWG or kcmil)	Hardware Included	
		Qty.	Catalog No.		Qty.	Cap Screws
15–37 ½ 1Ø 15–45 3Ø	VCELSK1	8 5	VCEL02114S1 VCEL030516H1	#8–1/0 #4–300 kcmil	8 1	1/4 x 1 in 1/4 x 2 in
50–75 1Ø 75–112 ½ 3 Ø	VCELSK2	13	VCEL030516H1	#4–300 kcmil	8 8	1/4 x 1 in 1/4 x 2 in
100–167 1Ø 150–300 3Ø	VCELSK3	3	VCEL030516H1	#4–300 kcmil	3	1/4 x 3/4 in
		26	VCEL07512H1	500–750 kcmil Al 500 kcmil Cu	16	3/8 x 2 in
500 3Ø	VCELSK4	34	VCEL07512H1	500–750 kcmil Al 500 kcmil Cu	21	3/8 x 2 in

Sealed, Mini Power-Zone™ Unit Substation

The Square D™ brand Mini Power-Zone™ unit substation from Schneider Electric provides the answer to requirements for a portable, compact power supply for small loads. This complete package yields considerable savings in installation time and costs. Its NEMA Type 3R enclosure is suitable for both indoor and outdoor use. The transformer is 115°C rise and epoxy-resin encapsulated. The panel section uses Square D™ brand QO™ style circuit breakers.

NOTE: Mini Power-Zone unit substations are UL 1062 File E92978 Listed.

Mini Power-Zone unit substations include factory-installed primary main and secondary main circuit breakers. Circuit breaker ratings are selected to meet National Electrical Code requirements and coordinate with transformer magnetizing inrush current. Order feeder circuit breakers (QO™ plug-on type) from your local Schneider Electric distributor. Use Qwik-Gard™ circuit breakers for required ground fault protection. Tandem circuit breakers are not permitted.

If bolt-on circuit breakers are required instead of plug-on, change the Mini Power-Zone part number from MPZ to MPZB. The MPZB product line leverages the NQ interior for application requirements.

The Mini Power-Zone unit substation uses a separate transformer and panel section. This allows the panel section to be removed and wired first if desired. Also the transformer can be replaced without disturbing the panel section and associated wiring. The new transformer simply slides into the top of the panel section and primary and secondary leads are reconnected to the main circuit breakers.

Table 14.12: Plug On Circuit Breakers

kVA	Catalog No.			Full Capacity Taps[14]	Enclosure	Weight (lbs)	Primary Main Circuit Breaker Rating (A)	Secondary Main Circuit Breaker Rating (A)	Square D Load Center Circuit Breaker Spaces	
	18k AIC		25k AIC						Maximum Number 1- or 2-Pole	Max. A
480 Vac Input into Transformer Output Single-Phase Panel Rated 120/240 Vac										
3	MPZ3S40F	MPZ3S40FSS	MPZ3S40F25K	2–5% FCBN	MPZ - A	85	15	15	10 or 5	20
5	MPZ5S40F	MPZ5S40FSS	MPZ5S40F25K	2–5% FCBN	MPZ - A	135	20	30	10 or 5	20
7.5	MPZ7S40F	MPZ7S40FSS	MPZ7S40F25K	2–5% FCBN	MPZ - A	145	30	40	10 or 5	30
10	MPZ10S40F	MPZ10S40FSS	MPZ10S40F25K	2–5% FCBN	MPZ - A	220	30	60	10 or 5	40
15	MPZ15S40F	MPZ15S40FSS	MPZ15S40F25K	2–5% FCBN	MPZ - B	350	60	80	28 or 14	60
25	MPZ25S40F	MPZ25S40FSS	MPZ25S40F25K	2–5% FCBN	MPZ - B	425	100	125	28 or 14	100
									Feeder Circuit Breakers	
Output Three-Phase Panel Rated 208Y/120 Vac									**Maximum Number 1- or 3-Pole**	**Max. A**
15	MPZ15T2F	MPZ15T2FSS	MPZ15T2F25K	2–5% FCBN	MPZ - C	710	40	60	27 or 9	40
22.5	MPZ22T2F	MPZ22T2FSS	MPZ22T2F25K	2–5% FCBN	MPZ - C	670	70	80	27 or 9	60
30	MPZ30T2F	MPZ30T2FSS	MPZ30T2F25K	2–5% FCBN	MPZ - C	815	90	100	27 or 9	80

[14] FCBN = Full Capacity Below Normal.

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Table 14.13: Bolt On Circuit Breakers

kVA	Catalog No.				Full Capacity Taps[15]	Enclosure	Weight (lbs)	Primary Main Circuit Breaker Rating (A)	Secondary Main Circuit Breaker Rating (A)	Feeder Circuit Breakers	
	18k AIC		25k AIC	65k AIC						Maximum Number 1- or 2-Pole	Max. A
Output Single-Phase Panel Rated 120/240 Vac											
3	MPZB3S40F	MPZB3S40FSS	MPZB3S40F25K	MPZB3S40F65K	2–5% FCBN	MPZ - AA	85	15	15	16 or 8	20
5	MPZB5S40F	MPZB5S40FSS	MPZB5S40F25K	MPZB5S40F65K	2–5% FCBN	MPZ - AA	135	20	30	16 or 8	20
7.5	MPZB7S40F	MPZB7S40FSS	MPZB7S40F25K	MPZB7S40F65K	2–5% FCBN	MPZ - AA	145	30	40	16 or 8	30
10	MPZB10S40F	MPZB10S40FSS	MPZB10S40F25K	MPZB10S40F65K	2–5% FCBN	MPZ - AA	220	40	60	16 or 8	40
15	MPZB15S40F	MPZB15S40FSS	MPZB15S40F25K	MPZB15S40F65K	2–5% FCBN	MPZ - BB	350	60	80	28 or 14	60
25	MPZB25S40F	MPZB25S40FSS	MPZB25S40F25K	MPZB25S40F65K	2–5% FCBN	MPZ - BB	425	100	125	28 or 14	100
Output Three-Phase Panel Rated 208Y/120 Vac											
15	MPZB15T2F	MPZB15T2FSS	MPZB15T2F25K	MPZB15T2F65K	2–5% FCBN	MPZ - CC	510	40	60	27 or 9	40
22.5	MPZB22T2F	MPZB22T2FSS	MPZB22T2F25K	MPZB22T2F65K	2–5% FCBN	MPZ - CC	670	70	80	27 or 9	60
30	MPZB30T2F	MPZB30T2FSS	MPZB30T2F25K	MPZB30T2F65K	2–5% FCBN	MPZ - CC	815	90	100	27 or 9	80

Table 14.14: Enclosure Dimensions and Accessories

Enclosure Number/Style		Height		Width		Depth		Mounting
		in.	mm	in.	mm	in.	mm	
MPZ	A	32.7	831	12	305	11.9	302	WALL
MPZ	AA	41	1041	12	305	11.9	302	WALL
MPZ	B	42.9	1090	17.4	442	13.5	343	WALL
MPZ	BB	51	1295	17.4	442	13.5	343	WALL
MPZ	C	44.6	1133	27.4	696	13.6	345	WALL
MPZ	CC	48.6	1234	27.4	696	13.6	345	WALL

NOTE: Dimensions should not be used for construction. Contact you local Schneider Electric representative for certified prints.
FCBN = Full Capacity Below Normal

Resin Encapsulated Three and Single Phase Transformers

Table 14.15: Resin Encapsulated Three and Single Phase Transformers

kVA	Type 3R STD			Type 3R 304 Stainless			Type 4X 304 Stainless					
	Catalog No.	Weight (lbs)[16]	Enclosure [17]	Catalog No.	Weight (lbs)[16]	Enclosure [18]	Catalog No.	Weight (lbs)[16]	Enclosure [18]	Full Capacity Taps[19]	Deg C Temp. Rise	Insulation Class
Three Phase—480 Vac Delta Primary 208Y/120 Vac Secondary, 60 Hz; UL/cULus Listed												
3	3T2F	120	12C	3T2SS	120	12C	4X3T2FSS	165	54X	2–5%FCBN	115	180
6	6T2F	145	12C	6T2SS	145	12C	4X6T2FSS	195	54X	2–5%FCBN	115	180
9	9T2F	235	14C	9T2SS	235	14C	4X9T2FSS	290	54X	2–5%FCBN	115	180
15	15T2F	300	14C	15T2SS	300	14C	4X15T2FSS	350	54X	2–5%FCBN	115	180
30	30T2F	660	16C	30T2SS	660	16C	4X30T2FSS	850	55X	2–5%FCBN	115	180
Three Phase—480 Vac Delta Primary 240 Vac Delta Secondary, 60 Hz; UL/cULus Listed												
3	3T5F	120	12C	3T5SS	120	12C	4X3T5FSS	165	54X	2–5%FCBN	115	180
6	6T5F	145	12C	6T5SS	145	12C	4X6T5FSS	195	54X	2–5%FCBN	115	180
9	9T75F	235	14C	9T75SS	235	14C	4X9T75FSS	290	54X	2–5%FCBN	115	180
15	15T75F	300	14C	15T75SS	300	14C	4X15T75FSS	350	54X	2–5%FCBN	115	180
30	30T75F	660	16C	30T75SS	660	16C	4X30T75FSS	850	55X	2–5%FCBN	115	180
Single Phase—240 x 480 Vac Primary 120/240 Vac Secondary, 60 Hz; UL/cULus Listed												
1	1S1F	21.2	7A	1S1FSS	21.2	7A	4X1S1FSS	48	51X	None	115	180
1.5	1.5S1F	30.1	8A	1.5S1FSS	30.1	8A	4X1.5S1FSS	55	51X	None	115	180
2	2S1F	39.1	9A	2S1FSS	39.1	9A	4X2S1FSS	55	51X	None	115	180
3	3S1F	60	10A	3S1FSS	60	10A	4X3S1FSS	75	52X	None	115	180
5	5S1F	115	13B	5S1FSS	115	13B	4X5S1FSS	125	52X	None	115	180
7.5	7S1F	135	13B	7S1FSS	135	13B	4X7S1FSS	150	52X	None	115	180
10	10S1F	165	13B	10S1FSS	165	13B	4X10S1FSS	180	52X	None	115	180
15	15S1F	225	15B	15S1FSS	225	15B	4X15S1FSS	390	53X	None	115	180
25	25S1F	300	15B	25S1FSS	300	15B	4X25S1FSS	450	53X	None	115	180
Single Phase—480 Vac Primary 120/240 Vac Secondary, 60 Hz; UL/cULus Listed												
1	1S40F	21.2	7A	1S40FSS	21.2	7A	4X1S40FSS	48	51X	2–5%FCBN	115	180
1.5	1.5S40F	30.1	8A	1.5S40FSS	30.1	8A	4X1.5S40FSS	55	51X	2–5%FCBN	115	180
2	2S40F	39.1	9A	2S40FSS	39.1	9A	4X2S40FSS	55	51X	2–5%FCBN	115	180
3	3S40F	60	10A	3S40FSS	60	10A	4X3S40FSS	75	52X	2–5%FCBN	115	180
5	5S40F	115	13B	5S40FSS	115	13B	4X5S40FSS	125	52X	2–5%FCBN	115	180
7.5	7S40F	135	13B	7S40FSS	135	13B	4X7S40FSS	150	52X	2–5%FCBN	115	180
10	10S40F	165	13B	10S40FSS	165	13B	4X10S40FSS	180	52X	2–5%FCBN	115	180
15	15S40F	225	15B	15S40FSS	225	15B	4X15S40FSS	390	53X	2–5%FCBN	115	180
25	25S40F	300	15B	25S40FSS	300	15B	4X25S40FSS	450	53X	2–5%FCBN	115	180
Single Phase—600 Vac Primary 120/240 Vac Secondary, 60 Hz; UL/cULus Listed												
1	1S51F	21.2	7A	1S51FSS	21.2	7A	4X1S51FSS	48	51X	None	115	180
1.5	1.5S51F	30.1	8A	1.5S51FSS	30.1	8A	4X1.5S51FSS	55	51X	None	115	180
2	2S51F	39.1	9A	2S51FSS	39.1	9A	4X2S51FSS	55	51X	None	115	180
3	3S4F	60	10A	3S4FSS	60	10A	4X3S4FSS	75	52X	2–5%FCBN	115	180
5	5S4F	115	13B	5S4FSS	115	13B	4X5S4FSS	125	52X	2–5%FCBN	115	180
7.5	7S4F	135	13B	7S4FSS	135	13B	4X7S4FSS	150	52X	2–5%FCBN	115	180
10	10S4F	165	13B	10S4FSS	165	13B	4X10S4FSS	180	52X	2–5%FCBN	115	180
15	15S4F	225	15B	15S4FSS	225	15B	4X15S4FSS	390	53X	2–5%FCBN	115	180
25	25S4F	300	15B	25S4FSS	300	15B	4X25S4FSS	450	53X	2–5%FCBN	115	180
Single Phase—208 Vac Primary 120/240 Vac Secondary, 60 Hz; UL/cULus Listed												
1	1S7F	21.2	7A	1S7FSS	21.2	7A	4X1S7FSS	48	51X	None	115	180
1.5	1.5S7F	30.1	8A	1.5S7FSS	30.1	8A	4X1.5S7FSS	55	51X	None	115	180
2	2S7F	39.1	9A	2S7FSS	39.1	9A	4X2S7FSS	55	51X	None	115	180

[15] FCBN = Full Capacity Below Normal.
[16] Not for construction, Contact your local Schneider Electric representative for certified prints.
[17] For enclosure styles, see Table 14.9 Enclosure Dimensions and Accessories, page 14-8
[18] For enclosure styles, see Table 14.18 Enclosure Dimensions, page 14-12
[19] FCBN = Full Capacity Below Normal.

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Table 14.15 Resin Encapsulated Three and Single Phase Transformers (cont'd.)

kVA	Type 3R STD			Type 3R 304 Stainless			Type 4X 304 Stainless					
	Catalog No.	Weight (lbs)*[16]*	Enclosure *[17]*	Catalog No.	Weight (lbs)*[16]*	Enclosure *[18]*	Catalog No.	Weight (lbs)*[16]*	Enclosure *[18]*	Full Capacity Taps*[19]*	Deg C Temp. Rise	Insulation Class
3	3S60F	60	10A	3S60FSS	60	10A	4X3S60FSS	75	52X	2–5%FCBN	115	180
5	5S60F	115	13B	5S60FSS	115	13B	4X5S60FSS	125	52X	2–5%FCBN	115	180
7.5	7S60F	135	13B	7S60FSS	135	13B	4X7S60FSS	150	52X	2–5%FCBN	115	180
10	10S60F	165	13B	10S60FSS	165	13B	4X10S60FSS	180	52X	2–5%FCBN	115	180
15	15S60F	225	15B	15S60FSS	225	15B	4X15S60FSS	390	53X	2–5%FCBN	115	180
25	25S60F	300	15B	25S60FSS	300	15B	4X25S60FSS	450	53X	2–5%FCBN	115	180
Single Phase—277 Vac Primary 120/240 Vac Secondary, 60 Hz; UL/cULus Listed												
1	1S8F	21.2	7A	1S8FSS	21.2	7A	4X1S8FSS	48	51X	None	115	180
1.5	1.5S8F	30.1	8A	1.5S8FSS	30.1	8A	4X1.5S8FSS	55	51X	None	115	180
2	2S8F	39.1	9A	2S8FSS	39.1	9A	4X2S8FSS	55	51X	None	115	180
3	3S61F	60	10A	3S61FSS	60	10A	4X3S61FSS	75	52X	2–5%FCBN	115	180
5	5S61F	115	13B	5S61FSS	115	13B	4X5S61FSS	125	52X	2–5%FCBN	115	180
7.5	7S61F	135	13B	7S61FSS	135	13B	4X7S61FSS	150	52X	2–5%FCBN	115	180
10	10S61F	165	13B	10S61FSS	165	13B	4X10S61FSS	180	52X	2–5%FCBN	115	180
15	15S61F	225	15B	15S61FSS	225	15B	4X15S61FSS	390	53X	2–5%FCBN	115	180
25	25S61F	300	15B	25S61FSS	300	15B	4X25S61FSS	450	53X	2–5%FCBN	115	180

Table 14.16: Single-Phase—120/240 Vac Secondary 60 Hz; cULus Listed

kVA	240 x 480 Primary Catalog No.	Weight (lbs) *[16]*	Enclosure*[18]*	600 Primary Catalog No.	Weight (lbs) *[16]*	Enclosure*[18]*	Full Capacity Taps	Degree C Temperature Rise	Insulation Class
0.05	50SV1A	4.2	1A	50SV51A	4.2	1A	None	55	105
0.1	100SV1A	4.5	2A	100SV51A	4.5	2A	None	55	105
0.15	150SV1A	6.2	3A	150SV51A	6.2	3A	None	55	105
0.25	250SV1B	10.5	4A	250SV51B	10.5	4A	None	80	130
0.5	500SV1B	13.8	5A	500SV51B	13.8	5A	None	80	130
0.75	750SV1F	15.5	6A	750SV51F	15.5	6A	None	115	180

[16] Not for construction, Contact your local Schneider Electric representative for certified prints.
[17] For enclosure styles, see Table 14.9 Enclosure Dimensions and Accessories, page 14-8
[18] For enclosure styles, see Table 14.18 Enclosure Dimensions, page 14-12
[19] FCBN = Full Capacity Below Normal.

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Resin Encapsulated Export Model and Buck Boost Transformers

Single Phase Export Model

These general purpose transformers accommodate voltage systems world wide. Export model transformers 10 kVA and smaller, CE marked in addition to being cULus Listed. For CE marked transformers in other ratings, contact your local Schneider Electric representative for CE marked transformers up to 300 kVA, single and three phase.

Table 14.17: Single-Phase—110/220 Vac Secondary; 50/60 Hz; cULus Listed (240 x 480 Vac Primary to 120/240 Vac Secondary - 60 Hz only)

kVA	220 x 440 Primary Catalog No.	Weight (lbs)*[20]*	Enclosure*[21]*	Full Capacity Taps	Degree C Temperature Rise	Insulation Class
1	1S67F	21.2	7A	190/200/208/220 x 380/400/416/440	115	180
2	2S67F	39.1	9A	190/200/208/220 x 380/400/416/440	115	180
3	3S67F	55.2	10A	190/200/208/220 x 380/400/416/440	115	180
5	5S67F	135	13B	190/200/208/220 x 380/400/416/440	115	180
7.5	7S67F	165	13B	190/200/208/220 x 380/400/416/440	115	180
10	10S67F	165	13B	190/200/208/220 x 380/400/416/440	115	180

Sealed Single-Phase Buck and Boost

When buck and boost transformers are interconnected as an autotransformer, they can supply small changes in voltage. Wiring diagrams and sizing are available from catalog 7414CT0201 or www.buckboostcalculator.com.
Units can also be used as isolation transformers for:
120 x 240 to 12/24 or 16/32 and 240 x 480 to 24/48 by connecting using the diagram on the nameplate.
NOTE: When used to supply a three-phase four-wire load, the source must be three-phase four-wire.

kVA	120 x 240 Vac Primary 60 Hz		240 x 480 Vac Primary 60 Hz	Weight (lbs)*[20]*	Enclosure*[21]*	Degree C Temperature Rise	Insulation Class
	12/24 Vac Secondary	16/32 Vac Secondary	24/48 Vac Secondary				
0.05	50SV43A	50SV46A	50SV82A	4.2	1A	55	105
0.1	100SV43A	100SV46A	100SV82A	4.5	2A	55	105
0.15	150SV43A	150SV46A	150SV82A	6.2	3A	55	105
0.25	250SV43B	250SV46B	250SV82B	10.5	4A	80	130
0.5	500SV43B	500SV46B	500SV82B	13.8	5A	80	130
0.75	750SV43F	750SV46F	750SV82F	15.5	6A	115	180
1	1S43F	1S46F	1S82F	21.2	7A	115	180
1.5	1.5S43F	1.5S46F	1.5S82F	30.1	8A	115	180
2	2S43F	2S46F	2S82F	39.1	9A	115	180
3	3S43F	3S46F	3S82F	60	* See table 14.17 3 kVA Buck Boost	115	180

Style A—Type 3R Rated

Style B—Type 3R Rated

Style C—Type 3R Rated

Style X—Type 4X Rated

3 kVA Buck Boost

Table 14.18: Enclosure Dimensions

Enclosure Number/ Style		Height		Width		Depth		Mounting
		in.	mm	in.	mm	in.	mm	
1	A	5.00	127	4.47	114	3.44	87	Wall
2	A	5.50	140	4.47	114	3.44	87	Wall
3	A	5.00	127	4.85	123	3.75	95	Wall
4	A	5.50	140	5.23	133	4.06	103	Wall
5	A	6.19	157	6.19	157	4.69	119	Wall
6	A	6.69	170	6.19	157	4.69	119	Wall
7	A	8.13	270	6.94	176	5.31	135	Wall
8	A	8.25	210	8.68	220	6.56	167	Wall
9	A	9.56	243	8.68	220	6.56	167	Wall
10	A	10.50	267	8.62	219	6.50	165	Wall
11	A	12.56	319	8.62	219	6.50	165	Wall
*** 3 kVA Buck Boost**		14.5	—	8.62	—	6.5	—	—
12	C	13.50	343	14.75	375	9	229	Wall
13	B	14.75	375	9.75	248	11.75	298	Wall
14	C	14.75	375	19.1	485	2.25	311	Wall
15	B	20.00	508	15	381	13.5	343	Wall
16	C	22.00	559	25	635	13.5	343	Wall
51	X	9.5	24	10	25	7.75	20	Wall
52	X	12	30	13.75	35	13.75	35	Wall
53	X	24	61	21.5	55	16.38	42	Floor
54	X	23	58	25.5	65	13.75	35	Floor
55	X	31.5	80	31.5	80	16.25	41	Floor

These dimensions are not for construction. Contact you local Schneider Electric representative for certified prints.

Fingersafe™ terminal block cover kits for encapsulated transformers can be used to meet touch-safe requirements.

Enclosure	Kit Catlog Number	Description
7A (1 kVA)	7400ENT9	Terminal Block H1, H2, H3, H4, H5, H6, H7, H8, H9, H10 and X1, X2, X3, X4
9A (2 kVA)	7400ENT11	Terminal Block H1, H2, H3, H4, H5, H6, H7, H8, H9, H10 and X1, X2, X3, X4
10A (3 kVA)	7400ENT11	Terminal Block H1, H2, H3, H4, H5, H6, H7, H8, H9, H10 and X1, X2, X3, X4
13B (5–10 kVA)	7400ENT13	Terminal Block H1, H2, H3, H4, H5, H6, H7, H8, H9, H10 and X1, X2, X3, X4

[20] Not for construction, Contact your local Schneider Electric representative for certified prints.
[21] For enclosure styles, see Table 14.18 Enclosure Dimensions, page 14-12

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Non-Ventilated and Transformer House

Table 14.19: NV Three Phase; 60 Hz; 208Y/120 Vac Secondary *[22]*

kVA	Type 3R - IP 54 Catalog No.	Type 3R - IP 54 Catalog 304 Stainless Steel	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%IZ	Weight (lbs) *[23]*	Enclosure *[24]*
480 Vac Delta Primary, Aluminum Windings								
15	15T3HNV	15T3HNVSS	6–2.5%2+4–	150	220	2.8	—	—
30	30T3HNV	30T3HNVSS	6–2.5%2+4–	150	220	3.5	340	19E
45	45T3HNV	45T3HNVSS	6–2.5%2+4–	150	220	3.3	510	19E
75	75T3HNV	75T3HNVSS	6–2.5%2+4–	150	220	2.5	1025	22E
112.5	112T3HNV	112T3HNVSS	6–2.5%2+4–	150	220	3.3	1250	24E
150	150T3HNV	150T3HNVSS	6–2.5%2+4–	150	220	2.9	2000	25E
225	225T3HNV	225T3HNVSS	6–2.5%2+4–	150	220	4.3	2100	30E
300	300T3HNV	300T3HNVSS	6–2.5%2+4–	150	220	2.8	3950	31E

Table 14.20: NV Single Phase; 60 Hz; 120/240 Vac Secondary *[22]*

kVA	Type 3R - IP 54 Catalog No.	Type 3R - IP 54 Catalog 304 Stainless Steel	Full Capacity Taps	Degree C Temp. Rise	Insulation Class	%IZ	Weight (lbs) *[23]*	Enclosure *[24]*
240 x 480 Vac Primary, Aluminum Windings								
15	15S3HNV	15S3HNVSS	480 Vac 6 - 2.5% 2+4- 240 Vac 3 -5% 1+2-	150	220	4.4	230	17E
25	25S3HNV	25S3HNVSS		150	220	4.1	310	18E
37.5	37S3HNV	37S3HNVSS		150	220	4.4	350	18E
50	50S3HNV	50S3HNVSS		150	220	3.1	450	21E
75	75S3HNV	75S3HNVSS		150	220	2.9	880	24E
100	100S3HNV	100S3HNVSS		150	220	1.7	975	25E

Style E—IP55 Rated

Table 14.21: Enclosure Dimensions and Accessories

Enclosure Number/ Style		Height in.	Height mm	Width in.	Width mm	Depth in.	Depth mm	Mounting	Wall Mounting Bracket	Ceiling Mounting Bracket	Insulation Class oC
17	E	27	686	20	508	16	406	Floor	WMB361362	CMB363	220
18	E	30	762	20	508	20	508	Floor	WMB363364	CMB363	220
19	E	30	762	30	762	20	508	Floor	WMB363364	CMB364	220
21	E	37	940	30	762	24	610	Floor	—	CMB364	220
22	E	43.75	1111	32	813	27	686	Floor	—	CMB380	220
24	E	49.5	1257	35	889	28.5	724	Floor	—	CMB381	220
25	E	49.5	1257	41	1041	32	813	Floor	—	—	220
26	E	57.5	1461	41	1041	32	813	Floor	—	—	220
28	E	60	1524	56	1422	36	914	Floor	—	—	220
29	E	68	1727	56	1422	36	914	Floor	—	—	220
30	E	71	1803	48	1219	36	914	Floor	—	—	220
31	E	74	1880	56	1422	40.5	1029	Floor	—	—	220

These dimensions are not for construction. Contact your local Schneider Electric representative for certified prints.

PZC Transformer Enclosures

Power Zone Center house is installed over the standard ventilated units to provide additional security and environmental protection.

Type 3R enclosure Option # 1 constructed of 304 stainless steel for corrosive protection.

Designed to allow energy efficient transformers to be installed in environments requiring more protection.

Type 3R enclosure Option # 2 constructed of painted galvanized for safety

Designed to allow energy efficient transformers to be secured with a padlockable handle for security, which is ideal for school yards.

PZC transformer enclosures are shipped separately from transformers so they can be pre-installed on the job site.

Four standard enclosures of each type material are available for installation of transformer enclosure types D and H.

Drawings are in the Classic Technical Library. Search by catalog number, which is the same as the drawing number.

Table 14.22: Stainless Steel Option

Catalog No.	L	W	H	Weight	Enclosure
7400SS3R-001	3'-8"	3'-4"	4'-9"	450 lbs	17D, 17H, 18D, 18H, 19D, 20D, 21D, 22D
7400SS3R-002	4'-6"	3'-9"	6'-0"	500 lbs	24D, 25D, 26D, 36D, 37D
7400SS3R-003	5'-8"	4'-1"	7'-0"	550 lbs	28D, 29D, 30D, 38D
7400SS3R-004	6'-4"	4'-9"	7'-10"	600 lbs	31D, 45D

Table 14.23: Painted Galvanized Option

Catalog No.	L	W	H	Weight	Enclosure
7400PG3R-001	3'-8"	3'-4"	4'-9"	450 lbs	17D, 17H, 18D, 18H, 19D, 20D, 21D, 22D
7400PG3R-002	4'-6"	3'-9"	6'-0"	500 lbs	24D, 25D, 26D, 36D, 37D
7400PG3R-003	5'-8"	4'-1"	7'-0"	550 lbs	28D, 29D, 30D, 38D
7400PG3R-004	6'-4"	4'-9"	7'-10"	600 lbs	31D, 45D

[22] Lugs are furnished by customer.
[23] Not for construction, Contact your local Schneider Electric representative for certified prints.
[24] For enclosure styles, see Table 14.21 Enclosure Dimensions and Accessories, page 14-13

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Type T and Type TF

Type T transformers are designed with low impedance windings for excellent voltage regulation and can accommodate the high inrush current associated with contactors, starters, solenoids, and relays. Type T transformers are manufactured using the most advanced insulating materials and are the best choice if size and cost are of concern.

Type TF transformers include factory-installed primary and secondary fuse blocks. Type TF transformers consist of two primary fuse blocks and one secondary fuse block. The primary includes rejection-style clips to increase the AIC ratings for the fuses. Since the fuse blocks are mounted on the top of the transformer, Type TF transformers are interchangeable with Type T transformers except for their increased height.

Selection Guide

1. Determine the inrush and sealed VA of each coil in the control circuit and the VA of all other components.
2. Total the **sealed** VA of all operating coils and the VA of all other loads. (This determines the minimum VA size required for the circuit.)
3. Total the **inrush** VA of all coils that are starting at the same time and all loads and coils that are running.
4. Locate a value in the VA column ofTable 14.24 Regulation Chart for Type T, page 14-14, shown below, that is **equal to** or **greater than** the value calculated in step 2.
5. In the VA row selected in step 4, find the inrush value under the appropriate voltage regulation column ofTable 14.24 Regulation Chart for Type T, page 14-14, shown below. If this value is **greater than** the calculated value from step 3, this is the correct transformer VA rating.

   If the inrush value on the selected VA row is **not greater than** the calculated value from step 3, use the next higher transformer VA rating, that is, the rating on the next row.

If your supply voltage is stable and fluctuates less than 5%, Schneider Electric recommends you use the 90% secondary voltage column. If your supply voltage is not stable and fluctuates more than 10% we recommend you use the 95% secondary voltage column. We recommend that you never use the 85% secondary voltage column since magnetic devices lose life expectancy if they are continuously started at 85% of rated voltage.

Table 14.24: Regulation Chart for Type T

VA	Inrush VA @ 20% power factor			Inrush VA @ 40% power factor		
	95% Secondary Voltage	90% Secondary Voltage	85% Secondary Voltage	95% Secondary Voltage	90% Secondary Voltage	85% Secondary Voltage
50	193	266	339	151	215	282
75	271	396	20	210	318	430
100	339	499	659	266	404	549
150	666	893	1120	529	731	942
200	588	815	1041	459	659	866
250	1416	1910	2388	1057	1494	1936
300	1634	2184	2709	1194	1681	2169
350	1894	2592	3261	1392	2005	621
500	3197	4104	4981	2374	3195	4019
750	3770	5515	7231	2887	4391	5945
1000	6587	9079	11430	4706	6886	9051
1500	19324	23983	28607	15066	19361	23756
2000	31384	38777	6161	24794	31630	38667
3000	26539	39934	52713	19355	30721	42216
5000	53111	85265	116277	39368	66309	93882

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Table 14.25: 240 x 480 V Primary, 120 V Secondary; 230 x 460 V Primary, 115 V Secondary; 220 x 440 V Primary, 110 V Secondary

VA		Type T	Type TF	Weight	Height				Width		Depth		Acce-sory Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D1	9070TF25D1	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D1	9070TF50D1	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D1	9070TF75D1	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D1	9070TF100D1	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D1	9070TF150D1	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D1	9070TF200D1	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D1	9070TF250D1	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D1	9070TF300D1	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D1	9070TF350D1	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D1	9070TF500D1	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D1	9070TF750D1	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D1	9070TF1000D1	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D1	9070TF1500D1	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D1	9070TF2000D1	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D1	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D1	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.26: 208 Vac Primary, 120 Vac Secondary

VA		Type T	Type TF	Weight	Height				Width		Depth		Acce-sory Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D3	9070TF25D3	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D3	9070TF50D3	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D3	9070TF75D3	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D3	9070TF100D3	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D3	9070TF150D3	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D3	9070TF200D3	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D3	9070TF250D3	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D3	9070TF300D3	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D3	9070TF350D3	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D3	9070TF500D3	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D3	9070TF750D3	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D3	9070TF1000D3	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D3	9070TF1500D3	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D3	9070TF2000D3	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D3	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D3	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.27: 600 Vac Primary, 120 Vac Secondary

VA		Type T	Type TF	Weight	Height				Width		Depth		Acce-sory Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D5	9070TF25D5	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D5	9070TF50D5	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D5	9070TF75D5	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D5	9070TF100D5	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D5	9070TF150D5	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D5	9070TF200D5	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D5	9070TF250D5	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D5	9070TF300D5	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D5	9070TF350D5	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D5	9070TF500D5	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D5	9070TF750D5	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D5	9070TF1000D5	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D5	9070TF1500D5	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D5	9070TF2000D5	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D5	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D5	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.28: 277 Vac Primary, 120 Vac Secondary

VA		Type T	Type TF*[1]*	Weight	Height				Width		Depth		Acce-sory Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D4	—	2.5	2.58	66	—	—	3.00	76	3.09	79	FSC1
50	50	9070T50D4	—	2.5	2.58	66	—	—	3.00	76	3.09	79	FSC1
75	75	9070T75D4	—	3.8	2.89	73	—	—	3.38	86	3.34	85	FSC1
100	100	9070T100D4	—	3.8	2.89	73	—	—	3.38	86	3.34	85	FSC1
150	150	9070T150D4	—	5.5	3.20	81	—	—	3.75	95	3.59	91	FSC1
200	200	9070T200D4	—	5.5	3.20	81	—	—	3.75	95	3.59	91	FSC1
250	160	9070T250D4	—	7.1	3.20	81	—	—	3.75	95	5.30	135	FSC2
300	200	9070T300D4	—	8.5	3.84	98	—	—	4.50	114	4.74	120	FSC2
350	250	9070T350D4	—	10.5	3.84	98	—	—	4.50	114	5.11	130	FSC2
500	300	9070T500D4	—	11.9	3.84	98	—	—	4.50	114	5.49	139	FSC2
750	500	9070T750D4	—	11.0	4.51	115	—	—	5.25	133	5.61	143	FSC2
1000	630	9070T1000D4	—	20.6	4.51	115	—	—	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D4	—	34.0	6.17	157	—	—	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D4	—	47.0	6.17	157	—	—	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D4	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D4	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

[1] TF units are design for line to line voltages on the primary, 277 Vac is a line to neutral voltage.

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Table 14.29: 240 x 480 V Primary, 120/240 V Secondary; 230 x 460 V Primary, 115/230 V Secondary; 220 x 440 V Primary, 110/220 V Secondary

VA		Type T	Type TF[2]	Weight	Height				Width		Depth		Acce-sory Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D31	9070TF25D31	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D31	9070TF50D31	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D31	9070TF75D31	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D31	9070TF100D31	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D31	9070TF150D31	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D31	9070TF200D31	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D31	9070TF250D31	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D31	9070TF300D31	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D31	9070TF350D31	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D31	9070TF500D31	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D31	9070TF750D31	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D31	9070TF1000D31	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D31	9070TF1500D31	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D31	9070TF2000D31	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D31	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D31	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.30: 600 Vac Primary, 120/240 Vac Secondary

VA		Type T	Type TF[2]	Weight	Height				Width		Depth		Acce-sory Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D37	9070TF25D37	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D37	9070TF50D37	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D37	9070TF75D37	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D37	9070TF100D37	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D37	9070TF150D37	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D37	9070TF200D37	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D37	9070TF250D37	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D37	9070TF300D37	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D37	9070TF350D37	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D37	9070TF500D37	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D37	9070TF750D37	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D37	9070TF1000D37	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D37	9070TF1500D37	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D37	9070TF2000D37	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D37	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D37	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.31: 380/400/415 Vac Primary, 115/230 Vac Secondary

VA		Type T	Type TF	Weight	Height				Width		Depth		Acce-sory Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
25	25	9070T25D33	9070TF25D33	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
50	50	9070T50D33	9070TF50D33	2.5	2.58	66	4.00	102	3.00	76	3.09	79	FSC1
75	75	9070T75D33	9070TF75D33	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D33	9070TF100D33	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
150	150	9070T150D33	9070TF150D33	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D33	9070TF200D33	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
250	160	9070T250D33	9070TF250D33	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
300	200	9070T300D33	9070TF300D33	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
350	250	9070T350D33	9070TF350D33	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
500	300	9070T500D33	9070TF500D33	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
750	500	9070T750D33	9070TF750D33	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
1000	630	9070T1000D33	9070TF1000D33	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D33	9070TF1500D33	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D33	9070TF2000D33	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D33	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D33	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Field Installed Fuse Blocks—Design for Line to Line Primary Voltages and Line to Neutral Secondary Voltages

Table 14.32: Accessories

Catalog No.	Voltage Codes			Description	Order Qty
Fuse Kit					
—	D1, D2, D3, D4, D5, D13, D14,D15, D23, D31, D33, D37	D20, D32	D19, D50	—	—
9070FB3A	T25–T200	T25–T150	—	3-pole fuse block for primary and secondary fusing, accommodates 1-1/2 x 13/32 in. midget fuse (2 rejection and 1 non-rejection)	1
9070FB3B	T250–T3000	T250–T2000	T25–T2000		1
9070FB2A	T25–T200	T25–T150		2-pole fuse block for primary fusing, accommodates 1-1/2 x 13/32 in. midget fuse (2 rejection)	1
9070FB2B	T250–T3000	T250–T2000	T25–T2000		1
9070SF25A	T25–T200	T25–T150		Secondary fuse clips accommodates 1-1/4 x 1/4 in. fuse	10
9070SF25B	T250–T3000	T250–T2000	T25–T2000		10
9070SF41A	T25–T200	T25–T150		Secondary fuse clips accommodates 1-1/2 x 13/32 in. fuse	10
9070SF41B	T250–T3000	T250–T2000	T25–T2000		10
9070FB1A	T25–T200	T25–T150		Secondary fuse block accommodates 1-1/4 x 1/4 in. fuse	1
9070FB1B	T250–T3000	T250–T2000	T25–T2000		1
9070FP1	—	—	—	Fuse puller for TF and FB kits	10

[2] TF designed for line to line primary and line to neutral secondary. If secondary connected in series, fuse block should be disconnected.

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Table 14.33: 208/230/460 Vac Primary, 115 Vac Secondary

VA		Type T	Type TF	Weight	Height				Width		Depth		Acce-sory Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
50	50	9070T50D20	9070TF50D20	4.0	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
75	75	9070T75D20	9070TF75D20	5.5	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D20	9070TF100D20	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
150	150	9070T150D20	9070TF150D20	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D20	9070TF200D20	8.5	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
250	160	9070T250D20	9070TF250D20	10.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
300	200	9070T300D20	9070TF300D20	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
350	250	9070T350D20	9070TF350D20	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
500	300	9070T500D20	9070TF500D20	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
750	500	9070T750D20	9070TF750D20	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1000	630	9070T1000D20	9070TF1000D20	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
1500	1000	9070T1500D20	9070TF1500D20	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
2000	1500	9070T2000D20	9070TF2000D20	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
3000	2000	9070T3000D20	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.34: 240/480/600 V Primary, 120 V Secondary; 230/460/575 V Primary, 115 V Secondary; 220/440/550 V Primary to 110 V Secondary

VA		Type T	Type TF	Weight	Height				Width		Depth		Acce-sory Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
50	50	9070T50D32	9070TF50D32	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
75	75	9070T75D32	9070TF75D32	3.8	2.89	73	4.18	106	3.38	86	3.34	85	FSC1
100	100	9070T100D32	9070TF100D32	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
150	150	9070T150D32	9070TF150D32	5.5	3.20	81	4.50	114	3.75	95	3.59	91	FSC1
200	200	9070T200D32	9070TF200D32	7.1	3.20	81	4.50	114	3.75	95	5.30	135	FSC2
250	160	9070T250D32	9070TF250D32	8.5	3.84	98	5.13	130	4.50	114	4.74	120	FSC2
300	200	9070T300D32	9070TF300D32	10.5	3.84	98	5.13	130	4.50	114	5.11	130	FSC2
350	250	9070T350D32	9070TF350D32	11.9	3.84	98	5.13	130	4.50	114	5.49	139	FSC2
500	300	9070T500D32	9070TF500D32	11.0	4.51	115	5.80	147	5.25	133	5.61	143	FSC2
750	500	9070T750D32	9070TF750D32	20.6	4.51	115	5.80	147	5.25	133	6.30	160	FSC2
1000	630	9070T1000D32	9070TF1000D32	34.0	6.17	157	7.46	190	7.06	179	5.92	150	FSC2
1500	1000	9070T1500D32	9070TF1500D32	47.0	6.17	157	7.46	190	7.06	179	7.17	182	FSC2
2000	1500	9070T2000D32	9070TF2000D32	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
3000	2000	9070T3000D32	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.35: 240/416/480/600 Vac Primary, 99/120/130 Vac Secondary; 230/400/460/575 Vac Primary, 95/115/125 Vac Secondary; 220/380/440/550 Vac Primary, 90/110/120 Vac Secondary; 208/360/416/520 Vac Primary, 85/104/115 Vac Secondary

VA		Type T	Type TF	Weight	Height				Width		Depth		Acce-sory Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
50	50	9070T50D50	9070TF50D50	4.0	2.89	73	4.19	106	3.38	86	4.43	113	FSC23
75	75	9070T75D50	9070TF75D50	7.2	3.20	81	4.50	114	3.75	95	4.70	119	FSC23
100	100	9070T100D50	9070TF100D50	7.1	3.20	81	4.50	114	3.75	95	4.70	119	FSC23
150	150	9070T150D50	9070TF150D50	8.5	3.84	98	5.14	131	4.50	114	4.74	120	FSC23
200	200	9070T200D50	9070TF200D50	10.5	3.84	98	5.14	131	4.50	114	5.11	130	FSC23
250	160	9070T250D50	9070TF250D50	10.5	3.84	98	5.14	131	4.50	114	5.11	130	FSC23
300	200	9070T300D50	9070TF300D50	11.9	3.84	98	5.14	131	4.50	114	5.49	139	FSC23
350	250	9070T350D50	9070TF350D50	11.0	4.51	115	5.81	148	5.25	133	5.61	143	FSC23
500	300	9070T500D50	9070TF500D50	11.0	4.51	115	5.81	148	5.25	133	5.61	143	FSC23
750	500	9070T750D50	9070TF750D50	20.6	4.51	115	5.81	148	5.25	133	6.3.	160	FSC23
1000	630	9070T1000D50	9070TF1000D50	34.0	6.17	157	7.47	190	7.06	179	5.92	150	FSC23
1500	1000	9070T1500D50	9070TF1500D50	47.0	6.17	157	7.47	190	7.06	179	7.17	182	FSC23
2000	1500	9070T2000D50	9070TF2000D50	60.0	7.63	194	8.93	227	9.00	229	6.38	162	FSC23

Table 14.36: 240 x 480 Vac Primary, 120/24 Vac Secondary (24 Vac limited to 20% of nameplate VA)

VA		Type T	Type TF	Weight	Height				Width		Depth		Acce-sory Finger-safe Covers
					Type T		Type TF						
UL/CSA/NOM	CE	Catalog No.			in.	mm	in.	mm	in.	mm	in.	mm	
50	50	9070T50D15	—	2.5	2.58	66	—	—	3.00	76	3.09	79	FSC1
75	75	9070T75D15	—	3.8	2.89	73	—	—	3.38	86	3.34	85	FSC1
100	100	9070T100D15	—	3.8	2.89	73	—	—	3.38	86	3.34	85	FSC1
150	150	9070T150D15	—	5.5	3.20	81	—	—	3.75	95	3.59	91	FSC1
200	200	9070T200D15	—	5.5	3.20	81	—	—	3.75	95	3.59	91	FSC1
250	160	9070T250D15	—	7.1	3.20	81	—	—	3.75	95	5.30	135	FSC2
300	200	9070T300D15	—	8.5	3.84	98	—	—	4.50	114	4.74	120	FSC2
350	250	9070T350D15	—	10.5	3.84	98	—	—	4.50	114	5.11	130	FSC2
500	300	9070T500D15	—	11.9	3.84	98	—	—	4.50	114	5.49	139	FSC2
750	500	9070T750D15	—	11.0	4.51	115	—	—	5.25	133	5.61	143	FSC2
1000	630	9070T1000D15	—	20.6	4.51	115	—	—	5.25	133	6.30	160	FSC2
1500	1000	9070T1500D15	—	34.0	6.17	157	—	—	7.06	179	5.92	150	FSC2
2000	1500	9070T2000D15	—	47.0	6.17	157	—	—	7.06	179	7.17	182	FSC2
3000	2000	9070T3000D15	—	60.0	8.75	222	—	—	9.00	229	7.24	184	FSC2
5000	3000	9070T5000D15	—	89.0	8.75	222	—	—	9.00	229	9.15	232	FSC2

Table 14.37: Accessories

Catalog No.	Voltage Codes			Description	Order Qty
—	D1, D2, D3, D4, D5, D13, D14,D15, D23, D31, D33, D37	D20, D32	D19, D50	—	—
9070FSC1	T25–T200	T25–T150	—	2 covers per kit	10
9070FSC2	T250–T5000	T250–T5000	—	2 covers per kit	10
9070FSC23	—	—	T25–T5000	2 covers per kit	10

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Table 14.38: 240 x 480 Vac Primary, 24 Vac Secondary

VA		Type T	Weight	Height		Width		Depth		Accesory Fingersafe Covers
				Type T						
UL/CSA/NOM	CE	Catalog No.		in.	mm	in.	mm	in.	mm	
50	50	9070T50D2	2.5	2.58	66	3.00	76	3.09	79	FSC1
75	75	9070T75D2	3.8	2.89	73	3.38	86	3.34	85	FSC1
100	100	9070T100D2	3.8	2.89	73	3.38	86	3.34	85	FSC1
150	150	9070T150D2	5.5	3.20	81	3.75	95	3.59	91	FSC1
200	200	9070T200D2	5.5	3.20	81	3.75	95	3.59	91	FSC1
250	160	9070T250D2	7.1	3.20	81	3.75	95	5.30	135	FSC2
300	200	9070T300D2	8.5	3.84	98	4.50	114	4.74	120	FSC2
350	250	9070T350D2	10.5	3.84	98	4.50	114	5.11	130	FSC2
500	300	9070T500D2	11.9	3.84	98	4.50	114	5.49	139	FSC2
750	500	9070T750D2	11.0	4.51	115	5.25	133	5.61	143	FSC2
1000	630	9070T1000D2	20.6	4.51	115	5.25	133	6.30	160	FSC2

Table 14.39: 208 Vac Primary, 24 Vac Secondary

VA		Type T	Weight	Height		Width		Depth		Accesory Fingersafe Covers
				Type T						
UL/CSA/NOM	CE	Catalog No.		in.	mm	in.	mm	in.	mm	
50	50	9070T50D14	2.5	2.58	66	3.00	76	3.09	79	FSC1
75	75	9070T75D14	3.8	2.89	73	3.38	86	3.34	85	FSC1
100	100	9070T100D14	3.8	2.89	73	3.38	86	3.34	85	FSC1
150	150	9070T150D14	5.5	3.20	81	3.75	95	3.59	91	FSC1
200	200	9070T200D14	5.5	3.20	81	3.75	95	3.59	91	FSC1
250	160	9070T250D14	7.1	3.20	81	3.75	95	5.30	135	FSC2
300	200	9070T300D14	8.5	3.84	98	4.50	114	4.74	120	FSC2
350	250	9070T350D14	10.5	3.84	98	4.50	114	5.11	130	FSC2
500	300	9070T500D14	11.9	3.84	98	4.50	114	5.49	139	FSC2
750	500	9070T750D14	11.0	4.51	115	5.25	133	5.61	143	FSC2
1000	630	9070T1000D14	20.6	4.51	115	5.25	133	6.30	160	FSC2

Table 14.40: 120 x 240 Vac Primary, 24 Vac Secondary

VA		Type T	Weight	Height		Width		Depth		Accesory Fingersafe Covers
				Type T						
UL/CSA/NOM	CE	Catalog No.		in.	mm	in.	mm	in.	mm	
50	50	9070T50D23	2.5	2.58	66	3.00	76	3.09	79	FSC1
75	75	9070T75D23	3.8	2.89	73	3.38	86	3.34	85	FSC1
100	100	9070T100D23	3.8	2.89	73	3.38	86	3.34	85	FSC1
150	150	9070T150D23	5.5	3.20	81	3.75	95	3.59	91	FSC1
200	200	9070T200D23	5.5	3.20	81	3.75	95	3.59	91	FSC1
250	160	9070T250D23	7.1	3.20	81	3.75	95	5.30	135	FSC2
300	200	9070T300D23	8.5	3.84	98	4.50	114	4.74	120	FSC2
350	250	9070T350D23	10.5	3.84	98	4.50	114	5.11	130	FSC2
500	300	9070T500D23	11.9	3.84	98	4.50	114	5.49	139	FSC2
750	500	9070T750D23	11.0	4.51	115	5.25	133	5.61	143	FSC2
1000	630	9070T1000D23	20.6	4.51	115	5.25	133	6.30	160	FSC2

Table 14.41: 120 Vac Primary, 12/24 Vac Secondary

VA		Type T	Weight	Height		Width		Depth		Accesory Fingersafe Covers
				Type T						
UL/CSA/NOM	CE	Catalog No.		in.	mm	in.	mm	in.	mm	
50	50	9070T50D13	2.5	2.58	66	3.00	76	3.09	79	FSC1
75	75	9070T75D13	3.8	2.89	73	3.38	86	3.34	85	FSC1
100	100	9070T100D13	3.8	2.89	73	3.38	86	3.34	85	FSC1
150	150	9070T150D13	5.5	3.20	81	3.75	95	3.59	91	FSC1
200	200	9070T200D13	5.5	3.20	81	3.75	95	3.59	91	FSC1
250	160	9070T250D13	7.1	3.20	81	3.75	95	5.30	135	FSC2
300	200	9070T300D13	8.5	3.84	98	4.50	114	4.74	120	FSC2
350	250	9070T350D13	10.5	3.84	98	4.50	114	5.11	130	FSC2
500	300	9070T500D13	11.9	3.84	98	4.50	114	5.49	139	FSC2
750	500	9070T750D13	11.0	4.51	115	5.25	133	5.61	143	FSC2
1000	630	9070T1000D13	20.6	4.51	115	5.25	133	6.30	160	FSC2

Table 14.42: 208/240/277/380/480 Vac Primary, 24 Vac Secondary

VA		Type T	Weight	Height		Width		Depth		Accesory Fingersafe Covers
				Type T						
UL/CSA/NOM	CE	Catalog No.		in.	mm	in.	mm	in.	mm	
50	50	9070T50D19	4.0	2.89	106	3.38	86	3.34	85	FSC23
75	75	9070T75D19	5.5	2.89	106	3.38	86	3.34	85	FSC23
100	100	9070T100D19	5.5	3.20	114	3.75	95	3.59	91	FSC23
150	150	9070T150D19	5.5	3.20	114	3.75	95	3.59	91	FSC23
200	200	9070T200D19	8.5	3.20	114	3.75	95	5.30	135	FSC23
250	160	9070T250D19	10.5	3.84	130	4.50	114	4.74	120	FSC23
300	200	9070T300D19	10.5	3.84	130	4.50	114	5.11	130	FSC23
350	250	9070T350D19	11.9	3.84	130	4.50	114	5.49	139	FSC23
500	300	9070T500D19	11.0	4.51	147	5.25	133	5.61	143	FSC23
750	500	9070T750D19	20.6	4.51	147	5.25	133	6.30	160	FSC23
1000	630	9070T1000D19	34.0	6.17	190	7.06	179	5.92	150	FSC23

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Transformer disconnects are available in NEMA Type 1 Standard, NEMA Type 12 Standard, and NEMA Type 1 Mini.

Transformer Disconnects for NEMA Type 1 and Type 12 Enclosures

Square D™ brand transformer disconnects mount inside or outside a control system enclosure. The transformer disconnect being connected directly to the 480 Vac system controls power for auxiliary, single-phase loads when the main three-phase disconnect is either ON or OFF. The transformer disconnect is normally wired to the line side of the control panel's main disconnect.

This convenient source of 120 Vac power can be used for auxiliary or isolated loads, such as panel lighting, portable power tools, and programmable controller equipment.

Units consist of copper-wound transformers, a disconnect switch, and primary and secondary fuse blocks. All blocks are installed in NEMA Type 1 or Type 12 enclosures.

Transformer disconnects are UL Listed. Use Square D™ brand Type TF industrial control transformers and Square D™ brand disconnect switches.

Multiple enclosure options and accessories are available. See catalog 9070CT0301 or contact your local Schneider Electric representative or distributor.

- Standard NEMA Type 1
- Mini NEMA Type 1
- Compact NEMA Type 1
- NEMA Type 12

Table 14.43: Transformer Disconnects

VA	Catalog No.	Catalog No.	Enclosure	H		W		D		Weight (lbs)
	Without Outlet	With Outlet		in.	mm	in.	mm	in.	mm	
NEMA Type 1 Enclosure, 240 x 480 Vac Primary, 120 Vac Secondary (Compact Design)										
100	9070MN100G0D1	9070MN100G0D1G13	G0	7.00	178	11.30	287	7.81	198	16
250	9070MN250G0D1	9070MN250G0D1G13	G0	7.00	178	11.30	287	7.81	198	21
500	9070MN500G0D1	9070MN500G0D1G13	G0	7.00	178	11.30	287	7.81	198	24
750	9070SK750G3D1	9070SK750G3D1G13	G3	13.40	340	14.80	376	10.21	259	47
1000	9070SK1000G3D1	9070SK1000G3D1G13	G3	13.40	340	14.80	376	10.21	259	51
1500	9070SK1500G3D1	9070SK1500G3D1G13	G3	13.40	340	14.80	376	10.21	259	65
2000	9070SK2000G3D1	9070SK2000G3D1G13	G3	13.40	340	14.80	376	10.21	259	71
3000	9070SK3000G3D1	9070SK3000G3D1G13	G3	13.40	340	14.80	376	10.21	259	85
NEMA Type 1 Enclosure, 240 x 480 Vac Primary, 120 Vac Secondary										
250	9070SK250G1D1	9070SK250G1D1G13	G1	9.40	239	11.80	300	8.96	228	26
500	9070SK500G1D1	9070SK500G1D1G13	G1	9.40	239	11.80	300	8.96	228	28
750	9070SK750G1D1	9070SK750G1D1G13	G1	9.40	239	11.80	300	8.96	228	33
1000	9070SK1000G1D1	9070SK1000G1D1G13	G1	9.40	239	11.80	300	8.96	228	37
1500	9070SK1500G2D1	9070SK1500G2D1G13	G2	13.40	340	14.80	376	12.21	310	67
2000	9070SK2000G2D1	9070SK2000G2D1G13	G2	13.40	340	14.80	376	12.21	310	73
3000	9070SK3000G2D1	9070SK3000G2D1G13	G2	13.40	340	14.80	376	12.21	310	87
NEMA Type 1 Enclosure, 480 Vac Primary, 120 Vac Secondary										
5000	9070SK5000G4D9	9070SK5000G4D9G13	G4	16.90	429	18.20	462	14.50	368	125
NEMA Type 12 Enclosure, 240 x 480 Vac Primary, 120 Vac Secondary										
250	9070SK250A2D1	9070SK250A2D1G13	A2	16.50	419	14.50	368	13.50	343	46
500	9070SK500A2D1	9070SK500A2D1G13	A2	16.50	419	14.50	368	13.50	343	49
750	9070SK750A2D1	9070SK750A2D1G13	A2	16.50	419	14.50	368	13.50	343	53
1000	9070SK1000A2D1	9070SK1000A2D1G13	A2	16.50	419	14.50	368	13.50	343	58
1500	9070SK1500A2D1	9070SK1500A2D1G13	A2	16.50	419	14.50	368	13.50	343	79
2000	9070SK2000A2D1	9070SK2000A2D1G13	A2	16.50	419	14.50	368	13.50	343	85
3000	9070SK3000A2D1	9070SK3000A2D1G13	A2	16.50	419	14.50	368	13.50	343	99
NEMA Type 12 Enclosure, 240 x 480 Vac Primary, 120 Vac Secondary, Flange Switch										
250	9070SK250A3D1	9070SK250A3D1G13	A3	15.50	394	17.00	432	10.00	254	48
500	9070SK500A3D1	9070SK500A3D1G13	A3	15.50	394	17.00	432	10.00	254	53
750	9070SK750A3D1	9070SK750A3D1G13	A3	15.50	394	17.00	432	10.00	254	57
1000	9070SK1000A3D1	9070SK1000A3D1G13	A3	15.50	394	17.00	432	10.00	254	61
1500	9070SK1500A3D1	9070SK1500A3D1G13	A3	15.50	394	17.00	432	10.00	254	75
2000	9070SK2000A3D1	9070SK2000A3D1G13	A3	15.50	394	17.00	432	10.00	254	86

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Voltage Transformers

Schneider Electric offers three models of voltage transformers, each suited for a particular application:

- Model 450R
  - Applications requiring accurate voltage measurement within the 0.3% accuracy class
  - Switchboards with 1% instrumentation
- Model 460R
  - Applications with less critical accuracy and low burden requirements
  - Transducers and other panelboard monitoring
- Model 470R
  - Extremely accurate voltage measurement
  - Low burden applications, such as PLC modules and similar, high-impedance electronic devices

Table 14.44: Voltage Transformers

Application	Model Number	Accuracy/Burden and Thermal Rating	Primary Voltages (120 Vac Secondary)
Large burden	450R	0.3 W, X, M, Y; 500 VA Thermal	120–600 Vac
Small burden	460R	0.6 W, 1.2X; 150 VA Thermal	120–600 Vac
Small burden	470R	0.3W, 1.2X; 150 VA Thermal	120–600 Vac

Current Transformers

Current transformers are low cost, compact units that offer good electrical performance in a general purpose transformer.

- They are very easy to mount on the conductors.
- All current transformers feature permanent polarity marks molded into the case.

The following types of current transformers are available:

- General purpose
- Toroidal (single ratio)
- Rectangle window (single ratio)
- Split core
- Bushing (single ratio) (multi-ratio)

For part numbers, see Section 6 of the Supplemental Digest or see the Schneider Electric Product Configurator.

Contact your local Schneider Electric representative for other available features.

Table 14.45: Current Transformers

Window Diameter		Model Number	Usual Application			Primary Range in Amperes *[1]*	UL Recognized Product
in.	mm		Metering	Metering or Control Relaying	High Output Relaying		
1.3	28	2NR	X	—	—	50–300	Yes
1.56	40	5NR	X	—	—	100–600	
		54R	X	—	—	100–600	
1.94	49	64R	X	—	—	100–750	
		66R	—	X	—	100–750	
2.25	57	7RL	—	—	—	50–1500	
		7RT	—	—	—	50–1500 150–1500 *[2]*	
2.34	59	74R	X	—	—	200–1500	
		76R	—	X	—	200–1500	
2.50	63	74RFT	—	—	—	—	
		180R	—	X	—	100–1500	
		200R	—	X	—	100–600	
3.50	89	201R	—	X	—	100–800	
4.00	102	100R	—	X	—	200–2000	
		110R	—	X	—	200–2000	
4.25	108	170R	—	X	—	200–2000	
4.50	114	312R	—		X	600–4000	
		202R	—	X	X	100–1000	
5.25	133	203R	—	X	—	100–3000	
5.75	146	120R	—	X	—	200–3000	
6.25	159	210R	—	X	X	200–3000	
6.88	175	151R	—		X	600–4000	
		152R	—	X	X	50–4000	
8.13	206	140R	—	X	X	50–6000	
2.12 x 4.25	54 x 108	260R	X	—	—	100–4000	
3.50 x 6.25	89 x 159	273	X	—	—	200–4000	
3.56 x 8.81	90 x 224	270R	X	—	—	400–5000	
7.45 x 3.75	189 x 95	560R	X	—	—	400–5000	

[1] With a 5 A secondary.
[2] With a 1 A secondary.

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Power Cast II™

Liquid Filled Pad Mounted

Liquid Filled Substation

Power Dry II™

New!

Medium Voltage Distribution Transformers

New! Revised Medium Voltage Transformer Energy Efficiency Information For 2016! In 2010 Schneider Electric released new efficiencies for MV transformers based on The Department of Energy (DOE) 10 CFR Part 431 Energy Conservation program for Commercial Equipment. We are now launching even more efficient transformers to further reduce energy consumption from MV transformers. Starting January 1, 2016 certain medium voltage distribution transformers with ratings of 2,500 kVA and below, 34.5 kV primary and below and 600 Vac class secondary voltages must meet revised minimum efficiency requirements. Liquid Filled Padmounts, Liquid Filled Substations, Dry Type VPI and Power Cast products shipped after January 1, 2016 will all be included. The minimum efficiency tables are listed below. Please contact your nearest Schneider Electric Sales Office for more information. Page 14-19 and 14-20 includes our updated offer.

Table 14.46: New! Standard Efficiency Levels for Liquid Immersed Distribution Transformers

Single Phase		Three Phase	
kVA	Efficiency %	kVA	Efficiency %
10	98.7	—	—
15	98.82	—	—
25	98.95	45	98.92
37.5	99.05	75	99.03
50	99.11	112.5	99.11
75	99.19	150	99.16
100	99.25	225	99.23
167	99.33	300	99.27
250	99.39	500	99.35
333	99.43	750	99.4
500	99.49	1000	99.43
667	99.52	1500	99.48
833	99.55	2000	99.51
—	—	2500	99.53

All Efficiency values are at 50% of nameplate-rated load, determined according to the DOE Test Procedure 10 CFR 431, Subpart K, Appendix A.

Table 14.47: New! Standard Levels for Medium Voltage Dry Type Distribution Transformers

kVA	Single Phase			kVA	Three Phase		
	20-45kV BIL Efficiency %	46-95 kV BIL Efficiency %	>/ 96 kV BIL Efficiency %		20-45kV BIL Efficiency %	46-95 kV BIL Efficiency %	>/ 96 kV BIL Efficiency %
15	98.1	97.86	—	45	98.1	97.86	—
25	98.33	98.12	—	75	98.33	98.13	—
37.5	98.49	98.3	—	112.5	98.52	98.36	—
50	98.6	98.42	—	150	98.65	98.51	—
75	98.73	98.57	98.53	225	98.82	98.69	98.57
100	98.82	98.67	98.63	300	98.93	98.81	98.69
167	98.96	98.83	98.8	500	99.09	98.99	98.89
250	99.07	98.95	98.91	750	99.21	99.12	99.02
333	99.14	99.03	98.99	1000	99.28	99.2	99.11
500	99.22	99.12	99.09	1500	99.37	99.3	99.21
667	99.27	99.18	99.15	2000	99.43	99.36	99.28
833	99.31	99.23	99.2	2500	99.47	99.41	99.33

NOTE: BIL means Basic Impulse Level.

NOTE: All Efficiency values are at 50% of nameplate-rated load, determined according to the DOE Test Procedure 10 CFR 431, Subpart K, Appendix A.

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New!

Dry Type Medium Voltage

All transformers are built with 220 °C insulation and 150 °C temperature rise. For 115 °C rise add F to catalog number. For 80 °C rise add B to catalog number. For copper windings, add CU to the end of the part number. Check with factory to verify dimensional changes and weights for copper windings or alternate temperature rises.

Standard high voltage taps: 4-2.5%, 2AN and 2BN. For 4-2.5% FCBN, add BN to catalog number.

New!

New! 1,201–15,000 Vac Three-Phase Indoor Transformers

See Table 14.52 New! Enclosure Dimensions, page 14-23. Enclosures are for indoor use only. If outdoor enclosure is required, this is outside the scope of the digest, contact your local Schneider Electric Representative.

Lugs: Furnished by customer.

Table 14.48: New! EX Three Phase Medium Voltage Transformers

kVA	Catalog No.	Minimum Efficiency @ 50% load	Weight (lbs)	Enclosure
2.4 kV and 5 kV Voltage Class 60 Hz 150°C Rise				
112.5	EX112T( )H	98.52	1200	50D
150	EX150T( )H	98.65	1400	51D
225	EX225T( )H	98.82	1900	51D
300	EX300T( )H	98.93	2100	52D
500	EX500T( )H	99.09	3000	52D
750	EX750T( )H	99.21	5000	55F
1000	EX1000T( )H	99.28	6000	56F
1500	EX1500T( )H	99.37	8100	56F
2000	EX2000T( )H	99.43	11000	57F
2500	EX2500T( )H	99.47	13100	58F
15 kV Voltage Class 60 Hz 150°C Rise				
112.5	EX112T( )H	98.36	2000	52D
150	EX150T( )H	98.51	2200	52D
225	EX225T( )H	98.69	2800	53D
300	EX300T( )H	98.81	3300	53D
500	EX500T( )H	98.99	5000	54F
750	EX750T( )H	99.12	6000	55F
1000	EX1000T( )H	99.2	7400	56F
1500	EX1500T( )H	99.3	9000	56F
2000	EX2000T( )H	99.36	11000	57F
2500	EX2500T( )H	99.41	13000	58F
3000	EX3000T( )H	—	18000	58F

Table 14.49: New! Three Phase Voltage Codes

kV Class	Code	Primary	Secondary
2.4 30 kV BIL	13	2400 Delta	208Y/120
	14	2400 Delta	480Y/277
	15	2400 Delta	240 Delta
	16	2400 Delta	480 Delta
	17	2400 Delta	600 Delta
5 30 kV BIL	18	4160 Delta	208Y/120
	19	4160 Delta	480Y/277
	20	4160 Delta	240 Delta
	21	4160 Delta	480 Delta
	22	4160 Delta	600 Delta
	23	4160Y/2400	240 Delta
	25	4160Y/2400	480 Delta
	26	4160/2400	600 Delta
	27	4800 Delta	208Y/120
	28	4800 Delta	480Y/277
	29	4800 Delta	240 Delta
	30	4800 Delta	480 Delta
	31	4800 Delta	600 Delta
15 60 kV BIL	32	7200 Delta	208Y/120
	33	7200 Delta	480Y/277
	34	7200 Delta	240 Delta
	35	7200 Delta	480 Delta
	36	7200 Delta	600 Delta
	37	12000 Delta	208Y/120
	38	12000 Delta	480Y/277
	39	12000 Delta	240 Delta
	40	12000 Delta	480 Delta
	41	12000 Delta	600 Delta
	42	12470 Delta	208Y/120
	43	12470 Delta	480Y/277
	44	12470 Delta	240 Delta
	45	12470 Delta	480 Delta
	46	12470 Delta	600 Delta
	47	12470Y/7200	240 Delta
	48	12470Y/7200	480 Delta
	49	12470Y/7200	600 Delta
	50	13200 Delta	208Y/120
	51	13200 Delta	480Y/277
	52	13200 Delta	240 Delta
	53	13200 Delta	480 Delta
	54	13200 Delta	600 Delta
	55	13200Y/7620	240 Delta
	56	13200Y/7620	480 Delta
	57	13200Y/7620	600 Delta
	58	13800 Delta	208Y/120
	59	13800 Delta	480Y/277
	60	13800 Delta	240 Delta
	61	13800 Delta	480 Delta
	62	13800 Delta	600 Delta

All secondary voltages are at 10 KV BIL (BIL means Basic Impulse Level).

To complete the three-phase catalog numbers on this page:

1. Select the voltage you require from the chart on the pricing page.
2. Insert the voltage code number in place of the ( ) in the catalog number.

Example 1: 1,000 kVA Energy Efficient, 3Ø, 60 Hz, 150°C temp. rise, 60 kV BIL, NEMA sound level, ventilated indoor enclosure, 13.2 kV delta 480Y/277, with 2-2.5% full capacity taps. 2AN and 2BN = EX1000T51H .

Example 2: 750 KVA Energy Efficient 3Ø, 60 Hz, 80°C temp. rise, 60 kV BIL, NEMA sound level, ventilated indoor enclosure, 4160 V Delta, 480Y/277, 2-2.5% full capacity taps. 2AN and 2BN = Part number EX750T19HB.

Example 3: 500 kVA Energy Efficient, 3Ø, 60 Hz, 115°C temp. rise, Copper Windings, 60 kV BIL, NEMA sound level, ventilated indoor enclosure, 12470 Vac delta, 208Y/120, with 2-2.5% full capacity taps. 2AN and 2BN = EX500T42BCU.

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New!

1,201–15,000 Vac Single-Phase Indoor Transformers

Table 14.50: New! EX Single Phase Medium Voltage Transformers

kVA	Catalog No.	Minimum Efficiency @ 50% load	Weight (lbs)	Enclosure
2.4 kV Voltage Class 60 Hz 150 °C Rise				
167	EX167S( )H	98.96	1500	51D
250	EX250S( )H	99.07	2200	52D
333	EX333S( )H	99.14	2500	52D
5 kV Voltage Class 60 Hz 150 °C Rise				
167	EX167S( )H	99.07	1500	52D
250	EX250S( )H	99.14	2400	52D
333	EX333S( )H	99.22	3000	53D
15 kV Voltage Class 60 Hz 150 °C Rise				
167	EX167S( )H	98.95	2400	52D
250	EX250S( )H	99.03	3400	53D
333	EX333S( )H	99.12	4000	53D

Lugs: Furnished by customer.

Table 14.51: New! Single Phase Voltage Codes

kV Class	Code	Primary	Secondary
2.4 30 kV BIL	14	2400 Delta	120/240
	25	2400 Delta	277
5 30 kV BIL	13	2400/4160Y	120/240
	15	4800 Delta	120/240
	16	4160 Delta	120/240
	24	2400/4160Y	277
	26	4800 Delta	277
	27	4160 Delta	277
15 60 kV BIL	17	4160/7200Y	120/240
	18	7200	120/240
	28	4160/7200Y	277
	29	7200	277
	19	7200/12470Y	120/240
	20	7620/13200Y	120/240
	21	12470	120/240
	22	13200	120/240
	23	13800	120/240
	30	7200/12470Y	277
	31	7620/13200Y	277
	32	12470	277
	33	13200	277
	34	13800	277

To complete the single-phase catalog numbers on this page:
1. Select the voltage you require from the chart on the pricing page.
2. Insert the voltage code number in place of the ( ) in the catalog number.

Example: 167 kVA Energy Efficient 1Ø 2400/4160Y-120/240 Vac, 1Ø 60 Hz unit is EX167S13H. The unit would be supplied with 2–2.5% above and 2–2.5% full capacity below normal taps on the primary.

New!

Enclosures

Table 14.52: New! Enclosure Dimensions

Enclosure Number/ Style		Height		Width		Depth		Mounting	NEMA 3R
		in.	mm	in.	mm	in.	mm		
50	D	40.5	1029	36.5	927	21.75	552	Floor	n/a consult factory
51	D	51.5	1308	40.5	1029	26.5	673	Floor	n/a consult factory
52	D	66	1676	50.5	1283	32	813	Floor	n/a consult factory
53	D	80	2032	64	1626	44	1118	Floor	n/a consult factory
54	F	90	2286	72	1829	50	1270	Floor	n/a consult factory
55	F	90	2286	80	2032	50	1270	Floor	n/a consult factory
56	F	90	2286	90	2286	50	1270	Floor	n/a consult factory
57	F	100	2540	100	2540	60	1524	Floor	n/a consult factory
58	F	108	2743	108	2743	60	1524	Floor	n/a consult factory

These dimensions are not for construction. Contact your local Schneider Electric sales office for certified prints.
Special outdoor construction required for NEMA 3R applications. Contact your local Schneider Electric sales office for details.

Style D, NEMA 1 Rated

Style F—NEMA 1 Rated

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Section 15
Medical Products

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Operating Room Isolated Power Panel

Iso-Gard Series 6 LIM

IG2000CBM Remote Alarm Indicator

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Iso—Gard Series 6 LIM

Overview of Isolated Power Panels

Schneider Electric has been involved in the design and manufacture of isolated power systems since 1944. Our isolated power panels have evolved over the years and will continue to do so to meet the ever-changing needs of the health care industry.

All of our current power panels incorporate single-phase, NQ panelboard interiors that accept plug-on or bolt-on branch circuit breakers. The panels are designed to support up to 16 branch circuits, eight of which are factory-installed. Since the average number of circuits required per panel in an operating room is five, the eight factory-installed branch circuit breakers will meet the majority of applications.

The Iso-Gard™ Series 6 Line Isolation Monitor (LIM) is readily visible in all layouts, eliminating the need for a composite unit when isolation power panels are installed in operating rooms.

Iso-Gard™ Series 6—UL Recognized

The Square D™ brand, Iso-Gard Series 6, microprocessor-controlled, line isolation monitor (LIM) is included as standard equipment in all Schneider Electric hospital isolation panels. The Iso-Gard Series 6 LIM incorporates automatic and manual self-test and self-calibration to reduce the frequency of required periodic testing. Other features include:

- Digital and analog display
- Unique audible alarm that will not be confused with other equipment
- UL component recognized and CSA classified
- Microprocessor-controlled circuitry for highest accuracy and stability
- Total hazard current factory set to 5 mA; field-capable setting to 2 mA
- Communication to MODBUS via Gateway

The Iso-Gard Series 6 LIM is also available as a replacement unit for older LIMs, is a direct replacement for all previous Schneider Electric LIMs, and is electrically compatible with all hospital isolated power systems. For more details, refer to 4805CT1301 and MED101301xx.

Schneider Electric created the following four upgrade kits to simplify the ordering process. With a single catalog number, you can now purchase all components necessary for the functional replacement of your existing Iso-Gard LIM.

Table 15.1: Upgrade Kit Ordering Information

Upgrade Kit	Includes			
	Line Isolation Monitor	Mounting Bracket	Converter Box and Wiring Harness	Transformer
IG6ADKIT	IG6M	IG6CBKTVM	Not applicable	4800XMIA
IG6BDKIT	IG6M	IG6CBKTVM	4800RA1WMAHA	4800XMIA
IG6DDKIT	IG6M	IG6CBKTVM	4800RA1WMAHA	Not applicable
IG6KIT	IG6M	IG6CBKTVM	Not applicable	Not applicable

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NEC® Requirement

The National Electrical Code® (NEC®) **requires** audible and visual alarm indication where isolation power is used (NEC 517-160). Schneider Electric offers the IG2000P and IG2000CBM remote alarm indicators for this purpose.

IG2000P

The Iso-Gard™ IG2000P remote indicator from Schneider Electric provides remote indication of the visible and audible alarms from a line isolation monitor (LIM).

- Green LED—stays illuminated while the system is in normal condition
- Red hazard LED—illuminates when the Total Hazard Current (THC) exceeds the preset alarm level
- Audible hazard alarm—sounds when the THC exceeds the preset alarm level Mute button with yellow LED—silences the audible alarm on the remote indicator (local muting), or silences all audible alarms in the system (system muting)
- Test button—remotely performs a functional test of the LIM

The IG2000P remote indicator is available mounted in a one- or two-gang stainless steel faceplate for flush mounting into a panel or wall box with a two-inch minimum depth. The basic electrical connection is made using three wires.

New!

IG2000CBM

The Iso-Gard™ IG2000CBM remote indicator from Schneider Electric provides remote indication of the visible and audible alarms and digital mA reading from an Iso-Gard Series 6 (IG6) line isolation monitor (LIM).

- Green LED—stays illuminated while the system is in normal condition
- Red hazard LED—illuminates when the Total Hazard Current (THC) exceeds the preset alarm level
- Audible hazard alarm—sounds when the THC exceeds the preset alarm level Mute button with yellow LED—silences the audible alarm on the remote indicator (local muting), or silences all audible alarms in the system (system muting)
- Test button—remotely performs a functional test of the LIM

The IG2000CBM remote indicator is available mounted in a two-gang stainless steel faceplate for flush mounting into a wall box with a two-inch minimum depth. The basic electrical connection is made using four wires.

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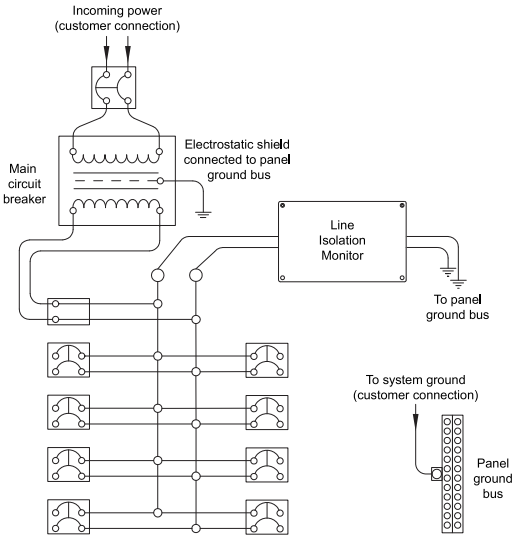

Overview

Isolated power panels provide a small local electrical network that can be monitored from a line isolation monitor (LIM), allowing for predictive ground fault protection instead of reactive.

A typical isolated power system contains:

- Main disconnect
  - QO circuit breaker (120 V, 208 V, 240 V)
  - H-Frame circuit breaker (277 V, 480 V)
- Isolation Transformer
- Line isolation monitor
- NQ interior
- QO branch circuit breakers
  - Eight factory-installed
  - Space for eight additional
- Ground bus

Multiple layouts are available:

- Standard isolation panels
- Duplex panels
- Dual voltage panels
- Controlled panels

Standard Isolation Panels

Standard panels offer the most compact solution for a single isolated power system feeding one operating room.

120 V Distribution

- Available in four options: 3, 5, 7.5, or 10 kVA
- Up to 16 branch circuits

208 V (240 V) Distribution

- Available in four options: 3, 5, 7.5, or 10 kVA
- One or two branch circuits

Duplex Panels

Duplex panels offer two isolated power systems in a single panel. The systems are separated from each other by a barrier. Duplex panels provide the ability to mix and match the two systems for kVA and distribution voltage to help the designer maximize wall space while meeting the power requirements of the operating room(s).

Dual Voltage Panels

Dual voltage panels supply both 120 V and 208 V (240 V) isolated power to an operating room.

- Back box requires a 14–inch-deep wall
- Each panel supplies up to sixteen 120 V circuits, plus two 208 V branch circuits

The standard offering includes the following:

- One 30 A, 208 V circuit for equipment such as a laser receptacle
- One 50 A, 208 V circuit for equipment such as an X-ray receptacle

Controlled Panels

Controlled panels are designed to provide 208 V (240 V) of isolated power to multiple areas from one central location. Historically, they were used to retrofit operating rooms with 208 V. A programmable logic controller (PLC) lets the panel be designed to feed multiple load location, but only provide power to specific power modules. This helps prevent overloading of the system. Since the PLC limits the number of circuits, only the longest-possible conductor length is taken into account during start-up testing.

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Schneider Electric offers 208 V or 240 V modules designed to complete the control circuit of a controlled power panel.

Receptacle Modules for Controlled Panels

X-ray/laser power receptacle modules provide a convenient source of power for portable X-ray and laser equipment. The receptacle provided in each module is matched to the NEMA plug configuration of the equipment with which it will be used, and is mounted behind the door on the stainless steel face plate. The door features a concealed hinge and a touch latch.

Power/Ground Modules

When both ground jacks and power receptacles are required, these UL Listed modules offer convenience and save labor in field wiring. The units include four power receptacles, four twist-to-lock ground jacks, and a ground bus with a generous number of lugs for external ground connections.

The main ground connection in the module accommodates up to a #1/0 cable. The units are completely factory wired; only field power connections and ground connections are necessary. They are furnished with Type 304, brushed stainless steel face plates.

4 Red Duplex Receptacles and 4 Ground Jacks

4 Locking Receptacles and 4 Ground Jacks

Hospital Ground Cords and Jacks

Schneider Electric provides hospital-grade devices for the supply and grounding of portable equipment.

- Hospital ground cords
  - Highly flexible wire with a heavy duty lug or clip end
  - Ground cord with lug end is UL Listed (UL 467)
  - Various lengths available

Ground Cord with Lug End

Ground Cord with Clip End

- Hospital ground jacks

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Medical Isolated Power Panels

Table 15.2: 120 V Distribution

Transformer				Interior					Trim Catalog No.		Back Box Catalog No.	
kVA	Primary	Secondary	Catalog No.	LIM Included (field-installed)	Main Disconnect	Circuit Breakers (factory-installed)	Spaces	Catalog No.	Flush	Surface	Flush	Surface
Plug-on Circuit Breakers												
3	208 V	120 V	SXM03BA	Iso-Gard Series 6	QOU220	Eight QO220	Eight 2-pole	SIP03BA	ST4526	ST4324	SB432406	SB432406S
	240 V		SXM03CA					SIP03CA				
	277 V		SXM03DA		HDL26015			SIP03DA				
5	208 V	120 V	SXM05BA	Iso-Gard Series 6	QOU230	Eight QO220	Eight 2-pole	SIP05BA	ST4526	ST4324	SB432406	SB432406S
	240 V		SXM05CA					SIP05CA				
	277 V		SXM05DA		HDL26025			SIP05DA				
	480 V		SXM05EA		HDL26015			SIP05EA				
7.5	208 V	120 V	SXM07BA	Iso-Gard Series 6	QOU245	Eight QO220	Eight 2-pole	SIP07BA	ST4526	ST4324	SB432408	SB432408S
	240 V		SXM07CA		QOU240			SIP07CA				
	277 V		SXM07DA		HDL26035			SIP07DA				
	480 V		SXM07EA		HDL26020			SIP07EA				
10	208 V	120 V	SXM10BA	Iso-Gard Series 6	QOU260	Eight QO220	Eight 2-pole	SIP10BA	ST4526	ST4324	SB432408	SB432408S
	240 V		SXM10CA					SIP10CA				
	277 V		SXM10DA		HDL26045			SIP10DA				
	480 V		SXM10EA		HDL26030			SIP10EA				

Table 15.3: 120 V Distribution on Both Sides of the Panel

Transformer					Interior								
			Catalog No.		Left				Right				
kVA	Primary	Secondary	Left	Right	LIM Included (field-installed)	Main Disconnect	Circuit Breakers (field-installed)	Spaces	LIM Included (field-installed)	Main Disconnect	Circuit Breakers (field-installed)	Spaces	Catalog No.
Plug-on Circuit Breakers													
3	208 V	120 V	SXM03BA	SXM03BA	Iso-Gard Series 6	QOU220	Eight QO220	Eight 2-pole	Iso-Gard Series 6	QOU220	Eight QO220	Eight 2-pole	SIX03BA03BA
	240 V		SXM03CA	SXM03CA									SIX03CA03CA
	277 V		SXM03DA	SXM03DA		HDL26015				HDL26015			SIX03DA03DA
5	208 V	120 V	SXM05BA	SXM05BA	Iso-Gard Series 6	QOU230	Eight QO220	Eight 2-pole	Iso-Gard Series 6	QOU230	Eight QO220	Eight 2-pole	SIX05BA05BA
	240 V		SXM05CA	SXM05CA									SIX05CA05CA
	277 V		SXM05DA	SXM05DA		HDL26025				HDL26025			SIX05DA05DA
	480 V		SXM05EA	SXM05EA		HDL26015				HDL26015			SIX05EA05EA
7.5	208 V	120 V	SXM07BA	SXM07BA	Iso-Gard Series 6	QOU245	Eight QO220	Eight 2-pole	Iso-Gard Series 6	QOU245	Eight QO220	Eight 2-pole	SIX07BA07BA
	240 V		SXM07CA	SXM07CA		QOU240				QOU240			SIX07CA07CA
	277 V		SXM07DA	SXM07DA		HDL26035				HDL26035			SIX07DA07DA
	480 V		SXM07EA	SXM07EA		HDL26020				HDL26020			SIX07EA07EA
10	208 V	120 V	SXM10BA	SXM10BA	Iso-Gard Series 6	QOU260	Eight QO220	Eight 2-pole	Iso-Gard Series 6	QOU260	Eight QO220	Eight 2-pole	SIX10BA10BA
	240 V		SXM10CA	SXM10CA									SIX10CA10CA
	277 V		SXM10DA	SXM10DA		HDL26045				HDL26045			SIX10DA10DA
	480 V		SXM10EA	SXM10EA		HDL26030				HDL26030			SIX10EA10EA
Bolt-on Circuit Breakers													
3	208 V	120 V	SXM03BA	SXM03BA	Iso-Gard Series 6	QOU220	Eight QOB220	Eight 2-pole	Iso-Gard Series 6	QOU220	Eight QOB220	Eight 2-pole	SIX03BA03BAB
	240 V		SXM03CA	SXM03CA									SIX03CA03CAB
	277 V		SXM03DA	SXM03DA		HDL26015				HDL26015			SIX03DA03DAB
5	208 V	120 V	SXM05BA	SXM05BA	Iso-Gard Series 6	QOU230	Eight QOB220	Eight 2-pole	Iso-Gard Series 6	QOU230	Eight QOB220	Eight 2-pole	SIX05BA05BAB
	240 V		SXM05CA	SXM05CA									SIX05CA05CAB
	277 V		SXM05DA	SXM05DA		HDL26025				HDL26025			SIX05DA05DAB
	480 V		SXM05EA	SXM05EA		HDL26015				HDL26015			SIX05EA05EAB
7.5	208 V	120 V	SXM07BA	SXM07BA	Iso-Gard Series 6	QOU245	Eight QOB220	Eight 2-pole	Iso-Gard Series 6	QOU245	Eight QOB220	Eight 2-pole	SIX07BA07BAB
	240 V		SXM07CA	SXM07CA		QOU240				QOU240			SIX07CA07CAB
	277 V		SXM07DA	SXM07DA		HDL26035				HDL26035			SIX07DA07DAB
	480 V		SXM07EA	SXM07EA		HDL26020				HDL26020			SIX07EA07EAB
10	208 V	120 V	SXM10BA	SXM10BA	Iso-Gard Series 6	QOU260	Eight QOB220	Eight 2-pole	Iso-Gard Series 6	QOU260	Eight QOB220	Eight 2-pole	SIX10BA10BAB
	240 V		SXM10CA	SXM10CA									SIX10CA10CAB
	277 V		SXM10DA	SXM10DA		HDL26045				HDL26045			SIX10DA10DAB
	480 V		SXM10EA	SXM10EA		HDL26030				HDL26030			SIX10EA10EAB

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Section 16

NEMA and Definite Purpose Contactors and Starters

Manual Starters and Switches

Definite Purpose Contactors and Starters

NEMA Style Type S Contactors and Starters

Lighting Contactors

Pump Panel

Combination Starters

NEMA Style TeSys N Contactors and Starters

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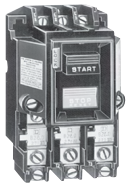
Selection Information



Class	2510, 2511, 2512	T02, T36	8502 & 8702	8536 & 8736	8538 & 8738
		NEMA Style, Full Voltage Non-Reversing and Full Voltage Reversing			
Type of Product	Manual Starters and Switches, Non-Reversing, Reversing and Two Speed	TeSys™ N Contactors and Starters	AC Magnetic Contactors	AC Magnetic Starters	Combination Magnetic Starters with Disconnect Switch
Page	page 16-4	page 16-14	8502: page 16-28 8702: page 16-58	8536: page 16-32 8736: page 16-60	8538: page 16-45 8738: page 16-65
NEMA Sizes	M-0 M-1 M-1P	00–7	00–7	00–7	8538: 0– 6 8738: 0–5
Load Voltage	Type F: 277 Vac Types K & M: 600 Vac	600 Vac Max.	600 Vac Max.	600 Vac Max.	600 Vac Max.
Current Ratings (Continuous)	Type F: 16 A Types K & M: 30 A	9–810 A	9–810 A	9–810 A	8538: 18–540 A 8738: 18–270 A
Horsepower Ratings (Maximum)	Type F: 1 Type K: 20 Type M: 10	600	0.5–600	0.5–600	8538: 0.5–400 8738: 0.5–200
Overload Relay	Type F: Melting Alloy Type K: N/A Type M: Melting Alloy	Contactors: N/A Starters: Bimetallic (Size 00-2) or Solid-State	N/A	Melting Alloy Bimetallic (Size 00–2) Solid State	Melting Alloy Bimetallic (Size 0–2) Solid State
Enclosure Types	1, Flush Mount, 3R, 4, 4X, 7 & 9 and Open	Open	1, 3R, 4, 4X, 12/3R, 7 & 9 and Open	1, 3R, 4, 4X, 12/3R, 7 & 9 and Open	1, 4, 4X, 12/3R
Approvals	UL File E42243 NLRV UR File E42243 NLRV2 CSA File LR 25490	Contactors: UL File E164862 NLDX CSA LR43364 Class 3211-24 Starters: UL File E152395 NKJH CSA LR60905 Class 3211-24	UL File E78351 NLDX CSA 60905 Class 3211-04 CE IEC 947-4-1 Sizes 00–5 Only	UL File E78351 NLDX CSA 60905 Class 3211-04 CE IEC 947-4-1 Sizes 00–5 Only	UL File E152395 NKJH7 CSA LR584 Class 3211 04

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Selection Information

Class	8539 & 8739	8903L & 8903S	8903 Combination Devices	8910, 8911, 8965	8940	8941
Type of Product	Combination Magnetic Starters with PowerPact™ Circuit Breaker	Multipole electrically held and mechanically held contactors available in 30 A configurations to 12 poles and 800 A configurations to 3 poles.	Type S lighting contactors electrically held and mechanically held available with disconnect switches or PowerPact™ circuit breakers	Definite Purpose non-reversing contactors available as compact 1 or 2 pole to 40 A and 2 to 4 pole to 90 A. Reversing and Starter Configurations also available.	Well-Guard Control™ Pumping Plant Panels available with disconnect switches or PowerPact™ circuit breakers.	NEMA Style AC Duplex Motor Controllers available as a combination starter or without disconnecting means.
Page	8539: page 16-49 8739: page 16-67	page 16-72	page 16-75	8910: page 16-87 8911: page 16-90 8965: page 16-97	page 16-91 page 16-92	page 16-94
NEMA Sizes	8539: 0–7 8739: 0–6	N/A	N/A	N/A	1–7	1–4
Load Voltage	600 Vac Max.	600 Vac Max.	600 Vac Max.	600 Vac Max.	600 Vac Max.	600 Vac Max.
Current Ratings (Continuous)	8539: 18–810 A 8739: 18–540 A	8903L to 30 A 8903S to 800 A	300 A (Disconnect) 600 A (Circuit Breaker)	20–40 A (Compact) 20–90 A	27–810 A	27–135 A
Horsepower Ratings (Maximum)	8539: 0.5–600 8739: 0.5–400	N/A	N/A	0.5–50	0.5–600	0.5–100
Overload Relay	Melting Alloy Bimetallic (Size 0–1) Solid State	N/A	N/A	Melting Alloy (8911)	Melting Alloy Bimetallic Solid State	Melting Alloy Bimetallic Solid State
Enclosure Types	1, 4, 4X, 12/3R	1, 3R, 4, 4X, 12/3R and Open	1, 4, 4X, 12/3R	1	3R	1, 4, 4X, 12/3R and Open
Approvals	UL File E152395 NKJH7 CSA LR584 Class 3211 04	UL File E78427 NRNT CSA LR60905 Class 3231 01	UL File E16151 NRNT cUL File E16151 NRNT	UL E3190 NLDX2 CSA LR25490 Class 3211 04	UL/cUL 152395 NKJH	UL File E152395 NKJH7

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Fractional Horsepower Manual Starters with Melting Alloy Type Thermal Overload Relay

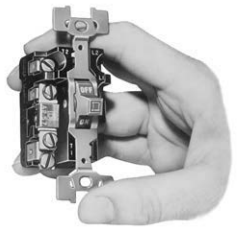
Table 16.1: Single-Unit Types—Class 2510—Rated 16 A—Thermal Units (see Thermal Unit Selection, page 16-130)

Type of Operator	No. of Poles	Features	NEMA 1 General Purpose Enclosure Surface Mounting		General Purpose Flush Mounting (Without Pull Box)			NEMA Type 4 *[1]* Enclosure Watertight and Dusttight	NEMA Types 3R, 7 & 9 Enclosure Hazardous Locations Div. 1 & 2 Class I Groups B, C, & D, & Class II Groups E, F, & G	Open Type	Number of Thermal Units Required
			Standard	Oversized	Gray Flush Plate	Standard Stainless Steel Flush Plate	Jumbo Stainless Steel Flush Plate				
			Type	Type	Type	Type	Type	Type	Type	Type	
Basic Starter—Class 2510											
Toggle	1	Standard	FG1	FGJ1	FF1	FS1	—	—	—	FO1	1
		With Red Pilot Light *[2]*	FG1P	FGJ1P	FF1P	FS1P	FSJ1P	—	—	FO1P	1
	2	Standard	FG2	FGJ2	FF2	FS2	—	—	—	FO2	1
		With Red Pilot Light *[2]*	FG2P	FGJ2P	FF2P	FS2P	FSJ2P	—	—	FO2P	1
Key	1	Standard	FG3	FGJ3	FF3	FS3	—	—	—	FO3	1
		With Red Pilot Light *[2]*	FG3P	FGJ3P	FF3P	FS3P	FSJ3P	—	—	FO3P	1
	2	Standard	FG4	FGJ4	FF4	FS4	—	—	—	FO4	1
		With Red Pilot Light *[2]*	FG4P	FGJ4P	FF4P	FS4P	FSJ4P	—	—	FO4P	1
Starter with Handle Guard/Lock-Off—Class 2510											
Toggle	1	Standard	FG5	FGJ5	Order basic starter plus separate handle guard kit.			FW1	FR1	*[3] [4]*	1
		With Red Pilot Light *[2]*	FG5P	FGJ5P				FW1P	—	*[3] [4]*	1
	2	Standard	FG6	FGJ6				FW2	FR2	*[3] [4]*	1
		With Red Pilot Light *[2]*	FG6P	FGJ6P				FW2P	—	*[3] [4]*	1

Table 16.2: Duplex Units—Class 2510

Type of Operator	No. of Poles	Features	NEMA 1 General Purpose Enclosure Surface Mounting	General Purpose Flush Mounting (Without Pull Box)			Number of Thermal Units Required
				Gray Flush Plate for Wall or Cavity Mounting	Stainless Steel Flush Plate for Wall or Cavity Mounting	Replacement Starter Class 2510	
			Type	Type	Type	Type	
One Starter in Duplex Enclosure—Class 2510							
Toggle	2	Standard	FG02	—	—	—	1
		With Red Pilot Light *[2]*	FG02P	—	—	—	
Key	2	With Red Pilot Light *[2]*	FG04P	—	—	—	1
Two Starters in One Enclosure—Class 2510							
Toggle	2 Each Str.	Standard	FG22	FF22	—	—	2
		With Red Pilot Light on Each *[2]*	FG22P	FF22P	FS22P	—	
Key	2 Each Str.	With Red Pilot Light on Each *[2]*	FG44P	FF44P	FS44P	—	2
Starter and Auto-Off-Hand SPDT Selector Switch (AC Only)—Class 2510							
Toggle	1	Standard	FG71	FF71	—	—	1
		With Red Pilot Light *[2]*	FG71P	FF71P	FS71P	—	
	2	Standard	FG72	FF72	—	—	1
		With Red Pilot Light *[2]*	FG72P	FF72P	FS72P	—	
Key	2	With Red Pilot Light *[2]*	FG74P	FF74P	FS74P	—	1
Two Speed Starters (AC Only)—Class 2512						**Replacement Starter—Class 2510**	
Toggle	1	**With Mechanical Interlock:**					2
		Standard	FG11	FF11	—	FO1T	
		With 2 Red Pilot Lights *[2]*	FG11P	FF11P	—	FO1PT	
		With High-Off-Low Selector Switch:					
		With 2 Red Pilot Lights *[2]*	—	—	FS101P	FO1PT	
	2	**With Mechanical Interlock:**					2
		Standard	FG22	FF22	—	FO2T	
		With 2 Red Pilot Lights *[2]*	FG22P	FF22P	—	FO2PT	
		With High-Off-Low Selector Switch:					
		With 2 Red Pilot Lights *[2]*	—	—	FS202P	FO2PT	

Type FG2P



Type FO2

Table 16.3: Horsepower Ratings, Type F (continuous current rating: 16 A)

Volts	Maximum Horsepower		
	AC Single Phase		DC
	1-Pole	2-Pole	2-Pole Only
115	1	1	3/4
230	1	2	3/4
277	1	1	—

Table 16.4: Approvals—2510 Type F and K

Agency	Enclosed		Open	
UL	UL Listed	File: E42243, CCN: NLRV	UL Component Recognized	File: E42243, CCN: NLRV2
CSA	CSA Certified	File: LR25490, Class: 3211-05		

Table 16.5: How to Order

To Order Specify:	Catalog Number	
	Class	**Type**
• Class Number	2510	FG1
• Type Number		

[1] Furnished with one 3/4" pipe tap in the bottom (reversible for top feed). For a 3/4" pipe tap in the top and bottom, add the suffix **H** to the Type.
[2] For a green pilot light, add the letter **G** to the catalog number (i.e. 2510FG2P**G**).
[3] For a replacement starter, order the Open type above.
[4] When replacing a starter equipped with a pilot light in NEMA 4 enclosure, retain the pilot light mounting bracket from the original device.

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Table 16.6: Non-Reversing—Class 2510

Type of Operator	No. of Poles	Features	NEMA 1 General Purpose Enclosure Surface Mounting		General Purpose Flush Mounting (Without Pull Box)			NEMA Type 4 Enclosure *[5]* Watertight and Dusttight	NEMA Types 3R, 7 & 9 Enclosure*[5]* Hazardous Locations Div. 1 & 2 Class I Groups B, C, & D, & Class II Groups E, F, and G	Open Type
			Standard	Oversized	Gray Flush Plate	Standard Stainless Steel Flush Plate	Jumbo Stainless Steel Flush Plate			
			Type	Type	Type	Type	Type	Type	Type	Type
Toggle	2	**Standard**	KG1	KGJ1	KF1	KS1	—	KW1	KR1	KO1
		With Pilot Light *[6]*								
		115 Vac	KG1A	KGJ1A	KF1A	KS1A	KSJ1A	KW1A	—	KO1A *[7]*
		230 Vac	KG1B	KGJ1B	KF1B	KS1B	KSJ1B	KW1B	—	KO1B *[7]*
	3	**Standard**	KG2	KGJ2	KF2	KS2	—	KW2	KR2	KO2
		With Pilot Light *[6]*								
		208–277 Vac	KG2B	KGJ2B	KF2B	KS2B	KSJ2B	KW2B	—	KO2B *[7]*
		440–600 Vac	KG2C	KGJ2C	KF2C	KS2C	KSJ2C	KW2C	—	KO2C *[7]*
	2	**Standard**	KG5	KGJ5	—	—	—	KW5	—	KO5
		With Pilot Light *[6]*								
		115 Vac	KG5A	—	—	—	—	KW5A	—	KO5A *[7]*
		230 Vac	KG5B	—	—	—	—	KW5B	—	KO5B *[7]*
	3	**Standard**	KG6	KGJ6	—	—	—	KW6	—	KO6
		With Pilot Light *[6]*								
		208–277 Vac	KG6B	—	—	—	—	KW6B	—	KO6B *[7]*
		440–600 Vac	KG6C	—	—	—	—	KW6C	—	KO6C *[7]*
Key	2	**Standard**	KG3	KGJ3	KF3	KS3	—	—	—	KO3
		With Pilot Light *[6]*								
		115 Vac	KG3A	KGJ3A	KF3A	KS3A	KSJ3A	—	—	KO3A
		230 Vac	KG3B	KGJ3B	KF3B	KS3B	KSJ3B	—	—	KO3B
	3	**Standard**	KG4	KGJ4	KF4	KS4	—	—	—	KO4
		With Pilot Light *[6]*								
		208–277 Vac	KG4B	KGJ4B	KF4B	KS4B	KSJ4B	—	—	KO4B
		440–600 Vac	KG4C	KGJ4C	KF4C	KS4C	KSJ4C	—	—	KO4C

Table 16.7: Reversing—Class 2511

Type of Operator	No. of Poles	Motor Types for Which Suitable	Features (Including Mechanical Interlock)	NEMA 1 General Purpose Enclosure Surface Mounting	With Flush Plate for Cavity Mounting (Without Pull Box)	Replacement Switch Class 2510
				Type	Type	Type
Toggle	2	1 Ø 3-Lead Repulsion-Induction	**Standard**	KG11	KF11	KO1T
			With Pilot Light*[6]*			
			115 Vac	KG11A	KF11A	KO1AT
			230 Vac	KG11B	KF11B	KO1BT
	3	3 Ø; Also 1 Ø Capacitor, Split Ø, or 4-Lead Repulsion-Induction	**Standard**	KG22	KF22	KO2T
			With Pilot Light*[6]*			
			110–120 Vac	KG22A	KF22A	KO2AT
			208–220 Vac	KG22B	KF22B	KO2BT
			440–600 Vac	KG22C	KF22C	KO2CT

Table 16.8: Two Speed—Class 2512

Type of Operator	No. of Poles	Suitable for Motor Types	Features (Including Mechanical Interlock)	NEMA 1 General Purpose Enclosure Surface Mounting	With Flush Plate for Cavity Mounting (Without Pull Box)	Replacement Switch Class 2510
				Type	Type	Type
Toggle	2	1 Ø Two Winding (3-Lead)	**Standard**	KG11	KF11	KO1T
			With 2 Pilot Lights *[6]*			
			115 Vac	KG11A	KF11A	KO1AT
			230 Vac	KG11B	KF11B	KO1BT
	3	3 Ø Separate Winding (Wye-Connected)	**Standard**	KG22	KF22	KO2T
			With 2 Pilot Lights *[6]*			
			208–240 Vac	KG22B	KF22B	KO2BT
			440–600 Vac	KG22C	KF22C	KO2CT

Table 16.9: Class 2511 and 2512 Horsepower Ratings Type K

Device	No. of Poles	Motor Type AC	Maximum Hp			Maximum DC Hp (breaking 2 poles)		
			115 V	230 V	460–575 V	90 V	115 V	230 V
Class 2511	2	1 Ø	2	2	3	1	2	1-1/2
	3	3Ø	2	7-1/2	10			
Class 2512	2	1 Ø	2	2	3			
	3	3 Ø, Constant or Variable Torque	2	7-1/2	10			
	3	3 Ø, Constant Hp	2	7-1/2	10			
Continuous current rating			30 A at 600 Vac maximum			30 A at 24 Vdc maximum		

Table 16.10: Class 2510 Horsepower Ratings

Class 2510	No. of Poles	Motor Type AC	Maximum Hp				Maximum DC Hp (breaking 2 poles)		
			115 V	230 V	460 V	575 V	90 V	115 V	230 V
KO1 KO3	2	Single Ø	2	2	3	3	1	2	1-1/2
KO2 KO4	3	Three Ø	2	7-1/2	10	10			
KO5	2	Single Ø	2	3	7-1/2	10			
KO6	3	Three Ø	2	7-1/2	15	20			
Continuous current rating			30 A at 600 Vac maximum				30 A at 24 Vdc maximum		

Table 16.11: How to Order

To Order Specify:	Catalog Number	
	Class	Type
• Class Number	2510	KO2
• Type Number		

[5] Furnished with one 3/4" pipe tap in the bottom (reversible for top feed). For a 3/4" pipe tap in the top and bottom, add the suffix **H** to the Type.
[6] For a green pilot light, add the letter **G** to the catalog number (i.e. 2510FG2P**G**).
[7] When replacing a starter equipped with a pilot light in NEMA 4 enclosure, retain the pilot light mounting bracket from the original device.

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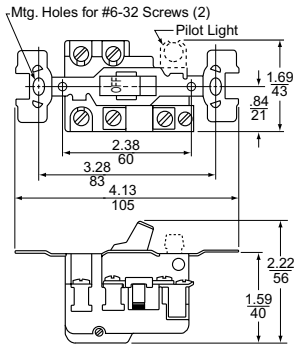
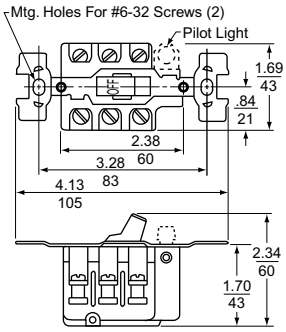
Open Type

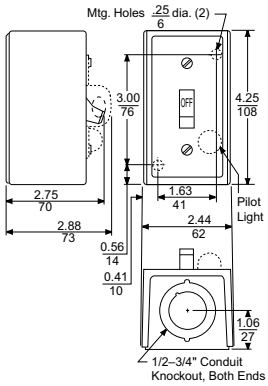


Types FO1, 1P, 2
Fractional Hp Starter

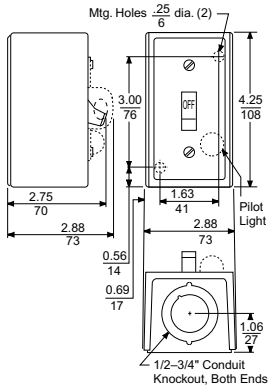


Types KO1, 1A, 1B, 2, 2B, 2C
Types KO5, 5A, 5B, 6, 6B, 6C
Motor Starting Switch

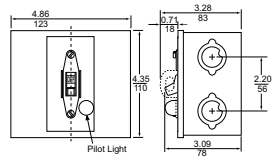
NEMA 1 General Purpose Enclosure (Surface Mount)



Standard
(Class 2510 Types FG & KG, Single Unit)

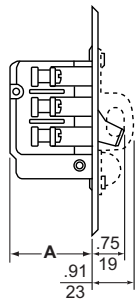


Oversized
(Class 2510 Types FGJ & KGJ, Single Unit)



Jumbo
(Class 9991Type KE2, see Table 16.29)

NEMA 1 General Purpose Enclosure (Flush Mount)



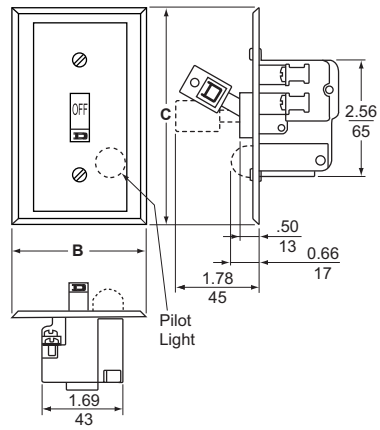
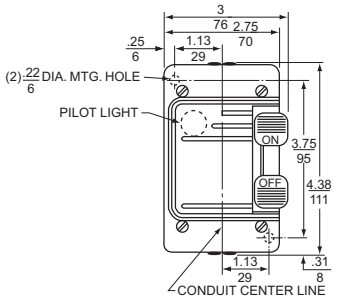


Table 16.12: General Purpose Enclosure (Flush Mount)

Device	Type of Operator	Class 2510 Type	Dimensions A	B	C
Fractional Hp Starter	Toggle	FF1, 1P, 2, 2P, FS1, 1P, 2, 2P	1.44	2.75	4.5
		FSJ1P, 2P	1.44	3.5	5.25
	Key	FF3, 3P, 4, 4P, FS3, 3P, 4, 4P	1.44	2.75	4.5
		FSJ3P, 4P	1.44	3.5	5.25
Motor Starting Switch	Toggle	KF1, 1A, 1B, 2, 2B, 2C KS1, 1A, 1B, 2, 2B, 2C	1.75	2.75	4.5
		KSJ1A, 1B, 2B, 2C	1.75	3.5	5.25
	Key	KF3, 3A, 3B, 4, 4B, 4C KS3, 3A, 3B, 4, 4B, 4C	1.75	2.75	4.5
		KSJ3A, 3B, 4B, 4C	1.75	3.5	5.25

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

NEMA 4 Watertight Die-Cast Zinc Enclosure



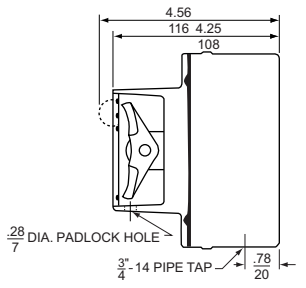


Table 16.13: NEMA 4 Watertight Die-Cast Zinc Enclosure

Device	Class	Type
Fractional Hp Starter	2510	FW1, 1P, 2, 2P
Motor Starting Switch	2510	KW1, 1A, 1B, 2, 2B, 2C

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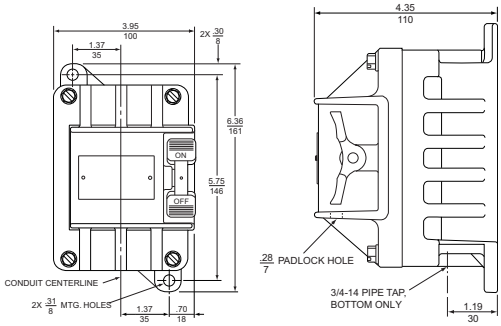
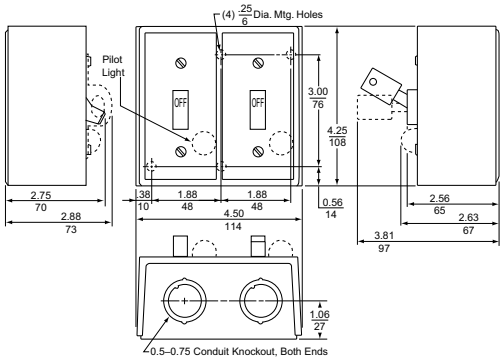


NEMA 3R, 7, and 9 Aluminum Enclosure for Hazardous Locations

Table 16.14: NEMA 3R, 7, and 9 Aluminum Enclosure for Hazardous Locations

Device	Class	Type
Fractional Hp Starter	2510	FR1, 2
Motor Starting Switch	2510	KR1, 2



Dimensions for Duplex Devices

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.15: NEMA 1 General Purpose Surface Mount Enclosure for Duplex Devices

Device	Type of Operator	Class	Type
One Starter	Toggle	2510	FGO2, 02P
	Key	2510	FGO4P
Two Starters	Toggle	2510	FG22, 22P
	Key	2510	FG44P
One Starter and One Selector Switch*[8]*	Toggle	2510	FG71, 71P, 72, 72P
	Key	2510	FG74P
Reversing Switch*[9]*	Toggle	2511	KG11, 11A, 11B, 22, 22A, 22B, 22C
Two-Speed Starter	Toggle	2512	FG11, 11P, 22, 22P
Two-Speed Switch	Toggle	2512	KG11, 11A, 11B, 22, 22B, 22C

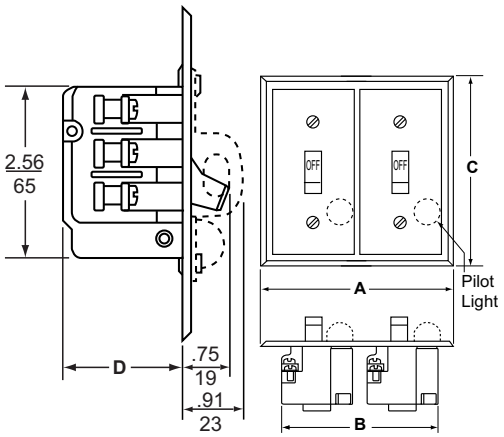


Table 16.16: General Purpose Flush Mounting Plate for Duplex Devices

Device	Type of Operator	Class	Type	Dimensions*[10]* A	B	C	D
Two Starters	Toggle	2510	FF22, 22P	5.25	3.75	5.25	1.44
			FS22P	4.56	3.5	4.5	1.44
	Key	2510	FF44P	5.25	3.75	5.25	1.44
			FS44P	4.56	3.5	4.5	1.44
One Starter and One Selector Switch*[11]*	Toggle	2510	FF71, 71P, 72, 72P	5.25	0.75	5.25	2
			FS71P, 72P	4.56	3.5	4.5	2
	Key	2510	FF74P	5.25	3.75	5.25	2
			FS74P	4.56	3.5	4.5	2
Reversing Switch	Toggle	2511	KF11, 11A, 11B KF22, 22A KF22B, 22C	5.25	3.75	5.25	1.75
Two-Speed Starter	Toggle	2512	FF11, 11P, 22, 22P	5.25	3.75	5.25	1.44
Two-Speed Switch	Toggle	2512	KF11, 11A, 11B, KF22, 22B, 22C	5.25	3.75	5.25	1.75

[8] Selector switch is on the left and increases the overall depth to 3.5 in.
[9] Only one pilot light (located on right) is used on Class 2511 switches.
[10] Dimensions include factory wired power connections.
[11] Selector Switch is on left, extends 1-5/8" from mounting surface.

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Integral Horsepower

Types M and T integral horsepower manual starters provide convenient On-Off operation of small single phase, polyphase or DC motors. Typical applications include small machine tools, pumps, fans and conveyors.

- Push button (M) or toggle (T) operators
- Reliable overload protection
- Pilot light and auxiliary contact available

Table 16.17: Integral Horsepower Manual Starters (see Thermal Unit Selection, page 16-130)

Non-Reversing, Class 2510, Max. Voltage: 600 Vac												
No. of Poles	NEMA Size	Ratings			NEMA 1 Surface Mounting		NEMA 4/4X Watertight and Dusttight Enclosure Brushed Stainless Steel	NEMA 4/4X Watertight, Dusttight and Corrosion-Resistant Glass-Polyester Enclosure	NEMA 7 & 9 For Hazardous Locations Class I— Groups C, D Class II— Groups E, F & G	NEMA 12 Dusttight and Driptight Industrial Use Enclosure	Open Type	
		Motor Voltage	Max. Hp		Square P.B. Operator	Toggle Operator					Square P.B. Operator	Toggle Operator
			Poly-Phase	Single Phase	Type		Type	Type	Type *[12]*	Type	Type	
2-Pole	M-0	115 230	— —	1 2	MBG1	TBG1	MBW11 *[13]*	MBW1 *[13]*	MBR1 *[13]*	MBA1 *[13]*	MBO1	TBO1
	M-1	115 230	— —	2 3	MCG1	TCG1	MCW11	MCW1	MCR1	MCA1	MCO1	TCO1
	M-1P	115 230	— —	3 5	MCG2	TCG2	MCW12	MCW2	MCR2	MCA2	MCO2	TCO2
3-Pole	M-0	200-230 380-575	— 3 5	— — —	MBG2	TBG2	MBW12 *[13]*	MBW2 *[13]*	MBR2 *[13]*	MBA2 *[13]*	MBO2	TBO2
	M-1	200-230 380-575	— 7.5 10	— — —	MCG3	TCG3	MCW13	MCW3	MCR3	MCA3	MCO3	TCO3
DC 2-Pole	M-0	115 230	1 hp DC 1.5 hp DC		MBG4	TBG4	MBW14	MBW4	—	MBA4	MBO4	TBO4
	M-1	115 230	1.5 hp DC 2 hp DC		MCG5	TCG5	MCW15	MCW5	MCR5	MCA5	MCO5	TCO5

All Except NEMA 7 and 9
File E42243
CCN NLRV
NEMA 7 and 9 Only
File E58760
CCN NPXZ

All Except NEMA 7 and 9
File LR60905
Class 3211-05
NEMA 7 and 9 Only
File LR26817
Class 3218-04

Table 16.18: How to Order

To Order Specify:	Catalog Number	
	Class	Type
• Class Number	2510	MCA1
• Type Number		

[12] NEMA 7 & 9 enclosures are cast-iron. NEMA 7 & 9 enclosures (cast aluminum) are available for outdoor use; to order these type of enclosures, replace the **R** in the catalog number with a **T**. For additional information, contact the Customer Care Center.

[13] Approved for group motor installations per NEC 430-53(c).

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Reversing and Two Speed

Class 2511 reversing and Class 2512 two-speed manual starters consist of two mechanically interlocked Class 2510 Types M or T manual starters.

Table 16.19: Reversing Class 2511

Class	Description	Number of Poles	NEMA Size	Ratings		NEMA 1 Surface Mounting		Open Type	
				Motor Voltage	Maximum Hp	Square P.B. Operator	Toggle Operator	Square P.B. Operator	Toggle Operator
2511	Standard	3-Pole	M-0	200-230	3	MBG1	TBG1	MBO1	TBO1
				380-575	5				
			M-1	200-230	7-1/2	MCG1	TCG1	MCO1	TCO1
				380-575	10				

Table 16.20: Two Speed, Class 2512 (Wye-Connected Separate Winding Motors Only)

Class	Description	Number of Poles	NEMA Size	Ratings			NEMA 1 Surface Mounting		Open Type	
				Motor Voltage	Constant Hp	Constant Torque or Variable Torque	Square P.B. Operator	Toggle Operator	Square P.B. Operator	Toggle Operator
2512	Standard	3-Pole	M-0	200-230	2	3	MBG1	TBG1	MBO1	TBO1
				380-575	3	5				
			M-1	200-230	5	7-1/2	MCG1	TCG1	MCO1	TCO1
				380-575	7-1/2	10				

Thermal Units

Starters will not operate without properly installed thermal units and device reset. Thermal unit must be installed so that markings face the front of starter.

Application Data

Size–Available in NEMA Sizes M-0, M-1, and M-1P.

Poles–Two poles single phase; three poles polyphase; 2 poles DC.

Voltage–600 Vac max.; 250 Vdc max.

Overload Relays–Melting alloy thermal overload relays have provisions for one Type B thermal unit for single phase starters and three Type B thermal units for three phase starters. **All thermal units must be installed and the device reset before the starter contacts will operate.** After overload relays have tripped, allow one or two minutes for the alloy to solidify before resetting.

Operator–Available with a push button or toggle operator in open and NEMA 1 versions. NEMA 4/4X (stainless) and 12 versions utilize a direct acting push button only. NEMA 4/4X (polyester) and 7/9 versions utilize an external toggle to actuate a push button device inside.

Maintenance of Equipment

For proper performance, all equipment should be periodically inspected and maintained. Replacement contacts and interlocks are available in kit form to facilitate servicing and stocking. In addition, the service bulletin contains an exploded view of the device with components clearly marked for easy identification by description and part number.

Mechanism Lock Off – Both open devices and starters in NEMA 1 surface and flush mounting, and NEMA 4, 4X, 7 & 9, and 12 enclosures can be locked in the Off or Stop position.
The NEMA 1 surface mounting, 4, 4X, 7 & 9, and 12 enclosures can also be locked closed to prevent unauthorized entry.

Table 16.21: Terminal information and Replacement Contact Kits

NEMA Size	Power Terminals		Auxiliary Interlock Terminals		Number of Poles	Service Bulletin	Replacement Contact Kit	
	Type of Lug	Wire Size (Solid or Stranded Copper Wire) Min.-Max.	Type of Lug	Wire Size (Solid or Stranded Copper Wire) Min.-Max.			Class	Type
M-0	Pressure Wire	14–8	Pressure Wire	16–12	2 or 3	312AS	9998	ML1
M-1	Pressure Wire	14–8	Pressure Wire	16–12	2 or 3	312AS	9998	ML2
M-1P	Box Lug	14–6	Pressure Wire	16–12	2	312AS	9998	ML2

Accessories and Modification Kits

One auxiliary contact, either N.O. or N.C. can easily be added internally to any open or enclosed Type M or T manual starter. It occupies the space provided in either the upper right hand or left hand corners of the device. These contacts are for AC loads only. For electrical ratings, refer to page 16-125, Class 9999 Types SX11 or SX12.

A unique red **pilot light** assembly that clips into place is available **factory installed** on NEMA 1, 4, 4X, 12 and flush enclosures or as a **field modification kit** on the NEMA 1 surface or flush mounting enclosures. See page 16-11. The color cap assembly snaps into a knockout in the enclosure cover on the NEMA 1 enclosures. Pilot light kits are available for use on Various voltages (110-600 V). Pilot light assemblies are not available for NEMA 7 and 9 enclosures.

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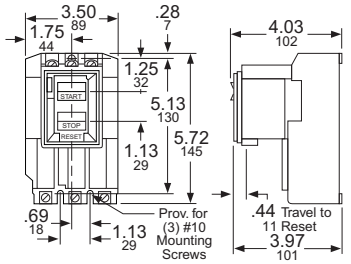
2/15/2017

Approximate Dimensions

NEMA 1
General Purpose Surface Mounting

NEMA 12
Dusttight and Driptight
Industrial Use

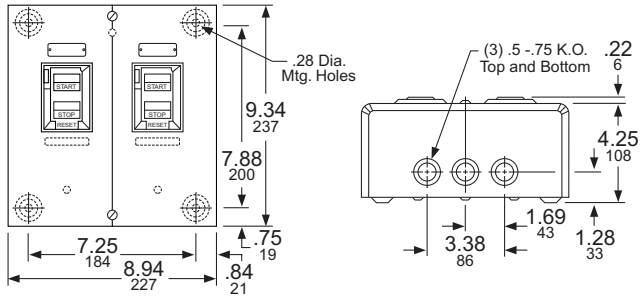
NEMA 4/4X
Watertight and Dusttight
Stainless Steel



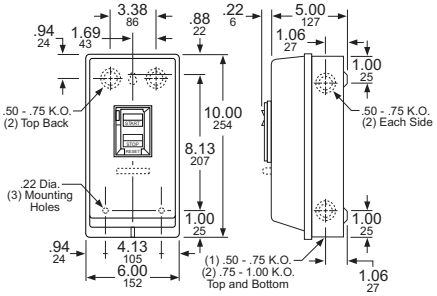
Class 2510 Type M
Sizes M-0, M-1 and M-1P, Open Style
Approximate Shipping Weight: 3 lb

NEMA 4/4X
Watertight, Dusttight
and Corrosion Resistant
Glass Polyester

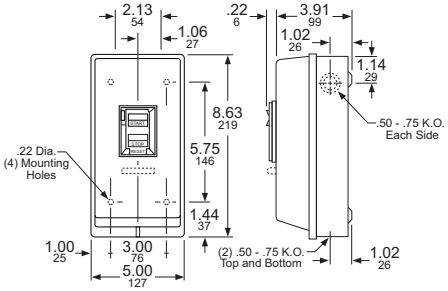
NEMA 7 & 9
Hazardous Locations
Cast Iron



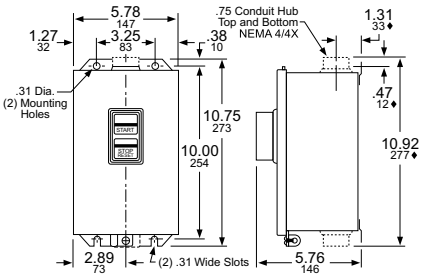
Classes 2511, 2512, Types M & T
Sizes M-0 and M-1 NEMA 1
General Purpose Enclosure
Approximate Shipping Weight: 9 lb



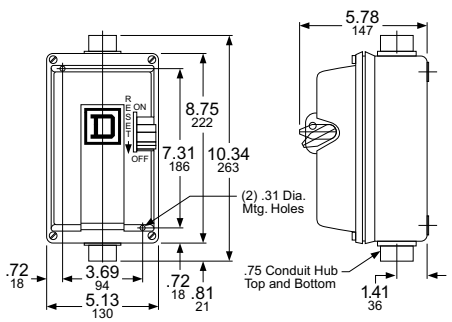
Class 2510 Type M & T Size M-1P
NEMA 1 General Purpose Enclosure
Approximate Shipping Weight: 5 lb



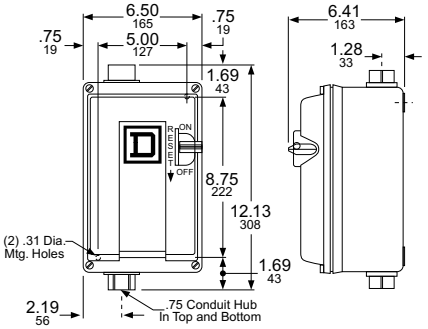
Class 2510 Type M & T Sizes M-0 and M-1
NEMA 1 General Purpose Enclosure
Approximate Shipping Weight: 5 lb



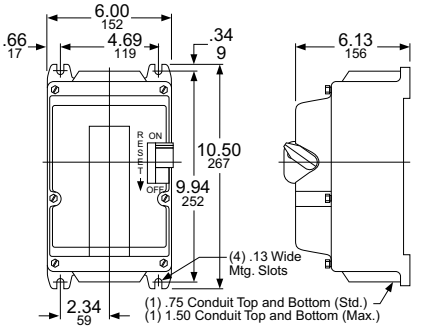
Class 2510 Type M Sizes M-0, M-1 and M-1P
NEMA 4/4X Watertight Stainless Steel Enclosure
NEMA 12 Dusttight Industrial Use Enclosure
Approximate Shipping Weight: 9 lb



Class 2510 Type M Size M-0 (AC–DC)
and Size M-1 (DC) NEMA 4/4X
Watertight Corrosion-Resistant
Glass Polyester Enclosure
Approximate Shipping Weight—6 lb



Class 2510 Type M Sizes M-1 and M-1P (AC)
NEMA 4/4X Watertight Corrosion-Resistant
Glass Polyester Enclosure
Approximate Shipping Weight—6 lb



Class 2510 Type M Sizes M-0, M-1 and M-1P
NEMA 7 & 9 Hazardous Location
Cast Iron Enclosure
Approximate Shipping Weight—18 lb

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Accessories, Modifications, and Replacement Parts

Table 16.22: P11 Pilot Light Voltage Codes

Voltage	Code
120 V	V02
200/208 V	V08
230 V	V03
460 V	V06
575 V	V07

Table 16.23: Modifications (Types M & T only)

Description	Factory Modifications (Forms)	Field Modification Kits, Class & Type
Red Pilot Light *[14]*	P11*[15]*	9999MP1 (110–120 V) 9999MP2 (208–240 V) 9999MP3 (440–600 V)
Auxiliary Contacts *[16]*	X1 (1 N.O.)	9999SX11 (N.O.)
	X2 (1 N.C.)	9999SX12 (N.C.)
Jumper Straps *[17]*	N/A	9998SO31
Contactor only	Y76	N/A

Table 16.24: Accessories—Class 2510 Types F and K

Description	Class & Type
Handle Guard Kit with Padlock Provision *[18]*	2510FL1
Emergency Off Actuator	2510PB1
Additional Key for Key Operated Devices	2510FK1

Table 16.25: Pilot Light Kits—Class 2510 Types F and K

Application	Voltage	Red Pilot Light	Green Pilot Light
		Class & Type	Class & Type
Type KF, KG, KW *[19]*	110–120 Vac	9999PL11	9999PL11G
	208–277 Vac	9999PL12	9999PL12G
	440–600 Vac	9999PL13	9999PL13G
Type FF, FG, FW *[19]*	115–240 Vac/dc	9999PL10	9999PL10G

Table 16.26: Replacement Nameplates—Class 2510 Types F and K

Description	Application	Nameplate Marking	Nameplate Type Number—Class 2510			
			For Type K Switch		For Type F Starter (includes Reset indication)	
			Without Pilot Light	With Pilot Light	Without Pilot Light	With Pilot Light
1-3/4" x 2-13/16" Nameplate with Embossed Mounting Holes for #6 Oval Head Screws	Standard commercial switch box cover or flush plate, including Square D stainless steel plates	(Blank)	FN1	—	FN2	—
		(Special marking –specify the marking desired)	FN5	—	FN6	—
1-29/32" x 3-27/32" Flat Nameplate with Mounting Holes for #6 Pan Head Screws	Square D NEMA 1 surface mounted enclosure or gray flush plate	(Blank)	FN10	FN20	FN30	FN40
		High	FN11	FN21	FN31	FN41
		Low	FN12	FN22	FN32	FN42
		Forward	FN13	—	—	—
		Reverse	FN14	FN24	—	—
		(Special marking—specify the marking desired)	FN15	FN25	FN35	FN45

Contact Kits

See page 16-122 for Class 9998 Replacement Contact Kits.

Table 16.27: Replacement Part Kits

Enclosure	Product Description	Kit Catalog No.
Replacement Toggle Kits		
NEMA 4	Type FW and KW	9998HW1
NEMA 7 & 9	Type FR and KR	9998HR2
Replacement Handle Kits		
NEMA 12	Type MBA, MCA (Ser. A & B)	9998HWA1
	Type MBA, MCA (Ser. C)	31085-381-50
NEMA 4/4X (Stainless)	Type MBW, MCW (Ser. A & B)	9998HWA1
	Type MBW, MCW (Ser. C)	31085-381-50
NEMA 4/4X (Polyester)	Type MBW (Size 0)	9998HWA1
	Type MCW (Size 1)	9998HR3
NEMA 7 and 9	Type MBR, MCR	9998HR3
Description		**Kit Catalog No.**
Internal Lever		9998IL1

Table 16.28: How to Order

To Order Specify:	Catalog Number	
• Class Number	Class	Type
• Type Number	9991	KE1

Table 16.29: Enclosures

For use with Class 2510 Type	Enclosure	Catalog No.
F and K	NEMA 1 Standard	9991EN1
M: Sizes M-0 & M-1		9991MG1
M: Size M-1P		9991MG2
MBO and MCO	NEMA 1 Flush Mount (with pull box and plaster adjustment)	9991MF1
	NEMA 1 Flush Mount (without pullbox but with mounting strap)	9991MF2
	NEMA 4X (Polyester)	9991MW1
	NEMA 4 (Stainless Steel)	9991MW11
FO1, FO1P, FO2, FO2P, FO3, FO3P, FO4, FO4P	NEMA 1 Oversized	9991FE1
KO1, KO1A, KO1B, KO2, KO2B, KO2C, KO3, KO3A, KO3B, KO4, KO4B, KO4C, KO5, KO5A, KO5B, KO6, KO6B, KO6C	NEMA 1 Oversized	9991KE1
	NEMA 1 Jumbo	9991KE2
	NEMA 3R	9991KE3

[14] May only be field-added to NEMA 1 enclosures. For green pilot light, order 9999SPG1 additionally.
[15] Form P11 pilot lights require a voltage code. Refer to Table 16.22. Catalog number example: 2510MBG1V02P11.
[16] For proper operation, only one auxiliary contact kit per device may be added.
[17] Used to control a single phase motor utilizing a three phase starter.
[18] Standard on Type K devices.
[19] The lens cannot be replaced. The pilot light kits for NEMA 4 enclosed units are for replacement only.

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For detailed information about TeSys U, visit www.schneider-electric.com/us.

Power Base

TeSys U Selection

The NEMA style TeSys U motor starter is an integrated product—simple to choose and to install—consisting of a control unit snapped into a power base. TeSys U can be configured to fit specific applications as well. The NEMA style TeSys U starter uses the same optional accessories—reverser, current limiter, predictive maintenance options, and communication options—as the IEC TeSys U.

Selecting a NEMA TeSys U Motor Starter in Three Steps

Step 1
Power Base

Step 2
Control Unit

Step 3
Function Modules
Auxiliary Contacts

= **NEMA TeSys™ U Motor Starter**

Table 16.30: Step 1. Select Power Base

Control Connection	NEMA Size	Max. hp, Three Phase				Max. hp, Single Phase		Power Bases
		200/208 V	220/240 V	460 V	575/600 V	120 V	240 V	Catalog Number
With screw terminations	1	7.5	7.5	10	10	2	3	LUB32NR

Table 16.31: Voltage Codes

Volts	24	48–72	110–240
DC	BL*[1]*	—	—
AC	B	—	—
DC or AC	—	ES*[2]*	FU

Table 16.32: Step 2. Select Control Unit *[3]*

Setting Range A	Standard 3-phase Class 10 trip *[4]*	Advanced 3-Phase Class 10 trip *[4]*	Advanced Single-Phase Class 10 trip *[4]*	Advanced 3-Phase Class 20 trip *[4]*
0.15–0.6	LUCAX6••	LUCBX6••	LUCCX6••	LUCDX6••
0.3–1.4	LUCA1X••	LUCB1X••	LUCC1X••	LUCD1X••
1.25–5.0	LUCA05••	LUCB05••	LUCC05••	LUCD05••
3–12	LUCA12••	LUCB12••	LUCC12••	LUCD12••
4.5–18	LUCA18••	LUCB18••	LUCC18••	LUCD18••
8–32	LUCA32••	LUCB32••	LUCC32••	LUCD32••

Control Unit

Auxiliary Contact

Table 16.33: Step 3. Select Auxiliary Contacts (optional)

Auxiliary Contact Blocks									
Terminals	Contact Indicates	Normal Contact Status	Contact State for Each Mode *[5]*						Catalog Number
			Off	Ready	Run	Short Circuit Trip	Overload Trip (Manual Reset)	Overload Trip (Remote/Auto Reset) *[6]*	
Screw	Ready condition	N.O.	O	I	I	O	O	I	LUA1C11
	Fault condition	N.C.	I	I	I	O	O	I	
Screw	Ready condition	N.O.	O	I	I	O	O	I	LUA1C20
	Fault condition	N.O.	O	O	O	I	I	O	

Table 16.34: TeSys U Auxiliary Contact Function Modules

Terminals	Contact Indicates	Normal Contact Status	Catalog Number
Screw	Power pole status	2 N.O.	LUFN20
Screw	Power pole status	1 N.O. and 1 N.C.	LUFN11
Screw	Power pole status	2 N.C.	LUFN02

Table 16.35: TeSys U Accessories

Accessories for LUB32NR	Quick Description	For details and selection, see pages:
Current limiter	Increases the breaking capacity to 130kA @ 460 V	18-25
Reverser	Stacked or side mounted (LU6MB0•• *[4]* only)	18-25
Line phase barrier	Required for use as a self-protected combination starter (UL508 Type E)	18-25
Multifunction control unit	Has functions for monitoring and predictive maintenance	18-25
Function modules	Fault differentiation, thermal overload, motor load indication	18-25
Communication modules	Integrates into existing networks, major protocols available	18-26
Soft starter + TeSys U	Use Altistart U01Soft Starter with TeSys U	18-42
Power bus bars	TeSys U cabling accessory	18-26
Control circuit accessories	Control circuit contact block, external handles, and control circuit filters	18-26

Accessories and Dimensions: See Section 18.

E164862
CCN NLDX

LR43364
Class 3211 08

[1] DC voltage with range of 0.90 to 1.10 of nominal.
[2] 48–72 Vdc; 48 Vac
[3] The control unit contains solid-state overload relay and control power source for TeSys U. For more details on the different control units, their functions, and placement on the power base see Section 18.
[4] Complete the catalog number by adding the appropriate voltage code from Table 16.31. For example: LUCAX6FU.
[5] I = closed contact; O = open contact
[6] Requires a multifunction or advanced control unit, plus fault differentiation module LUFDDA10.

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Interpreting the Catalog Number

Table 16.36: TeSys N Catalog Numbering System

T	02	C	N	1	3	G7

Product Family
T: TeSys N

Device Type
02: Contactor, page 16-14
36: Starter, page 16-16

NEMA Size
A: Size 00
B: Size 0
C: Size 1
D: Size 2
E: Size 3
F: Size 4
G: Size 5
H: Size 6 *[1]*
J: Size 7 *[1]*

Voltage Code
B7: 24 Vac, 50/60 Hz
BD: 24 Vdc
G7: 120 Vac, 50/60 Hz
LE7: 208 Vac, 50/60 Hz
U7: 240 Vac, 50/60 Hz
T7: 480 Vac, 50/60 Hz

Numerals
Used to define specific, physical arrangements such as number of poles for devices type T02 or protection type for devices type T36. Consult the Digest listings for specific device numbers.

Direction
1: Non-reversing
2: Reversing

Enclosure Type
N: No enclosure

[1] Not available for reversing Type T36 devices.

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TeSys N non-reversing contactor, Size 1

TeSys N non-reversing contactor, Size 3

New!

TeSys N Non-Reversing Contactors

TeSys N contactors are used to switch heating loads, capacitors, transformers and electric motors where overload protection is provided separately. TeSys N contactors are available in NEMA Sizes 00–7. Target market segments include hospitals; retail; food and beverage; marine; oil and gas; and mining, metals, and minerals.

Table 16.37: TeSys N Non-Reversing Contactors, 3-Pole Polyphase, 600 Vac Max.
(replace ●● with the coil voltage code)

NEMA Size	Continuous Current Rating (A)	Motor Voltage	Max HP	Open Catalog No. *[2]*
00	9	200	1.5	T02AN13●●
		230	1.5	
		460	2	
		575	2	
0	18	200	3	T02BN13●●
		230	3	
		460	5	
		575	5	
1	27	200	7.5	T02CN13●●
		230	7.5	
		460	10	
		575	10	
2	45	200	10	T02DN13●●
		230	15	
		460	25	
		575	25	
3	90	200	25	T02EN13●●*[3]*
		230	30	
		460	50	
		575	50	
4	135	200	40	T02FN13●●*[3]*
		230	50	
		460	100	
		575	100	
5	270	200	75	T02GN13●●*[3]*
		230	100	
		460	200	
		575	200	
6	540	200	150	T02HN13●●*[3]*
		230	200	
		460	400	
		575	400	
7	810	200	—	T02JN13●●*[3]*
		230	300	
		460	600	
		575	600	

Table 16.38: TeSys N Non-Reversing Contactors, 3-Pole Single Phase, 600 Vac Max.
(replace ●● with the coil voltage code)

NEMA Size	Continuous Current Rating (A)	Motor Voltage	Max HP	Open Catalog Number
00	9	115	1/3	T02AN13●●
		230	1	
0	18	115	1	T02BN13●●
		230	2	
1	27	115	2	T02CN13●●
		230	3	
2	45	115	3	T02DN13●●
		230	7.5	

Table 16.39: TeSys N Coil Voltage Codes

Voltage	Voltage Code by NEMA Size								
	Size 00	Size 0	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6	Size 7
24 Vac	B7	B7	B7	B7	B6	B6	n/a		
24 Vdc	BD	BD	BD	BD	BD	BD	n/a		
120 Vac	G7	G7	G7	G7	G6	G6	G7	F7	F7
208 Vac	LE7	LE7	LE7	LE7	L6	L6	L7	L7	L7
240 Vac	U7	U7	U7	U7	U6	U6	U7	U7	U7
480 Vac	T7	T7	T7	T7	Q5	Q5	S7	N7	N7

Dimensions: page 16-22 to page 16-26
Accessories: page 16-18 to page 16-20
Replacement Parts: page 16-21
Lugs: page 16-20

[2] Replace the bullets (●●) in the catalog number with the coil voltage code. Refer to voltage codes shown in Table 16.39.
[3] Order lugs separately. See Table 16.61. The mounting hardware (screws, washers, and nuts) comes with the contactors, not the lugs. Starters Sizes 3–7 come with lugs.

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TeSys N reversing contactor, Size 00

TeSys N reversing contactor, Size 4

New!

TeSys N Reversing Contactors

TeSys N reversing contactors are used for starting, stopping and reversing AC motors where overload protection is provided separately. TeSys N reversing contactors are mechanically and electrically interlocked and are available in NEMA Sizes 00–7. Target market segments include hospitals; retail; food and beverage; marine; oil and gas; and mining, metals, and minerals.

Table 16.40: TeSys N Reversing Contactors, 3-Pole Polyphase, 600 Vac Max. (replace ●● with the coil voltage code)

NEMA Size	Continuous Current Rating (A)	Motor Voltage	Max HP	Open Catalog No. *[4]*
00	9	200	1.5	T02AN23●●
		230	1.5	
		460	2	
		575	2	
0	18	200	3	T02BN23●●
		230	3	
		460	5	
		575	5	
1	27	200	7.5	T02CN23●●
		230	7.5	
		460	10	
		575	10	
2	45	200	10	T02DN23●●
		230	15	
		460	25	
		575	25	
3	90	200	25	T02EN23●●*[5]*
		230	30	
		460	50	
		575	50	
4	135	200	40	T02FN23●●*[5]*
		230	50	
		460	100	
		575	100	
5	270	200	75	T02GN23●●*[5]*
		230	100	
		460	200	
		575	200	
6	540	200	150	T02HN23●●*[5]*
		230	200	
		460	400	
		575	400	
7	810	200	—	T02JN23●●*[5]*
		230	300	
		460	600	
		575	600	

Table 16.41: TeSys N Reversing Contactors, 3-Pole Single Phase, 600 Vac Max. (replace ●● with the coil voltage code)

NEMA Size	Continuous Current Rating (A)	Motor Voltage	Max HP	Open Catalog No. *[4]*
00	9	115	1/3	T02AN23●●
		230	1	
0	18	115	1	T02BN23●●
		230	2	
1	27	115	2	T02CN23●●
		230	3	
2	45	115	3	T02DN23●●
		230	7.5	

Table 16.42: TeSys N Coil Voltage Codes

Voltage	Voltage Code by NEMA Size								
	Size 00	Size 0	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6	Size 7
24 Vac	B7	B7	B7	B7	B6	B6	n/a		
24 Vdc	BD	BD	BD	BD	BD	BD	n/a		
120 Vac	G7	G7	G7	G7	G6	G6	G7	F7	F7
208 Vac	LE7	LE7	LE7	LE7	L6	L6	L7	L7	L7
240 Vac	U7	U7	U7	U7	U6	U6	U7	U7	U7
480 Vac	T7	T7	T7	T7	Q5	Q5	S7	N7	N7

Dimensions: page 16-22 to page 16-26
Accessories: page 16-18 to page 16-20
Replacement Parts: page 16-21
Lugs: page 16-20

[4] Replace the bullets (●●) in the catalog number with the coil voltage code. Refer to the voltage codes shown in Table 16.42.
[5] Order lugs separately. See Table 16.61. The mounting hardware (screws, washers, and nuts) comes with the contactors, not the lugs. Starters Sizes 3–7 come with lugs.

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New!

TeSys N Non-Reversing Starters

TeSys N starters are used for full-voltage starting and stopping of AC squirrel-cage motors. Starters are available in NEMA Sizes 00–7 and come standard with Motor Logic Class 10/20 selectable solid-state overload relays. Starters with bimetal overload protection can be assembled from TeSys N contactors and TeSys D overload relays.

TeSys N non-reversing starter, Size 1

TeSys N Size 1 Contactor + TeSys LRD Bimetallic Overload Relay

TeSys N non-reversing starter, Size 3

TeSys N Size 1 Contactor + TeSys LR9D Electronic Overload Relay

For more information on TeSys D relays, see Section 18.

Dimensions: page 16-22
TeSys N Accessories: pages page 16-18

Table 16.43: 3-Pole Polyphase, 600 Vac Max. (replace ●● with the coil voltage code)

NEMA Size	Continuous Current Rating (A)	Motor Voltage	Max HP	Open Catalog No. [6]
00	9	200	1.5	T36AN13●●
		230	1.5	
		460	2	
		575	2	
0	18	200	3	T36BN13●●
		230	3	
		460	5	
		575	5	
1 [7]	27	200	7.5	T36CN13●●
		230	7.5	
		460	10	
		575	10	
2	45	200	10	T36DN13●●
		230	15	
		460	25	
		575	25	
3	90	200	25	T36EN13●●
		230	30	
		460	50	
		575	50	
4	135	200	40	T36FN13●●
		230	50	
		460	100	
		575	100	
5	270	200	75	T36GN13●●
		230	100	
		460	200	
		575	200	
6	540	200	150	T36HN13●●
		230	200	
		460	400	
		575	400	
7	810	200	—	T36JN13●●
		230	300	
		460	600	
		575	600	

Table 16.44: TeSys N Coil Voltage Codes

Voltage	Voltage Code by NEMA Size								
	Size 00	Size 0	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6	Size 7
24 Vac [8]	B7	B7	B7	B7	B6	B6	—	—	—
24 Vdc [9]	BD	BD	BD	BD	BD	BD	—	—	—
120 Vac [8]	G7	G7	G7	G7	G6	G6	G7	F7	F7
208 Vac	LE7	LE7	LE7	LE7	L6	L6	L7	L7	L7
240 Vac	U7	U7	U7	U7	U6	U6	U7	U7	U7
480 Vac	T7	T7	T7	T7	Q5	Q5	S7	N7	N7

Table 16.45: TeSys LR9D Electronic Overload Relays

Current Setting Range (A)	For Direct Mounting to TeSys N Contactors	Class 5/10/20/30 Selectable
0.1–0.5	Size 00–1	LR9D01
0.4–2.0		LR9D02
1.6–8.0		LR9D08
6.4–32		LR9D32

Table 16.46: TeSys D Overload Relays—Ambient Compensated, Bimetallic, Direct Mounting

Current Setting Range (A)	For Direct Mounting to TeSys N Contactors	Class 10 with Single-Phase Sensitivity	Class 10 without Single-Phase Sensitivity	Class 20 with Single-Phase Sensitivity	Class 20 without Single-Phase Sensitivity
0.10–0.16	Size 00–1	LRD01	LR3D01	—	—
0.16–0.25	Size 00–1	LRD02	LR3D02	—	—
0.25–0.40	Size 00–1	LRD03	LR3D03	—	—
0.40–0.63	Size 00–1	LRD04	LR3D04	LRD04L	LR3D04L
0.63–1	Size 00–1	LRD05	LR3D05	LRD05L	LR3D05L
1–1.6	Size 00–1	LRD06	LR3D06	LRD06L	LR3D06L
1.6–2.5	Size 00–1	LRD07	LR3D07	LRD07L	LR3D07L
2.5–4	Size 00–1	LRD08	LR3D08	LRD08L	LR3D08L
4–6	Size 00–1	LRD10	LR3D10	LRD10L	LR3D10L
5.5–8	Size 00–1	LRD12	LR3D12	LRD12L	LR3D12L
7–10	Size 00–1	LRD14	LR3D14	LRD14L	LR3D14L
9–13	Size 0–1	LRD16	LR3D16	LRD16L	LR3D16L
12–18	Size 0–1	LRD21	LR3D21	LRD21L	LR3D21L
16–24	Size 0–1	LRD22	LR3D22	—	—
17–24	Size 0–1	—	—	LRD22L	LR3D22L
23–32	Size 1	LRD32	LR3D32	LRD32L	LR3D32L
9–13	Size 2	LRD313	LR3D313	LRD313L	—
12–18	Size 2	LRD318	LR3D318	LRD318L	—
16–25	Size 2	LRD325	LR3D325	LRD325L	—
23–32	Size 2	LRD332	LR3D332	LRD332L	—
30–40	Size 2	LRD340	LR3D340	LRD340L	—
37–50	Size 2	LRD350	LR3D350	LRD350L	—

[6] Replace the bullets (●●) in the catalog number with the coil voltage code. Refer to the coil voltage codes shown in Table 16.44.
[7] Special size combinations of the contactor and Motor Logic overload relay are available. Add **0** to the catalog number before the coil voltage for a Size 0 overload relay (6–18 A); **9** for a Size 00C (3–9 A); and **8** for a Size 00B (1.5–4.5 A)—for example, T36CN13**0**G7.
[8] The 24 and 120 Vac coils are available with optional separate control; add **Form S** to the catalog number (for example, T36AN13B7**S**).
[9] The 24 Vdc coil requires separate control; add Form S to the catalog number (for example, T36AN13BD**S**).

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TeSys N reversing starter, Size 00

TeSys N reversing starter, Size 4

New!

TeSys N Reversing Starters

TeSys N reversing starters are used for full-voltage starting, stopping, and reversing of AC squirrel cage motors. Reversing starters are mechanically and electrically interlocked and are available in NEMA Sizes 00 through 5. Starters come with Motor Logic Class 10/20 selectable solid-state overload relays as standard. Reversing starters with bimetal overload protection can be assembled from TeSys N reversing contactors and TeSys D overload relays. For more information on TeSys D overload relays, see Section 18.

Table 16.47: TeSys N Reversing Starters, 3-Pole Polyphase, 600 Vac Max. (replace ●● with the coil voltage code)

NEMA Size	Continuous Current Rating (A)	Motor Voltage	Max HP	Open Catalog No. *[10]*
00	9	200	1.5	T36AN23●●
		230	1.5	
		460	2	
		575	2	
0	18	200	3	T36BN23●●
		230	3	
		460	5	
		575	5	
1*[11]*	27	200	7.5	T36CN23●●
		230	7.5	
		460	10	
		575	10	
2	45	200	10	T36DN23●●
		230	15	
		460	25	
		575	25	
3	90	200	25	T36EN23●●
		230	30	
		460	50	
		575	50	
4	135	200	40	T36FN23●●
		230	50	
		460	100	
		575	100	
5	270	200	75	T36GN23●●
		230	100	
		460	200	
		575	200	

Table 16.48: TeSys N Coil Voltage Codes

Voltage	Voltage Code by NEMA Size						
	Size 00	Size 0	Size 1	Size 2	Size 3	Size 4	Size 5
24 Vac*[12]*	B7	B7	B7	B7	B6	B6	n/a
24 Vdc *[13]*	BD	BD	BD	BD	BD	BD	n/a
120 Vac*[12]*	G7	G7	G7	G7	G6	G6	G7
208 Vac	LE7	LE7	LE7	LE7	L6	L6	L7
240 Vac	U7	U7	U7	U7	U6	U6	U7
480 Vac	T7	T7	T7	T7	Q5	Q5	S7

Dimensions: page 16-22 to page 16-26
Accessories: page 16-18 to page 16-20
Replacement Parts: page 16-21
Lugs: page 16-20

E164862
CCN NLDX

LR43364
Class 3211 04

[10] Replace the bullets (●●) in the catalog number with the coil voltage code. Refer to the coil voltage codes shown in Table 16.48.
[11] Special size combinations of the contactor and Motor Logic overload relay are available. Add **0** to the catalog number before the coil voltage for Size 0 overload relays (6–18 A); **9** for Size 00C (3–9 A); and **8** for Size 00B (1.5–4.5 A)—for example, T36CN23**0**G7.
[12] The 24 and 120 Vac coils are available with optional separate control; add **Form S** to the catalog number (for example, T36AN13B7**S**).
[13] The 24 Vdc coil requires separate control; add Form S to the catalog number (for example, T36AN23BD**S**).

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Front Mounted Auxiliary Blocks

Auxiliary Contacts, Time Delay, Mechanical Latch

Table 16.49: Standard, Instantaneous Auxiliary Contact Blocks

Snap-On Mounting	Number of Contacts	Composition N.O.	Composition N.C.	Catalog Number
To front of Size 00–2 or **To right side of** Size 3–7	4	2	2	LADN22 *[14]*
		1	3	LADN13 *[14]*
		4	0	LADN40 *[14]*
		0	4	LADN04 *[14]*
		3	1	LADN31 *[14]*
		2 *[15]*	2 *[15]*	LADC22 *[15]*
	2	1	1	LADN11 *[14]*
		2	0	LADN20 *[14]*
		0	2	LADN02 *[14]*
To left side of Size 3–7	1	1	0	LADN10
		0	1	LADN01
To side of Size 00–2	2	1	1	LAD8N11 *[16]*
		2	0	LAD8N20 *[16]*

Table 16.50: Instantaneous Blocks with Dust-Tight Auxiliary Contacts (IP54) NEMA 12

Snap-On Mounting	Standard Contacts N.O.	Standard Contacts N.C.	Dust-Tight Contacts N.O.	Dust-Tight Contacts N.C.	Catalog Number
To front of Size 00–2 or **To right side of** Size 3–7	—	—	2	—	LA1DX20
	2	—	2	—	LA1DZ40
	1	1	2	—	LA1DZ31
	—	—	2	—	LA1DY20 *[17]*

Table 16.51: Pneumatic Time Delay Contact Blocks

Snap-On Mounting	Time Delay Contacts N.O.	Time Delay Contacts N.C.	Type	Range of Time Delay	Catalog Number *[18]*
To front of Size 00–2 or **To right side of** Size 3–7	1	1	On energization (on delay)	0.1 to 3 s *[19]*	LADT0
				0.1 to 30 s	LADT2
				10 to 180 s	LADT4
				1 to 30 s *[20]*	LADS2
	1	1	On de-energization (off-delay)	0.1 to 3 s *[19]*	LADR0
				0.1 to 30 s	LADR2
				10 to 180 s	LADR4

Table 16.52: Mechanical Latch Blocks with Manual or Electrical Unlatch

Front snap-on mounting onto	Application	Catalog Number
Size 00–2	For silent operation and energy conservation	LAD6K10 *[21][22]*

Table 16.53: Coil Voltage Codes for LA6DK Mechanical Latch Blocks

Volts	24	120	208	240	480
AC or DC *[23]*	B	F	L	M	R

[14] For spring terminal versions of these blocks, add a **3** to the end of the catalog number (for example, LADN22**3**). For slip-on versions, add **9** to the end of the catalog number (for example, LADN22**9**).
[15] Including 1 N.O. + 1 N.C. make-before-break overlapping contacts.
[16] 1 block may be added to the left side of Size 00–1, AC coils only; only 1 block may be added to either side of the Size 2 contactor, AC coil only. Cannot be installed on Size 00–2 contactors with DC coils.
[17] Device comes with 4 ground terminal points.
[18] For spring terminal versions of these blocks, add a **3** to the end of the catalog number (for example, LADT2**3**). There is no charge for this modification.
[19] Scale range is expanded between 0.1 and 0.6 seconds on the dial for more accurate settings at the lower end of the range.
[20] Switching time between the opening of the N.C. contact and the closing of the N.O. contact: 40 ms ± 15 ms .
[21] Complete the catalog number by adding the coil voltage code (for example, LAD6K10F).
[22] Does not include internal coil clearing contact.
[23] DC available at 24 V only.

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LA4DA1U

Coil Suppressors and Cabling Accessories

RC Coil Suppressor

- Transient voltage limited to 300% of nominal voltage, maximum.
- Oscillating frequency is limited to 400 Hz maximum. Slight increase in drop-out time (1.2 to 2 times normal).

Table 16.54: Resistor/Capacitor Circuit (RC) for Reduction of Electrical Noise in AC Contactor Coils

Installed by	Mounting on	Operating Voltage 50/60 Hz	Catalog Number
Snapping into the cavity on the right side without tools *[24]*	Size 00–1	24 V	LAD4RCE
		120 V	LAD4RCG
		120–240 V	LAD4RCU
Snap-on mounting, and connection without tools to the contactor coil terminals	Size 2	24 V	LAD4RC3E
		120 V	LAD4RC3G
		120-240 V	LAD4RC3U

Varistor Coil Suppressor

- Transient voltage value limited to 200% of nominal voltage, maximum.
- Maximum reduction of transient voltage peaks. Slight increase in drop-out time (1.1 to 1.5 times normal).

Table 16.55: Varistor (Peak Limiting) for Reduction of Electrical Noise in AC Contactor Coils

Installed by	Mounting on	Operating Voltage 50/60 Hz	Catalog Number
Snapping into the cavity on the right side without tools*[25]*	Size 00–1	24 V	LAD4VE
		120 V	LAD4VG
		120–240 V	LAD4VU
Snap-on mounting, and connection without tools to the contactor coil terminals	Size 2	24 V	LAD4V3E
		120 V	LAD4V3G
		120-240 V	LAD4V3U

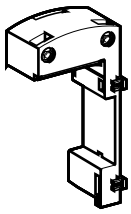
Diode Coil Suppressor

- No overvoltage or oscillating frequency.
- Polarized component. Increased drop-out time (6–10 times normal).

Table 16.56: Diode for Reduction of Electrical Noise in DC Contactor Coils

Installed on the upper part by	Mounting on	Operating Voltage, DC	Catalog Number
Snap-on mounting and connection w/o tools to the contactor coil terminals	Size 00–1	24 Vdc	LAD4DDL
Clip-on front mounting	Size 2	24 Vdc	LAD4D3U

LAD4T3B



LAD4BB• •

Bidirectional Diode Coil Suppressor

- Protection provided by limiting the transient voltage to 2 Uc max.
- Maximum reduction of transient voltage peaks.

Table 16.57: Bidirectional Peak Limiting Diode

Installed by	Mounting on	Operating Voltage 50/60 Hz and DC	Catalog Number
Snapping into the cavity on the right side of the contactor *[26]*	Size 00–1*[27]*	24 (AC only)	LAD4TB
Clip-on front mounting and connection without tools to the contactor coil terminals *[27]*	Size 2	24 V	LAD4T3B
		120 V	LAD4T3G
		208–240 V	LAD4T3U

TeSys N Cabling Accessories

Table 16.58: Cabling Accessories

Usage	Mounting on	Operating Voltage 50/60 Hz		Catalog Number
For adapting existing wiring to a new product or for use with top-mounting accessory.	Size 00–1, AC only	Without coil suppression		LAD4BB
		With coil suppression (varistor)	24 V	LAD4BBVE
			120 V	LAD4BBVG
			120-240 V	LAD4BBVU
For adapting existing wiring to a new product or for use with top-mounting accessory	Size 2, AC only	—		LAD4BB3

[24] Installing the suppressor into the cavity makes the electrical connection. The overall width of the contactor remains the same.
[25] Installing the suppressor into the cavity makes the electrical connection. The overall width of the contactor remains the same.
[26] Installing the suppressor into the cavity makes the electrical connection. The overall width of the contactor remains the same.
[27] For Size 00–2 with DC coils, 3-pole contactors are fitted with built-in bidirectional diode suppression as standard.

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Electronic Timers and Interface Modules

The following accessories require use of cabling accessories (LAD4BB●●) for proper mounting. See page 16-19 for illustration.

The solid-state **Electronic Serial Timer Modules** in Table 16.59delay the energizing of the contactor coil, and feature built-in varistor surge suppression.

Table 16.59: Electronic Serial Timer Modules

Type	Operational Voltage 24–250 Vac	Time Delay	Catalog Number
On-delay	Size 00–2	0.1–2 s	LA4DT0U
		1.5–30 s	LA4DT2U
		25–500 s	LA4DT4U

The **Interface Modules** in Table 16.60 allow the contactor coils to be energized from low voltage and low current level signals. They come in mechanical relay and solid-state versions. The relay plus manual operation versions include a lever for manually turning the contactor on and off. When a module receives a low-level signal, it allows the separate-sourced control voltage to flow to the contactor coil. It saves space and wiring time compared to conventional interposing relays.

Table 16.60: Interface Modules *[28]*

Interface Type	Operational Voltage 24–250 Vac	Input Voltage	Catalog Number
Relay	Size 00–2	24 Vdc	LA4DFB
Relay Plus Manual Operation	Size 00–2	24 Vdc	LA4DLB
Solid State	Size 00–2	24 Vdc	LA4DWB

Table 16.61: Lugs and Lug Kits *[29]*

TeSys N Contactor	Lugs		Lug Kits*[30]*	Cable size AWG range
	Line Size	Load Side		
Size 3	3 each DZ2FF1	3 each DZ2FF1	DZ2FF6	14 to 2/0
Size 4	3 each DZ2FG1	3 each DZ2FG1	DZ2FG6	6 to 3/0
Size 5	3 each DZ2FJ1	3 each DZ2FJ1	DZ2FJ6	4 to 500 MCM
Size 6	3 each DZ2FK1	3 each DZ2FK1	DZ2FK6	2 x 2 to 600 MCM
Size 7	1 each DZ2FL1 DZ2FL2 DZ2FL3	1 each DZ2FL1 DZ2FL2 DZ2FL3	DZ2FL6	3 x 2 to 600 MCM

Table 16.62: TeSys Safety-Chain Identification System

Description	Compatibility	Package Qty	Catalog Number
Red retrofit contactor safety cover	Size 00–2	10	LAD9ET1S
Red auxiliary contact block, 2 N.O. + 2 N.C.	Size 00–2	1	LADN22S

LA4DFB

LAD9ET1S

LADN22S

[28] Adapter required. See Table 16.58.
[29] The mounting hardware (screws, washers, and nuts) comes with the contactors, not the lugs. Starters Sizes 3–7 come with lugs.
[30] Lug kits incude 6 lugs.

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Replacement Contacts and Coils

Table 16.63: Replacement Contact Sets *[31]*

For use on contactors	Number of Poles	Catalog Number
Size 3–4	3 poles	LA5FF431
Size 5	3 poles	LA5F400803
Size 6	3 poles	LA5F500803
Size 7	3 poles	LA5F630803

TeSys N Magnet Coils

Table 16.64: Size 00–1 AC Coils

Rated Nominal Voltage	Catalog Number 50/60 Hz
24	LXD1B7
32	LXD1C7
36	LXD1CC7
42	LXD1D7
48	LXD1E7
60	LXD1EE7
100	LXD1K7
110	LXD1F7
115	LXD1FE7
120	LXD1G7
127	LXD1FC7
200	LXD1L7
208	LXD1LE7
220/230	LXD1M7
230	LXD1P7
230/240	LXD1U7
277	LXD1W7
380/400	LXD1Q7
400	LXD1V7
415	LXD1N7
440	LXD1R7
480	LXD1T7
575	LXD1SC7
600	LXD1X7
Specifications	50/60 Hz
Average consumption - Inrush (inductance 0.75) - Sealed (inductance 0.3)	 70 VA 7 VA
Operating range@ 60 °C	50 Hz: 80–110% of nominal 60 Hz: 85–110% of nominal

Table 16.65: Size 2 AC Coils

Rated Nominal Voltage V	Catalog Number 50/60 Hz
24	LXD3B7
32	LXD3C7
42	LXD3D7
48	LXD3E7
100	LXD3K7
110	LXD3F7
115	LXD3FE7
120	LXD3G7
127	LXD3FC7
200	LXD3L7
208	LXD3LE7
220	LXD3M7
230	LXD3P7
240	LXD3U7
277	LXD3W7
380	LXD3Q7
400	LXD3V7
415	LXD3N7
440	LXD3R7
480	LXD3T7
500	LXD3S7
575	LXD3SC7
600	LXD3X7
Specification	**50/60 Hz**
Average consumption: - Inrush (inductance 0.3) - Sealed (inductance 0.3)	 140 VA (inductance: 0.9) 7.5 VA (inductance: 0.9)
Operating range at θ < 55 °C / 131 °F	80–115% of nominal voltage

Table 16.66: Size 3–7 AC Coils

Contactor Size	Hz	Catalog Number	Catalog Number Suffix *[32]*											
			24 V	48 V	110 V	120 V	208 V	220 V	240 V	277 V	380 V	415 V	440 V	480 V	600 V
Size 3–4	60	LX1FF●	020	040	092	095	162	184	187	220	316	340	360	380	475
Size 5	40–400	LX1FH●	0242	0482	1102	1272	2002	2202	2402	2772	3802	3802	4402	5002	6002
Size 6*[33]*	40–400	LX1FK●	—	048	110	110	200	220	240	280	380	415	415	415	600
Size 7*[33]*	40–400	LX1FL●	—	048	110	110	200	220	240	260	380	415	415	415	600

Table 16.67: Size 3–4 DC Coils

Device Type	Catalog Number	Catalog Number Suffix *[34]*									
		24 V	36 V	48 V	60 V	72 V	110 V	125 V	220 V	250 V	440 V
Size 3–4	LX4FF●	024	035	048	060	070	110	125	220	250	440

[31] Provided per pole: 2 fixed contacts, 1 movable contact, 2 deflectors, 1 backplate, and the mounting screws and washers.
[32] Complete the catalog number by adding the suffix (for example, LX1FF020).
[33] The 600 V coils for Sizes 6 and 7 do not include an auxiliary contact for holding circuits. If required, select the appropriate contacts from page 16-18.
[34] Complete the catalog number by adding the suffix (for example, LX4FF024).

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TeSys™ N Non-Reversing Contactors

Table 16.68: TeSys N Contactors, Size 00–1, Non-Reversing *[35]*

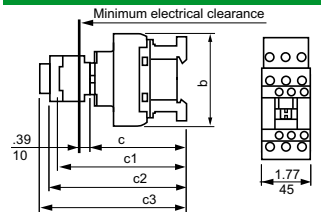
Dimensional Diagram	Dimension	Description	Dimensions			
			AC Coil		DC Coil	
			in.	mm	in.	mm
	b	Without add-on accessories	3.35	85	3.35	85
	b1	With LAD4BB	3.86	98	n/a	n/a
		With LA4D•2	4.49	114	n/a	n/a
		With LA4DF, DT	4.84	123	n/a	n/a
		With LA4DR, DW, DL	5.12	130	n/a	n/a
	c	Without cover or add-on blocks	3.54	90	3.90	99
		With cover, without add-on blocks	3.62	92	3.98	101
	c1	With LADN or LADC	4.84	123	5.20	132
	c2	With LAD6K10	5.31	135	5.67	144
	c3	With LADT, R, S	5.63	143	5.98	152
		With LADT, R, S and sealing cover	5.79	147	6.14	156

Table 16.69: TeSys N Contactors, Size 2, Non-Reversing *[35]*

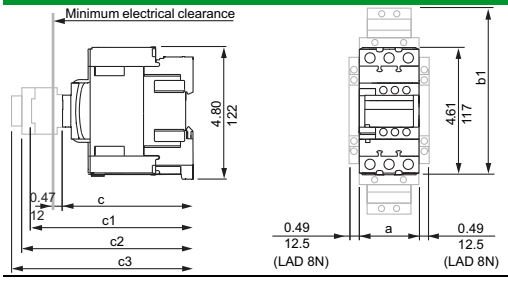
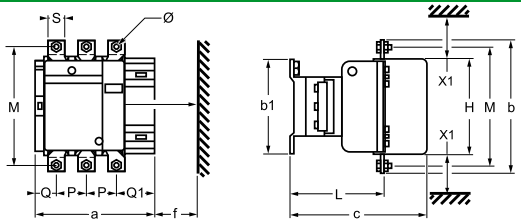
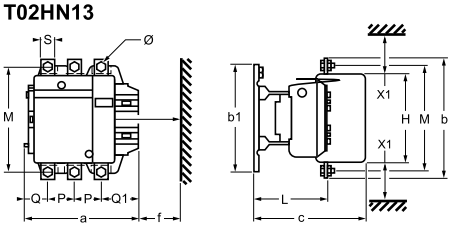
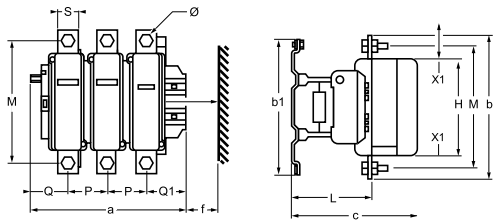
Dimensional Diagram	Dimension	Description	Dimensions	
			AC or DC Coils	
			in.	mm
	a		2.17	55
	b1	With LA4 DB3 or LAD 4BB3	5.35	136
		With LA4 DF, DT	6.18	157
		With LA4 DM, DW, DL	6.54	166
	c	Without cover or add-on blocks	4.65	118
		With cover, without add-on blocks	4.72	120
	c1	With LAD N or C (2 or 4 contacts)	5.91	150
	c2	With LAD 6K10 or LA6 DK	6.42	163
	c3	With LAD T, R, S	6.73	171
		With LAD T, R, S and sealing cover	6.89	175

Table 16.70: TeSys N Contactors, Size 3–7, Non-Reversing

Dimensional Diagram, Size 3–5	Dimension	Dimensions					
		T02EN13		T02FN13		T02GN13	
		in.	mm	in.	mm	in.	mm
T02EN13 **T02FN13** **T02GN13** 	a	6.4	163.5	6.4	163.5	8.4	213
	P	1.5	37	1.6	40	1.9	48
	Q	1.2	29.5	1	26	1.7	43
	Q1	2.4	60	2.3	57.5	2.9	74
	S	0.8	20	0.8	20	1	25
	ø	M6		M8		M10	
	f	5.2	131	5.2	131	5.8	147
	b	6.4	162	6.7	170	8.1	206
	b1	5.4	137	5.4	137	5.7	145
	M	5.8	147	5.9	150	7.1	181
	H	4.9	124	4.9	124	6.2	158
	c	6.7	171	6.7	171	8.6	219
	L	4.2	107	4.2	107	5.7	145
	X1 220–500 V	0.4	10	0.4	10	0.4	10

Dimensional Diagram, Size 6	Dimension	T02HN13	
		in.	mm
T02HN13 	a	9.2	233
	P	2.2	55
	Q	1.8	46
	Q1	3	77
	S	1.2	30
	ø	M10	
	f	5.9	150
	b	9.4	238
	b1	8.2	209
	M	8.2	208
	H	6.8	172
	c	9.1	232
	L	5.7	146
	X1 220–500 V	0.6	15

Dimensional Diagram, Size 7	Dimension	T02JN13	
		in.	mm
T02JN13 	a	12.2	309
	P	3.2	80
	Q	2.4	60
	Q1	3.5	89
	S	1.6	40
	ø	M12	
	f	7.1	181
	b	12	304
	b1	11	280
	M	10.4	264
	H	8	202
	c	10	255
	L	6.1	155
	X1 220–500 V	0.8	20

[35] DIN rail and panel mountable.

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TeSys™ N Reversing Contactors

Table 16.71: TeSys N Size 00–1, Reversing Contactors *[36]*

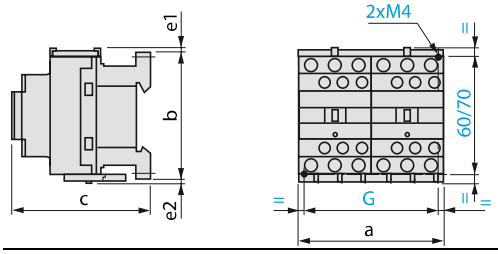
Dimensional Diagram	Dimension	Dimensions			
		AC Coil		DC Coil	
		in.	mm	in.	mm
	**a**: Without side-mount accessories	3.54	90	3.54	90
	b: Contactor base	3.35	85	3.35	85
	c: With cover, without add-on blocks	3.62	92	3.98	101
	e1	0.35	9	0.35	9
	e2	0.20	5	0.20	5
	G: Mounting holes	3.15	80	3.15	80

Table 16.72: TeSys N Size 2, Reversing Contactors *[36]*

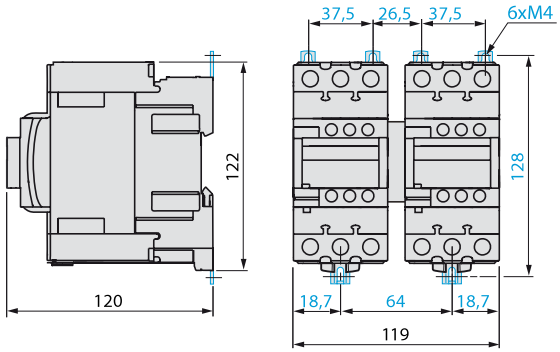
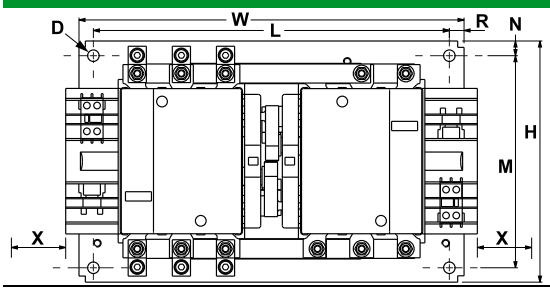
Dimensional Diagram	Description	Dimensions	
		AC and DC Coils	
		in.	mm
	Width	4.69	119
	Height	4.80	122
	Depth with cover, without add-on blocks	4.72	120
	Load side mounting hole width	2.52	64
	Line side mounting hole width	3.40	101.5
	Mounting hole height	5.04	128

Table 16.73: TeSys N Size 3–7, Reversing Contactors

Dimensional Diagram	Dimension	Dimensions									
		T02EN23		T02FN23		T02GN23		T02HN23		T02JN23	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
	D	0.38	9.7	0.38	9.7	0.56	14.2	0.56	14.2	0.56	14.2
	H	7.96	202.2	7.96	202.2	15.27	387.9	15.27	387.9	22.25	565.2
	L	11.75	298.5	11.75	298.5	18	457.2	18	457.2	30	762.0
	M	7	177.8	7	177.8	14	355.6	14	355.6	19.75	501.7
	N	0.49	12.5	0.49	12.5	0.62	15.8	0.62	15.8	1.25	31.8
	R	0.49	12.5	0.49	12.5	0.62	15.8	0.62	15.8	0.69	17.5
	W	12.71	322.8	12.71	322.8	19.27	489.5	19.27	489.5	31.38	797.0
	X	5.16	131.0	5.16	131.0	5.79	147.0	5.91	150.0	7.13	181.0

[36] DIN rail and panel mountable.

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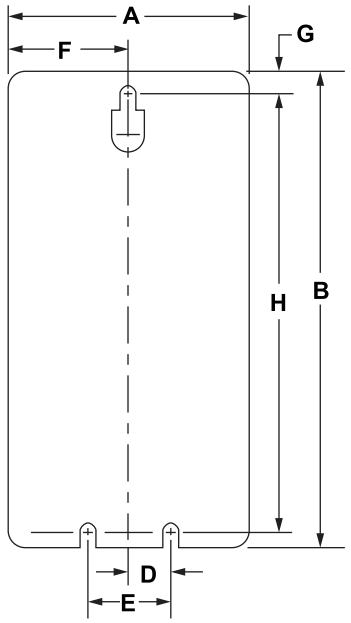
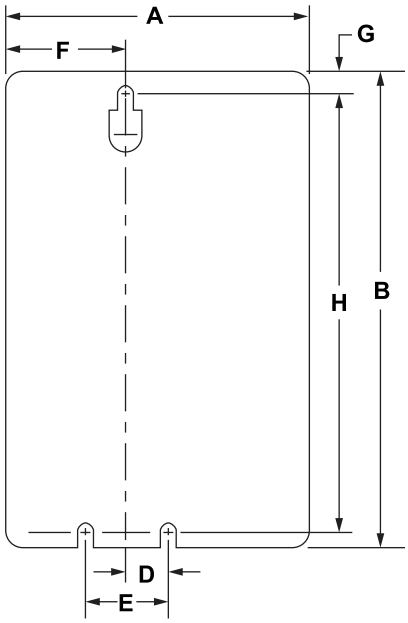
TeSys N Starters, Size 00–2

Table 16.74: TeSys N Size 00–2 Dimensions

Non-reversing
T36AN13 / T36BN13 / T36CN13 / T36DN13



Reversing
T36AN23 / T36BN23 / T36CN23 / T36DN23



Depth

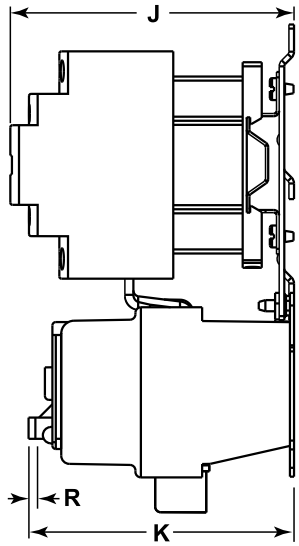


Table 16.75: TeSys N Size 00–2, Non-Reversing and Reversing Starters

Dimension	Non-Reversing								Reversing							
	Size 00 T36AN13		Size 0 T36BN13		Size 1 T36CN13		Size 2 T36DN13		Size 00 T36AN23		Size 0 T36BN23		Size 1 T36CN23		Size 2 T36DN23	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
A	3.19	81.0	3.19	81.0	3.19	81.0	3.19	81.0	43.9	111.5	43.9	111.5	43.9	111.5	5.19	131.8
B	6.64	168.7	6.64	168.7	6.64	168.7	8.61	218.7	6.64	168.7	6.64	168.7	6.64	168.7	8.61	218.7
D	0.5	12.7	0.5	12.7	0.5	12.7	0.5	12.7	0.5	12.7	0.5	12.7	0.5	12.7	0.5	12.7
E	1.0	25.4	1.0	25.4	1.0	25.4	1.0	25.4	1.0	25.4	1.0	25.4	1.0	25.4	1.0	25.4
F	1.59	40.5	1.59	40.5	1.59	40.5	1.59	40.5	1.59	40.5	1.59	40.5	1.59	40.5	1.59	40.5
G	0.20	5.2	0.20	5.2	0.20	5.2	0.20	5.2	0.20	5.2	0.20	5.2	0.20	5.2	0.20	5.2
H	6.16	156.5	6.16	156.5	6.16	156.5	8.22	208.8	6.16	156.5	6.16	156.5	6.16	156.5	8.22	208.8
J (AC Coil)	4.17	105.9	4.17	105.9	4.17	105.9	4.94	125.4	4.17	105.9	4.17	105.9	4.17	104.9	4.94	125.4
J (DC Coil)	4.52	114.9	4.52	114.9	4.52	114.9			4.52	114.9	4.52	114.9	4.52	114.9		
K	3.90	99.0	3.90	99.0	3.90	99.0	3.90	99.0	3.90	99.0	3.90	99.0	3.90	99.0	3.90	99.0
R*[37]*	0.24	6.1	0.24	6.1	0.24	6.1	0.24	6.1	0.24	6.1	0.24	6.1	0.24	6.1	0.24	6.1

[37] Reset travel.

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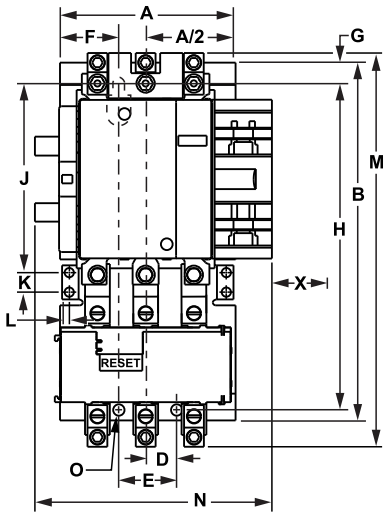
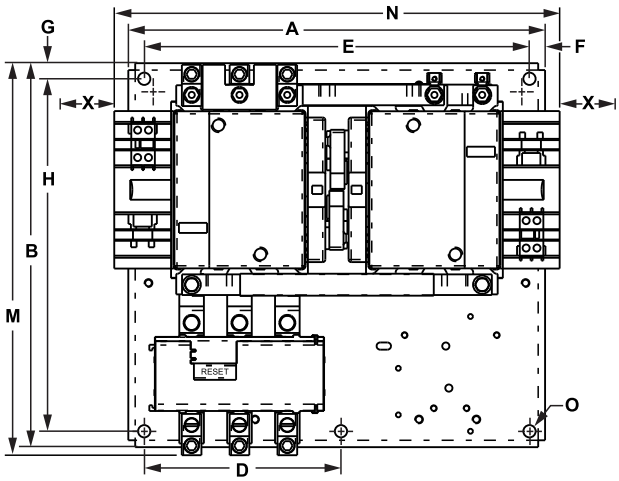
TeSys N Starters, Size 3–4

Table 16.76: TeSys N Size 3–4 Dimensions

Non-Reversing
T36EN13 / T36FN13



Reversing
T36EN23 / T36FN23



Depth

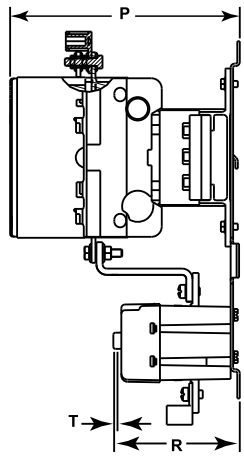


Table 16.77: TeSys N Size 3–4, Non-Reversing and Reversing Starters

Dimension	Non-Reversing				Reversing			
	Size 3 T36EN13		Size 4 T36FN13		Size 3 T36EN23		Size 4 T36FN23	
	in.	mm	in.	mm	in.	mm	in.	mm
A	5.31	134.9	5.31	134.9	12.71	322.8	12.71	322.8
B	10.82	274.8	10.82	274.8	11.71	297.4	11.71	297.4
D	0.88	22.4	0.88	22.4	6.0	152.4	6.0	152.4
E	1.75	44.5	1.75	44.5	11.75	298.5	11.75	298.5
F	1.78	45.0	1.78	45.0	0.48	12.2	0.48	12.2
G	0.32	8.1	0.32	8.1	0.48	12.2	0.48	12.2
H	10.19	258.8	10.19	258.8	10.75	273.1	10.75	273.1
J	6.03	153.2	6.03	153.2	—	—	—	—
K	0.59	15.0	0.59	15.0	—	—	—	—
L	0.22	5.6	0.22	5.6	—	—	—	—
M	11.91	302.4	11.91	302.4	11.96	303.8	11.96	303.8
N	6.57	166.8	6.57	166.8	13.58	344.9	13.58	344.9
O	0.375	9.5	0.375	9.5	0.375	9.5	0.375	9.5
P	6.96	176.7	6.96	176.7	7.18	182.4	7.18	182.4
R	3.8	97	3.8	97	3.8	97	3.8	97
T[38]	0.24	6.1	0.24	6.1	0.24	6.1	0.24	6.1
X[39]	5.16	131.0	5.16	131.0	5.16	131.0	5.16	131.0

[38] Reset travel.
[39] Minimum distance for coil removal.

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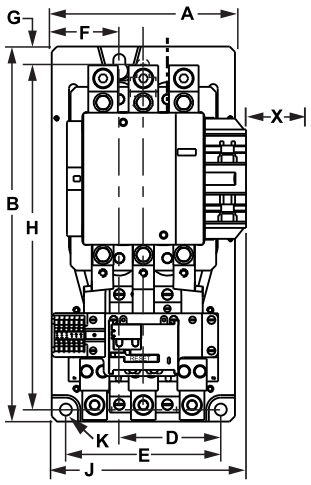
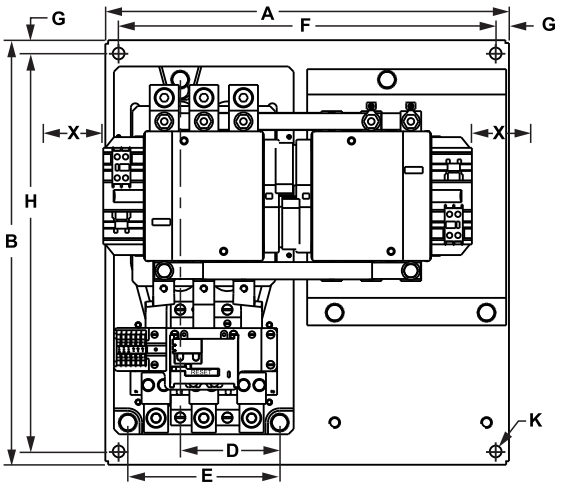
TeSys N Starters, Size 5–7

Table 16.78: TeSys N Size 5–7 Dimensions

Non-reversing
T36GN13 / T36HN13 / T36JN13



Reversing
T36GN23



Depth

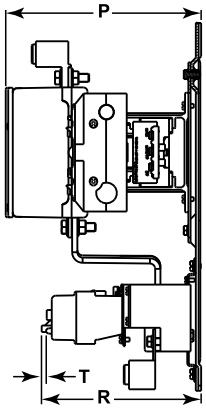


Table 16.79: TeSys N Size 5–7, Non-Reversing and Reversing Starters

Dimension	Non-Reversing						Reversing	
	Size 5 T36GN13		Size 6 T36HN13		Size 7 T36JN13		Size 5 T36GN23	
	in.	mm	in.	mm	in.	mm	in.	mm
A	8.58	217.9	8.58	217.9	8.58	217.9	19.3	489.4
B	17.56	446.0	19.75	501.7	23.58	598.9	20.3	514.8
D	4.75	120.7	4.75	120.7	4.75	120.7	4.75	120.7
E	7.25	184.2	7.25	184.2	7.25	184.2	7.25	184.2
F	3.17	80.4	3.17	80.4	3.17	80.4	18.0	457.2
G	0.63	16.0	0.63	16.0	0.63	16.0	0.63	16.1
H	16.37	415.8	18.56	463.6	22.38	565.9	19.0	482.6
J	9.91	251.6	9.91	251.6	9.91	251.6	—	—
K	0.56	14.2	0.56	14.2	0.56	14.2	0.56	14.2
P	9.32	236.8	9.32	236.8	9.32	236.8	9.95	252.7
R	7.38	187.0	9.16	232.7	8.07	205.0	7.38	187.0
T[40]	0.24	6.1	0.24	6.1	0.24	6.1	0.24	6.1
X[40]	5.79	147 1	5.91	150.1	7.13	181.1	5.79	147.1

[40] Minimum distance for coil removal.

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Catalog Numbering

Class 8536 **Type S C G 3 V02** **Form S**

General Classification	
8502	Contactor
8536	Starter
8538	Combination Starter with Disconnect Switch
8539	Combination Starter with Circuit Breaker
8702	Reversing Contactor
8736	Reversing Starter
8738	Reversing Combination Starter with Disconnect Switch
8739	Reversing Combination Starter with Circuit Breaker
8810	Two Speed Starter ▲
8903	Type S Lighting Contactors ▲
8940	Pumping Plant Panel ▲
8941	Duplex Controller ▲

▲Consult the Table of Contents for page numbers.

Design
Type S NEMA Contactors and Starters

NEMA Size		Rating (8903 only)	
A	Size 00		
B	Size 0	M	30 A
C	Size 1	P	60 A
D	Size 2	Q	100 A
E	Size 3	V	200 A
F	Size 4	X	300 A
G	Size 5	Y	400 A
H	Size 6	Z	600 A
J	Size 7	J	800 A

Enclosure	
A	NEMA 12 Industrial Use
F	NEMA 1 Flush Mounting General Purpose
G	NEMA 1 General Purpose Surface Mounting
H	NEMA 3R Rainproof
O	Open Style Device (no enclosure)
R	NEMA 7 & 9 Hazardous Environments, Spin Top™
T	NEMA 7 & 9 Hazardous Environments, Bolted
W	NEMA 4 Watertight, 4X Corrosion Resistant

Numerals
Used to designate specific physical arrangements, such as the number of poles, fuse clip size, etc.; but the numbering varies with the Class of the equipment. Consult the Digest listings for the specific device numbers.

Voltage Code	
AC operated devices without control transformer	
Code	Voltage/Frequency
V01	24/60
V02	120/60 or 110/50
V06	480/60 or 440/50
V07	600/60 or 550/50
V08	208/60

V81: 480 V Primary, 120 V Secondary for units using a fused transformer control circuit (Form F4T)

This is only a partial listing. Consult the Digest page for each product for more options.

Common Forms (factory modifications)	
A	Start-Stop pushbuttons in the enclosure cover
C	Hand-Off-Auto selector switch in the enclosure cover
E	Bimetallic overload relays
F4T	Fused transformer control circuit (primary fuses only)
FF4T	Fused transformer control circuit (primary & secondary fuses)
H	Solid-state overload relay (SSOLR)
P1	Red ON pilot light in the enclosure cover
P2	Green OFF pilot light in the enclosure cover
S	Separate control circuit
X01	One normally closed auxiliary contact N.C.
X10	One normally open auxiliary contact N.O.

Consult "Factory Modifications (Forms)" for additional Form designations. When more than one Form is applied to a single device, arrange the Forms in alphanumerical order.

Table 16.80: How to Order

To Order Specify:	Catalog Number			
	Class	Type	Voltage Code	Form(s)
• Class Number • Type Number • Voltage Code • Form(s): see page 16-115	8539	SCG44	V06	AH30P1X11

Description: NEMA Size 1 (10 hp) electronic motor circuit protector (MCP) combo starter in a NEMA 1 enclosure with a 480 V coil, start/stop push button (A), trip-class selectable SSOLR (H30), red pilot light (P1), and 1 N.O. and 1 N.C. auxiliary contact (X11).

IMPORTANT: This information is intended for general interpretation of the catalog numbers. Do not use it to create catalog numbers for this product line.

For more ordering information, refer to the Product Selector at www.schneider-electric.com/us/.

NOTE: The terms *Class, Type,* and *Form* do not appear in the catalog number.

Devices are wired from the factory according to customer preference as follows:

- Common control
- Separate control (Form S)
- Control power transformer (CPT)

NOTE: TeSys T devices are unwired.

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Type SCO2
Size 1, 3-Pole Contactor

General Information

Class 8502 Type S magnetic contactors are used to switch heating loads, capacitors, transformers, and electric motors where overload protection is provided separately. Class 8502 contactors are available in NEMA Sizes 00–7. Type S contactors are designed for operation up to 600 Vac, 50–60 Hz.

Table 16.81: 3-Pole Polyphase—600 Vac Maximum—50–60 Hz
(replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Open Type	NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure (Size 0-5)[1]
				Type [2]	Type [2]	Type [2]
00	9	200 230 460 575	1.5 1.5 2 2	SAO12●●●	SAG12●●●	Use Size 0
0	18	200 230 460 575	3 3 5 5	SBO2●●●	SBG2●●●	SBW12●●●
1	27	200 230 460 575	7.5 7.5 10 10	SCO2●●●	SCG2●●●	SCW12●●●
2	45	200 230 460 575	10 15 25 25	SDO2●●●	SDG2●●●	SDW12●●●
3	90	200 230 460 575	25 30 50 50	SEO2●●●	SEG2●●●	SEW12●●●
4	135	200 230 460 575	40 50 100 100	SFO2●●●	SFG2●●●	SFW12●●●
5	270	200 230 460 575	75 100 200 200	SGO2●●●	SGG2●●●	SGW12●●●
6	540	200 230 460 575	150 200 400 400	SHO2●●●	SHG2●●●	SHW2●●●
7	810	200 230 460 575	— 300 600 600	SJO2●●●	SJG2●●●	SJW2●●●

Table 16.82: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24 [3]	—	V01
120 [4]	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see Table 16.321.
Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Available at no charge.

Dimensions: page 16-38
Factory Modifications (Forms) page 16-115
Separate Enclosures (Class 9991): page 16-108
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[1] Size 6 and 7 are NEMA 4 only, painted sheet steel enclosures.
[2] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes shown in Table 16.82.
[3] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8502SBO2V01S).
[4] 120 V Polyphase contactors are wired for separate control **Form S** must be specified (i.e., order as 8502SCO2V02S).

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3-Pole Polyphase in NEMA 4X, 7 & 9, and 12/3R Enclosures

Table 16.83: 3-Pole Polyphase—600 Vac Maximum—50–60 Hz (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	NEMA 4X Watertight, Dusttight, Corrosion-Resistant Glass-Polyester Enclosure	NEMA 7 & 9 Hazardous Locations Div. 1 & 2 Class I, Groups C & D Class II, Groups E, F, & G			NEMA 12/3R *[5]* Dusttight & Driptight Industrial Use Enclosure
					Bolted Type *[6]*			
				Type *[6]*	Cast Iron *[7]*	Cast Aluminum *[8]*	Spin Top™ Type *[6]*	Type *[6]*
00	9	200 230 460 575	1-1/2 1-1/2 2 2	Use Size 0	Use Size 0	Use Size 0	Use Size 0	Use Size 0
0	18	200 230 460 575	3 3 5 5	SBW22●●●	SBT2●●●	SBT42●●●	SBR2●●●	SBA2●●●
1	27	200 230 460 575	7-1/2 7-1/2 10 10	SCW22●●●	SCT2●●●	SCT42●●●	SCR2●●●	SCA2●●●
2	45	200 230 460 575	10 15 25 25	SDW22●●●	SDT2●●●	SDT42●●●	SDR2●●●	SDA2●●●
3	90	200 230 460 575	25 30 50 50	SEW22●●●	—	SET42●●●	SER2●●●	SEA2●●●
4	135	200 230 460 575	40 50 100 100	SFW22●●●	—	SFT42●●●	SFR2●●●	SFA2●●●
5	270	200 230 460 575	75 100 200 200	—	—	SGT42●●●	SGR2●●●	SGA2●●●
6	540	200 230 460 575	150 200 400 400	—	—	—	—	SHA2●●●
7	810	200 230 460 575	– 300 600 600	—	—	—	—	SJA2●●●

Auxiliary Units

Auxiliary contacts and power poles can be added in the factory or the field on all Type S starters and contactors. Table 16.84 shows the maximum number of auxiliary units, **in addition to the holding circuit contact,** that can be added to a given size starter or contactor. In addition, it is possible to add a second internal contact on NEMA Size 0, 1, and 2 contactors and starters.

Table 16.84: Auxiliary Units—Class 8502 and 8536

NEMA Size	Type	No. of Poles—Basic Contactor	Maximum Number of External Auxiliary Units (in addition to holding circuit contact)
00	SA	2–3	4 single-circuit auxiliary contacts (N.O. or N.C.) if second internal auxiliary contact is not used.
0–2	SB–SD	1–3	4 single-circuit auxiliary contacts (N.O. or N.C.) *[9]*
			2 single-circuit auxiliary contacts (N.O. or N.C.) plus 1 power pole adder (1 or 2 poles, N.O. or N.C.)
		4–5	2 single-circuit auxiliary contacts (N.O. or N.C.)
3–4	SE–SF	2–5	3 single-circuit auxiliary contacts (N.O. or N.C.)
5	SG	2–3	2 single-circuit auxiliary contacts (N.O. or N.C.) plus 1 NEMA Size 0–1 or Size 2 power pole adder (1 or 2 poles, N.O. or N.C.)
6–7	SH–SJ	2–3	3 single-circuit auxiliary contacts (N.O. or N.C.)
			2 single-circuit auxiliary contacts (N.O. or N.C.) plus 1 NEMA Size 0–1 or Size 2 power pole adder (1 or 2 poles, N.O. or N.C.)

Dimensions page 16-38
Factory Modifications (Forms) page 16-115
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Replacement Parts (Class 9998) page 16-90
Type S Accessories (Class 9999) page 16-123

For How to Order Information, see page 16-27.

[5] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[6] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes shown in Table 16.82.
[7] Limited to one pilot light, and a selector switch or Start-Stop push button.
[8] NEMA 7 and 9 bolted cast aluminum are not UL listed.
[9] When adding 4 external auxiliary contacts to one Size 0 or 1 contactor, remove one of the return springs.

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Single-Phase, 4- and 5-Pole Polyphase: Open Type, NEMA 1 and 4 & 4X Enclosures

Table 16.85: 600 Vac Maximum—50–60 Hz (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Open Type	NEMA 1 General Purpose Enclosure	NEMA 4 & 4X –Watertight, Dusttight, Brushed Stainless Steel Enclosure (Size 0-5)*[10]*
				Type *[11]*	Type *[11]*	Type *[11]*
1-Pole Single Phase						
0	18	115 230	1 2	SBO5●●●	SBG5●●●	SBW15●●●
1	27	115 230	2 3	SCO5●●●	SCG5●●●	SCW15●●●
2-Pole Single Phase						
00	9	115 230	1/3 1	SAO11●●●	SAG11●●●	Use Size 0
0	18	115 230	1 2	SBO1●●●	SBG1●●●	SBW11●●●
1	27	115 230	2 3	SCO1●●●	SCG1●●●	SCW11●●●
2	45	115 230	3 7-1/2	SDO1●●●	SDG1●●●	SDW11●●●
3	90	— —	— —	SEO1●●●	SEG1●●●	SEW11●●●
4	135	—	—	SFO1●●●	SFG1●●●	SFW11●●●
5	270	—	—	SGO1●●●	SGG1●●●	SGW11●●●
6	540	—	—	SHO1●●●	SHG1●●●	SHW1●●●
7	810	—	—	SJO1●●●	SJG1●●●	SJW1●●●
4-Pole Polyphase						
0	18	200 230 460 575	3 3 5 5	SBO3●●●	SBG3●●●	SBW13●●●
1	27	200 230 460 575	7-1/2 7-1/2 10 10	SCO3●●●	SCG3●●●	SCW13●●●
2	45	200 230 460 575	10 15 25 25	SDO3●●●	SDG3●●●	SDW13●●●
3	90	200 230 460 575	25 30 50 50	SEO3●●●	SEG3●●●	SEW13●●●
4	135	200 230 460 575	40 50 100 100	SFO3●●●	SFG3●●●	SFW13●●●
5-Pole Polyphase						
0	18	200 230 460 575	3 3 5 5	SBO4●●●	SBG4●●●	SBW14●●●
1	27	200 230 460 575	7-1/2 7-1/2 10 10	SCO4●●●	SCG4●●●	SCW14●●●
2	45	200 230 460 575	10 15 25 25	SDO4●●●	SDG4●●●	SDW14●●●
3	90	200 230 460 575	25 30 50 50	SEO4●●●	SEG4●●●	SEW14●●●
4	135	200 230 460 575	40 50 100 100	SFO4●●●	SFG4●●●	SFW14●●●

Dimensions: page 16-38
Factory Modifications (Forms): page 16-115
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Replacement Parts (Class 9998): page 16-90
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[10] Size 6 and 7 are NEMA 4 only, painted sheet steel enclosures.
[11] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes shown in Table 16.82.

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Single-Phase and 4- and 5-Pole Polyphase: NEMA 4X, 7 & 9, and 12/3R Enclosures

Table 16.86: 600 Vac Maximum—50–60 Hz (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	NEMA 4X Watertight, Dusttight Corrosion-Resistant Glass-Polyester Enclosure	NEMA 7 & 9, Div. 1 & 2 Hazardous Locations Class I, Groups C & D Class II, Groups E, F & G			NEMA 12/3R *[12]* Dusttight & Driptight Industrial Use Enclosure
				Type *[13]*	Bolted Type *[13]*		Spin Top™ Type *[13]*	Type *[13]*
					Cast Iron *[14]*	Cast Aluminum *[15]*		
1-Pole Single Phase								
0	18	115 230	1 2	— —	SBT5●●●	SBT45●●●	SBR5●●●	SBA5●●●
1	27	115 230	2 3	— —	SCT5●●●	SCT45●●●	SCR5●●●	SCA5●●●
2-Pole Single Phase								
00	9	115 230	1/3 1	Use Size 0	Use Size 0		Use Size 0	Use Size 0
0	18	115 230	1 2	SBW21●●●	SBT1●●●	SBT41●●●	SBR1●●●	SBA1●●●
1	27	115 230	2 3	SCW21●●●	SCT1●●●	SCT41●●●	SCR1●●●	SCA1●●●
2	45	115 230	3 7-1/2	SDW21●●●	SDT1●●●	SDT41●●●	SDR1●●●	SDA1●●●
3	90	—	—	Consult the Customer Care Center at 1-888-778-2733.	—	SET41●●●	SER1●●●	SEA1●●●
4	135	—	—		—	SFT41●●●	SFR1●●●	SFA1●●●
5	270	—	—	—	—	—	SGR1●●●	SGA1●●●
6	540	—	—	—	—	—	—	SHA1●●●
7	810	—	—	—	—	—	—	SJA1●●●
4-Pole Polyphase								
0	18	200 230 460 575	3 3 5 5	SBW23●●●	SBT3●●●	Consult the Customer Care Center at 1-888-778-2733.	SBR3●●●	SBA3●●●
1	27	200 230 460 575	7-1/2 7-1/2 10 19	SCW23●●●	SCT3●●●		SCR3●●●	SCA3●●●
2	45	200 230 460 575	10 15 25 25	SDW23●●●	SDT3●●●		SDR3●●●	SDA3●●●
3	90	200 230 460 575	25 30 50 50	Consult the Customer Care Center at 1-888-778-2733.			SER3●●●	SEA3●●●
4	135	200 230 460 575	40 50 100 100				SFR3●●●	SFA3●●●
5-Pole Polyphase								
0	18	200 230 460 575	3 3 5 5	Consult the Customer Care Center at 1-888-778-2733.	—	—	—	SBA4●●●
1	27	200 230 460 575	7-1/2 7-1/2 10 10		—	—	—	SCA4●●●
2	45	200 230 460 575	10 15 25 25		—	—	—	SDA4●●●
3	90	200 230 460 575	25 30 50 50		—	—	—	SEA4●●●
4	135	200 230 460 575	40 50 100 100		—	—	—	SFA4●●●

Coil voltage codes and page number reference for additional information are shown on page 16-28.

For How to Order Information, see page 16-27.

[12] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[13] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes shown in Table 16.82.
[14] Limited to one pilot light, and a selector switch or Start-Stop push button.
[15] NEMA 7 and 9 bolted cast aluminum are not UL listed.

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Type SCO2
Size 1, Three-Pole Starter with Motor Logic™ SSOLR

Schneider Electric offers express shipping for factory modified NEMA Type 1 and Type 12/3R Enclosed Starters. When you need them fast, our Laser™ Delivery program is the answer to getting your product when you need it most. Ask for Laser™ Delivery, then select the product and the modifications you need when you place your order. It's as easy as that!

General Information

Type S magnetic starters are used for full-voltage starting and stopping of AC squirrel cage motors. Motor overload protection for three-phase starter applications can be provided through one of four options, as follows:

Solid-State Overload Relay Protection (Motor Logic™ SSOLR)

These ambient insensitive overload relays are available on Sizes 00 through 6 and standard on size 7. They provide phase loss and phase unbalance protection. To order, add Form **H30** (for selectable trip class 10 or 20 protection). For more information about Motor Logic SSOLRs, see page 16-99 and page 16-117. (Catalog number example: 8536SCO3V06H30)

New! Adapted Bimetallic Overload Relay (NEMA Sizes 00–1)

The Adapted Bimetallic motor starter consists of a specially designed adapter that attaches with bus bars to the NEMA Type S contactor and holds the LRD or LR3D (IEC Style) bimetallic overload relay. This starter configuration can be ordered by adding Form **E** (adapter only) to the standard catalog number. Once the FLA of the motor is determined, the LRD or LR3D bimetallic overload must be purchased separately and installed in the field in order to operate the starter. For more information, see Table 16.324. (Catalog number example: 8536SCO3V06E)

New! TeSys T Motor Management System (NEMA Sizes 1–6)

TeSys T is a flexible system that integrates seamlessly into your automation system through five major communication protocols. TeSys T can predict what will happen in the process, as it accurately monitors current, voltage, and power over a wide range. For additional information about TeSys T Motor Management System, see page 16-101 and page 16-118. NOTE: The full catalog number contains a four-character Form number (for example, 8536SCO3V06**H616**).

Melting Alloy Type Thermal Overload Relays

Melting alloy type thermal overload blocks are installed as part of the starter, and thermal elements must be selected and installed separately in order to operate the starter. For a three-phase motor, three thermal units must be ordered using the tables beginning under page 16-131. The catalog number includes no Form number (for example, 8536SCO3V06).

Table 16.87: 3-Pole Polyphase—600 Vac Maximum—50–60 Hz, with Motor Logic SSOLR (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Open Type	NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure (Size 0-5)*[16]*	NEMA 4X Watertight, Dusttight, Corrosion-Resistant Glass-Polyester Enclosure
				Type *[17]*	Type *[17]*	Type *[17]*	Type *[17]*
00	9	200 230 460 575	1.5 1.5 2 2	SAO12●●●H30	SAG12●●●H30 *[18]*	Use Size 0 *[18]*	Use Size 0 *[18]*
0	18	200 230 460 575	3 3 5 5	SBO2●●●H30 *[18]*	SBG2●●●H30 *[18]*	SBW12●●●H30 *[18]*	SBW22●●●H30 *[18]*
1	27	200 230 460 575	7.5 7.5 10 10	SCO3●●●H30 *[18]*	SCG3●●●H30 *[18]*	SCW13●●●H30 *[18]*	SCW23●●●H30 *[18]*
2	45	200 230 460 575	10 15 25 25	SDO1●●●H30 *[18]*	SDG1●●●H30 *[18]*	SDW11●●●H30 *[18]*	SDW21●●●H30 *[18]*
3	90	200 230 460 575	25 30 50 50	SEO1●●●H30	SEG1●●●H30	SEW11●●●H30	SEW21●●●H30
4	135	200 230 460 575	40 50 100 100	SFO1●●●H30	SFG1●●●H30	SFW11●●●H30	SFW21●●●H30
5	270	200 230 460 575	75 100 200 200	SGO1●●●H30	SGG1●●●H30	SGW11●●●H30	—
6	540	200 230 460 575	150 200 400 400	SHO2●●●H30	SHG2●●●H30	SHW2●●●H30	—
7	810	200 230 460 575	— 300 600 600	SJO2●●●H30	SJG2●●●H30	SJW2●●●H30	—

[16] Size 6 and 7 are NEMA 4 only, painted sheet steel enclosures.
[17] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in .
[18] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117

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3-Pole Polyphase: NEMA 7 & 9 and 12/3R

Table 16.88: 3-Pole Polyphase—600 Vac Maximum—50–60 Hz (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	NEMA 7 & 9 For Hazardous Locations Div. 1 & 2 Class I–Groups C, D Class II–Groups E, F, & G			NEMA 12/3R *[19]* Dusttight & Driptight Industrial Use Enclosure
				Bolted Type *[20]*		Spin Top™ Type *[20]*	Type *[20]*
				Cast Iron *[20]*	Cast Aluminum *[20]*		
00	9	200 230 460 575	1.5 1.5 2 2	Use Size 0		Use Size 0	Use Size 0
0	18	200 230 460 575	3 3 5 5	SBT2●●●H30 *[21]*	SBT42●●●H30 *[21]*	SBR2●●●H30 *[21]*	SBA2●●●H30 *[21]*
1	27	200 230 460 575	7.5 7.5 10 10	SCT3●●●H30 *[21]*	SCT43●●●H30 *[21]*	SCR3●●●H30 *[21]*	SCA3●●●H30 *[21]*
2	45	200 230 460 575	10 15 25 25	SDT1●●●H30 *[21]*	SDT41●●●H30 *[21]*	SDR1●●●H30 *[21]*	SDA1●●●H30 *[21]*
3	90	200 230 460 575	25 30 50 50	—	SET43●●●H30	SER3●●●H30	SEA1●●●H30
4	135	200 230 460 575	40 50 100 100	—	SFT41●●●H30	SFR1●●●H30	SFA1●●●H30
5	270	200 230 460 575	75 100 200 200	—	SGT41●●●H30	SGR1●●●H30	SGA1●●●H30
6	540	200 230 460 575	150 200 400 400	—	—	—	SHA2●●●H30
7	810	200 230 460 575	– 300 600 600	—	—	—	SJA2●●●H30

3 or 5 Days Laser Delivery

Schneider Electric offers express shipping for factory modified NEMA Type 1 and Type 12/3R Enclosed Starters. When you need them fast, our Laser™ Delivery program is the answer to getting your product when you need it most. Ask for Laser™ Delivery, then select the product and the modifications you need when you place your order. It's as easy as that!

Table 16.89: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24*[22]*	—	V01
120 *[23]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page 16-116. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage.

Dimensions: page 16-38
Factory Modifications (Forms): page 16-115
Separate Enclosures (Class 9991): page 16-108
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[19] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[20] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.89.
[21] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[22] 24 V coils are not available on Sizes 4–7. On Sizes 00-3, where 24 V coils are available, **Form S** (separate control) must be specified (i.e., order as 8536SBO2V01S).
[23] 120 V Polyphase contactors are wired for separate control. **Form S** (separate control) must be specified (i.e., order as 8536SCO2V02S).

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2-Pole Single Phase

Table 16.90: 2-Pole Single Phase—600 Vac Maximum—50–60 Hz (require 1 melting alloy thermal unit, page 16-130) (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Open Type	NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure	NEMA 4X Watertight, Dusttight, Corrosion-Resistant Glass-Polyester Enclosure
				Type *[24]*	Type *[24]*	Type *[24]*	Type *[24]*
00	9	115 230	1/3 1	SAO11●●●	SAG11●●●	Use Size 0	Use Size 0
0	18	115 230	1 2	SBO1●●●	SBG1●●●	SBW11●●●	SBW21●●●
1	27	115 230	2 3	SCO1●●●	SCG1●●●	SCW11●●●	SCW21●●●
1P	36	115 230	3 5	SCO2●●●	SCG2●●●	SCW12●●●	SCW22●●●
2	45	115 230	3 7-1/2	SDO6●●●	SDG6●●●	SDW16●●●	SDW26●●●

Table 16.91: Class 8538 4-Pole, 2-Phase—600 Vac Maximum—50–60 Hz (require 2 melting alloy thermal units, page 16-130) (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Open Type	NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure	NEMA 4X Watertight, Dusttight, Corrosion-Resistant Glass-Polyester Enclosure
				Type *[25]*	Type *[25]*	Type *[25]*	Type *[25]*
0	18	200 230 460 575	3 3 5 5	SBO3●●●	SBG3●●●	SBW13●●●	SBW23●●●
1	27	200 230 460 575	7-1/2 7-1/2 10 10	SCO4●●●	SCG4●●●	SCW14●●●	SCW24●●●
2	45	200 230 460 575	10 15 25 25	SDO2●●●	SDG2●●●	SDW12●●●	SDW22●●●
3	90	200 230 460 575	25 30 50 50	SEO2●●●	SEG2●●●	SEW12●●●	Consult the Customer Care Center at (1-888-778-2733)
4	135	200 230 460 575	40 50 100 100	SFO2●●●	SFG2●●●	SFW12●●●	

Table 16.92: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24 *[26]*	—	V01
120 *[27]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page 16-116.
Form S (separate control) is used when a separate source of power is available for the
control (coil) voltage. Form S is provided at no charge.

Dimensions: page 16-38
Factory Modifications (Forms): page 16-115
Separate Enclosures (Class 9991): page 16-108
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999) page 16-123

For How to Order Information, see page 16-27.

[24] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.92.
[25] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.92.
[26] 24 V coils are not available on Sizes 4–7. On sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (i.e., order as 8536SBO2V01S).
[27] 120 V polyphase starters are wired for separate control. **Form S** (separate control) must be specified (for example, order as 8536SCO2V02S).

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Table 16.93: 2-Pole Single Phase—600 Vac Maximum—50–60 Hz (require 1 melting alloy thermal unit, page 16-130) (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	NEMA 7 & 9 Hazardous Locations, Div. 1 & 2 Class I, Groups C & D Class II, Groups E, F, & G			NEMA 12/3R *[28]* Dusttight & Driptight Industrial Use Enclosure
				Bolted Type *[29]*		Spin Top™ Type	Type
				Cast Iron *[30]*	Cast Aluminum *[31]*		
00	9	115 230	1/3 1	Use Size 0		Use Size 0	Use Size 0
0	18	115 230	1 2	SBT1●●●	SBT41	SBR1●●●	SBA1●●●
1	27	115 230	2 3	SCT1●●●	SCT41	SCR1●●●	SCA1●●●
1P	36	115 230	3 5	SCT2●●●	SCT42	SCR2●●●	SCA2●●●
2	45	115 230	3 7-1/2	SDT6●●●	SDT46	SDR6●●●	SDA6●●●

Table 16.94: 4-Pole 2-Phase—600 Vac Maximum—50–60 Hz (require 2 melting alloy thermal units, page 16-130) (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Coil Voltage	NEMA 7 & 9 Hazardous Locations Class I, Groups C & D Class II, Groups E, F, & G			NEMA 12/3R *[32]* Dusttight & Driptight Industrial Use Enclosure
					Bolted Type *[33]*		Spin Top™ Type *[33]*	Type *[33]*
					Cast Iron *[34]*	Cast Aluminum		
0	18	200 230 460 575	3 3 5 5	208 240 480 600	SBT3●●●	Consult the Customer Care Center at 1-888-778-2733	SBR3●●●	SBA3●●●
1	27	200 230 460 575	7-1/2 7-1/2 10 10	208 240 480 600	SCT4●●●		SCR4●●●	SCA4●●●
2	45	200 230 460 575	10 15 25 25	208 240 480 600	SDT2●●●		SDR2●●●	SDA2●●●
3	90	200 230 460 575	25 30 50 50	208 240 480 600	Consult the Customer Care Center at 1-888-778-2733		SER2●●●	SEA2●●●
4	135	200 230 460 575	40 50 100 100	208 240 480 600			—	SFA2●●●

Dimensions: page 16-38
Factory Modifications (Forms): page 16-115
Separate Enclosures (Class 9991): page 16-108
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[28] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[29] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.92.
[30] Limited to one pilot light, and a selector switch or Start-Stop push button.
[31] NEMA 7 and 9 bolted cast aluminum are not UL listed.
[32] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[33] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.92.
[34] Limited to one pilot light, and a selector switch or Start-Stop push button.

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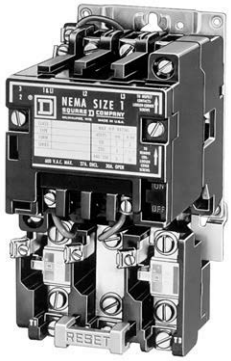

Types SB–SD With Auxiliary Load Terminals

It is sometimes desirable to use capacitors in motor branch circuits to improve power factor. The Size 0–2 Type SB–SD starters listed Table 16.95 include three auxiliary terminals to allow easy connection of power factor correction capacitors. When capacitors are connected using these terminals, no adjustment to the selection of thermal units is necessary. The auxiliary terminals accept 12–16 AWG solid or stranded wire. NEMA Size 3 and 4 starters have provisions for auxiliary connections. User must supply lugs as necessary.

The Type S starters with auxiliary load terminals may also be used to control two motors simultaneously from a single starter. However, this application is tightly restricted by Section 430-53 of the National Electrical Code. Refer to the NEC for restrictions regarding overload protection, size of controller and motor branch circuit protection.

Table 16.95: 3-Pole Polyphase—600 Vac Maximum—50–60 Hz (devices require 3 melting alloy thermal units, page 16-130) (replace ●●● with the voltage code)

NEMA Size	Motor Voltage	Max. Hp	Open Type *[35]*
0	200 230 460 575	3 3 5 5	SBTO2●●●
1	200 230 460 575	7-1/2 7-1/2 10 10	SCTO3●●●
2	200 230 460 575	10 15 25 25	SDTO1●●●

Extra Capacity Single Phase Starters (Not NEMA Style)

Table 16.96: 2-Pole Single Phase—250 Vac Maximum—50–60 Hz (require 1 melting alloy thermal unit, page 16-130) (replace ●●● with the voltage code)

Motor Voltage	Max. Hp	Open Type	NEMA 1 General Purpose Enclosure	NEMA 3R Rain-proof, Sleet Resistant, Outdoor Use Enclo-sure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure	NEMA 4X Watertight Corrosion Resistant Glass-Polyester Enclosure	NEMA 12/3R *[36]* Dusttight and Driptight Industrial Use Enclosure
		Type *[37]*	Type *[37]*	Type *[37]*	Type *[37]*	Type *[37]*	Type *[37]*
115 230	5 10	SDO8●●● *[38]*	—	SDH8●●● *[38]*	—	—	—
115 230	7-1/2 15	SEO6●●●	SEG6●●●	SEH6●●●	SEW16●●●	SEW26●●●	SEA6●●●

Table 16.97: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24 *[39]*	—	V01
120 *[40]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page 16-116. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is supplied at no charge.

Dimensions: page 16-38
Factory Modifications (Forms): page 16-115
Separate Enclosures (Class 9991): page 16-108
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[35] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes in Table 16.97.
[36] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[37] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes in Table 16.97.
[38] Uses a Size 3 overload relay.
[39] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified.
[40] 120 Volt Polyphase starters are wired for separate control and must be ordered with Form S (i.e., 8536SCO2V02S).

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Application Data for Selection

Table 16.98: Application Data per NEMA Standards ICS-1 and ICS-2

NEMA Size	Load Voltage	Max. Hp Rating: Nonplugging and Nonjogging Duty		Max. Hp Rating: Plugging and Jogging Duty *[41]*		Continuous Current Rating (A) 600 V Max.	Service-Limit Current Rating (A) *[42]*	Tungsten and Infrared Lamp Load (A), 250 V Max. *[43]*	Resistance Heating Loads (KW) other than Infrared Lamp Loads *[44]*		KVA Rating for Switching Transformer Primaries at 50 or 60 Cycles				3 Ø Rating for Switching Capacitors *[45]*
											Inrush Currents (Worst Case Peak)				
											≤20 Times Peak of Continuous Current Rating		>20 to 40 Times Peak of Continuous Current Rating		
		Single Phase	Poly-phase	Single Phase	Poly-phase				Single Phase	Poly-phase	Single Phase	Poly-phase	Single Phase	Poly-phase	KVAR
00	115	0.5	—	—	—	9	11	5	—	—	—	—	—	—	—
	200	—	1.5	—	—	9	11	5	—	—	—	—	—	—	—
	230	1	1.5	—	—	9	11	5	—	—	—	—	—	—	—
	380	—	1.5	—	—	9	11	—	—	—	—	—	—	—	—
	460	—	2	—	—	9	11	—	—	—	—	—	—	—	—
	575	—	2	—	—	9	11	—	—	—	—	—	—	—	—
0	115	1	—	0.5	—	18	21	10	—	—	0.6	—	0.3	—	—
	200	—	3	—	1.5	18	21	10	—	—	—	1.8	—	0.9	—
	230	2	3	1	1.5	18	21	10	—	—	1.2	2.1	0.6	1.0	—
	380	—	5	—	1.5	18	21	—	—	—	—	—	—	—	—
	460	—	5	—	2	18	21	—	—	—	2.4	4.2	1.2	2.1	—
	575	—	5	—	2	18	21	—	—	—	3.0	5.2	1.5	2.6	—
1	115	2	—	1	—	27	32	15	3	5	1.2	—	0.6	—	—
	200	—	7.5	—	3	27	32	15	—	9.1	—	3.6	—	1.8	—
	230	3	7.5	2	3	27	32	15	6	10	2.4	4.3	1.2	2.1	—
	380	—	10	—	5	27	32	—	—	16.5	—	—	—	—	—
	460	—	10	—	5	27	32	—	12	20	4.9	8.5	2.5	4.3	—
	575	—	10	—	5	27	32	—	15	25	6.2	11.0	3.1	5.3	—
1P	115	3	—	1.5	—	36	42	24	—	—	—	—	—	—	—
	230	5	—	3	—	36	42	24	—	—	—	—	—	—	—
2	115	3	—	2	—	45	52	30	5	8.5	2.1	—	1.0	—	—
	200	—	10	—	7.5	45	52	30	—	15.4	—	6.3	—	3.1	—
	230	7.5	15	5	10	45	52	30	10	17	4.1	7.2	2.1	3.6	8
	380	—	25	—	15	45	52	—	—	28	—	—	—	—	—
	460	—	25	—	15	45	52	—	20	34	8.3	14	4.2	7.2	16
	575	—	25	—	15	45	52	—	25	43	10.0	18	5.2	8.9	20
3	115	—	—	—	—	90	104	60	10	17	4.1	—	2.0	—	—
	200	—	25	—	15	90	104	60	—	31	—	12	—	6.1	—
	230	—	30	—	20	90	104	60	20	34	8.1	14	4.1	7.0	27
	380	—	50	—	30	90	104	—	—	56	—	—	—	—	—
	460	—	50	—	30	90	104	—	40	68	16	28	8.1	14	53
	575	—	50	—	30	90	104	—	50	86	20	35	10	18	67
4	200	—	40	—	25	135	156	120	—	45	—	20	—	10	—
	230	—	50	—	30	135	156	120	30	52	14	23	6.8	12	40
	380	—	75	—	50	135	156	—	—	86.7	—	—	—	—	—
	460	—	100	—	60	135	156	—	60	105	27	47	14	23	80
	575	—	100	—	60	135	156	—	75	130	34	59	17	29	100
5 *[46]*	200	—	75	—	60	270	311	240	—	91	—	41	—	20	—
	230	—	100	—	75	270	311	240	60	105	27	47	14	24	80
	380	—	150	—	125	270	311	—	—	173	—	—	—	—	—
	460	—	200	—	150	270	311	—	120	210	54	94	27	47	160
	575	—	200	—	150	270	311	—	150	260	68	117	34	59	200
6 *[46]*	200	—	150	—	125	540	621	480	—	182	—	81	—	41	—
	230	—	200	—	150	540	621	480	120	210	54	94	27	47	160
	380	—	300	—	250	540	621	—	—	342	—	—	—	—	—
	460	—	400	—	300	540	621	—	240	415	108	188	54	94	320
	575	—	400	—	300	540	621	—	300	515	135	234	68	117	400
7 *[46]*	230	—	300	—	—	810	932	—	180	315	—	—	—	—	240
	460	—	600	—	—	810	932	—	360	625	—	—	—	—	480
	575	—	600	—	—	810	932	—	450	775	—	—	—	—	600

Table 16.99: Maximum Allowable Motor Code Letter

Motor Hp Rating	Maximum Allowable Motor Code Letter
1.5–2	L
3–5	K
7.5 and above	H

The motor ratings in Table 16.98 are NEMA standard ratings and apply only when the code letter of the motor is the same as or occurs earlier in the alphabet than what is shown in Table 16.99. Motors with code letters occurring later in the alphabet may require a larger controller. Consult the Customer Care Center at 1-888-778-2733.

The ratings for capacitor switching in Table 16.98 assume the following maximum available fault currents (rms symmetrical amperes):

- NEMA Size 00–3: 5,000 A
- NEMA Size 4–5: 10,000 A
- NEMA Size 6: 18,000 A
- NEMA Size 7: 30,000 A

If the available fault current is greater than these values, connect sufficient impedance in series.

Refer to the instruction material for the actual tested SCCR values.

NOTE: Tables and footnotes are taken from NEMA Standards.

[41] Ratings shown are for applications requiring repeated interruptions of stalled motor current or repeated closing of high transient currents encountered in rapid motor reversal, involving more than five openings or closings per minute and more than ten in a ten-minute period, such as plug-stop, plug-reverse or jogging duty. Ratings apply to single speed and multi-speed controllers.

[42] Per NEMA Standards paragraph ICS 2-321.20, the service-limit current represents the maximum rms current, in Amperes, which the controller may be expected to carry for protracted periods in normal service. At service-limit current ratings, temperature rises may exceed those obtained by testing the controller at its continuous current rating. The ultimate trip current of over-current (overload) relays or other motor protective devices shall not exceed the service-limit current ratings of the controller.

[43] **Fluorescent Lamp Loads—300 V and Less—**The characteristics of fluorescent lamps are such that it is not necessary to derate Class 8502 contactors below their normal continuous current rating. Class 8903 contactors may also be used with fluorescent lamp loads. For controlling tungsten and infrared lamp loads, and resistance heating loads, Class 8903 AC lighting contactors are recommended. These contactors are specifically designed for such loads and are applied at their full rating as listed in the Class 8903 (lighting contactors) section.

[44] Ratings apply to contactors which are employed to switch the load at the utilization voltage of the heat producing element with a duty which requires continuous operation of not more than five openings per minute. Class 8903 Types L and S lighting contactors are rated for resistance heating loads.

[45] When discharged, a capacitor has essentially zero impedance. For repetitive switching by a contactor, sufficient impedance should be connected in series to limit inrush current to not more than 6 times the contactor rated continuous current. In many installations, the impedance of connecting conductors may be sufficient for this purpose. When switching to connect additional banks, the banks already on the line may be charged and can supply additional available short-circuit current which should be considered when selecting the impedance to limit the current.

[46] For NEMA Size 6 and 7, the operation rate is as follows: Continuous operation rate is 3 operations per minute maximum; Jogging or Plugging Duty operation rate is 15 operations per minute for a maximum of three minutes.

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Dimensions for Open Type and NEMA 1 Enclosures

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.100: Dimensions for Class 8502 Open Type

NEMA Size	Type	No. of Poles	Fig. No.	Dimensions, in. (Refer to Figure 1)									Wt
				A	B	C	D	E	F	G	H	I	
				in.	in.	in.	in.	in.	in.	in.	in.	in.	(lb)
00	SAO	2–3	1	3.22	4.34	4.22	1.63	1.63	0.22	3.94	—	—	4
0	SBO	1–3	1	3.22	4.34	4.22	1.63	1.63	0.22	3.94	—	—	4
1	SCO	4–5		4.25	4.34	4.22	1.63	2.63	0.22	3.94	—	—	4.5
2	SDO	2–3	1	4.31	5.13	4.94	2.16	2.16	0.22	4.59	0.53	1.06	6.75
		4–5		5.63	5.13	4.94	2.16	3.47	0.22	4.59	0.53	1.06	8.25
3	SEO	2–3	1	5.47	7.09	6.5	1.88	3.53	0.31	6.03	3.25	4.75	14
		4–5		9.75	7.88	6.5	3.94	5.81	0.31	7	4.53	9.06	22
4	SFO	2–3	1	6	8.19	6.5	2.06	3.94	0.31	7	3.59	5.31	18
		4–5		9.75	8.19	6.5	3.94	5.81	0.31	7	4.53	9.06	22
5	SGO	2–3	1	8.67	12.31	8.75	3.25	5.81	0.63	11.13	4.75	7.25	45
6	SHO	2–3	1	10.55	28.06	9	3.53	7.03	5.06	18.56	4.75	7.25	80
7	SJO	2–3	1	10.55	37.25	10.88	3.53	7.03	7.22	22.38	4.75	7.25	135

Table 16.101: Dimensions for 8536 Open Type

NEMA Size	Type	No. of Poles	Fig. No.	Dimensions, in. (Refer to Figure 2)									Wt
				A	B	C	D	E	F	G	H	I	
				in.	in.	in.	in.	in.	in.	in.	in.	in.	(lb)
00, 0, 1, 1P	SAO–SCO	2–3	2	3.5	6.77	4.22	0.5	1	1.61	0.2	6.25	3.97	5
0, 1	SBO–SCO	4	2	4.53	6.77	4.22	0.5	1	2.67	0.2	6.25	3.97	5.5
2	SDO	2–3	2	4.31	7.81	4.94	0.5	1	2.16	0.2	7.34	4.06	7.75
		4		5.63	7.81	4.94	0.5	1	3.47	0.2	7.34	4.06	9.25
3	SEO	2–3	2	5.47	11.09	6.5	0.88	1.75	3.59	0.31	10.19	5.75	17
		4		9.75	12.13	6.5	1.81	1.75	5.81	0.31	11.19	5.75	25
4	SFO	3	2	6	12.88	6.5	1.81	1.75	3.94	0.31	11.19	5.75	22
		4		9.75	12.88	6.5	1.81	1.75	5.91	0.31	11.19	5.75	25
5	SGO	3	2	8.56	17.56	8.75	4.75	7.25	5.38	0.63	16.38	6	62
6	SHO	3	2	12.34	28.06	9	4.75	7.25	5.78	5.06	18.56	8.69	85
7	SJO	3	2	12.34	37.25	10.88	4.75	7.25	5.78	7.22	22.38	9	140

Table 16.102: Dimensions for NEMA 1 General Purpose Enclosure

NEMA Size	Type	No. of Poles	Fig. No.	Dimensions, in.												
				A	B	C		D	E	F	G	H	I	J	K	L
						8502	8536									
00 0 1	SAG SBG SCG	All All All	3 3 3	6	10	5.28	5.56	3	0.88	8.13	1	0.94	4.13	5	—	—
2	SDG	All	3	7.81	12.69	6.03	6.31	—	1.09	10.5	1.09	1.09	5.63	5.75	1.09	5.63
3	SEG	All	3	11.44	21.81	8	8.38	—	1.53	18.75	1.53	1.53	8.38	7.75	1.53	8.38
4	SFG	All	5	11.25	25.16	9	9	8.59	1.25	1.25	22.31	1.44	0.44	—	—	—
5	SGG	All	5	17.22	44.22	12.81	12.94	13	2.13	2.13	40	2.13	0.56	—	—	—
6	SHG	All	4	65.75	20.22	13.13	13.13	—	11	64.5	2.31	5.5	—	—	—	—
7	SJG	All	4	93	34.5	23.5	23.5	Floor Mounting								

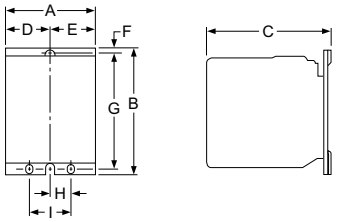

Figure 1
Class 8502

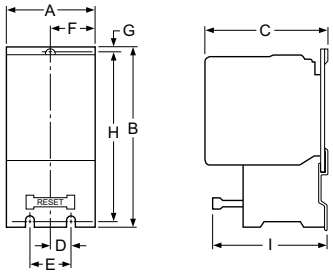

Figure 2
Class 8536

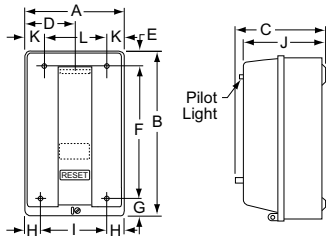

Figure 3

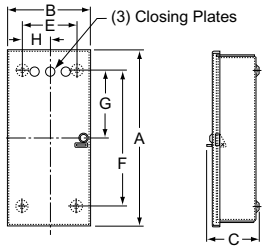

Figure 4

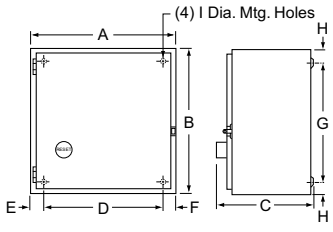

Figure 5

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Dimensions for NEMA 4 and 4X Enclosures

Table 16.103: See Figure: NEMA 4 and 4X—Stainless Steel Watertight Enclosure

NEMA Size	Class	Type	No. of Poles	Dimensions, in.												Hub Dia.	
				A	B	C	D	E	F	G	H	I	J	K	L	Bot. Only W	Top & Bot. X
0 and 1	8502	SBW	All	6.38	7.13	13.19	1.56	3.25	12	0.59	1.19	11.78	1.63	2.31	0.31	3/4"	1"
		SCW															
	8536	SBW	All	6.38	7.81	13.19	1.56	3.25	12	0.59	1.88	11.78	1.63	2.31	0.31		
		SCW															
2	8502	SDW	All	8.13	7.88	16.19	1.56	5	15	1.09	1.94	14.75	2	2.63	0.31	3/4"	1-1/2"
	8536	SDW	All	8.13	8.56	16.19	1.56	5	15	1.09	2.88	14.75	2	2.63	0.31		
3 and 4	8502	SEW	All	18.16	8.75	32.22	3.08	12	30.5	0.88	3.69	26.72	2.56	3.19	0.44	3/4"	2-1/2"
		SFW															
	8536	SEW	All	18.16	9.56	32.22	3.08	12	30.5	0.88	4.5	26.72	2.56	3.19	0.44	3/4"	2-1/2"
		SFW															
5	8502 & 8536	SGW	All	17.22	12.63	47.22	4.13	9	46	0.63	4.59	28.31	3.13	5.75	0.56	3/4"	3-1/2"
6 *[47]*	8502 & 8536	SHW	All	20.22	12.13	65.22	4.13	12	64	0.63	4.59	30.81	2.69	4.5	0.56	3/4"	(2) 3"
7 *[47]*	8502 & 8536	SJW	All	34.5	23.5	101	Floor Mounting										

Table 16.104: See Figure: NEMA 4 and 4X—Stainless Steel Watertight Enclosure with Form F4T

NEMA Size	Class	Type	No. of Poles	Dimensions, in.											
				A	B	C	D	E	F	G	H	I	J	K	L
0 and 1	8502	SBW	All	12.63	7.13	14.69	2.56	7.5	13.5	0.59	3.19	18.81	1.66	2.31	0.31
		SCW													
	8536	SBW	All	12.63	7.81	14.69	2.56	7.5	13.5	0.59	3.88	18.41	1.66	2.31	0.31
		SCW													
2	8502	SDW	All	14.88	7.56	16.31	2.56	9.75	15	0.66	3.19	20.88	2	2.63	0.31
	8536	SDW	All	14.88	8.25	16.31	2.56	9.75	15	0.66	3.88	20.88	2	2.63	0.31
3 and 4	8502	SEW	2–3	Same as Standard NEMA 4 dimensions, see above.											
		SFW	2–3												
	8536	SEW	2–3	Same as Standard NEMA 4 dimensions, see above.											
		SFW	2–3												
5	8502 & 8536	SGW	All	Same as Standard NEMA 4 dimensions, see above.											
6 *[47]*	8502 & 8536	SHW	All	Form F4T is supplied as standard. Refer to Table 16.319.											
7 *[47]*	8502 & 8536	SJW	All												

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

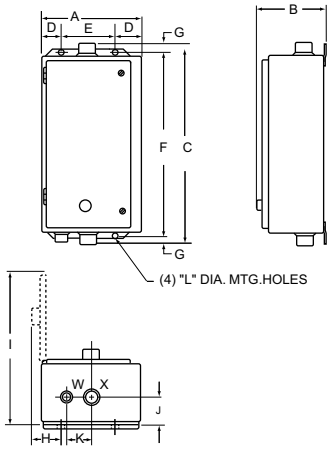

Figure 16.1: NEMA 4 and 4X—Stainless Steel Watertight Enclosure

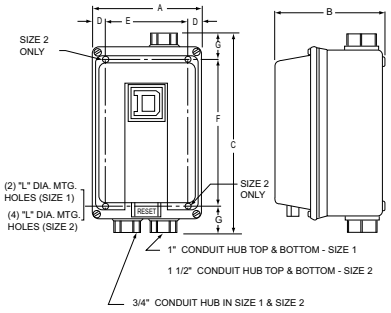

Figure 16.2: NEMA 4X—Watertight and Corrosion Resistant Glass Polyester Enclosures, Sizes 0–2, without Form F4T

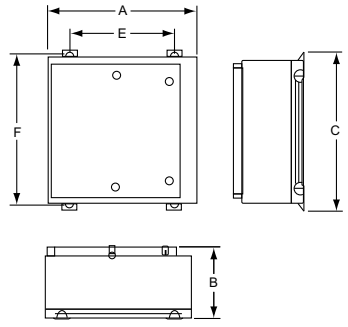

Figure 16.3: NEMA 4X—Watertight and Corrosion Resistant Glass Polyester Enclosures

Table 16.105: See Figure: NEMA 4X—Watertight and Corrosion Resistant Glass Polyester Enclosures

Size	Type	No. of Poles	Dimensions, in.													Hub		Weight (lb)
			A	B	C	D	E	F	G	H	I	J	K	L		Bot. Only W	Top & Bot. X	
0, 1	SBW	All	6.5	6.44	12.13	0.75	5	8.75	1.69	3.34	10.06	1.31	2.13	0.31		0.75	1	17
	SCW																	
2	SDW	All	8.5	7.06	13.88	0.75	7	10.5	1.69	3.91	11.94	1.63	2.38	0.31		0.75	1.5	22

Table 16.106: See Figure: NEMA 4X—Watertight and Corrosion Resistant Glass Polyester Enclosures with Form F4T

NEMA Size	Type	No. of Poles	Dimensions, in.				
			A	B	C	E	F
0–2	SBW	All	16.88	9.78	22.75	10.13	21.5
	SCW						
	SDW						
3–4 *[48]*	SEW	All	25.81	11.94	33.5	18.5	32.25
	SFW						

NOTE: Devices with Form F4T may use a larger enclosure. Consult the Customer Care Center at 1-888-778-2733 for dimensions.

[47] Size 6 and 7 are NEMA 4 painted sheet steel enclosures.
[48] Dimensions with or without Form F4T (control power transformer).

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NEMA 7 and 9 Enclosures

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.107: NEMA 7 and 9 Enclosures

Bolted Cover, Cast Iron Enclosure	Spin Top™ Enclosure

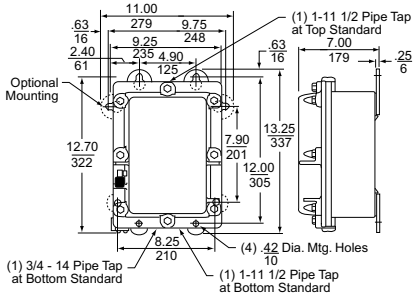

Figure 16.4: NEMA 7 and 9 Enclosure, Bolted Cover, Cast Iron—NEMA Size 0 and 1 (weight: 59 lb)

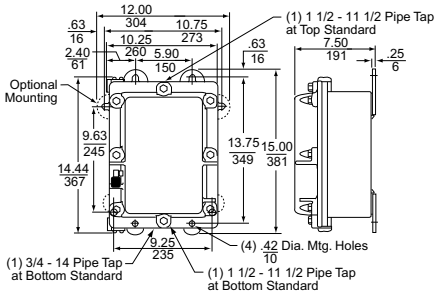

Figure 16.5: NEMA 7 and 9 Enclosure, Bolted Cover, Cast Iron—NEMA Size 2 (weight: 75 lb)

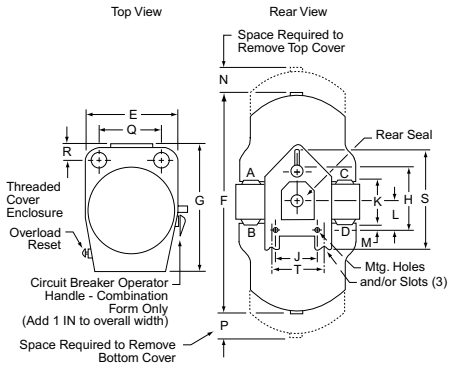

Figure 16.6: NEMA 7 and 9—Spin Top™ Enclosure

Table 16.108: See Figure: NEMA 7 and 9—Spin Top™ Enclosure

Conduit Sizes Loc. A, B, C & D			Dimensions, in.														Wt. (lb)
NEMA Size	Std.	Type	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	
0–1	1.25	SBR SCR	10.63	26	15.25	8	4.75	5.38	3.75	1.06	7.5	11	7.31	2.06	—	—	70
2	1.5	SDR	13.88	30.5	19.25	8	4.75	5.25	3.75	1.06	7	18	9.38	2.75	—	—	100
3–4	2.5	SER SFR	13.38	39.5	20.25	8	4.75	7.5	3.75	—	7.75	23	8.63	3	—	—	165 195
5	4	SGR	19	53.5	27.75	—	—	11.25	5.75	0.13	16	20.63	11.38	4.31	12	6.5	375

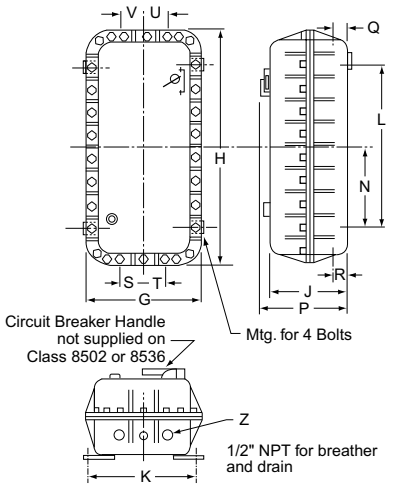

Figure 16.7: NEMA 7 and 9—Bolted Cover, Cast Aluminum

Table 16.109: See Figure: NEMA 7 and 9—Bolted Cover, Cast Aluminum

NEMA Size	Type	Dimensions, in.									Z Dia.	Wt. (lb)
		G	H	J	K	L	N	P	Q, R	S, T, U, V		
0–1	SBT SCT	14.25	17.25	9.5	12.25	8.88	4.5	11	2.38	3.13	1.5	75
2	SDT	13.63	27.63	9.5	12.25	19.25	9.63	11	2.38	3.13	1.5	115
3–4	SET SFT	18.13	31.63	10	16.25	19.25	9.63	12.63	2.38	3.75	2.5	180
5	SGT	24.5	45.63	13.75	22.5	27.5	13.75	15.38	3.44	4	4	500

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Dimensions for NEMA 12/3R Enclosures

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.110: NEMA 12/3R—Dusttight Enclosure

NEMA Size	Type	No. of Poles	Dimensions, in.										Weight (lb)	
			A	B	C	D	E	F	G	H	I	J	Class 8502	Class 8536
0	SBA	All	6.38	8.53	12.75	1.56	3.25	12	0.38	3.56	12.25	0.31	15	16
1	SCA	All												
2	SDA	All	8.13	9.28	16	1.56	5	15	0.5	3.56	15.38	0.31	22	23
3	SEA	All	18.16	9.56	31.5	3.08	12	30.5	0.5	4.5	26.72	0.44	65	68
4	SFA	All											69	73
5	SGA	All	17.22	13.44	47	4.13	9	46	0.5	5.41	28.31	0.56	160	177
6	SHA	All	20.22	13	65	4.13	12	64	0.5	6.44	30.88	0.69	228	233
7	SJA	All	34.5	23.5	93	Floor Mounting							—	—

Table 16.111: NEMA 12/3R—Dusttight Enclosure With Form F4T

NEMA Size	Type	No. of Poles	Dimensions, in.									
			A	B	C	D	E	F	G	H	I	J
0	SBA	All	11.88	8	13.5	2.81	6.75	12.75	0.38	3.91	18.38	0.31
1	SCA	All										
2	SDA	All	14.88	8.13	16	2.56	9.75	15	0.38	3.66	21.5	0.31
3	SEA	2–3	Same as Standard NEMA 12 dimensions, see above.									
4	SFA	2–3										
5	SGA	All	Same as Standard NEMA 12 dimensions, see above.									
6	SHA	All	Form F4T comes standard. Refer to page 16-116.									
7	SJA	All										

Table 16.112: NEMA 3R—Rainproof and Sleet Resistant Enclosures

Size	Type	No. of Poles	Dimensions, in.																	
			A	B	C	D1	D2	E	F	G1	G2	H1	H2	J	K	L	M	N	P	K.O. X	K.O. Y
0, 1	SBH SCH	All	8.84	12.28	7.13	1.38	1.44	6	7.5	2.59	2.19	2.06	2.63	14.28	1.38	1.38	1.88	4.38	1.84	1/2 3/4 1	1/2 3/4 1
2	SDH	All	9.84	16.28	8.63	1.38	1.44	7	11.5	2.59	2.19	2.06	2.63	16.78	1.31	1.75	2.13	4.88	1.84	1 1-1/4 1-1/2	1/2 3/4
3	SEH	All	12.84	25.28	8.63	1.38	1.44	10	20.5	2.59	2.19	2.06	2.63	19.78	1.31	1.94	2.44	6.38	1.84	1 1-1/4 2 2-1/2	1/2 3/4
4	SFH	All	12.84	40.28	9.13	1.38	1.44	10	35.5	2.59	2.19	2.06	2.63	20.28	1.31	2.31	2.69	6.38	1.84	1 1-1/4 2 2-1/2	1/2 3/4

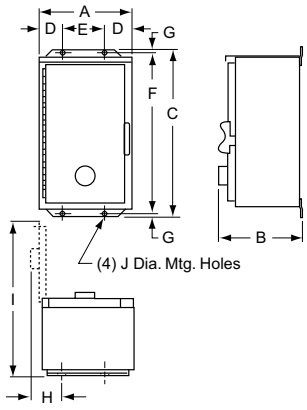

Figure 16.8: NEMA 12

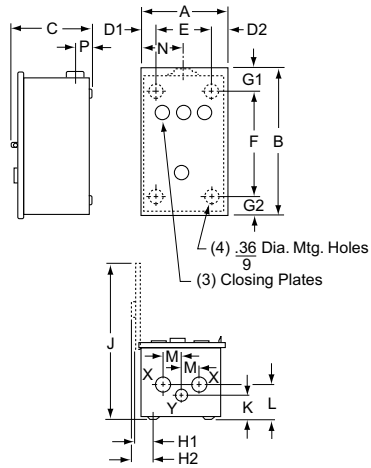

Figure 16.9: NEMA 3R

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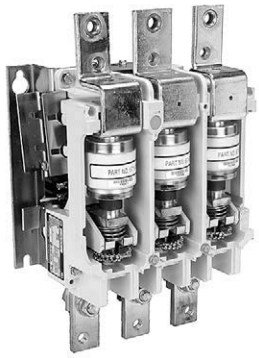
General Information

Class 8502 Type W non-reversing vacuum contactors used to switch capacitors, transformers and electric motors where overload protection is separately provided. Type W vacuum contactors are designed for operation at 600 Volts, 50/60 Hz. (See page 16-64 for Class 8702 Reversing Vacuum Contactors.)



Class 8502 Type WH

Table 16.113: Class 8502—Full Voltage 3 Pole Vacuum Contactors (replace ●●● with the voltage code)

NEMA Size	Enclosed Ampere Rating	Locked Rotor Current (A)	Motor Voltage	Max. Hp	Open Style Type [1]
4	135	1080	200 230 460 575	40 50 100 100	WFO3●●●
5	270	2160	200 230 460 575	75 100 200 200	WGO3●●●
6	540	4320	200 230 460 575	150 200 400 400	WHO3●●●

Table 16.114: Class 9998—Replacement Coils for Class 8502 and 8702 Vacuum Contactors (Includes Rectifier)

Size	Type	Poles	Class and Type	Suffix Number (Complete Coil Number Consists of Class and Type Followed by Suffix Number)			
				120 V 110 V	240 V 220 V	480 V 440 V	600 V 550 V
4 5 6	WF WG WH	3 3 3	9998WF 9998WG 9998WH	120	240	480	600

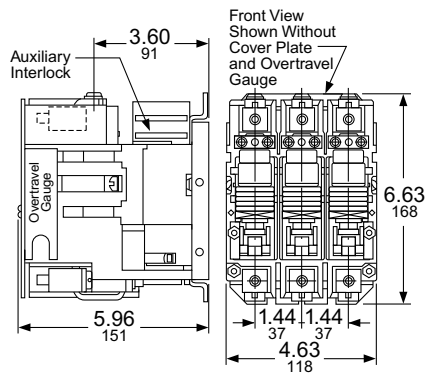
Table 16.115: Class 9999—Vacuum Contactor Kits

Kit Description		For Use With Type	For Use With Size	Class 9999 Type
Auxiliary Contacts, Non-Convertible 1-N.O. & 1-N.C. Isolated Contacts		WF–WG WH	4–5 6	WX11
Coil Circuit Auxiliary Contacts	1-N.O. & 1-N.C. Isolated Contacts, Delayed Break 1-N.C. Isolated Contact	WF WG–WH	4 5–6	WCX11 WLX01
Lug Kits (include 6 lugs)		WG WH	5 6	LUW5 LUW6

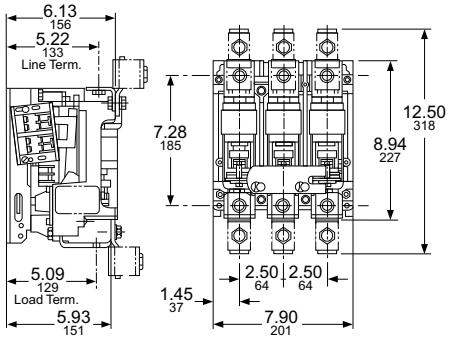
Table 16.116: Coil Voltage Codes

Volts	110	120	220	240	440	480	550	600
50 Hz	V02	—	V03	—	V06	—	V07	—
60 Hz	—	V02	—	V03	—	V06	—	V07

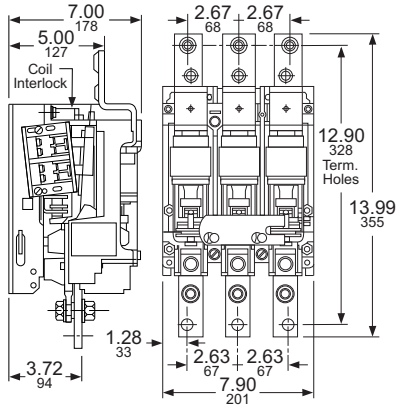
Table 16.117: Dimensions, Class 8502



Type WF Size 4



Type WG Size 5



Type WH Size 6

For How to Order Information, see page 16-27.

[1] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.116.

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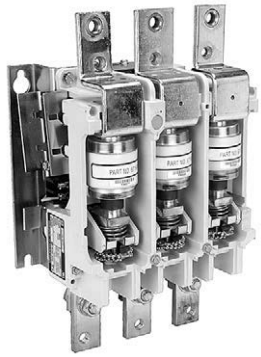
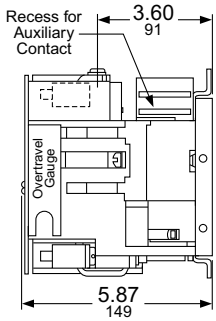
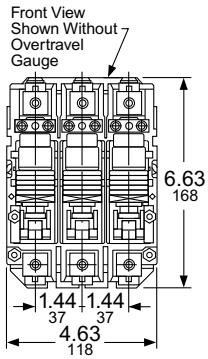


Class 8502 Type VF





Dimensions for Class 8502 Type VF Size 4

For How to Order Information, see the *Digest*.

General Information

The Class 8502 Type V vacuum contactor is a three-pole device rated 1500 V that meets UL508 (1.5 kV) and CSA. Vacuum technology offers long life and low maintenance in a compact, lightweight design. The contactor is suitable for contaminated atmospheres because the main contacts are sealed in vacuum bottles. Also, since gravity is not used to assist contactor operation, the Class 8502 contactor can be mounted in any plane without special modifications. Type V vacuum contactors are designed for the control of inductive or non-inductive loads at voltages from 200–1500 Vac.

Table 16.118: Class 8502—Full Voltage 3 Pole Vacuum Contactors (replace ●●● with the voltage code)

NEMA Size	Enclosed Ampere Rating	Locked Rotor Current (A)	Motor Voltage	Max. Hp	Open Style Type *[2]*
4	160	1080	200	50	VFO3●●●
			230	60	
			460	125	
			575	150	
			800	200	
			1000	250	
			1500	400	
5	320	2160	200	100	VGO3●●●
			230	125	
			460	250	
			575	300	
			800	400	
			1000	—	
			1500	800	
6	540	4320	200	150	VHO3●●●
			230	200	
			460	400	
			575	400	
			800	—	
			1000	—	
			1500	1300	

Table 16.119: Class 9998—Replacement Coils for Class 8502/8702 (contains rectifier)

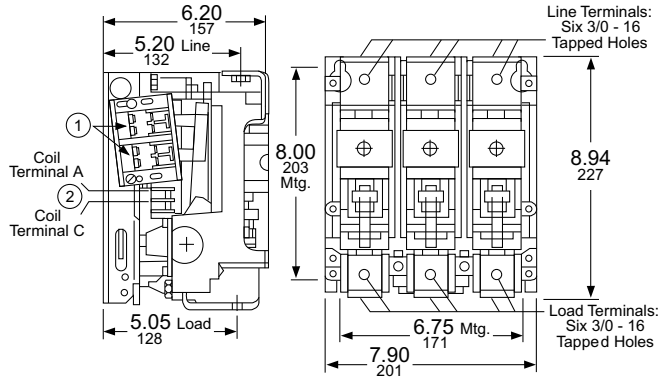
Size	Type	Poles	Class and Type	Suffix (the complete coil number consists of the Class, Type, and suffix)			
				110/120 V	220/240 V	440/480 V	550/600 V
4	VF	3	9998WF	120	240	480	600
5	VG	3	9998WG	120	240	480	600
6	VH	3	9998WH	120	240	480	600

Table 16.120: Class 9999—Vacuum Starter Kits

For Use With Type	For Use With Size	Kit Description	Class 9999 Type
VF–VG VH	4–5 6	Auxiliary Contacts, Non-Convertible 1 N.O. & 1 N.C. Isolated Contacts	WX11
VF VG–VH	4 5–6	Coil Circuit Auxiliary Contacts 1 N.O. & 1 N.C. Isolated Contacts, Delayed Break 1 N.C. Isolated Contact	WCX11 WLX01
VG VH	5 6	Lug Kits, 6 lugs included	LUW5 LUW6

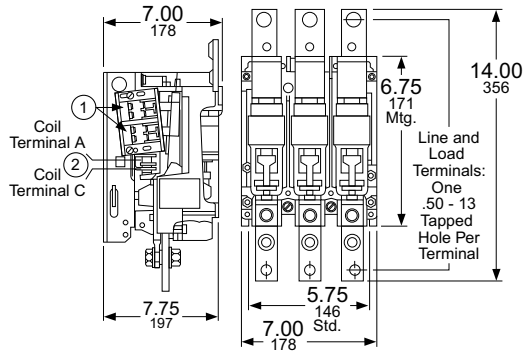
Table 16.121: Coil Voltage Codes

Voltage	110	120	220	240	440	480	550	600
50 Hz	V02	—	V03	—	V06	—	V07	—
60 Hz	—	V02	—	V03	—	V06	—	V07



1. Two dual circuit auxiliary contacts can be located on both sides of contactor.
2. Coil Terminals B and D located on opposite side of contactor.

Dimensions for Class 8502 Type VG Size 5



1. Two dual circuit auxiliary contacts can be located on both sides of contactor.
2. Coil terminals B and D located on opposite side of contactor.

Dimensions for Class 8502 Type VH Size 6

[2] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.121.

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General Information

Class 8536 Type W non-reversing vacuum starters are used to switch electric motors where overload protection is not separately provided.

Type W vacuum starters are designed for operation at 600 V, 50/60 Hz. Starters are available exclusively with Motor Logic™ solid-state overload relay (SSOLR), Class 10/20 selectable.

Table 16.122: Class 8536—Full Voltage Vacuum Starters (replace ●●● with the voltage code)

NEMA Size	Enclosed Ampere Rating	Locked Rotor Current (A)	Motor Voltage	Max. Hp	Open Style Type *[3]*
4	135	1080	200 230 460 575	40 50 100 100	WFO3●●●
5	270	2160	200 230 460 575	75 100 200 200	WGO3●●●
6	540	4320	200 230 460 575	150 200 400 400	WHO3●●●

Table 16.123: Class 9998—Replacement Coils for Class 8536 Vacuum Starters

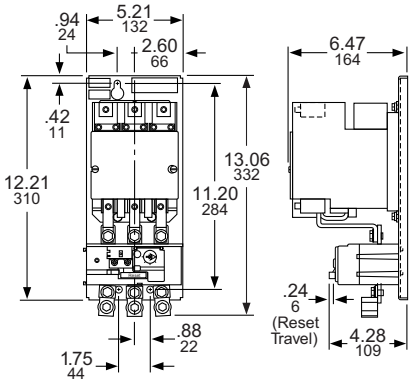
Size	Type	Poles	Class and Type	Suffix Number (Complete Coil Number Consists of Class and Type Followed by Suffix Number)			
				120 V 110 V	240 V 220 V	480 V 440 V	600 V 550 V
4	WF	All	9998WF	120	240	480	600
5	WG	All	9998WG	120	240	480	600
6	WH	All	9998WH	120	240	480	600

Table 16.124: Class 9999—Vacuum Starter Kits

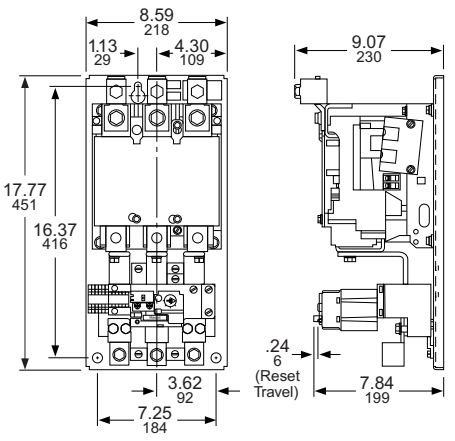
For Use With Type	For Use With Size	Kit Description	Class 9999 Type
WF–WG WH	4–5 6	Auxiliary Contacts, Non-Convertible 1 N.O. & 1 N.C. Isolated Contacts	WX11
WF WG–WH	4 5–6	Coil Circuit Auxiliary Contacts 1 N.O. & 1 N.C. Isolated Contacts, Delayed Break 1 N.C. Isolated Contact	WCX11 WLX01
WG	5	Lug Kits (6) lugs included	LUW5

Table 16.125: Coil Voltage Codes

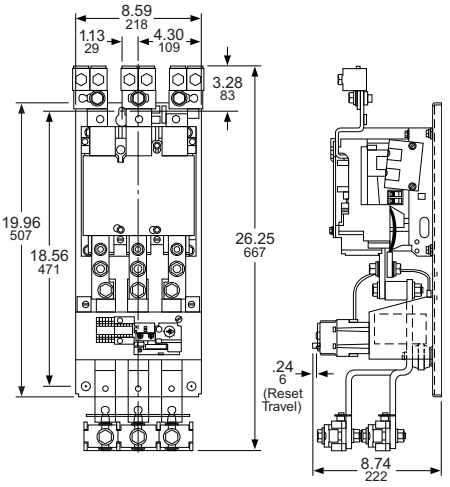
Voltage	110	120	220	240	440	480	550	600
50 Hz	V02	—	V03	—	V06	—	V07	—
60 Hz	—	V02	—	V03	—	V06	—	V07



Dimensions for Class 8536 Type WF Size 4



Dimensions for Class 8536 Type WG Size 5



Dimensions for Class 8536 Type WH Size 6

For How to Order Information, see the *Digest*.

[3] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.125 Coil Voltage Codes, page 16-44.

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Fusible Disconnect Switch Type
3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Class 8538 and 8539 Type S combination starters combine the requirements of motor overload and short circuit protection into one package. These starters are manufactured according to NEMA standards and are UL Listed (some Form numbers may not be listed —contact the Customer Care Center). Class 8538 and 8539 combination starters operate at 600 Vac maximum, 50–60 Hz, and can be provided with one of four overloaded relay styles (refer to page 16-32).

Table 16.126: Class 8538 Fusible Full Voltage Type (Class H Fuse Clips), with Motor Logic SSOLR (replace ●●● with the voltage code)

Ratings			Fuse Clip Size (A)	NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304) (Sizes 0-5)[1]	NEMA 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R[2] Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Polyphase	NEMA Size					With External Reset	Without External Reset
				Type [3]	Type [3]	Type [3]	Type [3]	Type [3]
200 (208)	3	0	30	SBG12●●●H30 [4]	SBW12●●●H30 [4]	SBW22●●●H30 [4]	SBA22●●●H30 [4]	SBA12●●●H30 [4]
	5	1	30	SCG12●●●H30 [4]	SCW12●●●H30 [4]	SCW22●●●H30 [4]	SCA22●●●H30 [4]	SCA12●●●H30 [4]
	7-1/2		60	SCG13●●●H30 [4]	SCW13●●●H30 [4]	SCW23●●●H30 [4]	SCA23●●●H30 [4]	SCA13●●●H30 [4]
	10	2	60	SDG12●●●H30 [4]	SDW12●●●H30 [4]	SDW22●●●H30 [4]	SDA22●●●H30 [4]	SDA12●●●H30 [4]
	20	3	100	SEG15●●●H30	SEW15●●●H30	SEW25●●●H30	SEA25●●●H30	SEA15●●●H30
	25		200	SEG12●●●H30	SEW12●●●H30	—	SEA22●●●H30	SEA12●●●H30
	40	4	200	SFG15●●●H30	SFW15●●●H30	—	SFA25●●●H30	SFA15●●●H30
	75	5	400	SGG15●●●H30	SGW15●●●H30	—	SGA25●●●H30	SGA15●●●H30
	150	6	600	SHG13●●●H30	SHW13●●●H30	—	SHA23●●●H30	SHA13●●●H30
230 (240)	3	0	30	SBG12●●●H30 [4]	SBW12●●●H30 [4]	SBW22●●●H30 [4]	SBA22●●●H30 [4]	SBA12●●●H30 [4]
	5	1	30	SCG12●●●H30 [4]	SCW12●●●H30 [4]	SCW22●●●H30 [4]	SCA22●●●H30 [4]	SCA12●●●H30 [4]
	7-1/2		60	SCG13●●●H30 [4]	SCW13●●●H30 [4]	SCW23●●●H30 [4]	SCA23●●●H30 [4]	SCA13●●●H30 [4]
	1	2	60	SDG12●●●H30 [4]	SDW12●●●H30 [4]	SDW22●●●H30 [4]	SDA22●●●H30 [4]	SDA12●●●H30 [4]
	25	3	100	SEG15●●●H30	SEW15●●●H30	SEW25●●●H30	SEA25●●●H30	SEA15●●●H30
	30		200	SEG12●●●H30	SEW12●●●H30	—	SEA22●●●H30	SEA12●●●H30
	50	4	200	SFG15●●●H30	SFW15●●●H30	—	SFA25●●●H30	SFA15●●●H30
	100	5	400	SGG15●●●H30	SGW15●●●H30	—	SGA25●●●H30	SGA15●●●H30
	200	6	600	SHG13●●●H30	SHW13●●●H30	—	SHA23●●●H30	SHA13●●●H30
460 (480)	5	0	30	SBG13●●●H30 [4]	SBW13●●●H30 [4]	SBW23●●●H30 [4]	SBA23●●●H30 [4]	SBA13●●●H30 [4]
	10	1	30	SCG14●●●H30 [4]	SCW14●●●H30 [4]	SCW24●●●H30 [4]	SCA24●●●H30 [4]	SCA14●●●H30 [4]
	15	2	30	SDG16●●●H30 [4]	SDW16●●●H30 [4]	SDW26●●●H30 [4]	SDA26●●●H30 [4]	SDA16●●●H30 [4]
	25		60	SDG14●●●H30 [4]	SDW14●●●H30 [4]	SDW24●●●H30[4]	SDA24●●●H30 [4]	SDA14●●●H30 [4]
	50	3	100	SEG13●●●H30	SEW13●●●H30	SEW23●●●H30	SEA23●●●H30	SEA13●●●H30
	100	4	200	SFG13●●●H30	SFW13●●●H30	—	SFA23●●●H30	SFA13●●●H30
	200	5	400	SGG13●●●H30	SGW13●●●H30	—	SGA23●●●H30	SGA13●●●H30
	400	6	600	SHG12●●●H30	SHW12●●●H30	—	SHA22●●●H30	SHA12●●●H30
575 (600)	5	0	30	SBG13●●●H30	SBW13●●●H30	SBW23●●●H30	SBA23●●●H30	SBA13●●●H30
	10	1	30	SCG14●●●H30	SCW14●●●H30	SCW24●●●H30	SCA24●●●H30	SCA14●●●H30
	15	2	30	SDG16●●●H30	SDW16●●●H30	SDW26●●●H30	SDA26●●●H30	SDA16●●●H30
	25		60	SDG14●●●H30	SDW14●●●H30	SDW24●●●H30	SDA24●●●H30	SDA14●●●H30
	50	3	100	SEG13●●●H30	SEW13●●●H30	SEW23●●●H30	SEA23●●●H30	SEA13●●●H30
	100	4	200	SFG13●●●H30	SFW13●●●H30	—	SFA23●●●H30	SFA13●●●H30
	200	5	400	SGG13●●●H30	SGW13●●●H30	—	SGA23●●●H30	SGA13●●●H30
	400	6	600	SHG12●●●H30	SHW12●●●H30	—	SHA22●●●H30	SHA12●●●H30

NOTE: Some control transformers may require the use of oversized enclosures. Refer to Table 16.155.

3 or 5 Days *Laser Delivery*

Schneider Electric offers express shipping for factory modified NEMA Combo Starters. When you need them fast, our Laser™ Delivery program is the answer to getting your product when you need it most. Ask for Laser™ Delivery, then select the product and the modifications you need when you place your order. It's as easy as that!

Table 16.127: Class 8538 Fusible Disconnect Switch Type (Class H Fuse Clips), Single Phase, [5][6] with Melting Alloy Overload Relays (see Thermal Unit Selection, page 16-130)

Motor Voltage	Max. Hp	Coil Voltage	NEMA Size	Poles	Fuse Clip Size (A)	NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304)	NEMA 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R[2] Dusttight and Driptight Industrial Use Enclosure	
									With External Reset	Without External Reset
						Type	Type	Type	Type	Type
120	1 2 3	120	0 1 2	2	30 30 60	SBG62V02 SCG62V02 SDG62V02	SBW62V02 SCW62V02 SDW62V02	SBW65V02 SCW65V02 SDW65V02	SBA65V02 SCA65V02 SDA65V02	SBA62V02 SCA62V02 SDA62V02
240	2 3 7-1/2	240	0 1 2	2	30 30 60	SBG62V03 SCG62V03 SDG62V03	SBW62V03 SCW62V03 SDW62V03	SBW65V03 SCW65V03 SDW65V03	SBA65V03 SCA65V03 SDA65V03	SBA62V03 SCA62V03 SDA62V03

For How to Order Information, see page 16-27.

[1] Size 6 starters are NEMA 4 painted sheet steel enclosures.
[2] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[3] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in
[4] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[5] Single-phase units require one thermal unit. They are not available with **Form H••** (solid-state overload relays).
[6] Not included in the Laser™ Delivery program.

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Non-Fusible Disconnect Switch Type
3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Table 16.128: Class 8538 Non-Fusible Full Voltage Type, Non-Reversing, with Motor Logic SSOLR (replace ●●● with the voltage code)

Ratings			NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304) (Sizes 0–5)[7]	NEMA 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R[8]Dusttight and Driptight Industrial Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Polyphase	NEMA Size				With External Reset	Without External Reset
			Type [9]	Type [9]	Type [9]	Type [9]	Type [9]
200 (208)	3	0	SBG11●●●H30 [10]	SBW11●●●H30 [10]	SBW21●●●H30 [10]	SBA21●●●H30 [10]	SBA11●●●H30 [10]
	7-1/2	1	SCG11●●●H30 [10]	SCW11●●●H30 [10]	SCW21●●●H30 [10]	SCA21●●●H30 [10]	SCA11●●●H30 [10]
	10	2	SDG11●●●H30 [10]	SDW11●●●H30 [10]	SDW21●●●H30 [10]	SDA21●●●H30 [10]	SDA11●●●H30 [10]
	25	3	SEG11●●●H30	SEW11●●●H30	SEW21●●●H30	SEA21●●●H30	SEA11●●●H30
	40	4	SFG11●●●H30	SFW11●●●H30	—	SFA21●●●H30	SFA11●●●H30
	75	5	SGG11●●●H30	SGW11●●●H30	—	SGA21●●●H30	SGA11●●●H30
	150	6	SHG11●●●H30	SHW11●●●H30	—	SHA21●●●H30	SHA11●●●H30
230 (240)	3	0	SBG11●●●H30 [10]	SBW11●●●H30 [10]	SBW21●●●H30 [10]	SBA21●●●H30 [10]	SBA11●●●H30 [10]
	7-1/2	1	SCG11●●●H30 [10]	SCW11●●●H30 [10]	SCW21●●●H30 [10]	SCA21●●●H30 [10]	SCA11●●●H30 [10]
	15	2	SDG11●●●H30 [10]	SDW11●●●H30 [10]	SDW21●●●H30 [10]	SDA21●●●H30 [10]	SDA11●●●H30 [10]
	30	3	SEG11●●●H30	SEW11●●●H30	SEW21●●●H30	SEA21●●●H30	SEA11●●●H30
	50	4	SFG11●●●H30	SFW11●●●H30	—	SFA21●●●H30	SFA11●●●H30
	100	5	SGG11●●●H30	SGW11●●●H30	—	SGA21●●●H30	SGA11●●●H30
	200	6	SHG11●●●H30	SHW11●●●H30	—	SHA21●●●H30	SHA11●●●H30
460 (480)	5	0	SBG11●●●H30 [10]	SBW11●●●H30 [10]	SBW21●●●H30 [10]	SBA21●●●H30 [10]	SBA11●●●H30 [10]
	10	1	SCG11●●●H30 [10]	SCW11●●●H30 [10]	SCW21●●●H30 [10]	SCA21●●●H30 [10]	SCA11●●●H30 [10]
	25	2	SDG11●●●H30 [10]	SDW11●●●H30 [10]	SDW21●●●H30 [10]	SDA21●●●H30 [10]	SDA11●●●H30 [10]
	50	3	SEG11●●●H30	SEW11●●●H30	SEW21●●●H30	SEA21●●●H30	SEA11●●●H30
	100	4	SFG11●●●H30	SFW11●●●H30	—	SFA21●●●H30	SFA11●●●H30
	200	5	SGG11●●●H30	SGW11●●●H30	—	SGA21●●●H30	SGA11●●●H30
	400	6	SHG11●●●H30	SHW11●●●H30	—	SHA21●●●H30	SHA11●●●H30
575 (600)	5	0	SBG11●●●H30	SBW11●●●H30	SBW21●●●H30	SBA21●●●H30	SBA11●●●H30
	10	1	SCG11●●●H30	SCW11●●●H30	SCW21●●●H30	SCA21●●●H30	SCA11●●●H30
	25	2	SDG11●●●H30	SDW11●●●H30	SDW21●●●H30	SDA21●●●H30	SDA11●●●H30
	50	3	SEG11●●●H30	SEW11●●●H30	SEW21●●●H30	SEA21●●●H30	SEA11●●●H30
	100	4	SFG11●●●H30	SFW11●●●H30	—	SFA21●●●H30	SFA11●●●H30
	200	5	SGG11●●●H30	SGW11●●●H30	—	SGA21●●●H30	SGA11●●●H30
	400	6	SHG11●●●H30	SHW11●●●H30	—	SHA21●●●H30	SHA11●●●H30

Table 16.129: Class 8538 Non-Fusible Disconnect Switch Type, Single Phase, with Melting Alloy Overload Relay *[11] [12]*
(see Thermal Unit Selection, page 16-130)

Motor Voltage	Max. Hp	Coil Voltage	NEMA Size	Poles	NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304)	NEMA 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R[8] Dusttight and Driptight Industrial Enclosure	
								With External Reset	Without External Reset
					Type	Type	Type	Type	Type
120	1	120	0	2	SBG61V02	SBW61V02	SBW64V02	SBA64V02	SBA61V02
	2		1		SCG61V02	SCW61V02	SCW64V02	SCA64V02	SCA61V02
	3		2		SDG61V02	SDW61V02	SDW64V02	SDA64V02	SDA61V02
240	2	240	0	2	SBG61V03	SBW61V03	SBW64V03	SBA64V03	SBA61V03
	3		1		SCG61V03	SCW61V03	SCW64V03	SCA64V03	SCA61V03
	7-1/2		2		SDG61V03	SDW61V03	SDW64V03	SDA64V03	SDA61V03

NOTE: Some control transformers may require the use of oversized enclosures. Refer to Table 16.155.

Table 16.130: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24 [13]	—	V01
120 [14]	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page Table 16.321. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is available at no charge.

For How to Order Information, see page 16-27.

[7] Size 6 starters are NEMA 4 painted sheet steel enclosures.
[8] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[9] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in
[10] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[11] Single-phase units require one thermal unit. They are not available with **Form H••** (solid-state overload relays).
[12] Not included in the Laser™ Delivery program.
[13] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8538SBG11V01S).
[14] These voltage codes must include **Form S** (furnished at no charge).
When specifying **Form S**, please include the motor voltage when ordering (for example, order as 8538SCG11V02S).

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Fusible Disconnect Switch Type with Class R Fuse Clips
3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Table 16.131: Class 8538 Fusible (with Class R Fuse Clips) Full Voltage Type, Non-Reversing, with Motor Logic SSOLR (100,000 AIC Rated) (replace ●●● with the voltage code)

Ratings				NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304) (Sizes 0–5) *[15]*	NEMA 4 & 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R*[16]* Dusttight and Driptight Industrial Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Polyphase	NEMA Size	Fuse Clip Size (A)				With External Reset	Without External Reset
				Type *[17]*	Type *[17]*	Type *[17]*	Type *[17]*	Type *[17]*
200 (208)	3	0	30	SBG32●●●H30 *[18]*	SBW32●●●H30 *[18]*	SBW42●●●H30 *[18]*	SBA42●●●H30 *[18]*	SBA32●●●H30 *[18]*
	5	1	30	SCG32●●●H30 *[18]*	SCW32●●●H30 *[18]*	SCW42●●●H30 *[18]*	SCA42●●●H30 *[18]*	SCA32●●●H30 *[18]*
	7-1/2	1	60	SCG33●●●H30 *[18]*	SCW33●●●H30 *[18]*	SCW43●●●H30 *[18]*	SCA43●●●H30 *[18]*	SCA33●●●H30 *[18]*
	10	2	60	SDG32●●●H30 *[18]*	SDW32●●●H30 *[18]*	SDW42●●●H30 *[18]*	SDA42●●●H30 *[18]*	SDA32●●●H30 *[18]*
	20	3	100	SEG35●●●H30	SEW35●●●H30	SEW45●●●H30	SEA45●●●H30	SEA35●●●H30
	25	3	200	SEG32●●●H30	SEW32●●●H30	—	SEA42●●●H30	SEA32●●●H30
	40	4	200	SFG35●●●H30	SFW35●●●H30	—	SFA45●●●H30	SFA35●●●H30
	75	5	400	SGG35●●●H30	SGW35●●●H30	—	SGA45●●●H30	SGA35●●●H30
	150	6	600	SHG33●●●H30	SHW33●●●H30	—	SHA43●●●H30	SHA33●●●H30
230 (240)	3	0	30	SBG32●●●H30 *[18]*	SBW32●●●H30 *[18]*	SBW42●●●H30 *[18]*	SBA42●●●H30 *[18]*	SBA32●●●H30 *[18]*
	5	1	30	SCG32●●●H30 *[18]*	SCW32●●●H30 *[18]*	SCW42●●●H30 *[18]*	SCA42●●●H30 *[18]*	SCA32●●●H30 *[18]*
	7-1/2	1	60	SCG33●●●H30 *[18]*	SCW33●●●H30 *[18]*	SCW43●●●H30 *[18]*	SCA43●●●H30 *[18]*	SCA33●●●H30 *[18]*
	15	2	60	SDG32●●●H30 *[18]*	SDW32●●●H30 *[18]*	SDW42●●●H30 *[18]*	SDA42●●●H30 *[18]*	SDA32●●●H30 *[18]*
	25	3	100	SEG35●●●H30	SEW35●●●H30	SEW45●●●H30	SEA45●●●H30	SEA35●●●H30
	30	3	200	SEG32●●●H30	SEW32●●●H30	—	SEA42●●●H30	SEA32●●●H30
	50	4	200	SFG35●●●H30	SFW35●●●H30	—	SFA45●●●H30	SFA35●●●H30
	100	5	400	SGG35●●●H30	SGW35●●●H30	—	SGA45●●●H30	SGA35●●●H30
	200	6	600	SHG33●●●H30	SHW33●●●H30	—	SHA43●●●H30	SHA33●●●H30
460 (480)	5	0	30	SBG33●●●H30 *[18]*	SBW33●●●H30 *[18]*	SBW43●●●H30 *[18]*	SBA43●●●H30 *[18]*	SBA33●●●H30 *[18]*
	10	1	30	SCG34●●●H30 *[18]*	SCW34●●●H30 *[18]*	SCW44●●●H30 *[18]*	SCA44●●●H30 *[18]*	SCA34●●●H30 *[18]*
	15	2	30	SDG36●●●H30 *[18]*	SDW36●●●H30 *[18]*	SDW46●●●H30 *[18]*	SDA46●●●H30 *[18]*	SDA36●●●H30 *[18]*
	25	2	60	SDG34●●●H30 *[18]*	SDW34●●●H30 *[18]*	SDW44●●●H30 *[18]*	SDA44●●●H30 *[18]*	SDA34●●●H30 *[18]*
	50	3	100	SEG33●●●H30	SEW33●●●H30	SEW43●●●H30	SEA43●●●H30	SEA33●●●H30
	100	4	200	SFG33●●●H30	SFW33●●●H30	—	SFA43●●●H30	SFA33●●●H30
	200	5	400	SGG33●●●H30	SGW33●●●H30	—	SGA43●●●H30	SGA33●●●H30
	400	6	600	SHG32●●●H30	SHW32●●●H30	—	SHA42●●●H30	SHA32●●●H30
575 (600)	5	0	30	SBG33●●●H30 *[18]*	SBW33●●●H30 *[18]*	SBW43●●●H30 *[18]*	SBA43●●●H30 *[18]*	SBA33●●●H30 *[18]*
	10	1	30	SCG34●●●H30 *[18]*	SCW34●●●H30 *[18]*	SCW44●●●H30 *[18]*	SCA44●●●H30 *[18]*	SCA34●●●H30 *[18]*
	15	2	30	SDG36●●●H30 *[18]*	SDW36●●●H30 *[18]*	SDW46●●●H30 *[18]*	SDA46●●●H30 *[18]*	SDA36●●●H30 *[18]*
	25	2	60	SDG34●●●H30 *[18]*	SDW34●●●H30 *[18]*	SDW44●●●H30 *[18]*	SDA44●●●H30 *[18]*	SDA34●●●H30 *[18]*
	50	3	100	SEG33●●●H30	SEW33●●●H30	SEW43●●●H30	SEA43●●●H30	SEA33●●●H30
	100	4	200	SFG33●●●H30	SFW33●●●H30	—	SFA43●●●H30	SFA33●●●H30
	200	5	400	SGG33●●●H30	SGW33●●●H30	—	SGA43●●●H30	SGA33●●●H30
	400	6	600	SHG32●●●H30	SHW32●●●H30	—	SHA42●●●H30	SHA32●●●H30

NOTE: Some control transformers may require the use of oversized enclosures. Refer to Table 16.155.

Table 16.132: Class 8538 Fusible Disconnect Switch Type (Class R Fuses), Single Phase with Melting Alloy Overload Relay*[19][20]* **(see Thermal Unit Selection, page 16-130)**

Motor Voltage	Max. Hp	Coil Voltage	NEMA Size	Poles	Fuse Clip Size (A)	NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel	NEMA 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R Dusttight and Driptight Industrial Use Enclosure	
									With External Reset	Without External Reset
						Type	Type	Type	Type	Type
120	1	120	0	2	30	SBG63V02	SBW63V02	SBW66V02	SBA66V02	SBA63V02
	2		1		30	SCG63V02	SCW63V02	SCW66V02	SCA66V02	SCA63V02
	3		2		60	SDG63V02	SDW63V02	SDW66V02	SDA66V02	SDA63V02
240	2	240	0	2	30	SBG63V03	SBW63V03	SBW66V03	SBA66V03	SBA63V03
	3		1		30	SCG63V03	SCW63V03	SCW66V03	SCA66V03	SCA63V03
	7-1/2		2		60	SDG63V03	SDW63V03	SDW66V03	SDA66V03	SDA63V03

Table 16.133: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24*[21]*	—	V01
120*[22]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see Table 16.321. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is available at no charge.

For How to Order Information, see page 16-27.

[15] Size 6 starters are NEMA 4 painted sheet steel enclosures.
[16] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[17] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.133.
[18] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[19] Single-phase units require one thermal unit. They are not available with **Form H••** (solid-state overload relays).
[20] Not included in the Laser™ Delivery program.
[21] 24 V coils are not available on Sizes 4–7. On Sizes 00-3, where 24 V coils are available, **Form S** (separate control) must be specified (i.e., order as 8538SBG32V01S).
[22] These voltage codes must include **Form S** (provided at no charge). When specifying **Form S**, please include the motor voltage when ordering (for example, order as 8538SCG32V02S).

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Full Voltage Type with Motor Logic Solid-State Overload Relays 3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Table 16.134: Class 8538 with Oversized Enclosures (replace ●●● with the voltage code)

Ratings				NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dustight Enclosure Stainless Steel (304)	NEMA 12/3R *[23]* Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Polyphase	NEMA Size	Fuse Clip Size (A)			With External Reset	Without External Reset
				Type *[24]*	Type *[24]*	Type *[24]*	Type *[24]*
Class 8538 Non-Fusible Disconnect Switch Type—NEMA Size 0–2 *[25][26]*							
200 (208)	3	0	N/A	SBG11S8●●●H30 *[27]*	SBW11S8●●●H30 *[27]*	SBA21S8●●●H30 *[27]*	SBA11S8●●●H30 *[27]*
	7-1/2	1	N/A	SCG11S8●●●H30 *[27]*	SCW11S8●●●H30 *[27]*	SCA21S8●●●H30 *[27]*	SCA11S8●●●H30 *[27]*
	10	2	N/A	SDG11S8●●●H30 *[27]*	SDW11S8●●●H30 *[27]*	SDA21S8●●●H30 *[27]*	SDA11S8●●●H30 *[27]*
230 (240)	3	0	N/A	SBG11S8●●●H30 *[27]*	SBW11S8●●●H30 *[27]*	SBA21S8●●●H30 *[27]*	SBA11S8●●●H30 *[27]*
	7-1/2	1	N/A	SCG11S8●●●H30 *[27]*	SCW11S8●●●H30 *[27]*	SCA21S8●●●H30 *[27]*	SCA11S8●●●H30 *[27]*
	15	2	N/A	SDG11S8●●●H30 *[27]*	SDW11S8●●●H30 *[27]*	SDA21S8●●●H30 *[27]*	SDA11S8●●●H30 *[27]*
460 (480)	5	0	N/A	SBG11S8●●●H30 *[27]*	SBW11S8●●●H30 *[27]*	SBA21S8●●●H30 *[27]*	SBA11S8●●●H30 *[27]*
	10	1	N/A	SCG11S8●●●H30 *[27]*	SCW11S8●●●H30 *[27]*	SCA21S8●●●H30 *[27]*	SCA11S8●●●H30 *[27]*
	25	2	N/A	SDG11S8●●●H30 *[27]*	SDW11S8●●●H30 *[27]*	SDA21S8●●●H30 *[27]*	SDA11S8●●●H30 *[27]*
575 (600)	5	0	N/A	SBG11S8●●●H30 *[27]*	SBW11S8●●●H30 *[27]*	SBA21S8●●●H30 *[27]*	SBA11S8●●●H30 *[27]*
	10	1	N/A	SCG11S8●●●H30 *[27]*	SCW11S8●●●H30 *[27]*	SCA21S8●●●H30 *[27]*	SCA11S8●●●H30 *[27]*
	25	2	N/A	SDG11S8●●●H30 *[27]*	SDW11S8●●●H30 *[27]*	SDA21S8●●●H30 *[27]*	SDA11S8●●●H30 *[27]*
Class 8538 Fusible Disconnect Switch Type—NEMA Size 0–2 *[25][26]*							
200 (208)	3	0	30	SBG12S8●●●H30 *[27]*	SBW12S8●●●H30 *[27]*	SBA22S8●●●H30 *[27]*	SBA12S8●●●H30 *[27]*
	5 7-1/2	1 1	30 60	SCG12S8●●●H30 *[27]* SCG13S8●●●H30 *[27]*	SCW12S8●●●H30 *[27]* SCW13S8●●●H30 *[27]*	SCA22S8●●●H30 *[27]* SCA23S8●●●H30 *[27]*	SCA12S8●●●H30 *[27]* SCA13S8●●●H30 *[27]*
	10	2	60	SDG12S8●●●H30 *[27]*	SDW12S8●●●H30 *[27]*	SDA22S8●●●H30 *[27]*	SDA12S8●●●H30 *[27]*
230 (240)	3	0	30	SBG12S8●●●H30 *[27]*	SBW12S8●●●H30 *[27]*	SBA22S8●●●H30 *[27]*	SBA12S8●●●H30 *[27]*
	5 7-1/2	1 1	30 60	SCG12S8●●●H30 *[27]* SCG13S8●●●H30 *[27]*	SCW12S8●●●H30 *[27]* SCW13S8●●●H30 *[27]*	SCA22S8●●●H30 *[27]* SCA23S8●●●H30 *[27]*	SCA12S8●●●H30 *[27]* SCA13S8●●●H30 *[27]*
	15	2	60	SDG12S8●●●H30 *[27]*	SDW12S8●●●H30 *[27]*	SDA22S8●●●H30 *[27]*	SDA12S8●●●H30 *[27]*
460 (480)	5	0	30	SBG13S8●●●H30 *[27]*	SBW13S8●●●H30 *[27]*	SBA23S8●●●H30 *[27]*	SBA13S8●●●H30 *[27]*
	10	1	30	SCG14S8●●●H30 *[27]*	SCW14S8●●●H30 *[27]*	SCA24S8●●●H30 *[27]*	SCA14S8●●●H30 *[27]*
	15 25	2 2	30 60	SDG16S8●●●H30 *[27]* SDG14S8●●●H30 *[27]*	SDW16S8●●●H30 *[27]* SDW14S8●●●H30 *[27]*	SDA26S8●●●H30 *[27]* SDA24S8●●●H30 *[27]*	SDA16S8●●●H30 *[27]* SDA14S8●●●H30 *[27]*
575 (600)	5	0	30	SBG13S8●●●H30 *[27]*	SBW13S8●●●H30 *[27]*	SBA23S8●●●H30 *[27]*	SBA13S8●●●H30 *[27]*
	10	1	30	SCG14S8●●●H30 *[27]*	SCW14S8●●●H30 *[27]*	SCA24S8●●●H30 *[27]*	SCA14S8●●●H30 *[27]*
	15	2	30	SDG16S8●●●H30 *[27]*	SDW16S8●●●H30 *[27]*	SDA26S8●●●H30 *[27]*	SDA16S8●●●H30 *[27]*
	25	2	60	SDG14S8●●●H30 *[27]*	SDW14S8●●●H30 *[27]*	SDA24S8●●●H30 *[27]*	SDA14S8●●●H30 *[27]*
Class 8538 Fusible Disconnect Switch Type with Class R Fuse Clips—NEMA Size 0–2 *[25][26]*							
200 (208)	3	0	30	SBG32S8●●●H30 *[27]*	SBW32S8●●●H30 *[27]*	SBA42S8●●●H30 *[27]*	SBA32S8●●●H30 *[27]*
	5 7-1/2	1 1	30 60	SCG32S8●●●H30 *[27]* SCG33S8●●●H30 *[27]*	SCW32S8●●●H30 *[27]* SCW33S8●●●H30 *[27]*	SCA42S8●●●H30 *[27]* SCA43S8●●●H30 *[27]*	SCA32S8●●●H30 *[27]* SCA33S8●●●H30 *[27]*
	10	2	60	SDG32S8●●●H30 *[27]*	SDW32S8●●●H30 *[27]*	SDA42S8●●●H30 *[27]*	SDA32S8●●●H30 *[27]*
230 (240)	3	0	30	SBG32S8●●●H30 *[27]*	SBW32S8●●●H30 *[27]*	SBA42S8●●●H30 *[27]*	SBA32S8●●●H30 *[27]*
	5 7-1/2	1 1	30 60	SCG32S8●●●H30 *[27]* SCG33S8●●●H30	SCW32S8●●●H30 SCW33S8●●●H30 *[27]*	SCA42S8●●●H30 SCA43S8●●●H30 *[27]*	SCA32S8●●●H30 SCA33S8●●●H30 *[27]*
	15	2	60	SDG32S8●●●H30 *[27]*	SDW32S8●●●H30 *[27]*	SDA42S8●●●H30 *[27]*	SDA32S8●●●H30 *[27]*
460 (480)	5	0	30	SBG33S8●●●H30 *[27]*	SBW33S8●●●H30 *[27]*	SBA43S8●●●H30 *[27]*	SBA33S8●●●H30 *[27]*
	10	1	30	SCG34S8●●●H30 *[27]*	SCW34S8●●●H30 *[27]*	SCA44S8●●●H30 *[27]*	SCA34S8●●●H30 *[27]*
	15 25	2 2	30 60	SDG36S8●●●H30 *[27]* SDG34S8●●●H30 *[27]*	SDW36S8●●●H30 *[27]* SDW34S8●●●H30 *[27]*	SDA46S8●●●H30 *[27]* SDA44S8●●●H30 *[27]*	SDA36S8●●●H30 *[27]* SDA34S8●●●H30 *[27]*
575 (600)	5	0	30	SBG33S8●●●H30 *[27]*	SBW33S8●●●H30 *[27]*	SBA43S8●●●H30 *[27]*	SBA33S8●●●H30 *[27]*
	10	1	30	SCG34S8●●●H30 *[27]*	SCW34S8●●●H30 *[27]*	SCA44S8●●●H30 *[27]*	SCA34S8●●●H30 *[27]*
	15 25	2 2	30 60	SDG36S8●●●H30 *[27]* SDG34S8●●●H30 *[27]*	SDW36S8●●●H30 *[27]* SDW34S8●●●H30 *[27]*	SDA46S8●●●H30 *[27]* SDA44S8●●●H30 *[27]*	SDA36S8●●●H30 *[27]* SDA34S8●●●H30 *[27]*

NOTE: Some control transformers may require the use of oversized enclosures. Refer to Table 16.155

Table 16.135: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24 *[28]*	—	V01
120 *[29]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see Table 16.321.

Table 16.136: Class 8538 Fusible Disconnect Switch Type for Horizontal Mounting *[26]* (replace ●●● with the voltage code)

Ratings				NEMA 12/3R *[23]* Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Polyphase	NEMA Size	Fuse Clip Size (A)	With External Reset	Without External Reset
				Type *[24]*	Type *[24]*
200 (208)	2 7-1/2	1	30 60	SCA22S1●●●H30 SCA23S1●●●H30	SCA12S1●●●H30 SCA13S1●●●H30
230 (240)	2 7-1/2	1	30 60	SCA22S1●●●H30 SCA23S1●●●H30	SCA12S1●●●H30 SCA13S1●●●H30
460 (480)	10	1	30	SCA24S1●●●H30	SCA14S1●●●H30
575 (600)	10	1	30	SCA24S1●●●H30	SCA14S1●●●H30

For How to Order Information, see page 16-27.

[23] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[24] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.135.
[25] For Size 3–5 starters in oversized NEMA 1, 4 or 12 enclosures, contact the factory for pricing and TAG number.
[26] Not included in the Laser™ Delivery program.
[27] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[28] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8538SBG1158V01S).
[29] These voltage codes must include **Form S** (provided at no charge). When specifying **Form S,** supply motor voltage when ordering (for example, order as 8538SCG1158V02S).

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Electronic Motor Circuit Protector (MCP)
3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Table 16.137: Class 8539 Full Voltage Type, Non-Reversing, 200–240 V, with Motor Logic SSOLR (replace ●●● with the voltage code)

Ratings				NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304) (Sizes 0–5)*[30]*	NEMA 4 & 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R*[31]* Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Hp Range Polyphase	NEMA Size	Circuit Breaker (See Page 7-32 for Breaker Adjustment Range)	Type *[32]*	Type *[32]*	Type *[32]*	With External Reset Type *[32]*	Without External Reset Type *[32]*
200 (208)	0.25–3	0	HLL36030M71	SBG43●●●H30 *[33]*	SBW43●●●H30 *[33]*	SBW53●●●H30 *[33]*	SBA53●●●H30 *[33]*	SBA43●●●H30 *[33]*
	0.25–5 7.5	1	HLL36030M71 HLL36050M72	SCG44●●●H30*[33]* SCG45●●●H30 *[33]*	SCW44●●●H30 *[33]* SCW45●●●H30 *[33]*	SCW54●●●H30 *[33]* SCW55●●●H30 *[33]*	SCA54●●●H30*[33]* SCA55●●●H30 *[33]*	SCA44●●●H30 *[33]* SCA45●●●H30 *[33]*
	1.5–5 7.5–10	2	HLL36030M71 HLL36050M72	SDG42●●●H30*[33]* SDG43●●●H30 *[33]*	SDW42●●●H30 *[33]* SDW43●●●H30 *[33]*	SDW52●●●H30 *[33]* SDW53●●●H30 *[33]*	SDA52●●●H30 *[33]* SDA53●●●H30 *[33]*	SDA42●●●H30 *[33]* SDA43●●●H30 *[33]*
	15–25	3	HLL36100M73	SEG42●●●H30	SEW42●●●H30	SEW52●●●H30	SEA52●●●H30	SEA42●●●H30
	30–40	4	JLL36250M75	SFG44●●●H30	SFW44●●●H30	SFW54●●●H30	SFA54●●●H30	SFA44●●●H30
	50–60 75	5	JLL36250M75 LJL36400M36	SGG44●●●H30 SGG45●●●H30	SGW44●●●H30 SGW45●●●H30	— —	SGA54●●●H30 SGA55●●●H30	SGA44●●●H30 SGA45●●●H30
	100 125–150	6	LJL36400M36 LJL36600M42	SHG43●●●H30 SHG45●●●H30	SHW43●●●H30 SHW45●●●H30	— —	SHA53●●●H30 SHA55●●●H30	SHA43●●●H30 SHA45●●●H30
230 (240)	0.25–3	0	HLL36030M71	SBG43●●●H30 *[33]*	SBW43●●●H30 *[33]*	SBW53●●●H30 *[33]*	SBA53●●●H30 *[33]*	SBA43●●●H30 *[33]*
	0.25–7.5	1	HLL36030M71	SCG44●●●H30 *[33]*	SCW44●●●H30 *[33]*	SCW54●●●H30 *[33]*	SCA54●●●H30 *[33]*	SCA44●●●H30 *[33]*
	1.5–7.5 10 15	2	HLL36030M71 HLL36050M72 HLL36100M73	SDG42●●●H30 *[33]* SDG43●●●H30 *[33]* SDG44●●●H30 *[33]*	SDW42●●●H30 *[33]* SDW43●●●H30 *[33]* SDW44●●●H30 *[33]*	SDW52●●●H30 *[33]* SDW53●●●H30 *[33]* SDW54●●●H30 *[33]*	SDA52●●●H30 *[33]* SDA53●●●H30 *[33]* SDA54●●●H30 *[33]*	SDA42●●●H30 *[33]* SDA43●●●H30 *[33]* SDA44●●●H30 *[33]*
	15–30	3	HLL36100M73	SEG42●●●H30	SEW42●●●H30	SEW52●●●H30	SEA52●●●H30	SEA42●●●H30
	40–50	4	JLL36250M75	SFG44●●●H30	SFW44●●●H30	SFW54●●●H30	SFA54●●●H30	SFA44●●●H30
	60 75–100	5	JLL36250M75 LJL36400M36	SGG44●●●H30 SGG46●●●H30	SGW44●●●H30 SGW45●●●H30	— —	SGA54●●●H30 SGA55●●●H30	SGA44●●●H30 SGA45●●●H30
	125–150 200	6	LJL36600M42 PLL34080M68	SHG45●●●H30 SHG46●●●H30	SHW45●●●H30 SHW46●●●H30	— —	SHA55●●●H30 SHA56●●●H30	SHA45●●●H30 SHA46●●●H30
	250–300	7	PLL36100M69	SJA43●●●H30	SJW43●●●H30	—	SJA53●●●H30	—

NEMA Type 1 Enclosure with 30 mm Operators

3 or 5 Days Laser Delivery

Refer to page 16-31 for details.

NOTE: Some control transformers may require the use of oversized enclosures. Refer to Table 16.155 Control Transformer Selection, page 16-55.

Table 16.138: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24*[34]*	—	V01
120*[35]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page 16-116. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is available at no charge.

Dimensions: page 16-56
Factory Modifications (Forms): page 16-115
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[30] Size 6 and 7 are NEMA 4 sheet steel enclosures.
[31] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[32] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.138.
[33] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[34] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8539SBG41V01S).
[35] These voltage codes must include **Form S** (supplied at no charge). When specifying **Form S,** please supply motor voltage when ordering (for example, order as 8539SCG41V02S).

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Table 16.139: Class 8539 Full Voltage Type, Non-Reversing, 460–600 V, with Motor Logic Electronic Motor Circuit Protector (MCP) (replace ●●● with the voltage code)

Ratings				NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304) (Sizes 0–5)*[36]*	NEMA 4 & 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R*[37]* Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Hp Range Poly-phase	NEMA Size	Circuit Breaker (See Page 7-32 for Breaker Adjustment Range)	Type *[38]*	Type *[38]*	Type *[38]*	With External Reset Type *[38]*	Without External Reset Type *[38]*
460 (480)	0.25–5	0	HLL36030M71	SBG43●●●H30 *[39]*	SBW43●●●H30 *[39]*	SBW53●●●H30 *[39]*	SBA53●●●H30 *[39]*	SBA43●●●H30 *[39]*
	0.25–10	1	HLL36030M71	SCG44●●●H30 *[39]*	SCW44●●●H30 *[39]*	SCW54●●●H30 *[39]*	SCA54●●●H30 *[39]*	SCA44●●●H30 *[39]*
	5–15 20–25	2	HLL36030M71 HLL36050M72	SDG42●●●H30 *[39]* SDG43●●●H30	SDW42●●●H30 SDW43●●●H30 *[39]*	SDW52●●●H30 SDW53●●●H30 *[39]*	SDA52●●●H30 SDA53●●●H30 *[39]*	SDA42●●●H30 SDA43●●●H30 *[39]*
	20–25 30–50	3	HLL36050M72 HLL36100M73	SEG41●●●H30 SEG42●●●H30	SEW41●●●H30 SEW42●●●H30	SEW51●●●H30 SEW52●●●H30	SEA51●●●H30 SEA52●●●H30	SEA41●●●H30 SEA42●●●H30
	60–100	4	JLL36250M75	SFG44●●●H30	SFW44●●●H30	SFW54●●●H30	SFA54●●●H30	SFA44●●●H30
	125 150–200	5	JLL36250M75 LJL36400M36	SGG44●●●H30 SGG45●●●H30	SGW44●●●H30 SGW45●●●H30	— —	SGA54●●●H30 SGA55●●●H30	SGA44●●●H30 SGA45●●●H30
	250–350 400	6	LJL36600M42 PLL34080M68	SHG45●●●H30 SHG46●●●H30	SHW45●●●H30 SHW46●●●H30	— —	SHA55●●●H30 SHA56●●●H30	SHA45●●●H30 SHA46●●●H30
	500 600	7	PLL36080M68 PLL36100M69	SJA42●●●H30 SJA43●●●H30	SJW42●●●H30 SJW43●●●H30	— —	SJA52●●●H30 SJA53●●●H30	— —
575 (600)	0.25–5	0	HLL36030M71	SBG43●●●H30 *[39]*	SBW43●●●H30 *[39]*	SBW53●●●H30 *[39]*	SBA53●●●H30 *[39]*	SBA43●●●H30 *[39]*
	0.25–10	1	HLL36030M71	SCG44●●●H30 *[39]*	SCW44●●●H30 *[39]*	SCW54●●●H30 *[39]*	SCA54●●●H30 *[39]*	SCA44●●●H30 *[39]*
	5–20 25	2	HLL36030M71 HLL36050M72	SDG42●●●H30 *[39]* SDG43●●●H30 *[39]*	SDW42●●●H30 *[39]* SDW43●●●H30 *[39]*	SDW52●●●H30 *[39]* SDW53●●●H30 *[39]*	SDA52●●●H30 *[39]* SDA53●●●H30 *[39]*	SDA42●●●H30 *[39]* SDA43●●●H30 *[39]*
	25–30 40–50	3	HLL36050M72 HLL36100M73	SEG41●●●H30 SEG42●●●H30	SEW41●●●H30 SEW42●●●H30	SEW51●●●H30 SEW52●●●H30	SEA51●●●H30 SEA52●●●H30	SEA41●●●H30 SEA42●●●H30
	60–100	4	JLL36250M75	SFG44●●●H30	SFW44●●●H30	SFW54●●●H30	SFA54●●●H30	SFA44●●●H30
	125–150 200	5	JLL36250M75 LJL36400M36	SGG44●●●H30 SGG45●●●H30	SGW44●●●H30 SGW45●●●H30	— —	SGA54●●●H30 SGA55●●●H30	SGA44●●●H30 SGA45●●●H30
	250 300–400	6	LJL36400M36 LJL36600M42	SHG43●●●H30 SHG45●●●H30	SHW43●●●H30 SHW45●●●H30	— —	SHA53●●●H30 SHA55●●●H30	SHA43●●●H30 SHA45●●●H30
	500–600	7	PLL34100M69	SJG41●●●H30	SJW41●●●H30	—	SJA51●●●H30	—

NOTE: Some control transformers may require the use of oversized enclosures. Refer to Table 16.155.

Table 16.140: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24*[40]*	—	V01
120*[41]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see Table 16.321. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is available at no charge.

Dimensions: page 16-56
Factory Modifications (Forms): page 16-115
Replacement Parts (Class 9998): page 16-90
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[36] Size 6 and 7 are NEMA 4 only, painted sheet steel enclosures.
[37] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[38] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.140.
[39] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[40] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (i.e., order as 8539SBG41V01S).
[41] These voltage codes must include **Form S** (furnished at no charge). When specifying **Form S,** please include the motor voltage when ordering (for example, order as 8539SCG41V02S).

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NEMA Size 0–2 in Oversized Enclosure
3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Table 16.141: Class 8539 Electronic Motor Circuit Protectors (MCP) in Oversized Enclosure, NEMA Size 0–2 *[42][43]*
Full Voltage Type, Non-Reversing with Motor Logic SSOLR (replace ●●● with the voltage code)

Ratings				NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304)	NEMA 12/3R *[44]* Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Hp Range Polyphase	NEMA Size	Circuit Breaker (See Page 7-32 for Breaker Adjustment Range)			With External Reset	Without External Reset
				Type *[45]*	Type *[45]*	Type *[45]*	Type *[45]*
200 (208)	0.25–3	0	HLL36030M71	SBG43S8●●●H30*[46]*	SBW43S8●●●H30*[46]*	SBA53S8●●●H30*[46]*	SBA43S8●●●H30*[46]*
	0.25–5 7.5	1	HLL36030M71 HLL36050M72	SCG44S8●●●H30*[46]* SCG45S8●●●H30*[46]*	SCW44S8●●●H30*[46]* SCW45S8●●●H30*[46]*	SCA54S8●●●H30*[46]* SCA55S8●●●H30*[46]*	SCA44S8●●●H30*[46]* SCA45S8●●●H30*[46]*
	1.5–5 7.5–10	2	HLL36030M71 HLL36050M72	SDG42S8●●●H30*[46]* SDG43S8●●●H30*[46]*	SDW42S8●●●H30*[46]* SDW43S8●●●H30*[46]*	SDA52S8●●●H30*[46]* SDA53S8●●●H30*[46]*	SDA42S8●●●H30*[46]* SDA43S8●●●H30*[46]*
230 (240)	0.25–3	0	HLL36030M71	SBG43S8●●●H30*[46]*	SBW43S8●●●H30*[46]*	SBA53S8●●●H30*[46]*	SBA43S8●●●H30*[46]*
	0.25–7.5	1	HLL36030M71	SCG44S8●●●H30*[46]*	SCW44S8●●●H30*[46]*	SCA54S8●●●H30*[46]*	SCA44S8●●●H30*[46]*
	1.5–7.5 10 15	2	HLL36030M71 HLL36050M72 HLL36100M73	SDG42S8●●●H30*[46]* SDG43S8●●●H30*[46]* SDG44S8●●●H30*[46]*	SDW42S8●●●H30*[46]* SDW43S8●●●H30*[46]* SDW44S8●●●H30*[46]*	SDA52S8●●●H30*[46]* SDA53S8●●●H30*[46]* SDA54S8●●●H30*[46]*	SDA42S8●●●H30*[46]* SDA43S8●●●H30*[46]* SDA44S8●●●H30*[46]*
460 (480)	0.25–5	0	HLL36030M71	SBG43S8●●●H30*[46]*	SBW43S8●●●H30*[46]*	SBA53S8●●●H30*[46]*	SBA43S8●●●H30*[46]*
	0.25–10	1	HLL36030M71	SCG44S8●●●H30*[46]*	SCW44S8●●●H30*[46]*	SCA54S8●●●H30*[46]*	SCA44S8●●●H30*[46]*
	5–15 20–25	2	HLL36030M71 HLL36050M72	SDG42S8●●●H30*[46]* SDG43S8●●●H30*[46]*	SDW42S8●●●H30*[46]* SDW43S8●●●H30*[46]*	SDA52S8●●●H30*[46]* SDA53S8●●●H30*[46]*	SDA42S8●●●H30*[46]* SDA43S8●●●H30*[46]*
575 (600)	0.25–5	0	HLL36060M71	SBG43S8●●●H30*[46]*	SBW43S8●●●H30*[46]*	SBA53S8●●●H30*[46]*	SBA43S8●●●H30*[46]*
	0.25–10	1	HLL36030M71	SCG44S8●●●H30*[46]*	SCW44S8●●●H30*[46]*	SCA54S8●●●H30*[46]*	SCA44S8●●●H30*[46]*
	5–20 25	2	HLL36030M71 HLL36050M72	SDG42S8●●●H30*[46]* SDG43S8●●●H30*[46]*	SDW42S8●●●H30*[46]* SDW43S8●●●H30*[46]*	SDA52S8●●●H30*[46]* SDA53S8●●●H30*[46]*	SDA42S8●●●H30*[46]* SDA43S8●●●H30*[46]*

NOTE: Some control transformers may require the use of oversized enclosures. Refer to Table 16.155.

Table 16.142: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24*[47]*	—	V01
120*[48]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page 16-116. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is available at no charge.

Dimensions: page 16-56
Factory Modifications (Forms): page 16-115
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[42] Not included in the Laser™ Delivery program.
[43] For NEMA Size 3–5 starters in oversized NEMA 1, 4 or 12 enclosures, contact factory for pricing and TAG number.
[44] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[45] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.142.
[46] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[47] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8539SBG41S8V01S).
[48] These voltage codes must include **Form S** (provided at no charge). When specifying **Form S,** please include the motor voltage when ordering (for example, order as 8539SCG41S8V02S).

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Thermal Magnetic Circuit Breaker
Full Voltage Type
3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Table 16.143: Class 8539 Full Voltage, Thermal-Magnetic Circuit Breaker Type, Non-Reversing, with Motor Logic SSOLR (replace ●●● with the voltage code)

Ratings					NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304) (Sizes 0–5)*[49]*	NEMA 4 & 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R*[50]* Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Polyphase	NEMA Size	Circuit Breaker		Type *[51]*	Type *[51]*	Type *[51]*	With External Reset	Without External Reset
			Type	Ampere Rating				Type *[51]*	Type *[51]*
200 (208)	2 3	0	HLL36015 HLL36020	15 20	SBG1●●●H30 *[52]* SBG3●●●H30 *[52]*	SBW1●●●H30 *[52]* SBW3●●●H30 *[52]*	SBW11●●●H30 *[52]* SBW13●●●H30 *[52]*	SBA11●●●H30 *[52]* SBA13●●●H30 *[52]*	SBA1●●●H30 *[52]* SBA3●●●H30 *[52]*
	5 7-1/2	1	HLL36035 HLL36050	35 50	SCG5●●●H30 *[52]* SCG2●●●H30 *[52]*	SCW5●●●H30 *[52]* SCW2●●●H30 *[52]*	SCW15●●●H30 *[52]* SCW12●●●H30 *[52]*	SCA15●●●H30 *[52]* SCA12●●●H30 *[52]*	SCA5●●●H30 *[52]* SCA2●●●H30 *[52]*
	10	2	HLL36060	60	SDG1●●●H30 *[52]*	SDW1●●●H30 *[52]*	SDW11●●●H30 *[52]*	SDA11●●●H30 *[52]*	SDA1●●●H30 *[52]*
	15 20 25	3	HLL36100 HLL36125 HLL36150	100 125 150	SEG3●●●H30 SEG1●●●H30 SEG5●●●H30	SEW3●●●H30 SEW1●●●H30 SEW5●●●H30	SEW13●●●H30 SEW11●●●H30 SEW15●●●H30	SEA13●●●H30 SEA11●●●H30 SEA15●●●H30	SEA3●●●H30 SEA1●●●H30 SEA5●●●H30
	30 40	4	JLL36200 JLL36250	200 250	SFG3●●●H30 SFG4●●●H30	SFW3●●●H30 SFW4●●●H30	SFW13●●●H30 SFW14●●●H30	SFA13●●●H30 SFA14●●●H30	SFA3●●●H30 SFA4●●●H30
	50 60–75	5	JLL36250 LLL36400U33X	250 400	SGG6●●●H30 SGG4●●●H30	SGW6●●●H30 SGW4●●●H30	— —	SGA16●●●H30 SGA14●●●H30	SGA6●●●H30 SGA4●●●H30
	100–125 150	6	LLL36600U33X MJL36800	600 800	SHG4●●●H30 SHG5●●●H30	SHW4●●●H30 SHW5●●●H30	— —	SHA14●●●H30 SHA15●●●H30	SHA4●●●H30 SHA5●●●H30
230 (240)	2 3	0	HLL36015 HLL36020	15 20	SBG1●●●H30 *[52]* SBG3●●●H30 *[52]*	SBW1●●●H30 *[52]* SBW3●●●H30 *[52]*	SBW11●●●H30 *[52]* SBW13●●●H30 *[52]*	SBA11●●●H30 *[52]* SBA13●●●H30 *[52]*	SBA1●●●H30 *[52]* SBA3●●●H30 *[52]*
	5 7-1/2	1	HLL36035 HLL36045	35 45	SCG5●●●H30 *[52]* SCG6●●●H30 *[52]*	SCW5●●●H30 *[52]* SCW6●●●H30 *[52]*	SCW15●●●H30 *[52]* SCW16●●●H30 *[52]*	SCA15●●●H30 *[52]* SCA16●●●H30 *[52]*	SCA1●●●H30 *[52]* SCA6●●●H30 *[52]*
	10 15	2	HLL36060 HLL36090	60 90	SDG1●●●H30 *[52]* SDG7●●●H30 *[52]*	SDW1●●●H30 *[52]* SDW7●●●H30 *[52]*	SDW11●●●H30 *[52]* SDW17●●●H30 *[52]*	SDA11●●●H30 *[52]* SDA17●●●H30 *[52]*	SDA1●●●H30 *[52]* SDA7●●●H30 *[52]*
	20 25–30	3	HLL36100 HLL36150	100 150	SEG3●●●H30 SEG5●●●H30	SEW3●●●H30 SEW5●●●H30	SEW13●●●H30 SEW15●●●H30	SEA13●●●H30 SEA15●●●H30	SEA3●●●H30 SEA5●●●H30
	40 50	4	JLL36225 JLL36250	225 250	SFG1●●●H30 SFG4●●●H30	SFW1●●●H30 SFW4●●●H30	SFW11●●●H30 SFW14●●●H30	SFA11●●●H30 SFA14●●●H30	SFA1●●●H30 SFA4●●●H30
	60 75 100	5	JLL36250 LLL36400U33X LLL36600U33X	250 400 600	SGG6●●●H30 SGG4●●●H30 SGG2●●●H30	SGW6●●●H30 SGW4●●●H30 SGW2●●●H30	— — —	SGA16●●●H30 SGA14●●●H30 SGA12●●●H30	SGA6●●●H30 SGA4●●●H30 SGA2●●●H30
	125 150–200	6	LLL36600U33X MJL36800	600 800	SHG4●●●H30 SHG5●●●H30	SHW4●●●H30 SHW5●●●H30	— —	SHA14●●●H30 SHA15●●●H30	SHA4●●●H30 SHA5●●●H30
	250–300	7	PKL36100	1200	SJG3●●●H30	SJW3●●●H30	—	SJA13●●●H30	—

NOTE: Some control transformers may require the use of oversized enclosures. Refer to Table 16.155.

Table 16.144: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24*[53]*	—	V01
120*[54]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page 16-116.. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is provided at no charge.

Dimensions: page 16-56
Factory Modifications (Forms): page 16-115
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[49] Size 6 and 7 are NEMA 4 only, painted sheet steel enclosures.
[50] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[51] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.144.
[52] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[53] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8539SBG1V01S).
[54] These voltage codes must include **Form S** (provided at no charge). When specifying **Form S,** please include the motor voltage when ordering (for example, order as 8539SCG5V02S).

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Line Voltage Type
3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Table 16.145: Class 8539 Line Voltage, Thermal-Magnetic Circuit Breaker Type, Non-Reversing, with Motor Logic SSOLR (replace ●●● with the voltage code)

Ratings					NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304) (Sizes 0–5)*[55]*	NEMA 4 & 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R*[56]* Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Polyphase	NEMA Size	Circuit Breaker		Type *[57]*	Type *[57]*	Type *[57]*	With External Reset	Without External Reset
			Type	Ampere Rating				Type *[57]*	Type *[57]*
460 (480)	5	0	HLL36015	15	SBG1●●●H30 *[58]*	SBW1●●●H30 *[58]*	SBW11●●●H30 *[58]*	SBA11●●●H30 *[58]*	SBA1●●●H30 *[58]*
	7.5 10	1	HLL36025 HLL36030	25 30	SCG3●●●H30 *[58]* SCG7●●●H30 *[58]*	SCW3●●●H30 *[58]* SCW7●●●H30 *[58]*	SCW13●●●H30 *[58]* SCW17●●●H30 *[58]*	SCA13●●●H30 *[58]* SCA17●●●H30 *[58]*	SCA3●●●H30 *[58]* SCA7●●●H30 *[58]*
	15 20 25	2	HLL36045 HLL36060 HLL36070	45 60 70	SDG3●●●H30 *[58]* SDG1●●●H30 *[58]* SDG5●●●H30 *[58]*	SDW3●●●H30 *[58]* SDW1●●●H30 *[58]* SDW5●●●H30 *[58]*	SDW13●●●H30 *[58]* SDW11●●●H30 *[58]* SDW15●●●H30 *[58]*	SDA13●●●H30 *[58]* SDA11●●●H30 *[58]* SDA15●●●H30 *[58]*	SDA3●●●H30 *[58]* SDA1●●●H30 *[58]* SDA5●●●H30 *[58]*
	30 40 50	3	HLL36080 HLL36100 HLL36150	80 100 150	SEG7●●●H30 SEG3●●●H30 SEG5●●●H30	SEW7●●●H30 SEW3●●●H30 SEW5●●●H30	SEW17●●●H30 SEW13●●●H30 SEW15●●●H30	SEA17●●●H30 SEA13●●●H30 SEA15●●●H30	SEA7●●●H30 SEA3●●●H30 SEA5●●●H30
	60 75 100	4	JLL36150 JLL36200 JLL36250	150 200 250	SFG5●●●H30 SFG3●●●H30 SFG4●●●H30	SFW5●●●H30 SFW3●●●H30 SFW4●●●H30	SFW15●●●H30 SFW13●●●H30 SFW14●●●H30	SFA15●●●H30 SFA13●●●H30 SFA14●●●H30	SFA5●●●H30 SFA3●●●H30 SFA4●●●H30
	125–150 200	5	LLL36400U33X LLL36600U33X	400 600	SGG4●●●H30 SGG2●●●H30	SGW4●●●H30 SGW2●●●H30	— —	SGA14●●●H30 SGA12●●●H30	SGA4●●●H30 SGA2●●●H30
	250 300–400	6	LLL36600U33X MJL36800	600 800	SHG4●●●H30 SHG5●●●H30	SHW4●●●H30 SHW5●●●H30	— —	SHA14●●●H30 SHA15●●●H30	SHA4●●●H30 SHA5●●●H30
	500–600	7	PLL36120	1200	SJG3●●●H30	SJW3●●●H30	—	SJA13●●●H30	—
575 (600)	5	0	HLL36015	15	SBG1●●●H30 *[58]*	SBW1●●●H30 *[58]*	SBW11●●●H30 *[58]*	SBA11●●●H30 *[58]*	SBA1●●●H30 *[58]*
	7.5 10	1	HLL36020 HLL36025	20 25	SCG8●●●H30 *[58]* SCG3●●●H30 *[58]*	SCW8●●●H30 *[58]* SCW3●●●H30 *[58]*	SCW18●●●H30 *[58]* SCW13●●●H30 *[58]*	SCA18●●●H30 *[58]* SCA13●●●H30 *[58]*	SCA8●●●H30 *[58]* SCA3●●●H30 *[58]*
	15 20 25	2	HLL36035 HLL36045 HLL36060	35 45 60	SDG8●●●H30 *[58]* SDG3●●●H30 *[58]* SDG1●●●H30 *[58]*	SDW8●●●H30 *[58]* SDW3●●●H30 *[58]* SDW1●●●H30 *[58]*	SDW18●●●H30 *[58]* SDW13●●●H30 *[58]* SDW11●●●H30 *[58]*	SDA18●●●H30 *[58]* SDA13●●●H30 *[58]* SDA11●●●H30 *[58]*	SDA8●●●H30 *[58]* SDA3●●●H30 *[58]* SDA1●●●H30 *[58]*
	30 40 50	3	HLL36070 HLL36090 HLL36100	70 90 100	SEG4●●●H30 SEG6●●●H30 SEG3●●●H30	SEW4●●●H30 SEW6●●●H30 SEW3●●●H30	SEW14●●●H30 SEW16●●●H30 SEW13●●●H30	SEA14●●●H30 SEA16●●●H30 SEA13●●●H30	SEA4●●●H30 SEA6●●●H30 SEA3●●●H30
	60–75 100	4	JLL36150 JLL36250	150 250	SFG5●●●H30 SFG4●●●H30	SFW5●●●H30 SFW4●●●H30	SFW15●●●H30 SFW14●●●H30	SFA15●●●H30 SFA14●●●H30	SFA5●●●H30 SFA4●●●H30
	125–150 200	5	JLL36250 LLL36400U33X	250 400	SGG6●●●H30 SGG4●●●H30	SGW6●●●H30 SGW4●●●H30	— —	SGA16●●●H30 SGA14●●●H30	SGA6●●●H30 SGA4●●●H30
	250–350 400	6	LLL36600U33X MJL36800	600 800	SHG4●●●H30 SHG5●●●H30	SHW4●●●H30 SHW5●●●H30	— —	SHA14●●●H30 SHA15●●●H30	SHA4●●●H30 SHA5●●●H30
	500–600	7	PKL36100	1200	SJG2●●●H30	SJW2●●●H30	—	SJA12●●●H30	—

Table 16.146: Class 8539 Thermal Magnetic Circuit Breaker Type, Single Phase*[59][60]* with Melting Alloy Overload Relays

Motor Voltage	Max. Hp	Coil Voltage	NEMA Size	Poles	Circuit Breaker (Type)	Ampere Rating	NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304) (Sizes 0–2)	NEMA 4 & 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R*[56]* Dusttight and Driptight Industrial Use Enclosure	
										With External Reset	Without External Reset
							Type	Type	Type	Type	Type
120	1 2 3	120	0 1 2	2	HLL26030 HLL26050 HLL26080	30 50 80	SBG72V02 SCG72V02 SDG71V02	SBW72V02 SCW72V02 SDW71V02	SBW75V02 SCW75V02 SDW74V02	SBA75V02 SCA75V02 SDA74V02	SBA72V02 SCA72V02 SDA71V02
240	2 3 7.5	240	0 1 2	2	HLL26025 HLL26035 HLL26080	25 35 80	SBG71V03 SCG71V03 SDG71V03	SBW71V03 SCW71V03 SDW71V03	SBW74V03 SCW74V03 SDW74V03	SBA74V03 SCA74V03 SDA74V03	SBA71V03 SCA71V03 SDA71V03

NOTE: Some control transformers may require the use of oversized enclosures.
Refer to page 16-55.

3 or 5 Days Laser Delivery

For How to Order Information, see page 16-27.

[55] Size 6 and 7 are NEMA 4 only, painted sheet steel enclosures.
[56] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[57] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.144.
[58] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[59] Not included in the Laser™ Delivery program.
[60] Single-phase units require one thermal unit and are not available with Form H●● (solid-state overload relay).

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Application Data

Table 16.147: Class 8539—UL Listed Short Circuit Ratings

Motor Circuit Protector Type			
NEMA Size	Enclosure	AIC at 480 Vac (RMS)	AIC at 600 Vac (RMS)
0, 1	Standard*[61]*	100,000	35,000
2 thru 5	Standard*[61]*	100,000	50,000
6	Standard*[61]*	65,000	18,000
7	Standard*[61]*	65,000	30,000

Table 16.148: Electronic Motor Circuit Protector (MCP) Selection by HP Ratings of Induction-type Squirrel-Cage Motors

3Ø, 60 Hz Voltages				Full-Load (A)	Suffix
200 Vac	230 Vac	460 Vac	575 Vac		
.5–5	.5–7.5	.75–15	1–20	1.5–25	M71
5–10	5–15	10–30	15–40	14–42	M72
10–25	15–30	25–60	30–75	30–80	M73
20–40	25–50	50–100	60–125	58–130	M74
40–60	50–75	100–150	125–200	114–217	M75

NOTE: The MCP adjustable trip range is determined by the suffix of the circuit breaker catalog number. This table indicates the trip range which corresponds to a given suffix number. The MCP motor circuit protector should be adjusted to a level just above locked-rotor current of the motor. This setting will provide optimum overcurrent protection for the motor. For more information on MCP instantaneous-trip circuit breakers, refer to the MCP circuit breaker section of this catalog.

Table 16.149: Class 8539, UL Listed Short Circuit Ratings

Thermal Magnetic Circuit Breaker Type			
NEMA Size	Enclosure	AIC at 480 Vac (RMS)	AIC at 600 Vac (RMS)
0, 1	Standard *[61]*	100,000	35,000
2 thru 5	Standard *[61]*	100,000	50,000
6	Standard *[61]*	65,000	18,000
7	Standard *[61]*	65,000	30,000

Table 16.150: Class 8538—UL Listed Short Circuit Ratings

NEMA Size	NEMA Fuse Class	Enclosure	Available Amperes RMS Symmetrical
0–3	Class H or K	Standard *[62]*	5,000
0–3	Class R/J	Standard*[62]*	100,000
0–2	Class H or K	Oversize	5,000
0–2	Class R/J	Standard	100,000
4–5	Class H or K	Standard *[62]*	10,000
4–5	Class R/J	Standard *[62]*	100,000
6	Class H or K	Standard *[62]*	18,000
6	Class R/J	Standard*[62]*	100,000

Table 16.151: 2: Motor Code Letter Table

Horsepower	Motor Code Letters
1/2 or less	A-L
3/4–1-1/2	A-K
2–3	A-J
5–25	A-H
30–125	A-G
150 or more	A-F

NOTE: The combination starter selection tables on pages page 16-49–page 16-51 are suitable for motors with locked-rotor current letters according to NEC Table 430-7 (b) as listed in Table 16.151. For other motors, a special thermal-magnetic circuit breaker with adjustable magnetic trip settings for the specific motor is required. When ordering for these special applications, specify the motor horsepower, voltage, frequency, full-load current, and code letter (or locked rotor current) to help ensure proper protection.

Table 16.152: Terminals

NEMA Size	Type	Line Terminals on Disconnect			Power Terminals On Magnetic Starter			Control Terminals On Magnetic Starter		
		Type of Lug	Wire Range		Type of Lug	Wire Range	Wires Per Terminal	Type of Lug	Wire Range	Wires Per Terminal
			Switch	Circuit Breaker						
0 & 1	SB & SC	Box Lug	14–1/0 Cu/Al	(1) 14-3/0 Al or Cu	Pressure Wire	14–8 Cu	1 or 2	Pressure Wire	16–12 Cu	2
2	SD	Box Lug	14–1/0 Cu/Al	(1) 14-3/0 Al or Cu	Box Lug	14–4 Cu	1	Pressure Wire	16–12 Cu	2
3	SE	Box Lug	14–1/0 Cu/Al	(1) 14-3/0 Al or Cu	Box Lug	14–0 Cu	1	Pressure Wire	16–12 Cu	2
4	SF	Box Lug	6–300 MCM Cu/Al	(1) 4-4/0 Al or Cu (JLL Breaker 150 A - 175 A) (1) 3/0 - 350 MCM Al or Cu (JLL Breaker 200 A - 250 A)	Box Lug	8–250 MCM Cu	1	Pressure Wire	16–12 Cu	2
5	SG	Box Lug	One 4–500 MCM Cu	(1) 2 - 500 MCM Al or (1) 2 - 350 MCM Cu (DJL36400 Breaker) (2) 2/0 - 500 MCM Al or (2) 2/0 - 350 MCM Cu (DLL36600 Breaker) (1) 3/0 - 350 MCM Al or (1) 3/0 - 350 MCM Cu (JLL36250 Breaker)	Box Lug	4–500 MCM Cu	1	Pressure Wire	16–12 Cu	2
6	SH	Box Lug	—	(2) 2/0 - 500 MCM Al or (2) 2/0 - 350 MCM Cu (DJL36600 Breaker, DLL Breaker) (1) 2 - 600 MCM Al or (1) 2 - 350 MCM Cu (DJL36400 Breaker) (3) 3/0 - 500 MCM Al or (3) 3/0 - 350 MCM Cu (MJL36800 Breaker) (3) 3/0 - 500 MCM Al or (3) 3/0 - 350 MCM Cu (PLL34080M68 Breaker)	Parallel Groove	250–500 MCM Cu *[63]*	1 or 2	Pressure Wire	16–12 Cu *[64]*	2
7	SJ	Box Lug	—	(4) 3/0 - 300 MCM Al or CU (PJL, PKL, PLL Breaker)	Parallel Groove	250–500 MCM Cu	1–4	Pressure Wire	16–12 Cu	2

[61] Standard enclosure includes: NEMA 1, 4 and 4X stainless, and 12/3R.
[62] Standard enclosure includes non-oversize NEMA 1, 4 and 4X stainless, and 12.
[63] Order Class 9999 Type SCU6 parts kit to convert power terminals to accept sizes 2/0–300 MCM wire.
[64] Terminal block range limited to 16–14.

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Accessories—Interlocks and Control Transformers

A one or twopole electrical interlock can be added to the disconnect switch or circuit breaker. So if a separate control circuit is used, the magnetic starter can be de-energized when the disconnect is switched to the Off position. See Table 16.153 for proper interlock selection.
For electrical ratings of disconnect and circuit breaker interlocks, see Table 16.154.

An electrical interlock may also be factory installed in either a disconnect switch or circuit breaker combination starter. Specify **Form Y74** for single-pole or **Form Y75** for two-pole interlocks.

Table 16.153: Disconnect Switch and Breaker Interlocks

Class	Type	SPDT (Y74)	DPDT (Y75)
		Class 9999 Type	Class 9999 Type
8538 *[65]*	SB, SC, SD (Series B)	R6	R7
8538, 8738	SD (Series C)	R43	R44
	SB, SC (Series C)	R45	R46
	SE, SF (Series A)	R8	R9
	SE (Series B & C)	R41	R42
	SF (Series B & C)	R39	R40
	SG	R35	R36
8539, 8739	SB, SC, SD, SE, SF, SG (Series K)	R26	R27
8538	SBA, SCA, SBG, SCG (Series D and above)	TC11	TC21
8538	SBAS8, SCAS8, SBGS8, SCGS8 (Series D and above)	TC10	TC20
8738	SBAS8, SCAS8, SBGS8, SCGS8 (Series E and above)	TC10	TC20
8738	SBA, SCA, SBG, SCG (Series E and above)	TC11	TC21
8538	SDA, SDA*[65]*, SDG, SDG*[65]* (Series D and above)	TC10	TC20
8738	SDA, SDG (Series E and above)	TC10	TC20
8538, 8738	SEA, SEG (Series D and above)	TC10	TC20

Table 16.154: Disconnect Switch and Breaker Interlock Electrical Ratings

Class 9999 Type R6, 8, 26, 35, 39, 41, 43, 45, TC10, & TC11				Class 9999 Type R7, 9, 27, 36, 40, 42, 44, 46 & TC 20, 21					
AC—50 or 60 Hz				AC—50 or 60 Hz					
Volts	Maximum Current			Volts	Maximum Current				
	Make	Break	Continuous Carrying Current		Make		Break		Continuous Carrying Current
	(A)	(A)	(A)		(A)	VA	(A)	VA	(A)
120	40	15	15	120	30	3450	3	345	10
240	20	10	15	240	15	3450	1.5	345	10
480	10	6	15	480	7.5	3450	0.75	345	10
600	8	5	15	600	6	3450	0.6	345	10

Table 16.155: Control Transformer Selection

NEMA Size	Starter Type	Standard Capacity (Form F4T)	Additional Capacity		
			50 VA (Form F4T10)	100 VA (Form F4T11)	200 VA (Form F4T12)
		Class 9070 Type *[66]*			
0 & 1	SB & SC	TF100	TF150	TF200	TF300 *[67][68]*
2	SD	TF100	TF150	TF200	TF300
3	SE	TF150	TF200	TF300	TF500
4	SF	TF300	TF300	TF500	T500
5	SG	TF100 and 8501XO20	TF100 and 8501XO20	TF150 and 8501XO20	TF300 and 8501XO20
6	SH	EO3S2 is standard	N/A	EO3FS2 and T100	EO3S2 and TF200
7	SJ	EO19S2 is standard	N/A	EO19S2 and TF100	EO3S2 and TF200

NOTE: 9070TF transformers are now standard in Series K combination starters.

Internal Auxiliary Switch—Circuit breakers can be supplied with a factory installed auxiliary switch for remote indication of an open and/or tripped or a closed breaker. One (specify **Form Y741**) or two (specify **Form Y751**) auxiliary switches can be supplied. The switches are supplied with normally open and normally closed circuits with a common connection. Contacts must be used on the same polarity and are rated 15 A at 240 Vac. The auxiliary switches are located internally and are furnished with 19-20 inch long leads.

Alarm Switch—The alarm switch only operates when the breaker is tripped. It is used to actuate bell alarms and warning lights. The alarm switch is factory installed only (specify **Form Y742**) and consists of a single pole single throw switch which is normally open except when the breaker is tripped. The contacts are rated 4 A at 240 Vac. This switch is located in the breaker and is supplied with 19-20 inch long leads.

Transformer Selection—Space and drilling are provided in all disconnect switch and circuit breaker combination starters in NEMA 1, 4 & 4X stainless and polyester, 12 and 7 & 9 bolted enclosures for the field addition (or factory installation) of a Class 9070 control circuit transformer and Class 9999 Type SFR4 fuse holder. This kit can be either panel mounted or side mounted on the Type S starter. For standard control transformer selection in combination starters, see Table 16.155. Consult the field office for transformer additions to NEMA 7 and 9 Spin Top™ enclosures. For secondary fuse holder, order 9080PF1.

Fuse Block Mounting Brackets—The standard capacity transformer, Class 9070 Type T100, for the Size 0 and 1 starters mounts to the right of the magnetic starter.

Standards—Most combination starters and forms are UL Listed in file E152395, Category NKJH, and CSA File CR 584.

[65] Class 8538 type numbers ending in suffix **S8**.
[66] Complete the contactor or starter Class and Type with the voltage code. See .
[67] Requires oversized enclosure. (Size 2 reversing enclosure.)
[68] Available in standard enclosure with Mag-Gard™ circuit breaker and non-fusible disconnect switch. Requires oversized enclosure with thermal-magnetic circuit breakers and fusible disconnect switches. (Size 2 reversing enclosure.)

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Approximate Dimensions

Table 16.156: See Figure: NEMA 1 Enclosure, Sizes 0–2

NEMA Size	Class	Type	Dimensions, in. *[69]*																Top & Bottom		Sides	Wt. (lb)
			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	W	X	Y	
0–1	8538	SBG, SCG	9.5	22.5	8.34	6.38	20.5	14.66	1.81	1.69	3	2.31	1.06	3.25	2.19	1.25	0.88	—	0.5–0.75	0.5–0.75	0.5	38
	8539	SBG, SCG	9.5	22.5	9.84	6.38	20.5	14.66	1.81	1.69	3	2.31	1.06	3.25	2.19	1.25	0.88	—	0.5–0.75	0.5–0.75	0.5	38
2	8538, 8539	SDG	10.5	26	9.59	7.38	24	16.91	2.13	2	4	2.31	1.06	3.25	2.19	1.25	0.88	—	1–1.25	0.5–0.75	0.5	54

Table 16.157: See Figure: NEMA 1 Enclosure, Sizes 3–6

NEMA Size	Class	Type	Dimensions, in. *[69]*																Top & Bottom		Sides	Wt. (lb)
			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	W	X	Y	
3 *[70]*	8538, 8539	SEG	15.25	42	10.59	9.25	3	22.72	41	0.5	—	2.83	3.53	5	2.69	5.38	1.28	0.91	1–1.25 2–2.5	0.5–0.75	0.5	102
4	8538	SFG	16	52.5	10.53	10	3	23.66	51.5	0.5	—	2.83	3.53	5	2.69	5.38	1.28	0.91	2.5	0.5–0.75	0.5	163
	8539	SFG	16	52.5	10.53	10	3	23.66	51.5	0.5	—	2.83	3.53	5	2.69	5.38	1.28	0.91	2.5	0.5–0.75	0.5	163
5	8538	SGG	20	78	15.5	12	4	29.41	77	0.5	—	3.52	4.61	9.25	3.19	—	—	—	0.5– 0.75 *[71]*	3	—	450
	8539	SGG	20	66	13.72	12	4	29.41	65	0.5	—	3.52	4.61	5	3.19	—	—	—	0.5–0.75	3	—	420
6 *[72]*	8538, 8539	SHG	36	90	21.03	—	—	41.38	—	—	—	—	—	5	—	—	—	—	—	—	—	—

Table 16.158: See Figure: NEMA 12/3R Enclosure

NEMA Size	Class	Type	Dimensions, in. *[73]*									Wt. (lb)
			A	B	C	D	E	F	G	H	I	J
0–1	8538	SBA SCA	9.5	8.34	24	3.25	2.5	4.5	23.5	0.59	4.44	14.31	40
	8539	SBA SCA	9.5	9.84	24	3.25	2.5	4.5	23.5	0.59	4.44	14.31	40
2	8538, 8539	SDA	10.5	9.59	27.75	3.25	2.5	5.5	27	0.38	4.13	16.56	55
3 *[70]*	8538, 8539	SEA	15.25	10.59	42	5	3	9.25	41	0.5	5.06	22.31	111
4	8538	SFA	16	10.53	52.5	5	3	10	51.5	0.5	4.19	22.97	170
	8539	SFA	16	10.53	52.5	5	3	10	51.5	0.5	5.19	22.97	170
5	8538	SGA	20	13.72	78	9.25	4	12	77	0.5	7.78	29.41	—
	8539	SGA	20	13.72	66	5	4	12	65	0.5	7.78	27.41	440
6 *[72]*	8538, 8539	SHA	36	17	90	5	—	—	—	—	—	47.38	—

Table 16.159: See Figure: NEMA 4 and 4X Stainless Steel Enclosure

NEMA Size	Class	Type	Dimensions, in. *[69]*												Bottom	Top & Bot.	Wt. (lb)
			A	B	C	D	E	F	G	H	I	J	K	L	W	X	
0–1	8538	SBW SCW	9.5	8.34	24.06	3.25	2.5	4.5	23.5	0.59	3.03	1.31	2.31	14.28	0.75 Hub	1 Hub	40
	8539	SBW SCW	9.5	9.84	24.06	3.25	2.5	4.5	23.5	0.59	3.03	1.31	2.31	14.28	0.75 Hub	1 Hub	40
2	8538, 8539	SDW	10.5	9.59	27.75	3.25	2.5	5.5	27	0.59	3	2	2.63	16.53	0.75 Hub	1.5 Hub	55
3 *[70]*	8538, 8539	SEW	15.25	10.59	42	5	3.19	10.25	40.5	0.59	3	2.56	3.19	22.19	0.75 Hub	2.5 Hub	111
4	8538	SFW	16	10.53	52.5	5	3.56	11	51	0.59	3	2.56	3.19	22.47	0.75 Hub	2.5 Hub	158
	8539	SFW	16	10.53	52.5	3.25	2.5	11	51	0.59	3	2.56	3.19	22.47	0.75 Hub	2.5 Hub	120
5	8538	SGW	20	13.72	78	9.25	4	12	77	0.56	4.5	3	3.5	29.41	0.75 Hub	3.5 Hub	—
	8539	SGW	20	13.72	66	5	4	12	65	0.56	4.5	3	3.5	29.41	0.75 Hub	3.5 Hub	440
6 *[72]*	8538, 8539	SHW	36	17	90	—	—	—	—	—	—	—	—	47.88	—	—	—

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

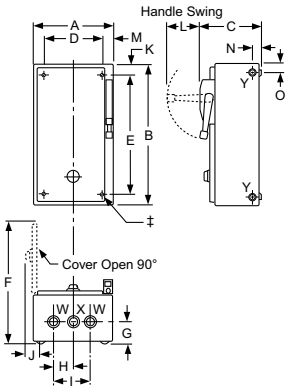

Figure 16.10: NEMA 1 Enclosure, Size 0–2

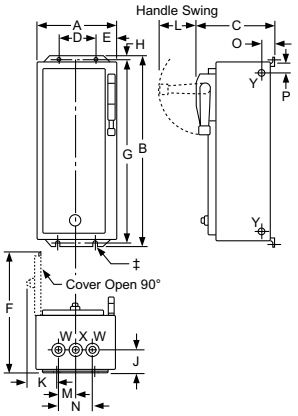

Figure 16.11: NEMA 1 Enclosure, Size 3–6

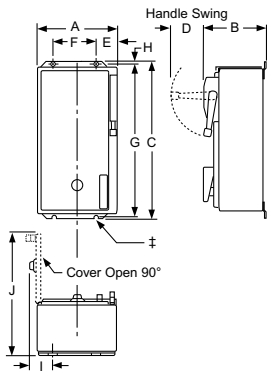

Figure 16.12: NEMA 12 Enclosure

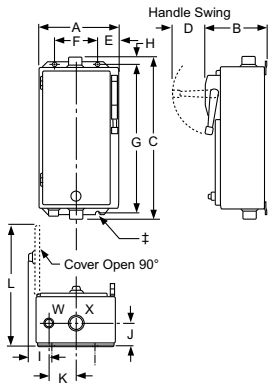

Figure 16.13: NEMA 4 and 4X Stainless Steel Enclosure

‡ = 4 mounting holes: 0.31 in. (8 mm) dia. for Sizes 0, 1, and 2; 0.44 in. (11 mm) dia. for Sizes 3 and 4; 0.56 in. (14 mm) dia., located on external flanges, for Size 5.

NOTE: Illustrations may not represent the actual enclosure. They are intended for dimensional information only.

[69] Dimensions also for **Form F4T** (standard control transformer). **Form F4T11** (100 VA extra capacity) and **Form F4T12** (200 VA extra capacity) could require the use of an oversized enclosure. Refer to Table 16.155.
[70] Class 8538 Size 3 devices with 200 A fuse clips use dimensions for Class 8538 Size 4.
[71] Left side only.
[72] Size 6 enclosures are floor mounting.
[73] Dimensions include space for control circuit transformers.

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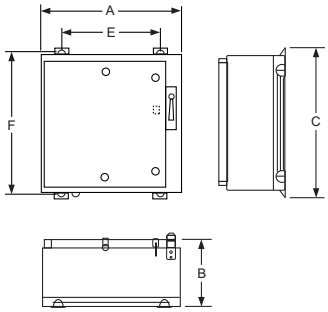

Figure 16.14: NEMA 4X Polyester Enclosure

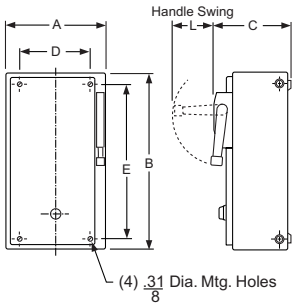

Figure 16.15: Class 8538 and 8539 in Oversize Enclosures—NEMA 1, 4 & 4X Stainless, and 12/3R

Enclosures

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.160: See Figure: NEMA 4X Polyester Enclosure, page 16-57 *[74]*

NEMA Size	Class	Dimensions, in.					
		Type	A	B	C	E	F
0, 1	8538	SBW SCW SDW	13.72	11.4	26.94	6.25	25.75
0, 1	8539						
0, 1, & 2	8738, 8739	SBW SCW SDW	25.25	11.4	27.00	17.88	25.75
2	8538, 8539						
3–4	8538, 8738 8539, 8739	SEW SFW *[75]*	26.31	11.4	33.50	18.50	32.25

Table 16.161: See Figure: Class 8538 and 8539 in Oversize Enclosures—NEMA 1, 4 & 4X Stainless, and 12/3R, page 16-57

NEMA Size	NEMA Type Encl.	Dimensions, in.					
		Wide A	High B	Deep C	Handle L	Mounting	
						D	E
0–2	1	15	28.33	9.59	3.25	11.625	26.25
	4	15	30.03	9.59	3.25	10	29.75
	12	15	31	10.97	3.25	9	30.25

Information on Hubs

Hubs are supplied with each NEMA Type 4X combination starter as shown in Table 16.162.

Note that hubs are only installed in stainless steel enclosures; they are not installed in polyester enclosures.

Table 16.162: Hub Sizes

NEMA Size	Quantity	Hub Size (in.)
0 and 1	1 2	0.75 1.00
2	1 2	0.75 1.50
3 and 4	1 2	0.75 2.50

NOTE: Illustrations may not represent the actual enclosure—they are intended for dimensional information only.

Table 16.163: Conduit Sizes LOC A, B, C and D

NEMA Size	Standard
0–1	1.25
2	1.5
3–4	2.5
5	4

[74] Dimensions also for **Form F4T** (standard control transformer) and **Form F4T10** (50 VA additional capacity). Other control transformers may require the use of oversized enclosures. Refer to Table 16.155 Control Transformer Selection, page 16-55.

[75] 8539 Size 4 only.

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NEMA 00, 0, and 1
Reversing Contactor

General Information

Class 8702 Type S reversing magnetic contactors are used for starting, stopping, and reversing AC motors where overload protection is separately provided. Class 8702 reversing contactors consist of two Class 8502 contactors mechanically and electrically interlocked. Open type devices, Sizes 0–5, are available in either horizontal or vertical arrangements. Sizes 00, 6, and 7 are available as horizontal only. Enclosed devices, Size 00–7, use horizontally arranged components. Type S reversing contactors are designed for operation at up to 600 Vac, 50/60 Hz.

Table 16.164: 600 Vac Maximum—50–60 Hz (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Open Type		NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure (Sizes 0–5)*[1]*	NEMA 7 & 9 *[1]* Hazardous Locations, Div. 1 & 2 Class I, Groups C & D Class II, Groups E, F & G		NEMA 12/3R *[2]* Dusttight & Driptight Industrial Use Enclosure
				Vertical Type *[3]*	Horizontal Type *[3]*	Type *[3]*	Type *[3]*	Bolted Type Aluminum *[3]*	SPIN TOP™ Type *[3]*	Type *[3]*
00	9	200 230 460 575	1.5 1.5 2 2	—	SAO4●●●	SAG4●●●	Use Size 0	Use Size 0	Use Size 0	Use Size 0
0	18	200 230 460 575	3 3 5 5	SBO12●●●	SBO4●●●	SBG4●●●	SBW14●●●	SBT49●●●	SBR9●●●	SBA4●●●
1	27	200 230 460 575	7.5 7.5 10 10	SCO7●●●	SCO8●●●	SCG8●●●	SCW14●●●	SCT49●●●	SCR9●●●	SCA4●●●
2	45	200 230 460 575	10 15 25 25	SDO1●●●	SDO2●●●	SDG2●●●	SDW11●●●	SDT43●●●	SDR3●●●	SDA1●●●
3	90	200 230 460 575	25 30 50 50	SEO1●●●	SEO2●●●	SEG2●●●	SEW11●●●	—	—	SEA1●●●
4	135	200 230 460 575	40 50 100 100	SFO1●●●	SFO3●●●	SFG3●●●	SFW11●●●	—	—	SFA1●●●
5	270	200 230 460 575	75 100 200 200	SGO1●●●	SGO3●●●	SGG3●●●	SGW11●●●	—	—	SGA1●●●
6	540	200 230 460 575	150 200 400 400	—	SHO1●●●	SHG1●●●	SHW1●●●	—	—	SHA1●●●
7	810	200 230 460 575	— 300 600 600	—	SJO1●●●	SJG1●●●	SJW1●●●	—	—	SJA1●●●

Table 16.165: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24*[4][5]*	—	V01
120*[5]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page page 16-116. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is available at no charge.

Dimensions: page 16-62
Factory Modifications (Forms) page 16-115
Separate Enclosures (Class 9991): page 16-108
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[1] NEMA 4 and 4X stainless steel enclosures (sizes 0–5) have a brushed finish. Sizes 6 and 7 are painted sheet steel and are rated NEMA 4 only.
[2] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[3] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.165.
[4] 24 V coils are not available on Sizes 4-7. On Sizes 00-3, where 24 V coils are available, **Form S** (separate control) must be specified (i.e., order as 8702SAO4V01S).
[5] These voltage codes must include **Form S** (provided at no charge) (for example, order as 8702SAO4V02S).

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Single-Phase and 4–Pole Polyphase

Table 16.166: 600 Vac Maximum—50–60 Hz (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Type of Motor	Open Type		NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure	NEMA 7 & 9 *[6]* Hazardous Locations, Div. 1 & 2 Class I, Groups C & D Class II, Groups E, F & G		NEMA 12/3R*[7]* Dusttight & Driptight Industrial Use Enclosure
					Vertical Type *[8]*	Horizontal Type *[8]*	Type *[8]*	Type *[8]*	Bolted Type *[8]*	Spin Top™ Type *[8]*	Type *[8]*
2-Pole Single Phase											
00	9	115 230	1/3 1	Single Phase 3-Wire	—	SAO1●●●	SAG1●●●	Use Size 0	Use Size 0	Use Size 0	Use Size 0
0	18	115 230	1 2		SBO9●●●	SBO1●●●	SBG1●●●	SBW11●●●	SBT46●●●	SBR6●●●	SBA1●●●
1	27	115 230	2 3		SCO1●●●	SCO2●●●	SCG2●●●	SCW11●●●	SCT46●●●	SCR6●●●	SCA1●●●
3-Pole Single Phase											
00	9	115 230	1/3 1	4-Wire Rep.-Ind.	—	SAO2●●●	SAG2●●●	Use Size 0	Use Size 0	Use Size 0	Use Size 0
		115 230	1/3 1	4-Wire Split Ph.	—	SAO3●●●	SAG3●●●	Use Size 0	Use Size 0	Use Size 0	Use Size 0
0	18	115 230	1 2	4-Wire Rep.-Ind.	SBO10●●●	SBO2●●●	SBG2●●●	SBW12●●●	SBT47●●●	SBR7●●●	SBA2●●●
		115 230	1 2	4-Wire Split Ph.	SBO11●●●	SBO3●●●	SBG3●●●	SBW13●●●	SBT48●●●	SBR8●●●	SBA3●●●
1	27	115 230	2 3	4-Wire Rep.Ind.	SCO3●●●	SCO4●●●	SCG4●●●	SCW12●●●	SCT47●●●	SCR7●●●	SCA2●●●
		115 230	2 3	4-Wire Split Ph.	SCO5●●●	SCO6●●●	SCG6●●●	SCW13●●●	SCT48●●●	SCR8●●●	SCA3●●●
4-Pole Polyphase											
0	18	200 230 460 575	3 3 5 5	2 Phase 4-Wire	SBO13●●●	SBO5●●●	SBG5●●●	SBW15●●●	Consult the Customer Care Center at 1-888-778-2733	SBR10●●●	SBA5●●●
1	27	200 230 460 575	7.5 7.5 10 10		SCO9●●●	SCO10●●●	SCG10●●●	SCW15●●●		SCR10●●●	SCA5●●●
2	45	200 230 460 575	10 15 25 25		—	SDO4●●●	SDG4●●●	SDW12●●●		SDR4●●●	SDA2●●●
3	90	200 230 460 575	25 30 50 50		—	SEO4●●●	SEG4●●●	SEW12●●●	—	—	SEA2●●●
4	135	200 230 460 575	40 50 100 100		—	SFO4●●●	SFG4●●●	SFW12●●●	—	—	SFA2●●●

Dimensions: page 16-62
Factory Modifications (Forms): page 16-115
Separate Enclosures (Class 9991): page 16-108
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123
For How to Order Information, see page 16-27.

Auxiliary Units

Table 16.167shows the maximum number of auxiliary units **(in addition to the holding circuit and interlocking contacts)** that can be added to either the forward or reverse contactor or starter.

Table 16.167: Auxiliary Units—Class 8702, 8736, and 8810

NEMA Size (Type)	No. of Poles—Basic Contactor	Maximum number of auxiliary units on each contactor, forward or reverse (in addition to internal holding circuit and interlocking contacts)
00 (SA)	2–3	2 single circuit auxiliary contacts (N.O. or N.C.)
0–2 (SB–SD)	2–3	4 single circuit auxiliary contacts (N.O. or N.C.)*[9]*
	4	2 single circuit auxiliary contacts (N.O. or N.C.)
3–7 (SE–SJ)	Any	2 single circuit auxiliary contacts (N.O. or N.C.)

[6] NEMA 7 and 9 bolted are not UL listed.
[7] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[8] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.165.
[9] When adding 4 external auxiliary contacts to one Size 0 or 1 contactor, remove one of the return springs.

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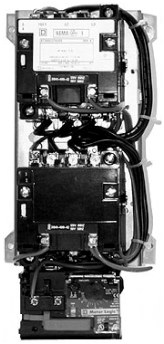
Introduction

NEMA Sizes 00, 0, 1 Reversing Starter (Horizontal Type)



NEMA Sizes 00, 0, and 1 Reversing Starter (Vertical Type)

Class 8736 Type S reversing magnetic starters are used for full-voltage starting, stopping, and reversing AC squirrel cage motors. Class 8736 starters consist of one Class 8502 contactor and one Class 8536 starter mechanically and electrically interlocked. Open type devices, Sizes 0–5, are available in either horizontal or vertical arrangements. Sizes 00, 6, and 7 are available as horizontal only. Enclosed devices use horizontally arranged components. Type S starters are designed for operation at up to 600 Vac, 50/60 Hz.

Overload Relays

Motor Logic™ Solid-State Overload Relay (SSOLR) Protection
These ambient insensitive overload relays are available on three phase sizes 00 through 6 and standard on size 7. They provide phase loss, phase unbalance protection. To order, add Form **H30** (for selectable trip class 10 or 20 protection). For more information about Motor Logic solid-state overload relays (SSOLRs), see pages page 16-99 and page 16-117. (Catalog number example: 8736SCO8V06H30)

New! **Adapted Bimetallic Overload Relay (NEMA Sizes 00–1)**
The Adapted Bimetallic motor starter consists of a specially designed adapter that attaches with bus bars to the NEMA Type S contactor and holds the LRD or LR3D (IEC Style) bimetallic overload relay. This starter configuration can be ordered by adding Form E (adapater only) to the standard catalog number. Once the FLA of the motor has been determined, the LRD or LR3D bimetallic overload can be purchased separately and must installed in the field at a later date for proper operation. For more information see Table 16.324. (Catalog number example: 8736SCO8V06E)

New! **TeSys T Motor Management System (NEMA Sizes 1–6)**
TeSys T is a flexible system that integrates seamlessly into your automation system through five major communication protocols. TeSys T can predict what will happen in the process, as it accurately monitors current, voltage, and power over a wide range. For additional information about the TeSys T Motor Management System, see page 16-101 (for example, 8736SCO8V06**H616**).

Melting Alloy Overload Relays
Melting alloy type thermal overload blocks are installed as part of the starter, and thermal elements must be selected and installed separately in order to operate the starter. For a three-phase motor, three thermal units must be ordered using the tables beginning under page 16-131. The catalog number includes no Form number (for example, 8736SCO8V06).

Type S Reversing Starters, 3–Pole Polyphase

Table 16.168: 3–Pole Polyphase, 600 Vac Maximum, 50–60 Hz, with Motor Logic SSOLR (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Open Type		NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure (Sizes 0–5)*[10]*	NEMA 7 & 9 *[11]* Hazardous Locations Class I, Groups C & D Class II, Groups E, F & G		NEMA 12/3R *[12]* Dusttight, Driptight Industrial Use Enclosure
				Vertical Type *[13]*	Horizontal Type *[13]*	Type *[13]*	Type *[13]*	Bolted Type *[13]*	SPIN-TOP™ Type *[13]*	Type *[13]*
00	9	200 230 460 575	1-1/2 1-1/2 2 2	—	SAO16●●●H30 *[14]*	SAG16●●●H30 *[14]*	Use Size 0 *[14]*	Use Size 0 *[14]*	Use Size 0 *[14]*	Use Size 0 *[14]*
0	18	200 230 460 575	3 3 5 5	SBO10●●●H30 *[14]*	SBO4●●●H30 *[14]*	SBG4●●●H30 *[14]*	SBW14●●●H30 *[14]*	SBT49●●●H30 *[14]*	SBR9●●●H30 *[14]*	SBA4●●●H30 *[14]*
1	27	200 230 460 575	7-1/2 7-1/2 10 10	SCO7●●●H30 *[14]*	SCO8●●●H30 *[14]*	SCG8●●●H30 *[14]*	SCW14●●●H30 *[14]*	SCT49●●●H30 *[14]*	SCR9●●●H30 *[14]*	SCA4●●●H30 *[14]*
2	45	200 230 460 575	10 15 25 25	SDO1●●●H30 *[14]*	SDO2●●●H30 *[14]*	SDG2●●●H30 *[14]*	SDW11●●●H30 *[14]*	SDT43●●●H30 *[14]*	SDR3●●●H30 *[14]*	SDA1●●●H30 *[14]*
3	90	200 230 460 575	25 30 50 50	SEO1●●●H30	SEO2●●●H30	SEG2●●●H30	SEW11●●●H30	—	—	SEA1●●●H30
4	135	200 230 460 575	40 50 100 100	SFO1●●●H30	SFO3●●●H30	SFG3●●●H30	SFW11●●●H30	—	—	SFA1●●●H30
5	270	200 230 460 575	75 100 200 200	SGO1●●●H30	SGO3●●●H30	SGG3●●●H30	SGW11●●●H30	—	—	SGA1●●●H30
6	540	200 230 460 575	150 200 400 400	—	SHO1●●●H30	SHG1●●●H30	SHW1●●●H30	—	—	SHA1●●●H30
7	810	200 230 460 575	– 300 600 600	—	SJO1●●●H30	SJG1●●●H30	SJW1●●●H30	—	—	SJA1●●●H30

For How to Order Information, see page 16-27.

[10] NEMA 4 and 4X stainless steel enclosures (sizes 0–5) have a brushed finish. Sizes 6 and 7 are painted sheet steel and are rated NEMA 4 only.
[11] NEMA 7 and 9 bolted are not UL listed.
[12] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[13] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.170.
[14] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117

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Type S, 2- and 3-Pole Single Phase, 4-Pole Polyphase

Devices require melting alloy thermal units, page 16-130.

Table 16.169: 2- and 3-Pole Single Phase, 4-Pole Polyphase, 600 Vac Maximum—50–60 Hz (replace ●●● with the voltage code)

NEMA Size	Continuous Current Ratings	Motor Voltage	Max. Hp	Type of Motor	Open Type		NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure	NEMA 7 & 9 *[15]* Hazardous Locations Class I, Groups C & D Class II, Groups E, F & G		NEMA 12/3R*[16]* Dusttight & Driptight Industrial Use Enclosure
					Vertical Type *[17]*	Horizontal Type *[17]*	Type *[17]*	Type *[17]*	Bolted Type *[17]*	Spin Top™ Type *[17]*	Type *[17]*
2-Pole Single Phase—1 Thermal Unit Required											
00	9	115 230	1/3 1	Single Phase 3-Wire	—	SAO13●●●	SAG13●●●	Use Size 0	Use Size 0	Use Size 0	Use Size 0
0	18	115 230	1 2		SBO7●●●	SBO1●●●	SBG1●●●	SBW11●●●	SBT46●●●	SBR6●●●	SBA1●●●
1	27	115 230	2 3		SCO1●●●	SCO2●●●	SCG2●●●	SCW11●●●	SCT46●●●	SCR6●●●	SCA1●●●
3-Pole Single Phase—1 Thermal Unit Required											
00	9	115 230	1/3 1	4-Wire Rep.-Ind.	—	SAO14●●●	SAG14●●●	Use Size 0	Use Size 0	Use Size 0	Use Size 0
		115 230	1/3 1	4-Wire Split Ph.	—	SAO15●●●	SAG15●●●	Use Size 0	Use Size 0	Use Size 0	Use Size 0
0	18	115 230	1 2	4-Wire Rep.-Ind.	SBO8●●●	SBO2●●●	SBG2●●●	SBW12●●●	SBT47●●●	SBR7●●●	SBA2●●●
		115 230	1 2	4-Wire Split Ph.	SBO9●●●	SBO3●●●	SBG3●●●	SBW13●●●	SBT48●●●	SBR8●●●	SBA3●●●
1	27	115 230	2 3	4-Wire Rep.Ind.	SCO3●●●	SCO4●●●	SCG4●●●	SCW12●●●	SCT47●●●	SCR7●●●	SCA2●●●
		115 230	2 3	4-Wire Split Ph.	SCO5●●●	SCO6●●●	SCG6●●●	SCW13●●●	SCT48●●●	SCR8●●●	SCA3●●●
4-Pole Polyphase—2 Thermal Units Required											
0	18	200 230 460 575	3 3 5 5	2 Phase 4-Wire	SBO11●●●	SBO5●●●	SBG5●●●	SBW15●●●	Consult the Customer Care Center at 1-888-778-2733	SBR10●●●	SBA5●●●
1	27	200 230 460 575	7.5 7.5 10 10		SCO9●●●	SCO10●●●	SCG10●●●	SCW15●●●		SCR10●●●	SCA5●●●
2	45	200 230 460 575	10 15 25 25		—	SDO4●●●	SDG4●●●	SDW12●●●		SDR4●●●	SDA2●●●
3	90	200 230 460 575	25 30 50 50		—	SEO4●●●	SEG4●●●	SEW12●●●	—	—	SEA2●●●
4	135	200 230 460 575	40 50 100 100		—	SFO4●●●	SFG4●●●	SFW12●●●	—	—	SFA2●●●

Table 16.170: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24*[18]*	—	V01
120*[19]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page page 16-116. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is supplied at no charge.

Dimensions: page 16-62
Factory Modifications (Forms) page 16-115
Separate Enclosures (Class 9991): page 16-108
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[15] NEMA 7 and 9 bolted are not UL listed.
[16] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[17] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.170.
[18] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8736SCO1U01S).
[19] These voltage codes must include **Form S** (provided at no charge) (for example, order as 8736SBO7V02S).

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Open and NEMA 1 Enclosures

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.171: Open Style, 2 or 3-Pole Only (Mounting: H = Horizontal; V = Vertical)
See Figures: Class 8702 Contactor, Open Type and Class 8736 Starter, Open Type

NEMA Size	Type	Mtg.	Fig. No.	Dimensions, in. A	B	C	D	E	F	G	H	I	J	K	L	M	Wt. (lb)
Class 8702 Contactors																	
00	SAO	H	1	7.13	5	5.31	—	—	3.41	0.47	4.34	0.19	5.5	0.91	—	—	12
0, 1	SBO, SCO	H V	1 1*[20]*	7.13 5.47	5 9.22	5.31 5.31	— 5.5	— 0.22	3.41 —	0.47 0.61	4.34 8	0.19 0.61	5.5 5.03	0.91 0.22	—	—	12 12
2	SDO	H V	1 1*[20]*	9 6.75	6.88 11.38	6.03 6.03	— 6.25	— 0.25	4.5 —	0.38 0.5	5.63 10.38	0.25 0.5	6 0.25	1.5 0.25	—	—	16 16
3	SEO	H V	1 1*[20]*	12.72 7.20	7.97 19	7 7	11.75 6.25	0.48 0.48	—	0.48 1.02	7 17	0.48 0.98	11.75 6.25	0.48 0.48	—	—	35 35
4	SFO	H V	1 1*[20]*	14.25 7.97	11.69 23.91	7 7	13.25 7	0.5 0.48	—	0.5 1.81	8 20.25	1.84 1.19	13.25 7	0.5 0.48	—	—	45 45
5	SGO	H V	1 1*[20]*	19.31 10.75	16.19 34.41	9.38 9.38	18 9.5	0.66 0.63	—	1.03 1.25	14 32	1.16 1.16	18 9.5	0.66 0.63	—	—	98 98
6	SHO	H	1	22.38	28.05	9.52	18	0.63	—	3.83	21.19	3.03	18	0.77	—	—	195
7	SJO	H	1	24.25	37.25	13.81	19.75	1.52	—	—	30	—	—	—	—	—	310
Class 8736 Starters																	
00	SAO	H	2	7.13	6.91	5.31	—	—	3.41	0.47	4.34	6.22	4.53	5.06	0.66	—	13
0, 1	SBO, SCO	H V	2 2*[20]*	7.13 5.47	6.91 11.52	5.31 5.31	— 5.03	— 0.22	3.41 —	0.47 0.61	4.34 8	6.22 10.70	4.53 2.52	5.06 5.06	0.66 0.22	— 5.03	13 13
2	SDO	H V	2 2*[20]*	9 6.75	8.5 13.48	6.03 6.03	— 6.25	— 0.25	4.5 —	0.38 0.78	5.63 10.38	7.5 12.97	5 3.13	5.16 5.16	1.5 0.25	— 6	18 18
3	SEO	H V	2 2*[20]*	12.72 7.31	11.72 22.25	7 7	11.75 6.25	0.48 0.48	—	0.48 1.02	10.75 20.75	10.75 —	11.75 6.25	6.25 6.25	0.48 0.48	11.75 6.25	38 38
4	SFO	H V	2 2*[20]*	14.25 7.97	14.59 26.81	7 7	13.25 7	0.5 0.48	—	1.84 1.84	12.25 24.5	12.25 —	13.25 4.05	6.25 6.25	0.5 0.48	13.25 7	48 48
5	SGO	H V	2 2*[20]*	19.31 10.75	20.91 39.16	9.38 9.38	18 9.5	0.66 0.66	—	1.28 1.28	19 37.25	19 37.25	18 9.5	6.63 6.63	0.63 0.63	18 9.5	115 115
6	SHO	H	2	22.38	28.05	9.52	18	0.69	—	3.83	21.19	3.03	18	0.77	—	—	200
7	SJO	H	1	24.25	37.25	13.81	19.75	1.52	—	—	30	—	—	—	—	—	315

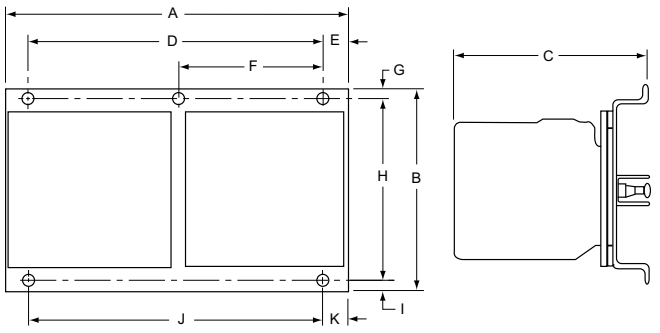

Figure 16.16: Class 8702 Contactor, Open Type

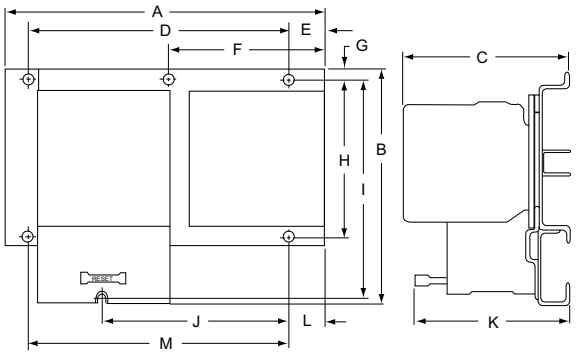

Figure 16.17: Class 8736 Starter, Open Type

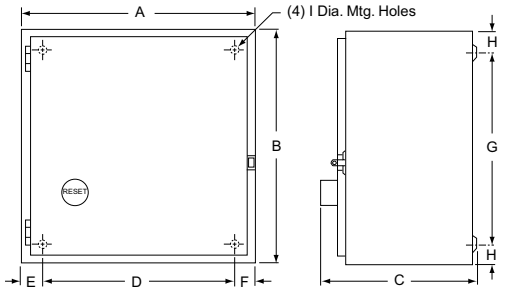

Figure 16.18: NEMA 1

Table 16.172: NEMA 1, Class 8702 and 8736 (see Figure: NEMA 1)

NEMA Size	Dimensions—in. A	B	C 8702	C 8736	D	E	F	G	H	I	Weight (lb) 8702	8736
00, 0 *[21]* 1 *[22]*	11.88	11.88	7.41	7.53	9.75	1.06	1.06	9.75	1.06	0.31	16	17
2 *[22]*	14.88	14.13	7.56	7.66	12.75	1.06	1.06	12	1.06	0.31	24	25
3 *[21]* 4 *[21]*	18.16	29.16	9.25	9.25	15.5	1.33	1.33	26.5	1.33	0.44	95	98
5	35.22	46.22	12.81	12.94	31	2.11	2.11	42	2.11	0.56	298	315
6	36.22	62.22	19.47		Floor Mounting.						400	405
7	34.5	93	23.5								—	—

[20] The vertical design differs from the horizontal design figure shown for the corresponding NEMA size, but the dimensions listed apply.
[21] 3-Pole only.
[22] The standard enclosure has space for a fused control transformer, **Form F4T**, on Sizes 0-2 (except 4-pole devices, Size 0 and 1).

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NEMA 4, 4X, 7, 9, and 12/3R Enclosures

Table 16.173: See Figure: NEMA 4 and 4X—Stainless Steel *[23]*

NEMA Size	Class Number	Dimensions, in.												Hub Dia.		Weight (lb)	
		A	B	C	D	E	F	G	H	I	J	K	L	W Bot. Only	X Top & Bot.	8702	8736
0*[24]* 1*[24]*	8702, 8736	12.63	7.81	14.69	2.56	7.5	13.5	0.59	3.88	18.41	1.66	2.31	0.31	0.75	1	25	26
2*[24]*	8702, 8736	14.88	8.25	15.75	2.56	9.75	15	0.38	3.88	20.88	1.72	2.63	0.31	0.75	1.5	33	35
3*[25]*	8702	18.16	8.75	32.22	3.08	12	30.5	0.88	3.69	26.72	2.56	3.19	0.44	0.75	2.5	96	—
4*[25]*	8736	18.16	9.56	32.22	3.08	12	30.5	0.88	4.5	26.72	2.56	3.19	0.44	0.75	2.5	—	99
5	8702	35.22	12.13	49.22	4.11	27	48	0.63	4.59	45.81	2.97	3.5	0.56	0.75	3.5	300	—
	8736	35.22	12.94	49.22	4.11	27	48	0.63	5.41	45.81	2.97	3.5	0.56	0.75	3.5	—	317
6	8702, 8736	36.22	19.47	70.13	Floor Mounting											500	505
7	8702, 8736	34.5	23.5	101												—	—

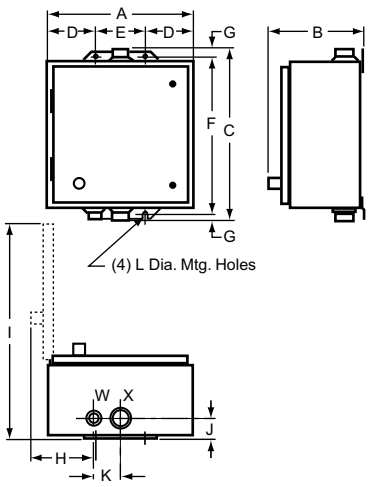

Figure 16.19: NEMA 4 and 4X—Stainless Steel

Table 16.174: See Figure: NEMA 7 and 9—Bolted Cover, Cast Aluminum, page 16-40

NEMA Size	Type	Dimensions, in. *[26]*									Wt. (lb)
		G	H	J	K	L	N	P	Q, R	S, T, U, V	
0–2	SBT SCT SDT	14.25	27.63	9.5	12.25	19.25	9.63	11.5	2.38	3.13	115
3–4	SET SFT	24.5	45.63	13.75	22.5	27.5	13.75	15.38	3.44	4	180

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.175: See Figure: NEMA 7 and 9—SPIN TOP™ Enclosure, page 16-40

NEMA Size	Type	Dimensions, in.																				Wt. (lb)
		A	B*[27]*	B*[28]*	C*[27]*	C*[28]*	D	E*[27]*	E*[28]*	F	G*[27]*	G*[28]*	H*[27]*	H*[28]*	J*[27]*	J*[28]*	K	L	M	N	P	R	
0-1	SBR SCR	12	41.06	46.13	68.06	79.13	16.75	7.25	12.25	7.69	26.13	26.13	3	9	24	24	8.5	2.06	9.38	5.25	1.5	0.38	70
2	SDR	16.13	48.5	50.5	81.5	85	20.25	12.13	9.13	8.63	27.75	32.75	8	4.5	25	30	12	2.63	11	5.5	2.5	0.38	100
3	SER	Consult the Customer Care Center at 1-888-778-2733.																				

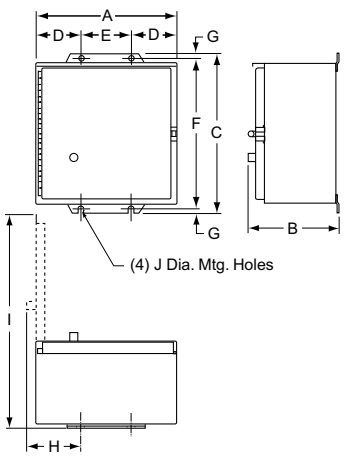

Figure 16.20: NEMA 12/3R

Table 16.176: See Figure: NEMA 12/3R

NEMA Size	Class	Dimensions, in.										Weight (lb)	
		A	B	C	D	E	F	G	H	I	J	8702	8736
0*[24]* 1*[24]*	8702 8736	11.88	7.75	13.75	2.56	6.75	12.75	0.5	3.66	18.13	0.31	23	24
2*[24]*	8702 8736	14.88	7.88	16	2.56	9.75	15	0.5	3.66	21.25	0.31	31	32
3*[25]*	8702	18.16	9.25	31.5	3.08	12	30.5	0.5	3.69	26.72	0.44	96	—
4*[25]*	8736	18.16	9.56	31.5	3.08	12	30.5	0.5	4.5	26.72	0.44	—	99
5	8702	35.22	13.13	49	4.13	27	48	0.5	5.31	45.88	0.56	302	—
	8736	35.22	13.94	49	4.13	27	48	0.5	6.13	45.88	0.56	—	319
6	8702 8736	36.22	19.47	62.22	Floor Mounting							490	495
7	8702 8736	34.5	23.5	93								—	—

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

[23] Size 6 and 7 are NEMA 4 sheet steel enclosures.
[24] The standard enclosure has space for a fused control transformer, **Form F4T**, on Sizes 0-2 (except 4-pole devices, Size 0 and 1).
[25] 3-Pole only.
[26] Dimensions shown for 2 or 3-Pole devices only.
[27] Without control transformer.
[28] With control transformer (**Form F4T**).

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Class 8702 Type W
Reversing Vacuum Contactor

Class 8702 Type W

Class 8702 Type W Reversing Vacuum Contactors are used to switch capacitors, transformers and electric motors where overload protection is separately provided. Type W reversing vacuum contactors are designed for operation at 600 V, 50/60 Hz.

Auxiliary Contacts—An auxiliary contact block, Class 9999 Type WX11, with one normally open contact and one normally closed contact, is used with Size 4, 5 and 6 vacuum contactors. Additional auxiliary contact units may be added to the Size 4 and 5 reversing contactors in the field. A maximum of 2 units may be added to the Size 4; a maximum of 1 unit may be added to the Size 5.

Termination Means—The Size 4 reversing vacuum contactor is supplied with line and load side lugs. The Size 5 and 6 reversing vacuum contactors are supplied without line and load side lugs.

Table 16.177: Class 8702 Full Voltage Reversing Vacuum Contactors (Horizontal Only) 3-Pole Polyphase—600 Vac Maximum—50–60 Hz (replace ●●● with the voltage code)

NEMA Size	Enclosed Ampere Rating	Motor Voltage	Maximum Horsepower	Open Style Type *[1]*
4	135	200 230 380 460 575	40 50 75 100 100	WFO3●●●
5	270	200 230 380 460 575	75 100 150 200 200	WGO3●●●
6	540	200 230 380 460 575	150 200 300 400 400	WHO3V●●●

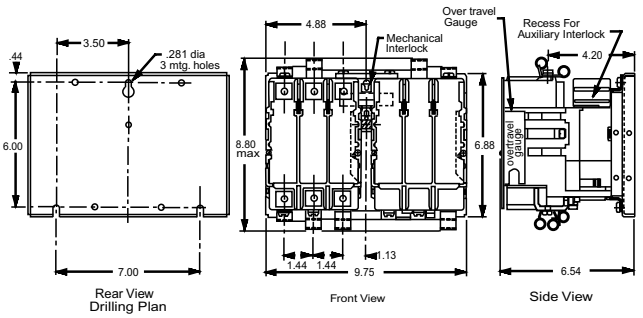
Table 16.178: Class 9998—Replacement Coils for Class 8702 Reversing Contactors

Size	Type	Poles	Class and Type	Suffix Number (Complete Coil Number Consists of Class and Type Followed by Suffix Number)			
				120 V 110 V	240 V 220 V	480 V 440 V	600 V 550 V
4	WF	All	9998WF	120	240	480	600
5	WG	All	9998WG	120	240	480	600
6	WH	All	9998WH	120	240	480	600

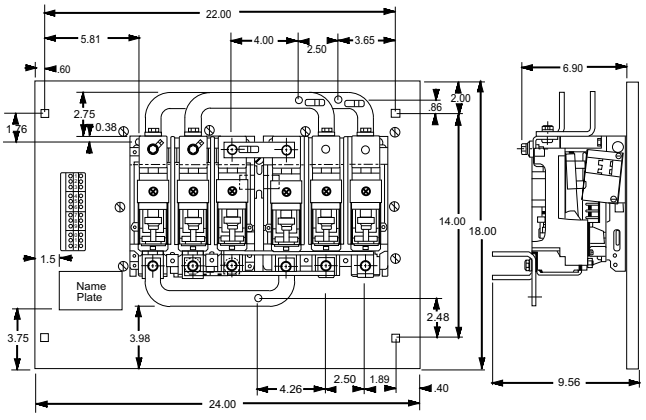
Table 16.179: Coil Voltage Codes

Voltage	110	120	220	240	440	480	550	600
50 Hz	V02		V03		V06		V07	
60 Hz		V02		V03		V06		V07

Table 16.180: Approximate Dimensions



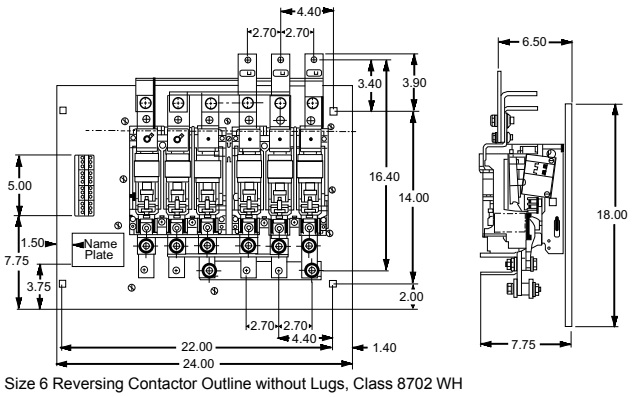
Size 4 Reversing Contactor Outline with Lugs, Class 8702 WF



Size 5 Reversing Contactor Outline without Lugs, Class 8702 WG

Table 16.181: Class 9999—Vacuum Starter Kits

For Use With Type	For Use With Size	Kit Description	Class 9999 Type
WF–WG WH	4–5 6	Auxiliary Contacts, Non-Convertible 1 N.O. & 1 N.C. Isolated Contacts	WX11
WF WG–WH	4 5–6	Coil Circuit Auxiliary Contacts 1 N.O. & 1 N.C. Isolated Contacts, Delayed Break 1 N.C. Isolated Contact	WCX11 WLX01
WG	5	Lug Kits 6 lugs included	LUW5



Size 6 Reversing Contactor Outline without Lugs, Class 8702 WH

For How to Order Information, see page 16-27.

[1] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes listed in Table 16.183. Replacement coils are listed in Table 16.114.

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Class 8738 Fusible Disconnect Switch Type 3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Class 8738 and 8739 Type S reversing combination starters combine the requirements of motor overload and short circuit protection into one convenient package. Type S reversing combination starters are manufactured in accordance with NEMA standards, and are UL Listed (although some Form numbers may not be listed—contact your nearest Square D/Schneider Electric sales office for further information). Class 8738 and 8739 reversing combination starters are designed to operate at 600 Vac, 50–60 Hz, and are available with one of four types of overload relays. See page 16-60 for more information. For Class J fuses, use Form Y1072 (no charge).

Table 16.182: Class 8738 Full-Voltage Type, Fusible (With Class H Fuse Clips) Reversing with Motor Logic SSOLR (replace ●●● with the voltage code)

Ratings				NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304)	NEMA 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R[1] Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Polyphase	NEMA Size	Fuse Clip Size (A)				With External Reset	Without External Reset
				Type [2]	Type [2]	Type [2]	Type [2]	Type [2]
200 (208)	3	0	30	SBG12●●●H30 [3]	SBW12●●●H30 [3]	SBW22●●●H30 [3]	SBA22●●●H30 [3]	SBA12●●●H30 [3]
	5	1	30	SCG12●●●H30 [3]	SCW12●●●H30 [3]	SCW22●●●H30 [3]	SCA22●●●H30 [3]	SCA12●●●H30 [3]
	7.5		60	SCG13●●●H30 [3]	SCW13●●●H30 [3]	SCW23●●●H30 [3]	SCA23●●●H30 [3]	SCA13●●●H30 [3]
	10	2	60	SDG12●●●H30 [3]	SDW12●●●H30 [3]	SDW22●●●H30 [3]	SDA22●●●H30 [3]	SDA12●●●H30 [3]
	20	3	100	SEG15●●●H30	SEW15●●●H30	—	SEA25●●●H30	SEA15●●●H30
	40	4	200	SFG15●●●H30	SFW15●●●H30	—	SFA25●●●H30	SFA15●●●H30
	75	5	400	SGG15●●●H30	SGW15●●●H30	—	SGA25●●●H30	SGA15●●●H30
230 (240)	3	0	30	SBG12●●●H30 [3]	SBW12●●●H30 [3]	SBW22●●●H30 [3]	SBA22●●●H30 [3]	SBA12●●●H30 [3]
	5	1	30	SCG12●●●H30 [3]	SCW12●●●H30 [3]	SCW22●●●H30 [3]	SCA22●●●H30 [3]	SCA12●●●H30 [3]
	7.5		60	SCG13●●●H30 [3]	SCW13●●●H30 [3]	SCW23●●●H30 [3]	SCA23●●●H30 [3]	SCA13●●●H30 [3]
	15	2	60	SDG12●●●H30 [3]	SDW12●●●H30 [3]	SDW22●●●H30 [3]	SDA22●●●H30 [3]	SDA12●●●H30 [3]
	25	3	100	SEG15●●●H30	SEW15●●●H30	—	SEA25●●●H30	SEA15●●●H30
	50	4	200	SFG15●●●H30	SFW15●●●H30	—	SFA25●●●H30	SFA15●●●H30
	100	5	400	SGG15●●●H30	SGW15●●●H30	—	SGA25●●●H30	SGA1●●●H30
460 (480)	5	0	30	SBG13●●●H30 [3]	SBW13●●●H30 [3]	SBW23●●●H30 [3]	SBA23●●●H30 [3]	SBA13●●●H30 [3]
	10	1	30	SCG14●●●H30 [3]	SCW14●●●H30 [3]	SCW24●●●H30 [3]	SCA24●●●H30 [3]	SCA14●●●H30 [3]
	15	2	30	SDG16●●●H30 [3]	SDW16●●●H30 [3]	SDW26●●●H30 [3]	SDA26●●●H30 [3]	SDA16●●●H30 [3]
	25		60	SDG14●●●H30 [3]	SDW14●●●H30 [3]	SDW24●●●H30 [3]	SDA24●●●H30 [3]	SDA14●●●H30 [3]
	50	3	100	SEG13●●●H30	SEW13●●●H30	—	SEA23●●●H30	SEA13●●●H30
	100	4	200	SFG13●●●H30	SFW13●●●H30	—	SFA23●●●H30	SFA13●●●H30
	200	5	400	SGG13●●●H30	SGW13●●●H30	—	SGA23●●●H30	SGA13●●●H30
575 (600)	5	0	30	SBG13●●●H30	SBW13●●●H30	SBW23●●●H30	SBA23●●●H30	SBA13●●●H30
	10	1	30	SCG14●●●H30	SCW14●●●H30	SCW24●●●H30	SCA24●●●H30	SCA14●●●H30
	15	2	30	SDG16●●●H30	SDW16●●●H30	SDW26●●●H30	SDA26●●●H30	SDA16●●●H30
	25		60	SDG14●●●H30	SDW14●●●H30	SDW24●●●H30	SDA24●●●H30	SDA14●●●H30
	50	3	100	SEG13●●●H30	SEW13●●●H30	—	SEA23●●●H30	SEA13●●●H30
	100	4	200	SFG13●●●H30	SFW13●●●H30	—	SFA23●●●H30	SFA13●●●H30
	200	5	400	SGG13●●●H30	SGW13●●●H30	—	SGA23●●●H30	SGA13●●●H30

Table 16.183: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24[4]	—	V01
120[5]	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page 16-116.
Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is available at no charge.

Dimensions: page 16-70
Factory Modifications (Forms): page 16-115
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[1] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[2] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.183.
[3] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[4] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8738SBG12V01S).
[5] These voltage codes must include **Form S** (supplied at no charge) (for example, order as 8738SC13V02S).

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Non-Fusible and Fusible Disconnect Switch Type 3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Table 16.184: Class 8738 Non-Fusible Disconnect Switch Type—Full-Voltage, Reversing, with Motor Logic SSOLR (replace ●●● with the voltage code)

Ratings				NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304)	NEMA 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R[6] Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Poly-Phase	NEMA Size	Fuse Clip Size (A)				With External Reset	Without External Reset
				Type [7]	Type [7]	Type [7]	Type [7]	Type [7]
200 (208)	3	0	None	SBG11●●●H30 [8]	SBW11●●●H30 [8]	SBW21●●●H30 [8]	SBA21●●●H30 [8]	SBA11●●●H30 [8]
	7-1/2	1	None	SCG11●●●H30 [8]	SCW11●●●H30 [8]	SCW21●●●H30 [8]	SCA21●●●H30 [8]	SCA11●●●H30 [8]
	10	2	None	SDG11●●●H30 [8]	SDW11●●●H30 [8]	SDW21●●●H30 [8]	SDA21●●●H30 [8]	SDA11●●●H30 [8]
	25	3	None	SEG11●●●H30	SEW11●●●H30	—	SEA21●●●H30	SEA11●●●H30
	40	4	None	SFG11●●●H30	SFW11●●●H30	—	SFA21●●●H30	SFA11●●●H30
	75	5	None	SGG11●●●H30	SGW11●●●H30	—	SGA21●●●H30	SGA11●●●H30
230 (240)	3	0	None	SBG11●●●H30 [8]	SBW11●●●H30 [8]	SBW21●●●H30 [8]	SBA21●●●H30 [8]	SBA11●●●H30 [8]
	7-1/2	1	None	SCG11●●●H30 [8]	SCW11●●●H30 [8]	SCW21●●●H30 [8]	SCA21●●●H30 [8]	SCA11●●●H30 [8]
	15	2	None	SDG11●●●H30 [8]	SDW11●●●H30 [8]	SDW21●●●H30 [8]	SDA21●●●H30 [8]	SDA11●●●H30 [8]
	30	3	None	SEG11●●●H30	SEW11●●●H30	—	SEA21●●●H30	SEA11●●●H30
	50	4	None	SFG11●●●H30	SFW11●●●H30	—	SFA21●●●H30	SFA11●●●H30
	100	5	None	SGG11●●●H30	SGW11●●●H30	—	SGA21●●●H30	SGA11●●●H30
460 (480)	5	0	None	SBG11●●●H30 [8]	SBW11●●●H30 [8]	SBW21●●●H30 [8]	SBA21●●●H30 [8]	SBA11●●●H30 [8]
	10	1	None	SCG11●●●H30 [8]	SCW11●●●H30 [8]	SCW21●●●H30 [8]	SCA21●●●H30 [8]	SCA11●●●H30 [8]
	25	2	None	SDG11●●●H30 [8]	SDW11●●●H30 [8]	SDW21●●●H30 [8]	SDA21●●●H30 [8]	SDA11●●●H30 [8]
	50	3	None	SEG11●●●H30	SEW11●●●H30	—	SEA21●●●H30	SEA11●●●H30
	100	4	None	SFG11●●●H30	SFW11●●●H30	—	SFA21●●●H30	SFA11●●●H30
	200	5	None	SGG11●●●H30	SGW11●●●H30	—	SGA21●●●H30	SGA11●●●H30
575 (600)	5	0	None	SBG11●●●H30 [8]	SBW11●●●H30 [8]	SBW21●●●H30 [8]	SBA21●●●H30 [8]	SBA11●●●H30 [8]
	10	1	None	SCG11●●●H30 [8]	SCW11●●●H30 [8]	SCW21●●●H30 [8]	SCA21●●●H30 [8]	SCA11●●●H30 [8]
	25	2	None	SDG11●●●H30 [8]	SDW11●●●H30 [8]	SDW21●●●H30 [8]	SDA21●●●H30 [8]	SDA11●●●H30 [8]
	50	3	None	SEG11●●●H30	SEW11●●●H30	—	SEA21●●●H30	SEA11●●●H30
	100	4	None	SFG11●●●H30	SFW11●●●H30	—	SFA21●●●H30	SFA11●●●H30
	200	5	None	SGG11●●●H30	SGW11●●●H30	—	SGA21●●●H30	SGA11●●●H30

Table 16.185: Class 8738 Fusible Disconnect Switch Type with Class R Fuse Clips—100,000 AIC Rating (replace ●●● with the voltage code)

Ratings				NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304)	NEMA 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure [9]	NEMA 12/3R[6] Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Poly-Phase	NEMA Size	Fuse Clip Size (A)				With External Reset	Without External Reset
				Type [7]	Type [7]	Type [7]	Type [7]	Type [7]
200 (208)	3	0	30	SBG32●●●H30 [8]	SBW32●●●H30 [8]	SBW42●●●H30 [8]	SBA42●●●H30 [8]	SBA32●●●H30 [8]
	5	1	30	SCG32●●●H30 [8]	SCW32●●●H30 [8]	SCW42●●●H30 [8]	SCA42●●●H30 [8]	SCA32●●●H30 [8]
	7-1/2		60	SCG33●●●H30 [8]	SCW33●●●H30 [8]	SCW43●●●H30 [8]	SCA43●●●H30 [8]	SCA33●●●H30 [8]
	10	2	60	SDG32●●●H30 [8]	SDW32●●●H30 [8]	SDW42●●●H30 [8]	SDA42●●●H30 [8]	SDA32●●●H30 [8]
	20	3	100	SEG35●●●H30	SEW35●●●H30	—	SEA45●●●H30	SEA35●●●H30
	40	4	200	SFG35●●●H30	SFW35●●●H30	—	SFA45●●●H30	SFA35●●●H30
	75	5	400	SGG35●●●H30	SGW35●●●H30	—	SGA45●●●H30	SGA35●●●H30
230 (240)	3	0	30	SBG32●●●H30 [8]	SBW32●●●H30 [8]	SBW42●●●H30 [8]	SBA42●●●H30 [8]	SBA32●●●H30 [8]
	5	1	30	SCG32●●●H30 [8]	SCW32●●●H30 [8]	SCW42●●●H30 [8]	SCA42●●●H30 [8]	SCA32●●●H30 [8]
	7-1/2		60	SCG33●●●H30 [8]	SCW33●●●H30 [8]	SCW43●●●H30 [8]	SCA43●●●H30 [8]	SCA33●●●H30 [8]
	15	2	60	SDG32●●●H30 [8]	SDW32●●●H30 [8]	SDW42●●●H30 [8]	SDA42●●●H30 [8]	SDA32●●●H30 [8]
	25	3	100	SEG35●●●H30	SEW35●●●H30	—	SEA45●●●H30	SEA3●●●H30
	50	4	200	SFG35●●●H30	SFW35●●●H30	—	SFA45●●●H30	SFA35●●●H30
	100	5	400	SGG35●●●H30	SGW35●●●H30	—	SGA45●●●H30	SGA35●●●H30
460 (480)	5	0	30	SBG33●●●H30 [8]	SBW33●●●H30 [8]	SBW43●●●H30 [8]	SBA43●●●H30 [8]	SBA33●●●H30 [8]
	10	1	30	SCG34●●●H30 [8]	SCW34●●●H30 [8]	SCW44●●●H30 [8]	SCA44●●●H30 [8]	SCA34●●●H30 [8]
	15	2	30	SDG36●●●H30 [8]	SDW36●●●H30 [8]	SDW46●●●H30 [8]	SDA46●●●H30 [8]	SDA36●●●H30 [8]
	25		60	SDG34●●●H30 [8]	SDW34●●●H30 [8]	SDW44●●●H30 [8]	SDA44●●●H30 [8]	SDA34●●●H30 [8]
	50	3	100	SEG33●●●H30	SEW33●●●H30	—	SEA43●●●H30	SEA33●●●H30
	100	4	200	SFG33●●●H30	SFW33●●●H30	—	SFA43●●●H30	SFA33●●●H30
	200	5	400	SGG33●●●H30	SGW33●●●H30	—	SGA43●●●H30	SGA33●●●H30
575 (600)	5	0	30	SBG33●●●H30 [8]	SBW33●●●H30 [8]	SBW43●●●H30 [8]	SBA43●●●H30 [8]	SBA33●●●H30 [8]
	10	1	30	SCG34●●●H30 [8]	SCW34●●●H30 [8]	SCW44●●●H30 [8]	SCA44●●●H30 [8]	SCA34●●●H30 [8]
	15	2	30	SDG36●●●H30 [8]	SDW36●●●H30 [8]	SDW46●●●H30 [8]	SDA46●●●H30 [8]	SDA36●●●H30 [8]
	25		60	SDG34●●●H30 [8]	SDW34●●●H30 [8]	SDW44●●●H30 [8]	SDA44●●●H30 [8]	SDA34●●●H30 [8]
	50	3	100	SEG33●●●H30	SEW33●●●H30	—	SEA43●●●H30	SEA33●●●H30
	100	4	200	SFG33●●●H30	SFW33●●●H30	—	SFA43●●●H30	SFA33●●●H30
	200	5	400	SGG33●●●H30	SGW33●●●H30	—	SGA43●●●H30	SGA33●●●H30

For How to Order Information, see page 16-27.

[6] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[7] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.187.
[8] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[9] 5,000 AIC Rating

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Electronic Motor Circuit Protector (MCP)
3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Table 16.186: Class 8739 Full-Voltage Type, Reversing with Motor Logic SSOLR (replace ●●● with the voltage code)

Ratings				NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304) (Sizes 0-5)*[10]*	NEMA 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R*[11]* Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	NEMA Size	Hp Range Poly-phase	Circuit Breaker (See Page 7-32 for Breaker Adjustment Range)				With External Reset	Without External Reset
				Type *[12]*	Type *[12]*	Type *[12]*	Type *[12]*	Type *[12]*
200 (208)	0	0.25–3	HLL36030M71	SBG43●●●H30 *[13]*	SBW43●●●H30 *[13]*	SBW53●●●H30 *[13]*	SBA53●●●H30 *[13]*	SBA43●●●H30 *[13]*
	1	0.25–5	HLL36030M71	SCG44●●●H30 *[13]*	SCW44●●●H30 *[13]*	SCW54●●●H30 *[13]*	SCA54●●●H30 *[13]*	SCA44●●●H30 *[13]*
		7.5	HLL36050M72	SCG45●●●H30 *[13]*	SCW45●●●H30 *[13]*	SCW55●●●H30 *[13]*	SCA55●●●H30 *[13]*	SCA45●●●H30 *[13]*
	2	1.5–5	HLL36030M71	SDG42●●●H30 *[13]*	SDW42●●●H30 *[13]*	SDW52●●●H30 *[13]*	SDA52●●●H30 *[13]*	SDA42●●●H30 *[13]*
		7.5–10	HLL36050M72	SDG43●●●H30 *[13]*	SDW43●●●H30 *[13]*	SDW53●●●H30 *[13]*	SDA53●●●H30 *[13]*	SDA43●●●H30 *[13]*
	3	15–25	HLL36100M73	SEG42●●●H30	SEW42●●●H30	SEW52●●●H30	SEA52●●●H30	SEA42●●●H30
	4	30–40	JJL36250M75	SFG44●●●H30	SFW44●●●H30	SFW54●●●H30	SFA54●●●H30	SFA44●●●H30
	5	50–60	JLL36250M75	SGG44●●●H30	SGW44●●●H30	—	SGA54●●●H30	SGA44●●●H30
		75	LJL36400M36	SGG45●●●H30	SGW45●●●H30	—	SGA55●●●H30	SGA45●●●H30
	6	100	LJL36400M36	SHG43●●●H30	SHW43●●●H30	—	SHA53●●●H30	SHA43●●●H30
		125–150	LJL36600M42	SHG45●●●H30	SHW45●●●H30	—	SHA55●●●H30	SHA45●●●H30
230 (240)	0	0.25–3	HLL36030M71	SBG43●●●H30 *[13]*	SBW43●●●H30 *[13]*	SBW53●●●H30 *[13]*	SBA53●●●H30 *[13]*	SBA43●●●H30 *[13]*
	1	0.25–7.5	HLL36030M71	SCG44●●●H30 *[13]*	SCW44●●●H30 *[13]*	SCW54●●●H30 *[13]*	SCA54●●●H30 *[13]*	SCA44●●●H30 *[13]*
	2	1.5–7.5	HLL36030M71	SDG42●●●H30 *[13]*	SDW42●●●H30 *[13]*	SDW52●●●H30 *[13]*	SDA52●●●H30 *[13]*	SDA42●●●H30 *[13]*
		10	HLL36050M72	SDG43●●●H30 *[13]*	SDW43●●●H30 *[13]*	SDW53●●●H30 *[13]*	SDA53●●●H30 *[13]*	SDA43●●●H30 *[13]*
		15	HLL36100M73	SDG44●●●H30 *[13]*	SDW44●●●H30 *[13]*	SDW54●●●H30 *[13]*	SDA54●●●H30 *[13]*	SDA44●●●H30 *[13]*
	3	15–30	HLL36100M73	SEG42●●●H30	SEW42●●●H30	SEW52●●●H30	SEA52●●●H30	SEA42●●●H30
	4	40–50	JJL36250M75	SFG44●●●H30	SFW44●●●H30	SFW54●●●H30	SFA54●●●H30	SFA44●●●H30
	5	60	JLL36250M75	SGG44●●●H30	SGW44●●●H30	—	SGA54●●●H30	SGA44●●●H30
		75–100	LJL36400M36	SGG45●●●H30	SGW45●●●H30	—	SGA55●●●H30	SGA45●●●H30
	6	125–150	LJL36600M42	SHG45●●●H30	SHW45●●●H30	—	SHA55●●●H30	SHA45●●●H30
		200	PLL34080M68	SHG46●●●H30	SHW46●●●H30	—	SHA56●●●H30	SHA46●●●H30
460 (480)	0	0.25–5	HLL36030M71	SBG43●●●H30 *[13]*	SBW43●●●H30 *[13]*	SBW53●●●H30 *[13]*	SBA53●●●H30 *[13]*	SBA43●●●H30 *[13]*
	1	0.25–10	HLL36030M71	SCG44●●●H30 *[13]*	SCW44●●●H30 *[13]*	SCW54●●●H30 *[13]*	SCA54●●●H30 *[13]*	SCA44●●●H30 *[13]*
	2	5–15	HLL36030M71	SDG42●●●H30 *[13]*	SDW42●●●H30 *[13]*	SDW52●●●H30 *[13]*	SDA52●●●H30 *[13]*	SDA42●●●H30 *[13]*
		20–25	HLL36050M72	SDG43●●●H30 *[13]*	SDW43●●●H30 *[13]*	SDW53●●●H30 *[13]*	SDA53●●●H30 *[13]*	SDA43●●●H30 *[13]*
	3	20–25 30–50	HLL36050M72 HLL36100M73	SEG41●●●H30 SEG42●●●H30	SEW41●●●H30 SEW42●●●H30	SEW51●●●H30 SEW52●●●H30	SEA51●●●H30 SEA52●●●H30	SEA41●●●H30 SEA42●●●H30
	4	60–100	JLL36250M75	SFG44●●●H30	SFW44●●●H30	SFW54●●●H30	SFA54●●●H30	SFA44●●●H30
	5	125 150–200	JLL36250M75 LJL36400M36	SGG44●●●H30 SGG45●●●H30	SGW44●●●H30 SGW45●●●H30	— —	SGA54●●●H30 SGA55●●●H30	SGA44●●●H30 SGA45●●●H30
	6	250–350 400	LJL36600M42 PLL34080M68	SHG45●●●H30 SHG46●●●H30	SHW45●●●H30 SHW46●●●H30	— —	SHA55●●●H30 SHA56●●●H30	SHA45●●●H30 SHA46●●●H30
575 (600)	0	0.25–5	HLL36030M71	SBG43●●●H30 *[13]*	SBW43●●●H30 *[13]*	SBW53●●●H30 *[13]*	SBA53●●●H30 *[13]*	SBA43●●●H30 *[13]*
	1	0.25–10	HLL36030M71	SCG44●●●H30 *[13]*	SCW44●●●H30 *[13]*	SCW54●●●H30 *[13]*	SCA54●●●H30 *[13]*	SCA44●●●H30 *[13]*
	2	5–20 25	HLL36030M71 HLL36050M72	SDG42●●●H30 *[13]* SDG43●●●H30 *[13]*	SDW42●●●H30 *[13]* SDW43●●●H30 *[13]*	SDW52●●●H30 *[13]* SDW53●●●H30 *[13]*	SDA52●●●H30 *[13]* SDA53●●●H30 *[13]*	SDA42●●●H30 *[13]* SDA43●●●H30 *[13]*
	3	25–30 40–50	HLL36050M72 HLL36100M73	SEG41●●●H30 SEG42●●●H30	SEW41●●●H30 SEW42●●●H30	SEW51●●●H30 SEW52●●●H30	SEA51●●●H30 SEA52●●●H30	SEA41●●●H30 SEA42●●●H30
	4	60–100	JLL36250M75	SFG44●●●H30	SFW44●●●H30	SFW54●●●H30	SFA54●●●H30	SFA44●●●H30
	5	125–150 200	JLL36250M75 LJL36400M36	SGG44●●●H30 SGG45●●●H30	SGW44●●●H30 SGW45●●●H30	— —	SGA54●●●H30 SGA55●●●H30	SGA44●●●H30 SGA45●●●H30
	6	250 300–400	LJL36400M36 LJL36600M42	SHG43●●●H30 SHG45●●●H30	SHW43●●●H30 SHW45●●●H30	— —	SHA53●●●H30 SHA55●●●H30	SHA43●●●H30 SHA45●●●H30

Table 16.187: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24*[14]*	—	V01
120*[15]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page 16-116.
Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is available at no charge.

Dimensions: page 16-70
Factory Modifications (Forms): page 16-115
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[10] Size 6 starters are NEMA 4 painted sheet steel enclosures.
[11] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[12] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.187.
[13] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[14] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8739SBG41V01S).
[15] These voltage codes must include **Form S** (provided at no charge) (for example, order as 8739SCG41V02S).

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Thermal Magnetic Circuit Breaker
3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Table 16.188: Class 8739 Full-Voltage Type, Reversing, 200–240 V, with Motor Logic SSOLR (replace ●●● with the voltage code)

Ratings					NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304) (Sizes 0-5) *[16]*	NEMA 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R *[17]* Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Polyphase	NEMA Size	Circuit Breaker		Type *[18]*	Type *[18]*	Type *[18]*	With External Reset	Without External Reset
			Type	Ampere Rating				Type *[18]*	Type *[18]*
200 (208)	2 3	0	HLL36015 HLL36020	15 20	SBG1●●●H30 *[19]* SBG3●●●H30 *[19]*	SBW1●●●H30 *[19]* SBW3●●●H30 *[19]*	SBW11●●●H30 *[19]* SBW13●●●H30 *[19]*	SBA11●●●H30 *[19]* SBA13●●●H30 *[19]*	SBA1●●●H30 *[19]* SBA3●●●H30 *[19]*
	5 7.5	1	HLL36035 HLL36050	35 50	SCG5●●●H30 *[19]* SCG2●●●H30 *[19]*	SCW5●●●H30 *[19]* SCW2●●●H30 *[19]*	SCW15●●●H30 *[19]* SCW12●●●H30 *[19]*	SCA15●●●H30 *[19]* SCA12●●●H30 *[19]*	SCA5●●●H30 *[19]* SCA2●●●H30 *[19]*
	10	2	HLL36060	60	SDG1●●●H30 *[19]*	SDW1●●●H30 *[19]*	SDW11●●●H30 *[19]*	SDA11●●●H30 *[19]*	SDA1●●●H30 *[19]*
	15 20 25	3	HLL36100 HLL36125 HLL36150	100 125 150	SEG3●●●H30 SEG1●●●H30 SEG5●●●H30	SEW3●●●H30 SEW1●●●H30 SEW5●●●H30	SEW13●●●H30 SEW11●●●H30 SEW15●●●H30	SEA13●●●H30 SEA11●●●H30 SEA15●●●H30	SEA3●●●H30 SEA1●●●H30 SEA5●●●H30
	30 40	4	JLL36200 JLL36250	200 250	SFG3●●●H30 SFG4●●●H30	SFW3●●●H30 SFW4●●●H30	SFW13●●●H30 SFW14●●●H30	SFA13●●●H30 SFA14●●●H30	SFA3●●●H30 SFA4●●●H30
	50 60–75	5	JLL36250 LLL36400U33X	250 400	SGG6●●●H30 SGG4●●●H30	SGW6●●●H30 SGW4●●●H30	— —	SGA16●●●H30 SGA14●●●H30	SGA6●●●H30 SGA4●●●H30
	100–125 150	6	LLL36600U33X MJL36800	600 800	SHG4●●●H30 SHG5●●●H30	SHW4●●●H30 SHW5●●●H30	— —	SHA14●●●H30 SHA15●●●H30	SHA4●●●H30 SHA5●●●H30
230 (240)	2 3	0	HLL36015 HLL36020	15 20	SBG1●●●H30 *[19]* SBG3●●●H30 *[19]*	SBW1●●●H30 *[19]* SBW3●●●H30 *[19]*	SBW11●●●H30 *[19]* SBW13●●●H30 *[19]*	SBA11●●●H30 *[19]* SBA13●●●H30 *[19]*	SBA1●●●H30 *[19]* SBA3●●●H30 *[19]*
	5 7.5	1	HLL36035 HLL36045	35 45	SCG5●●●H30 *[19]* SCG6●●●H30 *[19]*	SCW5●●●H30 *[19]* SCW6●●●H30 *[19]*	SCW15●●●H30 *[19]* SCW16●●●H30 *[19]*	SCA15●●●H30 *[19]* SCA16●●●H30 *[19]*	SCA5●●●H30 *[19]* SCA6●●●H30 *[19]*
	10 15	2	HLL36060 HLL36090	60 90	SDG1●●●H30 *[19]* SDG7●●●H30 *[19]*	SDW1●●●H30 *[19]* SDW7●●●H30 *[19]*	SDW11●●●H30 *[19]* SDW17●●●H30 *[19]*	SDA11●●●H30 *[19]* SDA17●●●H30 *[19]*	SDA1●●●H30 *[19]* SDA7●●●H30 *[19]*
	20 25–30	3	HLL36100 HLL36150	100 150	SEG3●●●H30 SEG5●●●H30	SEW3●●●H30 SEW5●●●H30	SEW13●●●H30 SEW15●●●H30	SEA13●●●H30 SEA15●●●H30	SEA3●●●H30 SEA5●●●H30
	40 50	4	JLL36225 JLL36250	225 250	SFG1●●●H30 SFG4●●●H30	SFW1●●●H30 SFW4●●●H30	SFW11●●●H30 SFW14●●●H30	SFA11●●●H30 SFA14●●●H30	SFA1●●●H30 SFA4●●●H30
	60 75 100	5	JLL36250 LLL36400U33X LLL36600U33X	250 400 600	SGG6●●●H30 SGG4●●●H30 SGG2●●●H30	SGW6●●●H30 SGW4●●●H30 SGW2●●●H30	— — —	SGA16●●●H30 SGA14●●●H30 SGA12●●●H30	SGA6●●●H30 SGA4●●●H30 SGA2●●●H30
	125 150–200	6	LLL36600U33X MJL36800	600 800	SHG4●●●H30 SHG5●●●H30	SHW4●●●H30 SHW5●●●H30	— —	SHA14●●●H30 SHA15●●●H30	SHA4●●●H30 SHA5●●●H30

Table 16.189: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24 *[20]*	—	V01
120 *[21]*	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page 16-116. Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is available at no charge.

Dimensions: page 16-70
Factory Modifications (Forms): page 16-115
Replacement Parts (Class 9998): page 16-120
Type S Accessories (Class 9999): page 16-123

For How to Order Information, see page 16-27.

[16] Size 6 starters are NEMA 4 painted sheet steel enclosures.
[17] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[18] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.189.
[19] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[20] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8739SBG1V01**S**).
[21] These voltage codes must include **Form S** (provided at no charge) (for example, order as 8739SCG5V02**S**).

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Thermal Magnetic Circuit Breaker
3-Pole Polyphase—600 Vac Maximum—50–60 Hz

Table 16.190: Class 8739 Full-Voltage Type, Reversing, 460–600 V, with Motor Logic SSOLR (replace ●●● with the voltage code)

Ratings					NEMA 1 General Purpose Enclosure	NEMA 4 & 4X Watertight and Dusttight Enclosure Stainless Steel (304) (Sizes 0 - 5)*[22]*	NEMA 4X Watertight, Dusttight and Corrosion Resistant Polyester Enclosure	NEMA 12/3R*[23]* Dusttight and Driptight Industrial Use Enclosure	
Motor Voltage (Starter Voltage)	Max. Hp Polyphase	NEMA Size	Circuit Breaker		Type *[24]*	Type *[24]*	Type *[24]*	With External Reset	Without External Reset
			Type	Ampere Rating				Type *[24]*	Type *[24]*
460 (480)	5	0	HLL36015	15	SBG1●●●H30 *[25]*	SBW1●●●H30 *[25]*	SBW11●●●H30 *[25]*	SBA11●●●H30 *[25]*	SBA1●●●H30 *[25]*
	7-1/2 10	1	HLL36025 HLL36030	25 30	SCG3●●●H30 *[25]* SCG7●●●H30 *[25]*	SCW3●●●H30 *[25]* SCW7●●●H30 *[25]*	SCW13●●●H30 *[25]* SCW17●●●H30 *[25]*	SCA13●●●H30 *[25]* SCA17●●●H30 *[25]*	SCA3●●●H30 *[25]* SCA7●●●H30 *[25]*
	15 20 25	2	HLL36045 HLL36060 HLL36070	45 60 70	SDG3●●●H30 *[25]* SDG1●●●H30 *[25]* SDG5●●●H30 *[25]*	SDW3●●●H30 *[25]* SDW1●●●H30 *[25]* SDW5●●●H30 *[25]*	SDW13●●●H30 *[25]* SDW11●●●H30 *[25]* SDW15●●●H30 *[25]*	SDA13●●●H30 *[25]* SDA11●●●H30 *[25]* SDA15●●●H30 *[25]*	SDA3●●●H30 *[25]* SDA1●●●H30 *[25]* SDA5●●●H30 *[25]*
	30 40 50	3	HLL36080 HLL36100 HLL36150	80 100 150	SEG6●●●H30 SEG3●●●H30 SEG5●●●H30	SEW6●●●H30 SEW3●●●H30 SEW5●●●H30	SEW16●●●H30 SEW13●●●H30 SEW15●●●H30	SEA16●●●H30 SEA13●●●H30 SEA15●●●H30	SEA6●●●H30 SEA3●●●H30 SEA5●●●H30
	60 75 100	4	JJL36105 JJL36200 JJL36250	150 200 250	SFG5●●●H30 SFG3●●●H30 SFG4●●●H30	SFW5●●●H30 SFW3●●●H30 SFW4●●●H30	SFW15●●●H30 SFW13●●●H30 SFW14●●●H30	SFA15●●●H30 SFA13●●●H30 SFA14●●●H30	SFA5●●●H30 SFA3●●●H30 SFA4●●●H30
	125–150 200	5	LLL36400U33X LLL36600U33X	400 600	SGG4●●●H30 SGG2●●●H30	SGW4●●●H30 SGW2●●●H30	— —	SGA14●●●H30 SGA12●●●H30	SGA4●●●H30 SGA2●●●H30
	250 300–400	6	LLL36600U33X MJL36800	600 800	SHG4●●●H30 SHG5●●●H30	SHW4●●●H30 SHW5●●●H30	— —	SHA14●●●H30 SHA15●●●H30	SHA4●●●H30 SHA5●●●H30
575 (600)	5	0	HLL36015	15	SBG1●●●H30	SBW1●●●H30	SBW11●●●H30	SBA11●●●H30	SBA1●●●H30
	7-1/2 10	1	HLL36020 HLL36025	20 25	SCG8●●●H30 SCG3●●●H30	SCW8●●●H30 SCW3●●●H30	SCW18●●●H30 SCW13●●●H30	SCA18●●●H30 SCA13●●●H30	SCA8●●●H30 SCA3●●●H30
	15 20 25	2	HLL36035 HLL36045 HLL36060	35 45 60	SDG8●●●H30 SDG3●●●H30 SDG1●●●H30	SDW8●●●H30 SDW3●●●H30 SDW1●●●H30	SDW18●●●H30 SDW13●●●H30 SDW11●●●H30	SDA18●●●H30 SDA13●●●H30 SDA12●●●H30	SDA8●●●H30 SDA3●●●H30 SDA1●●●H30
	30 40 50	3	HLL36070 HLL36090 HLL36100	70 90 100	SEG4●●●H30 SEG6●●●H30 SEG3●●●H30	SEW4●●●H30 SEW6●●●H30 SEW3●●●H30	SEW14●●●H30 SEW16●●●H30 SEW13●●●H30	SEA14●●●H30 SEA16●●●H30 SEA13●●●H30	SEA4●●●H30 SEA6●●●H30 SEA3●●●H30
	60–75 100	4	JLL36150 JLL36250	150 250	SFG5●●●H30 SFG4●●●H30	SFW5●●●H30 SFW4●●●H30	SFW15●●●H30 SFW14●●●H30	SFA15●●●H30 SFA14●●●H30	SFA5●●●H30 SFA4●●●H30
	125–150 200	5	JLL36250 LLL36400U33X	250 400	SGG6●●●H30 SGG4●●●H30	SGW6●●●H30 SGW4●●●H30	— —	SGA16●●●H30 SGA14●●●H30	SGA6●●●H30 SGA4●●●H30
	250–350 400	6	LLL36600U33X MJL36800	600 800	SHG4●●●H30 SHG5●●●H30	SHW4●●●H30 SHW5●●●H30	— —	SHA14●●●H30 SHA15●●●H30	SHA4●●●H30 SHA5●●●H30

Table 16.191: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24 *[26]*	—	V01
120 *[27]*	110	V02
208	—	V08
240	220	V03
480	440	V06
600	550	V07
Specify	Specify	V99

NOTE: For voltage codes used with control transformers, see page 16-116.
Form S (separate control) is used when a separate source of power is available for the control (coil) voltage. Form S is available at no charge.

For How to Order Information, see page 16-27.

Table 16.192: Class 8738 UL Listed Short Circuit Ratings

NEMA Size	Fuse Clip Type	Enclosure *[28]*	Ampere Interrupting Capability Rating (AIC)
0–3	Standard	Standard	5,000
0–3	Class R	Standard	100,000
4–5	Standard	Standard	10,000
4–5	Class R	Standard	100,000

Table 16.193: Class 8739 UL Listed Short Circuit Ratings

Motor Circuit Protector Type			
NEMA Size	Voltage	Enclosure *[28]*	Ampere Interrupting Capability Rating (AIC)
0–1	480	Standard	100,000
0–1	481 – 600	Standard	35,000
2–5	480	Standard	100,000
2–5	481 – 600	Standard	50,000
6	480	Standard	65,000
6	600	Standard	18,000
Thermal Magnetic Circuit Breaker Type			
0–1	480	Standard	100,000
0–1	481–600	Standard	35,000
2–5	480	Standard	100,000
2–5	481–600	Standard	50,000
6	480	Standard	65,000
6	600	Standard	18,000

[22] Size 6 starters are NEMA 4 painted sheet steel enclosures.
[23] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[24] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard coil voltage codes shown in Table 16.191.
[25] **Form H30**, with the possibility of a fourth character to select a lower FLA range (for example, **H308**). See page 16-117
[26] 24 V coils are not available on Sizes 4–7. On Sizes 00–3, where 24 V coils are available, **Form S** (separate control) must be specified (for example, order as 8739SBG2V01S).
[27] These voltage codes must include **Form S** (provided at no charge) (for example, order as 8739SDG3V02S).
[28] Standard enclosures include NEMA 1; 4 and 4X stainless; and 12/3R.

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NEMA 1, 12, and 3R Dimensions

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.194: See Figure: NEMA 1 Enclosure (Sizes 0–2), page 16-70

NEMA Size	Class	Type	Dimensions (in.) [29]																Top & Bottom		Sides	Wt. (lb)
			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	W	X	Y	
0–1	8738, 8739	SBG SCG	13.75	23	8.34	10.63	21	18.91	1.88	1.88	3.75	2.31	1.06	3.25	2.19	1.25	0.88	—	0.25–0.75–1	0.25–0.75–1	0.25	49
2	8738, 8739	SDG	15	28.75	9.59	11.63	26.25	21.47	2.19	2	4	2.56	1.25	3.25	2.19	1.25	0.91	—	1–1.25	1–1.25	0.25	80

Table 16.195: See Figure: NEMA 1 Enclosure (Sizes 3–6), page 16-70

NEMA Size	Class	Type	Dimensions (in.) [29]																Top & Bottom		Sides	Wt. (lb)
			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	W	X	Y	
3	8738, 8739	SEG	18.5	44	10.59	12.5	3	25.97	43.5	0.25	—	2.81	3.5	5	2.69	5.38	1.22	0.91	1–1.25 2–2.25	0.25–0.75	0.25	245
4	8738	SFG	21	51.5	10.53	15	3	30.72	51	0.25	—	2.81	3.5	5	2.69	5.38	1.22	0.91	2.5	0.25–0.75	0.25	—
	8739	SFG	18.5	44	10.59	12.5	3	25.97	43.5	0.25	—	2.81	3.5	5	2.69	5.38	1.22	0.91	1–1.25 2–2.25	0.25–0.75	0.25	—
5	8738	SGG	30	77	15.5	22	4	39.41	76	0.25	—	3.5	6.28	9.25	3.19	—	—	—	0.25–0.75	3	—	—
	8739	SGG	30	65	13.72	22	4	39.41	64	0.25	—	3.5	6.28	5	3.19	—	—	—	0.25–0.75	3	—	—
6	8738, 8739	SHG	36	90	17.03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 16.196: See Figure: NEMA 12/3R Enclosure, page 16-70

NEMA Size	Class	Type	Dimensions (in.) [29]										Wt. (lb)
			A	B	C	D	E	F	G	H	I	J	
0–1	8738, 8739	SBA SCA	13.75	10.09	24.75	3.25	2.5	8.75	24	0.38	3.75	20.31	52
2	8738, 8739	SDA	15	10.97	31	3.25	3	9	30.25	0.38	3.75	23.44	95
3	8738, 8739	SEA	18.5	10.59	45	5	3	12.5	44	0.25	3.75	25.59	255
4	8738	SFA	21	10.59	52.5	5	3	15	51.5	0.25	3.75	30.34	—
	8739	SFA	18.5	10.59	45	3.25	3	12.5	44	0.25	3.75	25.59	—
5	8738	SGA	30	15.5	78	9.25	4	22	77	0.25	7.5	39.41	—
	8739	SGA	30	15.5	66	—	4	22	65	0.25	7.5	37.88	—
6 [30]	8739	SHA	36	17.03	90	—	—	—	—	—	—	—	—

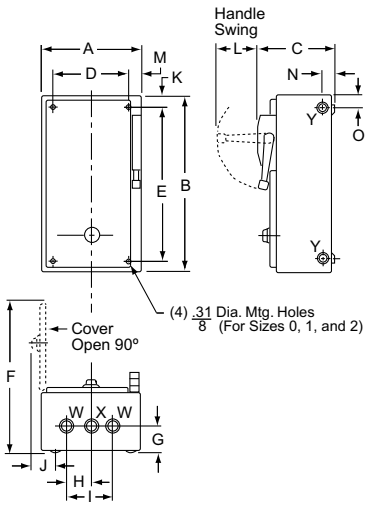

Figure 16.21: NEMA 1 Enclosure (Sizes 0–2)

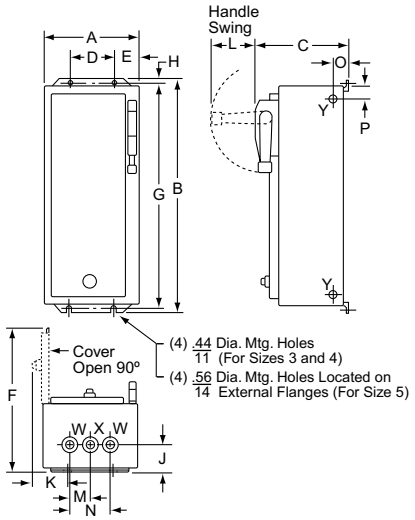

Figure 16.22: NEMA 1 Enclosure (Sizes 3–6)

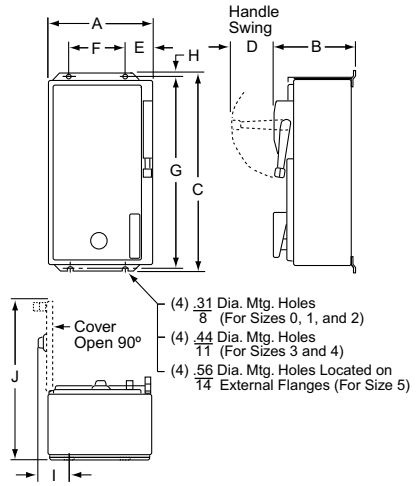

Figure 16.23: NEMA 12/3R Enclosure

NOTE: Illustrations may not represent the actual enclosure; they are intended for dimensional information only.

[29] The dimensions shown in all tables above are also for **Form F4T** (standard control transformer), **Form F4T11** (100 VA extra-capacity), and **Form F4T12** (200 VA extra-capacity).

[30] Size 6 enclosures are floor mounting.

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NEMA 4, 4X Dimensions

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.197: See Figure: NEMA 4X Polyester Enclosure, page 16-71 *[31]*

NEMA Size	Class	Dimensions (in inches)*[32]*					
		Type	A	B	C	E	F
0-2	8738 & 8739	SBW SCW SDW	25.25	11.4	27.00	17.88	25.75
3-4	8739	SEW SFW	26.31	11.4	33.50	18.50	32.25

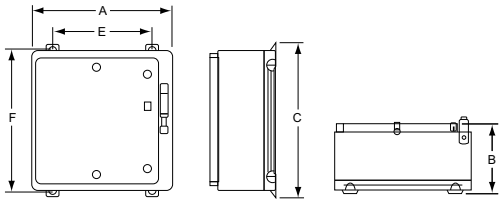

Figure 16.24: NEMA 4X Polyester Enclosure

Table 16.198: See Figure: NEMA 4 & 4X Stainless Steel Enclosure, page 16-71

NEMA Size	Class	Type	Dimensions (in inches) *[33]*												Bottom	Top & Bot.	Wt. (lb)
			A	B	C	D	E	F	G	H	I	J	K	L	W	X	
0–1	8738, 8739	SBW SCW	13.75	8.34	25.19	3.25	2.5	8.75	24	0.59	3	1.63	2.31	18.53	0.75 Hub	1 Hub	52
2	8738, 8739	SDW	15	9.59	30.03	3.25	2.5	10	29.75	0.63	3	2	2.63	21.03	0.75 Hub	1.5 Hub	95
3	8738, 8739	SEW	18.5	10.56	45.19	5	3	12.5	44	0.59	3.5	2.63	3.19	25.5	0.75 Hub	2.5 Hub	255
4	8738	SFW	21	10.53	52.69	5	3	15	51.5	0.59	3.5	2.63	3.19	30.25	0.75 Hub	2.5 Hub	—
	8739	SFW	18.5	10.56	45.19	5	3	12.5	44	0.59	3.5	2.63	3.19	25.5	0.75 Hub	2.5 Hub	—
5	8738	SGW	30	15.5	78.09	9.25	4	22	77	0.56	6.09	3	3.5	39.41	0.75 Hub	3.5 Hub	—
	8739	SGW	30	13.89	66.09	5	4	22	65	0.56	6.09	3	3.5	37.88	0.75 Hub	3.5 Hub	—
6	8739	SHW	36	17.03	98	—	—	—	—	—	—	—	—	—	—	—	—

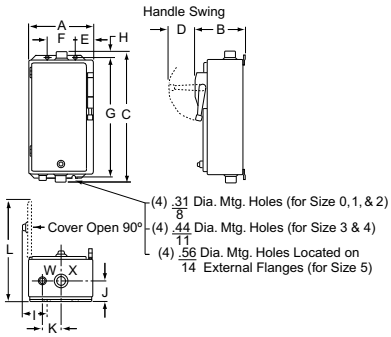

Figure 16.25: NEMA 4 & 4X Stainless Steel Enclosure

NOTE: Illustrations may not represent the actual enclosure; they are intended for dimensional information only.

Information on Hubs

Hubs are supplied with each NEMA 4X combination starter as shown in Table 16.199.

Note that hubs are only installed in stainless steel enclosures; they are supplied but not installed in polyester enclosures.

Table 16.199: Hubs

NEMA Size	Quantity	Hub Size (in.)
0–1	1 2	0.75 1.00
2	1 2	0.75 1.50
3–4	1 2	0.75 2.50

[31] See Table 16.199 for important information on hubs for NEMA 4X enclosures.
[32] The dimensions shown in all tables above are also for **Form F4T** (standard control transformer), **Form F4T11** (100 VA extra-capacity), and **Form F4T12** (200 VA extra-capacity).
[33] Dimensions also for **Form F4T** (standard control transformer), **Form F4T11** (100 VA extra capacity) and **Form F4T12** (200 VA extra capacity).

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Multipole Lighting Contactors, Type L and LX

Class **8903** / Refer to Catalog **8903CT9701**

Type L

Type LX

Features

- 30 A fluorescent lighting rating, 20 A tungsten lighting rating
- Electrically and mechanically held
- 2 through 12-pole versions
- Field-convertible contacts with N.O. and N.C. indicators (8 N.C. contacts maximum *[1]*)
- Silver-Cadmium-Oxide double break contacts

NOTE: When ordering contactors with more than 8 poles, the catalog number configuration is the number of normally open contacts followed by a 0 and then the number of normally closed contacts (i.e. for 4 N.O. and 6 N.C. on a 10-pole contactor, order 8903LG406V02).

File E78427 CCN NRNT

File LR60905 Class 3211 07

Table 16.200: Multipole Lighting Contactors (50–60 Hz) (replace ●●● with the voltage code)

Contact Ampere Ratings	No. of Poles	NEMA 1 General Purpose Enclosure	NEMA 1 Flush Mounting General Purpose Enclosure with Plaster Adjustment	NEMA 3R Rainproof Enclosure*[2]*	NEMA 4 & 4X Watertight, Dusttight, and Corrosion-Resistant Glass-Polyester Enclosure	NEMA 4 & 4X Watertight, Dusttight Brushed Stainless Steel Enclosure	NEMA 12/3R*[3]* Dusttight and Driptight Industrial Use Enclosure	Open Type *[4]*
		Type *[5]*	Type *[5]*	Type *[5]*	Type *[5]*	Type *[5]*	Type *[5]*	Type *[5]*
Electrically Held*[1]*								
30 *[5]*	2 3 4	LG20●●● LG30 ●●● LG40 ●●●	LF20●●● LF30 ●●● LF40 ●●●	LH20 ●●● LH30 ●●● LH40 ●●●	LWW20●●● LWW30 ●●● LWW40 ●●●	LW20●●● LW30 ●●● LW40 ●●●	LA20●●● LA30 ●●● LA40 ●●●	LO20 ●●● LO30 ●●● LO40 ●●●
	6 8 10	LG60●●● LG80 ●●● LG1000 ●●●	LF60●●● LF80 ●●● LF1000 ●●●	LH60 ●●● LH80 ●●● LH1000 ●●●	LWW60 ●●● LWW80 ●●● LWW1000 ●●●	LW60 ●●● LW80 ●●● LW1000●●●	LA60 ●●● LA80●●● LA1000 ●●●	LO60 ●●● LO80 ●●● LO1000 ●●●
	12	LG1200 ●●●	LF1200 ●●●	LH1200 ●●●	LWW1200 ●●●	LW1200 ●●●	LA1200●●●	LO1200 ●●●
Mechanically Held *[1] [6]*								
30 *[5]*	2 3 4	LXG20 ●●● LXG30 ●●● LXG40 ●●●	LXF20 ●●● LXF30 ●●● LXF40 ●●●	— — —	LXWW20 ●●● LXWW30●●● LXWW40 ●●●	LXW20 ●●● LXW30 ●●● LXW40 ●●●	LXA20 ●●● LXA30 ●●● LXA40 ●●●	LXO20 ●●● LXO30 ●●● LXO40 ●●●
	6 8 10	LXG60 ●●● LXG80 ●●● LXG1000●●●	LXF60 ●●● LXF80 ●●● LXF1000 ●●●	— — —	LXWW60 ●●● LXWW80 ●●● LXWW1000 ●●●	LXW60 ●●● LXW80 ●●● LXW1000 ●●●	LXA60 ●●● LXA80 ●●● LXA1000 ●●●	LXO60 ●●● LXO80●●● LXO1000 ●●●
	12	LXG1200 ●●●	LXF1200 ●●●	—	LXWW1200 ●●●	LXW1200 ●●●	LXA120 0●●●	LXO1200 ●●●

NOTE: If a holding circuit contact is required for proper operation, order an additional contact.

Type L3L

Type LO80

Type L3R

Type L1L

Type LO60

Type L1R

Power Pole Kits

The kits in Table 16.201 are used to add 30 A power poles to existing Type L contactors when additional circuits are required. Type L lighting contactors come with mounting brackets, so that adder poles may be mounted from the front by a single captive screw. Adder poles come standard with N.O. contacts which are convertible to N.C.

For How to Order Information, see page 16-27.

NOTE: 12 N.C. poles are only available with a 120 V coil (V02).

Table 16.201: Power Poles for Type L or LX

Power Pole Adder Kit*[7]* Class 8903 Type		Can Only Be Added to Contactor Type*[8]*
Single Pole	L1L	LO60, LXO60, LO80, LXO80, LO1000, LXO1000
	L1R	
Double Pole	L3L	
	L3R	

Table 16.202: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24	—	V01
120	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
Specify	Specify	V99

Table 16.203: How to Order

To Order Specify:		Catalog Number			
• Class Number • Type Number	• Voltage Code • Form(s)	Class	Type	Voltage Code	Form(s)
		8903	LXG60	VO4	CF4R6

Factory Modifications (Forms): page 16-77
Replacement Coils: page 16-120
Replacement Contacts: page 16-122

[1] Factory conversion of N.O. contacts to N.C., order by catalog number (for example, for 6 N.O. and 2 N.C. poles on an 8 pole contactor, order as 8903LG62V02). Versions are available from the factory with up to 12 N.C. poles for Type L (electrically held) or 2, 4, or 6 N.C. poles for Type LX (mechanically held). For field conversion, there is a maximum of eight N.C. poles for Type L (electrically held) and a maximum of six N.C. poles for Type LX (mechanically held) contactors.

[2] Cannot support control transformer Forms.

[3] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.

[4] Separate enclosures are available for these devices. It may be possible to improve delivery by ordering an open type contactor and separate Class 9991 enclosure.

[5] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes listed in Table 16.202. All lighting contactors come with separate control as standard.

[6] When ordering **Form C** on mechanically held devices, you must also include**Form R6**.

[7] 8903LO (electrically held) devices can accommodate 10 or 12 N.C. contacts use **only** 120 V 60Hz coils.

[8] LO60 and LXO60: add single-pole kits only, 1 on each side, for converting to 8-pole. To maintain proper operation, the contactor cannot be converted to more than 8 poles.
LO80 and LXO80: use single-pole kits, 1 on each side, for converting to 10-pole and use two-pole kits, 1 on each side, for converting to 12-pole.
LO1000 and LXO1000: remove the existing single-pole kit and install two-pole kits, 1 on each side, for converting to 12-pole.

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Electrically Held

Mechanically Held

Features

- Electrically and mechanically held
- 30–800 A lighting ratings
- 2- through 5-pole versions (5-poles through 200 A)
- UL Listed short-circuit rating up to 100,000 Amperes
- Factory wired controls and clearly marked termination points
- Quick ship on most items in 5–7 days

Table 16.204: Coil Voltage Codes

Voltage *[9]*		Code
60 Hz	50 Hz	
24 *[10]*	—	V01
120	110	V02
208	—	V08
240	220	V03
277	—	V04 *[11]*
480	440	V06
Specify	Specify	V99

Table 16.205: Multipole Lighting Contactors—Type S, 50–60 Hz (replace ●●● with the voltage code)

Contact Ampere Ratings	No. of Poles	NEMA 1 General Purpose Enclosure	NEMA 1 Flush Mounting General Purpose Enclosure with Plaster Adjustment	NEMA Type 3R Rainproof Enclosure *[12]*	NEMA 4 & 4X Watertight, Dusttight and Corrosion-Resistant Glass-Polyester Enclosure	NEMA Type 4 & 4X *[13]* Watertight and Dusttight Enclosure	NEMA Type 12/3R *[14]* Dusttight and Driptight Industrial Use Enclosure	Open Type
		Type *[15]*	Type *[15]*	Type *[15]*	Type *[15]*	Type *[15]*	Type *[15]*	Type *[15]*
Electrically Held *[9]*								
30	2	SMG1●●●	SMF1●●●	SMH1●●●	SMW21●●●	SMW1●●●	SMA1●●●	SMO1●●● *[16]*
	3	SMG2●●●	SMF2●●●	SMH2●●●	SMW22●●●	SMW2●●●	SMA2●●●	SMO2●●● *[16]*
	4	SMG3●●●	SMF3●●●	SMH3●●●	SMW23●●●	SMW3●●●	SMA3●●●	SMO3●●● *[16]*
	5	SMG4●●●	SMF4●●●	SMH4●●●	SMW24●●●	SMW4●●●	SMA4●●●	SMO4●●● *[16]*
60	2	SPG1●●●	SPF1●●●	SPH1●●●	SPW21●●●	SPW1●●●	SPA1●●●	SPO1●●● *[16]*
	3	SPG2●●●	SPF2●●●	SPH2●●●	SPW22●●●	SPW2●●●	SPA2●●●	SPO2●●● *[16]*
	4	SPG3●●●	SPF3●●●	SPH3●●●	SPW23●●●	SPW3●●●	SPA3●●●	SPO3●●● *[16]*
	5	SPG4●●●	SPF4●●●	SPH4●●●	SPW24●●●	SPW4●●●	SPA4●●●	SPO4●●● *[16]*
100	2	SQG1●●●	SQF1●●●	SQH1●●●	SQW21●●●	SQW1●●●	SQA1●●●	SQO1●●● *[16]*
	3	SQG2●●●	SQF2●●●	SQH2●●●	SQW22●●●	SQW2●●●	SQA2●●●	SQO2●●● *[16]*
	4	SQG3●●●	—	SQH3●●●	—	SQW3●●●	SQA3●●●	SQO3●●● *[16]*
	5	SQG4●●●	—	SQH4●●●	—	SQW4●●●	SQA4●●●	SQO4●●● *[16]*
200	2	SVG1●●●	—	SVH1●●●	—	SVW1●●●	SVA1●●●	SVO1●●●
	3	SVG2●●●	—	SVH2●●●	—	SVW2●●●	SVA2●●●	SVO2●●●
	4	SVG3●●●	—	—	—	SVW3●●●	SVA3●●●	SVO3●●●
	5	SVG4●●●	—	—	—	SVW4●●●	SVA4●●●	SVO4●●●
300	2	SXG1●●●	—	—	—	SXW1●●●	SXA1●●●	SXO1●●●
	3	SXG2●●●	—	—	—	SXW2●●●	SXA2●●●	SXO2●●●
400*[17]*	2	SYG1●●●	—	—	—	SYW1●●●	SYA1●●●	SYO1●●●
	3	SYG2●●●	—	—	—	SYW2●●●	SYA2●●●	SYO2●●●
600*[17]*	2	SZG1●●●	—	—	—	SZW1●●●	SZA1●●●	SZO1●●●
	3	SZG2●●●	—	—	—	SZW2●●●	SZA2●●●	SZO2●●●
800*[17]*	2	SJG1●●●	—	—	—	SJW1●●●	SJA1●●●	SJO1●●●
	3	SJG2●●●	—	—	—	SJW2●●●	SJA2●●●	SJO2●●●
Mechanically Held*[9]*								
30	2	SMG10●●●	SMF10●●●	—	SMW31●●●	SMW10●●●	SMA10●●●	SMO10●●● *[16]*
	3	SMG11●●●	SMF11●●●	—	SMW32●●●	SMW11●●●	SMA11●●●	SMO11●●● *[16]*
	4	SMG12●●●	SMF12●●●	—	SMW33●●●	SMW12●●●	SMA12●●●	SMO12●●● *[16]*
	5	SMG13●●●	SMF13●●●	—	SMW34●●●	SMW13●●●	SMA13●●●	SMO13●●● *[16]*
60	2	SPG10●●●	SPF10●●●	—	SPW31●●●	SPW10●●●	SPA10●●●	SPO10●●● *[16]*
	3	SPG11●●●	SPF11●●●	—	SPW32●●●	SPW11●●●	SPA11●●●	SPO11●●● *[16]*
	4	SPG12●●●	SPF12●●●	—	SPW33●●●	SPW12●●●	SPA12●●●	SPO12●●● *[16]*
	5	SPG13●●●	SPF13●●●	—	SPW34●●●	SPW13●●●	SPA13●●●	SPO13●●● *[16]*
100	2	SQG10●●●	SQF10●●●	—	SQW31●●●	SQW10●●●	SQA10●●●	SQO10●●● *[16]*
	3	SQG11●●●	SQF11●●●	—	SQW32●●●	SQW11●●●	SQA11●●●	SQO11●●● *[16]*
	4	SQG12●●●	—	—	—	SQW12●●●	SQA12●●●	SQO12●●● *[16]*
	5	SQG13●●●	—	—	—	SQW13●●●	SQA13●●●	SQO13●●● *[16]*
200	2	SVG10●●●	—	—	—	SVW10●●●	SVA10●●●	SVO10●●●
	3	SVG11●●●	—	—	—	SVW11●●●	SVA11●●●	SVO11●●●
	4	SVG12●●●	—	—	—	SVW12●●●	SVA12●●●	SVO12●●●
300	2	SXG13●●●	—	—	—	SXW13●●●	SXA13●●●	SXO13●●●
	3	SXG14●●●	—	—	—	SXW14●●●	SXA14●●●	SXO14●●●
400	2	SYG16●●●	—	—	—	SYW16●●●	SYA16●●●	SYO16●●●
	3	SYG17●●●	—	—	—	SYW17●●●	SYA17●●●	SYO17●●●
600	2	SZG18●●●	—	—	—	SZW18●●●	SZA18●●●	SZO18●●●
	3	SZG19●●●	—	—	—	SZW19●●●	SZA19●●●	SZO19●●●

NOTE: If a holding circuit contact is required for proper operation, order an additional contact.

[9] Lighting contactors come with separate control as standard—except electrically held 400, 600, and 800 A devices, which come with common control as standard.
[10] 24 V coils are not available for 200–800 A devices. Contact your local sales office for more information.
[11] On 400–800 A electrically held contactors, for voltage code V04, you must select Form S (separate control).
[12] Cannot support control transformer forms.
[13] **For contactor sizes 30–300 A, NEMA 4 and 4X** enclosures are brush finished stainless steel. Sizes 400–800 A are painted sheet steel.
[14] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[15] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes in Table 16.204.
[16] Separate enclosures are available for these devices. It may be possible to improve delivery time by ordering an open type contactor and a separate Class 9991 enclosure from the section, Separate Enclosures, page 16-108.
[17] **Form F4T** comes standard; include the line voltage when ordering. Control voltage is 120–60.

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Power Pole Kits for Type S Only

A single-pole or double-pole kit can be added to any 2- or 3-pole 30 or 60 A Type S lighting contactor to make a 4- or 5-pole device. Factory assembled 4- and 5-pole contactors utilize the basic 3-pole device with a single or double-pole kit installed. Only one power pole can be added per contactor. Sufficient room is provided in all enclosure styles for the addition of a power pole kit.

Table 16.206: Power Pole Kits for Type S Only

Ampere Rating	Description	Class 9999 Type
30	One N.O. One N.C. One N.O. and One N.C. Two N.O. Two N.C.	SB6 SB7 SB8 SB9 SB10
60	One N.O. One N.C. One N.O. and One N.C. Two N.O. Two N.C.	SB21 *[18]* SB22 *[18]* SB23 *[18]* SB24 *[18]* SB25 *[18]*

Factory Modifications (Forms): page 16-77
Replacement Coils: page 16-120
Replacement Contacts: page 16-122
Dimensions: page 16-81

For How to Order Information, see page 16-27.

[18] When power pole is added to 60 Ampere contactor, a 4-pole coil is also required. Order from Table 16.330. 60 A power poles are suitable for use with copper or aluminum wire.

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File E16151
CCN NRNT

NOTE: If a holding circuit contact is required for proper operation, order an additional contact.

Features

The features include: disconnect switch and circuit breaker versions; rugged flange-mounted handle; easy installation; occupation of less space; increased operator protection; room to spare for modifications; Class R fuse clips standard; electrically and mechanically held; 30–600 A.

It is desirable to install the branch-circuit protective device and lighting contactor, combining switching and over-current protection, in one enclosure. Combination lighting contactors are well suited for industrial, highway and area lighting applications, or where a lighting circuit may have to be disconnected for periodic maintenance. They may also be used for resistance heating loads.

Table 16.207: Fusible or Non-Fusible Disconnect Switch—3-Pole, 50–60 Hz (replace ●●● with the voltage code)

Contactor Ampere Rating	Fuse Clip Size (A)	Fuse Clip Spacing (V)	NEMA 1 General Purpose Enclosure	NEMA 4 & 4X *[19]* Watertight and Dusttight Enclosure Stainless Steel	NEMA 12/3R*[20]* Dusttight, Oiltight Driptight, Industrial Use Enclosure
			Type *[21]*	Type *[21]*	Type *[21]*
Electrically Held*[22]*					
30	None 30 30	— 600 250	SMG60●●● SMG61●●● SMG62●●●	SMW60●●● SMW61●●● SMW62●●●	SMA60●●● SMA61●●● SMA62●●●
60	None 60 60	— 600 250	SPG60●●● SPG61●●● SPG62●●●	SPW60●●● SPW61●●● SPW62●●●	SPA60●●● SPA61●●● SPA62●●●
100	None 100 100	— 600 250	SQG60●●● SQG61●●● SQG62●●●	SQW60●●● SQW61●●● SQW62●●●	SQA60●●● SQA61●●● SQA62●●●
200	None 200 200	— 600 250	SVG60●●● SVG61●●● SVG62●●●	SVW60●●● SVW61●●● SVW62●●●	SVA60●●● SVA61●●● SVA62●●●
300	None 400 400	— 600 250	SXG60●●● SXG61●●● SXG62●●●	SXW60●●● SXW61●●● SXW62●●●	SXA60●●● SXA61●●● SXA62●●●
Mechanically Held*[22]*					
30	None 30 30	— 600 250	SMG70●●● SMG71●●● SMG72●●●	SMW70●●● SMW71●●● SMW72●●●	SMA70●●● SMA71●●● SMA72●●●
60	None 60 60	— 600 250	SPG70●●● SPG71●●● SPG72●●●	SPW70●●● SPW71●●● SPW72●●●	SPA70●●● SPA71●●● SPA72●●●
100	None 100 100	— 600 250	SQG70●●● SQG71●●● SQG72●●●	SQW70●●● SQW71●●● SQW72●●●	SQA70●●● SQA71●●● SQA72●●●
200	None 200 200	— 600 250	SVG70●●● SVG71●●● SVG72●●●	SVW70●●● SVW71●●● SVW72●●●	SVA70●●● SVA71●●● SVA72●●●
300	None 400 400	— 600 250	SXG70●●● SXG71●●● SXG72●●●	SXW70●●● SXW71●●● SXW72●●●	SXA70●●● SXA71●●● SXA72●●●

Table 16.208: Coil Voltage Codes *[22]*

Voltage		Code
60 Hz	50 Hz	
24 *[23]*	—	V01
120	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
Specify	Specify	V99

Table 16.209: Circuit Breaker—3-Pole, 50–60 Hz (replace ●●● with the voltage code)

Contactor Ampere Rating	Circuit Breaker		NEMA 1 General Purpose Enclosure	NEMA 4 & 4X*[19]* Watertight and Dusttight Enclosure Stainless Steel (30-300 A)	NEMA 12/3R*[20]* Dusttight, Oiltight, Driptight, Industrial Use Enclosure
	Ampere Rating	Maximum Volts	Type *[21]*	Type *[21]*	Type *[21]*
Electrically Held*[22]*					
30	30	600	SMG81●●●	SMW81	SMA81●●●
60	60	600	SPG81●●●	SPW81●●●	SPA81●●●
100	100	600	SQG81●●●	SQW81●●●	SQA81●●●
200	200	600	SVG81●●●	SVW81●●●	SVA81●●●
300	300	600	SXG81●●●	SXW81●●●	SXA81●●●
400	400	600	SYG81●●●	SYW81●●●	SYA81●●●
600	600	600	SZG81●●●	SZW81●●●	SZA81●●●
Mechanically Held*[22]*					
30	30	600	SMG91●●●	SMW91●●●	SMA91●●●
60	60	600	SPG91●●●	SPW91●●●	SPA91●●●
100	100	600	SQG91●●●	SQW91●●●	SQA91●●●
200	200	600	SVG91●●●	SVW91●●●	SVA91●●●
300	300	600	SXG91●●●	SXW91●●●	SXA91●●●
400	400	600	SYG91●●●	SYW91●●●	SYA91●●●
600	600	600	SZG91●●●	SZW91●●●	SZA91●●●

For How to Order Information, see page page 16-27.

[19] For **NEMA 4 and 4X** watertight, dusttight ,and corrosion-resistant glass-polyester enclosures, add **Form G18** (limited to 100 A max.). 400 and 600 A enclosures are painted sheet steel **(NEMA Type 4 & 4X).**
[20] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[21] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes shown in Table 16.204.
[22] The control/coil voltage must be specified.
[23] 24 V coils are not available for 200 A or larger devices. Contact the Customer Care Center for additional information.

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NIGHT-MASTER®

Long Version

Short Version

UL Approved for **Service Entrance**

File E16151
CCN NRNT

Night-Master Combination Lighting Contactors

The Class 8903 Night-Master Outdoor Combination Lighting Contactor is the only product on the market that is UL Listed for Service Entrance. This allows the contactor to be pole mounted when used to control lighting in remote locations such as parks, monuments, group sports facilities, and streets and highways.

Factory modifications such as photocells, time switches, key operated selector switches, and the combination of photocells and time switches (photocell on, time switch off) allow the Night-Master to be located in applications where manual operation of lights is not practical.

Night-Master comes in long and short versions in sizes 30 through 200 Amperes. Most common modifications can be provided from the factory, or added in the field to the pre-drilled and pre-tapped panels.

NIGHT-MASTER Outdoor Combination Lighting Contactors offer a disconnecting means, overcurrent protection, and a lighting contactor in one NEMA 3R Rainproof enclosure. These combination units satisfy the requirements of the National Electrical Code and UL 508 for service entrance equipment.

Features

- Solid neutral standard
- Grounding lug standard
- Padlocking provisions
- Short and long versions available
- Electrically held Type S lighting contactor
- Eliminates the need for separate mounted safety switches
- Additional panel space eliminates the need for external mounting of time clocks
- Separate control comes standard on all lighting contactors

NOTE: If a holding circuit contact is required for proper operation, order an additional contact.

Table 16.210: Disconnect Switch Type—3-Pole (replace ●●● with the voltage code)

Contactor Ampere Rating	Fuse Clip Size (A)	Fuse Clip Spacing (V)	Short Version		Long Version	
			Class 8903 Type 3R *[24]*	Class 8903 Type 3R Stainless Steel *[24]*	Class 8903 Type 3R *[24]*	Class 8903 Type 3R Stainless Steel *[24]*
30	30 30	600 250	SMC61●●● SMC62●●●	SMH61●●● SMH62●●●	SMC63●●● SMC64●●●	SMH63●●● SMH64●●●
60	60 60	600 250	SPC61●●● SPC62●●●	SPH61●●● SPH62●●●	SPC63●●● SPC64●●●	SPH63●●● SPH64●●●
100	100 100	600 250	SQC61●●● SQC62●●●	SQH61●●● SQH62●●●	SQC63●●● SQC64●●●	SQH63●●● SQH64●●●
200	200 200	600 250	SVC61●●● SVC62●●●	SVH61●●● SVH62●●●	SVC63●●● SVC64●●●	SVH63●●● SVH64●●●

Table 16.211: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24 *[25]*	—	V01
120	110	V02
208	—	V08
240	220	V03
277	—	V04
480	440	V06
Specify	Specify	V99

Table 16.212: Circuit Breaker Type—3-Pole (replace ●●● with the voltage code)

Contactor Ampere Rating	Circuit Breaker		Short Version		Long Version	
	Ampere Rating	Maximum Volts	Class 8903 Type 3R *[24]*	Class 8903 Type 3R Stainless Steel *[24]*	Class 8903 Type 3R *[24]*	Class 8903 Type 3R Stainless Steel *[24]*
30	30	600	SMC81●●●	SMH81●●●	SMC83●●●	SMH83●●●
60	60	600	SPC81●●●	SPH81●●●	SPC83●●●	SPH83●●●
100	100	600	SQC81●●●	SQH81●●●	SQC83●●●	SQH83●●●
200	200	600	SVC81●●●	SVH81●●●	SVC83●●●	SVH83●●●

For How to Order Information, see page 16-27.

[24] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes listed in Table 16.211.
[25] 24 V coils are not available for 200 A devices. Contact your local sales office for additional information.

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NOTE: If a UL label is required, consult the Customer Care Center at 1-888-778-2733. Some Forms **are not** UL Listed.

Standard Equipment dimensions and enclosure construction may not apply when certain special features are added. Such cases should be referred to the factory with a complete description when precise dimensions are required.

Table 16.213: Lighting Contactor Forms (Factory Modifications)

Description	Form Letter	NEMA Enclosure Type	Used On					Rating (A)						
			Std.		Combo		Night-Master 30–200 A	30 Type L	30	60	100	200	300	400, 600, 800
			Elec. Held	Mech. Held	Elec. Held	Mech. Held								
On-Off push button(momentary contact)	A3	1	—	Y	—	Y	—	Y	Y	Y	Y	Y	Y	Y
	A3	3R, 4, 12	—	Y	—	Y	—	Y	Y	Y	Y	Y	Y	Y
On-Off push button (with holding circuit interlock)	A12	Any	Y	—	Y	—	Y	Y	Y	Y	Y	Y	Y	Y
Hand-Off-Auto selector switch. To substitute a key operated selector switch, use Form C33 and specify positions, legend marking, and key removal. This form must be used with another selector switch form (example: CC33).	C	1	Y	Y *[26]*	Y	Y *[26]*	—	Y	Y	Y	Y	Y	Y	Y
	C	3R, 4, 12	Y	Y *[26]*	Y	Y *[26]*	Y	Y	Y	Y	Y	Y	Y	Y
On-Off selector switch. To substitute a key operated selector switch, use Form C33 and specify positions, legend marking, and key removal. This form must be used with another selector switch form (example: C33C6).	C6	1	Y	Y	Y	Y	—	Y	Y	Y	Y	Y	Y	Y
	C6	3R, 4, 12	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Control circuit fuse (1 fuse)	F	Any	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Control circuit fuses (2 fuses)	F4	Any	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Control circuit transformer standard capacity 50/60 Hz														
Primary Fuses / Secondary Fuses / Transformer capacity														
2 *[27]* / 0 / Std.	F4T	1, 4, 12	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y *[28]*	Y *[29]*
2 / 1 / Std.	FF4T	1, 4, 12	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y *[28]*	Y *[29]*
2 / 1 / 100 VA Additional	FF4T11	1, 4, 12	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y *[28]*	Y *[28]*	Y *[29]*
2 / 1 / 200 VA Additional	FF4T12	1, 4, 12	Y	Y	Y	Y	Y	Y*[28]*	Y	Y	Y *[28]*	Y *[28]*	Y *[28]*	Y *[29]*
2 / 1 / 300 VA Additional	FF4T13	1, 4, 12	Y	Y	Y	Y	Y	Y	Y *[28]*	Y *[28]*	Y *[28]*	Y *[28]*	Y *[28]*	Y *[29]*
Noise reduced enclosure and shock mounted panel	G4	Any	—	Y	—	—	—	Y	Y	Y	Y	Y	Y	Y
Addition of photoelectric receptacle	G10	1 *[30]*, 3R, 12	Y	—	Y	—	Y	Y	Y	Y	Y	Y	Y	Y
Addition of photoelectric receptacle with photo-cell	G101	1 *[30]*, 3R, 12	Y	—	Y	—	Y	Y	Y	Y	Y	Y	Y	Y
Addition of photoelectric receptacle and relay (R6)*[31]*	G10R6	1 *[30]*, 12	—	Y	—	Y	—	Y	Y	Y	Y	Y	Y	Y
With photo-cell installed *[31]*	G101R6	1 *[30]*, 12	—	Y	—	Y	—	Y	Y	Y	Y	Y	Y	Y
Addition of terminal blocks (other than standard). The designation *xx* represents the number of terminals needed. Available in multiples of 5 only.														
Wired	G56xx	Any	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Unwired	G50xx	Any	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Addition of 24 hour time clock (120–277 V only)	K14	1, 4, 12	Y	Y	Y	Y	—	Y	Y	Y	Y	Y	Y	Y
Addition of 24 hour time clock w/day omission (120–277 V)	K141	1, 4, 12	Y	Y	Y	Y	—	Y	Y	Y	Y	Y	Y	Y
Addition of 7 day time clock (120–277 V)	K142	1, 4, 12	Y	Y	Y	Y	—	Y	Y	Y	Y	Y	Y	Y
Addition of 24 hour time clock (120–277 V only)	K14	3R	—	—	—	—	Y	—	Y	Y	Y	Y	—	—
Addition of 24 hr time clock w/skip day (120–277 V)	K141	3R	—	—	—	—	Y	—	Y	Y	Y	Y	—	—
Addition of 7 day time clock (120–277 V)	K142	3R	—	—	—	—	Y	—	Y	Y	Y	Y	—	—
Addition of solid neutral terminal block	N	1, 4, 12	Y	Y	Y	Y	Std.	Y	Y	Y	Y	Y	Y	Y
Red pilot light	P1	Any	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Two or more lights *[32]* (each)	P	Any	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red push-to-test pilot light	P21	Any	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Interlock necessary for pilot light one needed for each additional pilot light	*[33]*	Any	Y	Y	Y	Y	Y	*[34]*	Y	Y	Y	Y	Y	Y
Two-wire interface for mechanically held *[31]*	R6	Any	—	Y	—	Y	—	Y	Y	Y	Y	Y	Y	Y
Addition of undervoltage and overvoltage relay	R46	Any	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Three wire control for long distance applications*[31]*	R62	Any	—	Y	—	Y	—	Y	Y	Y	Y	Y	Y	Y
Auxiliary contacts (specify number of N.O. + N.C.)	X	Any	Y	Y	Y	Y	Y	*[34]*	Y	Y	Y	Y	Y	Y
Addition of DC coil to Type L (7 poles max)	Y48	Any	Y	—	—	—	—	Y	—	—	—	—	—	—
Auxiliary electrical interlock installed on disconnect switch or circuit breaker operating mechanism	Y74	Any	—	—	Y	Y	Y	—	Y	Y	Y	Y	Y	Y
Coil transient suppressor (120 Vac only)	Y145	Any	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	—	—
Addition of lightning arrestor	Y1532	Any	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Substitute copper only lugs for standard	Y157	Any	Y	Y	Y	Y	Y	—	—	Y	Y	Y	Y	Y

[26] When ordering **Form C** on mechanically held devices, you must also include**Form R6**.
[27] Transformer voltage codes.
[28] Single primary voltage must be specified using the codes shown in Table 16.214.
[29] Mechanically held only. Electrically held device has a control circuit requiring a 120 V secondary, therefore, a transformer is supplied. The transformer comes wired to L1 and L2 unless **Form S** is called for. It is supplied with two primary and one secondary fuse.
[30] Photocell mounted on a NEMA 1 enclosure is designed for indoor areas which rely on natural light. Addition of the photocell does not make the enclosure suitable for outdoor (NEMA Type 3R) installations.
[31] Available for 24 V, 120 V, 240 V, 277 V and 480 V applications only.
[32] For electrically held enclosed devices, the first pilot is wired in parallel with the coil. Operating interlocks are required for all additional pilot lights. Mechanically held devices require operating interlocks for all pilot lights.
[33] **Do not** use Form X for any interlock wired in series with a pilot light, but **do** specify how the pilot light and interlock are to be wired into the circuit.
[34] Electrically held 20 A multipole contactors cannot add interlocks. Additional poles can be used for the same function, however. Mechanically held (Type LX) provide one double throw auxiliary (or status) contact as standard.

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Table 16.214: Voltage Codes

Voltage at 60 Hz (primary–secondary)	Code
120–24	V89
208–120	V84
240–24	V82
240–120	V80
277–120	V85
480–24	V83
480–120	V81
480–240	V87
600–120	V86

Order Example

You have device 8903SMG2V02. V02 means that you need a coil voltage of 120-60/110-50, wired for separate control.
You want to add Form FF4T, with transformer voltages of 480 V primary, 120 V secondary. The new and complete Class, Type, Voltage Code and Form number are:

Class	Type	Voltage Code	Form *[35]*
8903	SMG2	V81	FF4T

Table 16.215: Lighting Contactor Field Modifications

Description	Types L & LX	Type S						
	30 A	30 A	60 A	100 A	200 A	300 A	400, 600, 800 A	Form No.
	Kit	Kit	Kit	Kit	Kit	Kit	Kit	
Auxiliary Contacts								
1 N.O. LH or RH Mounting	—	9999SX6	9999SX6	9999SX6	9999SX6	9999SX6	9999SX6	X
1 N.C. LH or RH Mounting	—	9999SX7	9999SX7	9999SX7	9999SX7	9999SX7	9999SX7	
1 N.C. & 1 N.O. Isolated LH or RH	—	9999SX8	9999SX8	9999SX8	9999SX8	9999SX8	9999SX8	
1 N.O. Overlapping LH or RH	—	9999SX9	9999SX9	9999SX9	9999SX9	9999SX9	9999SX9	
1 N.C. Overlapping LH or RH	—	9999SX10	9999SX10	9999SX10	9999SX10	9999SX10	9999SX10	
Control Circuit Fuse Holder								
Single Fuse Unit	9999LLX and 9999SFR3	9999SFR3	9999SFR3	9999SFR3	9999SFR3	9999SFR3	9999SFR3	F
Two Fuse Unit	9999LLX and 9999SFR4	9999SFR4	9999SFR4	9999SFR4	9999SFR4	9999SFR4	9999SFR4	F4
Transformers	9070TF50	9070TF100	9070TF100	9070TF150	9070TF300	9070TF500	9070TF750	T
Oversized Enclosures (Non-Combo)								
NEMA 1	9991SDG3	9991SDG3	9991SDG3	—	—	—	—	—
NEMA 4	9991SDW3	9991SDW3	9991SDW3	—	—	—	—	—
NEMA 12	9991SDA3	9991SDA3	9991SDA3	—	—	—	—	—
Standard Enclosures								
NEMA 1–Surface Mount	9991LXG1	9991SCG7 *[36]*	9991SDG7 *[36]*	9991SFG8	9991SFG4	9991SGG8	—	—
NEMA 3R	9991SDH1	9991SCH2	9991SDH1	9991SEH1	9991SFH1	—	—	—
NEMA 4–Standard	9991SDW1	9991SCW1	9991SDW1	—	—	—	—	—
NEMA 4–With 2 Cvr Mtd. Clsng Plts	9991SDW11	9991SCW11	9991SDW11	9991SEW11	—	—	—	—
NEMA 4X–Glass Polyester	9991SDW20	9991SCW20	9991SDW20	—	—	—	—	—
NEMA 12	9991SDA11	9991SCA11	9991SDA11	9991SEA11	—	—	—	—
NEMA 1–Flushmount–Complete	—	—	—	9991SEF11	—	—	—	—
NEMA 1–Flush Mount Parts	—	—	—	—	—	—	—	—
FLUSH PARTS	—	—	—	—	—	—	—	—
Standard–Elec. held	9991SDF13	9991SCF11	9991SDF11	—	—	—	—	—
Standard–Mech. held	9991SDF13	9991SCF13	9991SDF13	—	—	—	—	—
Mounting Strap	9991SDF2	9991SCF2	9991SDF2	—	—	—	—	—
Pull Box	9991SDF1	9991SCF1	9991SDF1	—	—	—	—	—
Internal Operator Mounting Bracket	3010215901	3010215901	3010215901	3010215901	3010215901	3010215901	3010215901	G53
Solid Neutral	9999SN1	9999SN1	9999SN1	9999SN1	9999SN2	9999SN2	9999SN3 *[37]*	N
Combination Lighting Contactor Disconnect Interlock Kit								
Breaker Type	—	9999R26	9999R26	9999R26	9999R26	9999R26	9999R26	Y74
1-Pole	—	9999R27	9999R27	9999R27	9999R27	9999R27	9999R27	
2-Pole								
Disconnect Type	—	9999TC11	9999TC10	9999TC10	9999R8	9999R35	9999R26	
1-Pole	—	9999TC21	9999TC20	9999TC20	9999R9	9999R36	9999R27	
2-Pole								
Lightning Arrestor								
175 Vac to Ground Max 2 or 3 wire Grounded	SDSA1175	SDSA1175	SDSA1175	SDSA1175	SDSA1175	SDSA1175	SDSA1175	Y1532
650 Vac to Ground Max 3 or 4 wire Grounded	SDSA3650	SDSA3650	SDSA3650	SDSA3650	SDSA3650	SDSA3650	SDSA3650	

[35] Form numbers should always be shown in alphabetical order.
[36] For electrically held only.
[37] Limited to 400 and 600 A versions. 800 A is a factory modification only.

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Cover Mounted Control Units

Table 16.216: Mechanically Held

Description	Form No.	TYPE LX	TYPE S					
		30 A	30 A	60 A	100 A	200 A	300 A	400, 600, 800 A
		Kit	Kit	Kit	Kit	Kit	Kit	Kit
Push Button (On-Off) NEMA 1 Enclosure	A3	9999BLX 9999LXPB	*[38]*	9001KA2 9999SA3 *[39]*	9001KA2 9999SA3 *[39]*	9001KA2 9999SA3 *[39]*	9001KA2 9999SA3 *[39]*	9001KA2 9999SA3 *[39]*
NEMA 3R, 4 or 12 Enclosure		9001KA2 9999SA3 *[39]*	9001KA2 9999SA3 *[39]*	9001KA2 9999SA3 *[39]*	9001KA2 9999SA3 *[39]*	9001KA2 9999SA3 *[39]*	9001KA2 9999SA3 *[39]*	9001KA2 9999SA3 *[39]*
Selector Switch (2 Position) NEMA 1 Enclosure	C6	9999BLX 9999LXS	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1
NEMA 3R, 4 or 12 Enclosure		9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1
Selector Switch (3 Position) NEMA 1 Enclosure (must include two wire control relay, Form R6	C	9999BLX 9999SC2	9001KN260 9001KS46BH2	9001KN260 9001KS46BH2	9001KN260 9001KS46BH2	9001KN260 9001KS46BH2	9001KN260 9001KS46BH2	9001KN260 9001KS46BH2
NEMA 3R, 4 or 12 Enclosure		9001KN260 9001KS46BH2						
Two Wire Control Relay (Form R6) *[40]*	R6	9999RLX CA2SK11 *[41]*	8501XO11	8501XO11	8501XO11	8501XO11	8501XO11	8501XO11

Table 16.217: Electrically Held

Description	Form No.	TYPE L	TYPE S					
		30 A	30 A	60 A	100 A	200 A	300 A	400, 600, 800 A
		Kit	Kit	Kit	Kit	Kit	Kit	Kit
Pilot Lights (Red and Green) NEMA 1 Enclosure NEMA 3R, 4 or 12 Enclosure	P1	9999SP28R	9999SP2R 9999SP28R	9999SP3R 9999SP28R	*[42]* 9999SP14R 9999SP28R	*[43]* 9999SP28R 9999SP28R	*[43]* 9999SP28R 9999SP28R	9999SP28R 9999SP28R
Push Buttons *[44]* NEMA 1 Enclosure	A12	9999BLX 9999SA10	9999SA10	9999SA10	9999SA3	9999SA3	9999SA3	9999SA3
NEMA 3R, 4 or 12 Enclosure		9999SA3	9999SA3	9999SA3	9999SA3	9999SA3	9999SA3	9999SA3
Selector Switch (2 Position) NEMA 1 Enclosure	C6	9999BLX 9999SC22	9999SC22	9999SC22	9999SC22	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1
NEMA 3R, 4 or 12 Enclosure		9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BM1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1	9001KN244 9001KS11BH1
Selector Switch (3 Position) NEMA 1 Enclosure	C	9999BLX 9999SC2	9999SC2	9999SC2	9999SC2	9999SC8	9999SC8	9999SC8
NEMA 3R, 4 or 12 Enclosure		9999SC8	9999SC8	9999SC8	9999SC8	9999SC8	9999SC8	9999SC8

[38] No field installed kit available.
[39] Mechanically held contactors need two distinct signals to operate. An N.O. contact block must be added to the Class 9999 Type SA3 push button kit.
[40] Form R6 available for 24 V, 120 V, 240 V and 277 V only.
[41] Insert CA2SK11( ) voltage code from page 23-21.
[42] 2- or 3-pole only. For 4- or 5-pole use Class 9999SP15R.
[43] The coil voltage must be the same as the pilot light rating. Kit contains one (1) Class 9001, Type KP1R6 120 V/60 Hz red pilot light control unit. For other voltages, refer to the Class 9001, Type KP Control Section.
[44] Requires holding circuit interlock for Type S or additional power pole on Type L devices.

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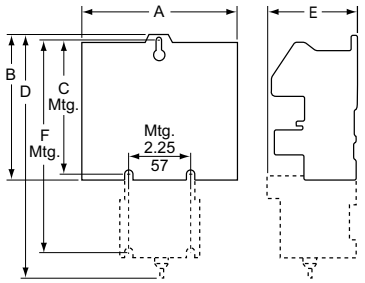
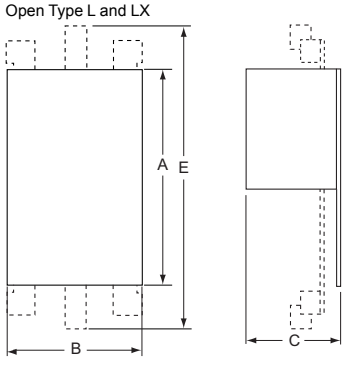
Open Type

Table 16.218: Open Type

Electrically Held								Mechanically Held						
Rating (A)	Type	No. of Poles	Dimensions				Type	Dimensions					
			A	B	C	E		A	B	C	D	E	F
30	LO	2–4	**2.88** 73	**5** 127	**4.62** 117	**3.12** 79	LXO	**2.88** 73	—	—	**8.81** 224	**3.25** 83	**7.70** 196
		6	**4.25** 108	**5** 127	**4.62** 117	**3.12** 79		**4.25** 108	—	—	**8.81** 224	**3.25** 83	**7.70** 196
		8–12	**5.63** 143	**5** 127	**4.62** 117	**3.12** 79		**5.63** 143	—	—	**8.81** 224	**3.25** 83	**7.70** 196
30	SMO	2–3	**4.34** 110	**3.22** 82	**4.22** 107	**3.50** 89	—	**7.15** 182	**3.79** 96	**4.68** 119	—	**6.04** 153	—
		4–5	**4.34** 110	**4.25** 108	**4.22** 107	**3.50** 89	—	**7.15** 182	**4.54** 115	**4.68** 119	—	**6.04** 153	—
60	SPO	2–3	**5.33** 135	**4.31** 110	**4.94** 125	**5.50** 140	—	**8.25** 210	**4.61** 117	**5.23** 133	—	**7.81** 198	—
		4–5	**6.22** 158	**5.61** 142	**4.94** 125	**5.50** 140	—	**8.70** 221	**5.90** 150	**5.23** 133	—	**7.81** 198	—
100	SQO	2–3	**7.09** 180	**5.45** 138	**6.50** 165	**7.26** 184	—	**10.13** 257	**5.94** 151	**6.72** 171	—	**7.26** 184	—
		4–5	**7.82** 199	**9.75** 248	**6.50** 165	**7.26** 184	—	**10.56** 268	**9.75** 248	**6.72** 171	—	**7.26** 184	—
200	SVO	2–3	**9.14** 232	**6.00** 152	**6.50** 165	**9.14** 232	SVO	**11.35** 288	**6.00** 152	**6.72** 171	—	**9.14** 232	—
		4, 5*[45]*	**9.14** 232	**9.75** 248	**6.50** 165	**9.14** 232		**11.55** 293	**9.75** 248	**6.72** 171	—	**9.14** 232	—
300	SXO	2–3	**12.31** 313	**8.66** 220	**8.74** 222	**12.25** 311	SXO	**12.31** 313	**8.66** 220	**10.50** 267	—	**12.31** 313	—
400	SYO	2–3	—	**12.33** 313	**9.00** 229	**27.78** 706	SYO	—	**8.66** 220	**10.50** 267	—	**21.00** 533	—
600	SZO						SZO						
800	SJO	2–3	—	**12.33** 313	**11.94** 303	**42.70** 1085	—	—	—	—	—	—	—



Open Type L and LX



Open Type S

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

[45] 5-Pole, electrically held only.

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NEMA 1

Table 16.219: NEMA 1 Non-Combination Lighting Contactors, Electrically Held (EH) and Mechanically Held (MH)
(See Table 16.220 Figures for NEMA 1 Non-Combination Lighting Contactors, page 16-81)

Rating (A)	Type	No. of Poles	Form(s)		Fig.	Dimensions, in. (mm)											
						A	B	C	D	E	F	G	H	I	J	K	L
30	LG, LXG	Any	Standard, A3, A12, C, C6, F, P, R6, Y48		A	**7.81** (198)	**12.69** (322)	**6.03** (153)	—	**1.09** (28)	**10.50** (267)	**1.09** (28)	**1.09** (28)	**5.63** (143)	**5.75** (146)	**1.09** (28)	**5.63** (143)
			P, T		B	**11.88** (302)	**11.88** (302)	**7.44** (189)	**9.75** (248)	**1.06** (27)	**1.06** (27)	**9.75** (248)	**1.06** (27)	**1.06** (27)	**0.31** (8)	—	—
			K14, K141, K142		A	**16.00** (406)	**22.00** (559)	**7.38** (188)	**8.00** (203)	**1.00** (25)	**20.00** (508)	**1.00** (25)	**1.00** (25)	**14.00** (356)	**7.38** (188)	**1.00** (25)	**7.00** (178)
30	SMG	2-5	EH	Standard, A12, C, C6, P, X	A	**6.00** (152)	**10.00** (254)	**5.28** (134)	**3.00** (76)	**0.88** (22)	**8.13** (206)	**1.00** (25)	**0.94** (24)	**4.13** (105)	**5.00** (127)	—	—
			MH	Standard, X													
			EH	T	A	**6.34** (161)	**15.88** (403)	**5.19** (132)	**14.38** (365)	**4.66** (118)	**0.28** (7)	**0.75** (19)	**0.84** (21)	—	—	—	—
				N	B	**14.88** (378)	**14.12** (359)	**7.56** (192)	**12.75** (324)	**1.06** (27)	**1.06** (27)	**12.00** (305)	**1.06** (27)	**1.06** (27)	**0.31** (8)	—	—
			MH	T, N, R6													
				A3, C, C6, P	B	**8.12** (206)	**14.12** (359)	**9.73** (247)	**6.00** (152)	**1.06** (27)	**1.06** (27)	**12.00** (305)	**1.06** (27)	**1.06** (27)	**0.31** (8)	—	—
60	SPG	2-3	EH	Standard, A12, C, C6, P, X	A	**7.81** (198)	**12.69** (322)	**6.03** 153)	—	**1.09** (28)	**10.50** (267)	**1.09** (28)	**1.09** (28)	**5.63** (143)	**5.75** (146)	**1.09** (28)	**5.63** (143)
		4-5	EH	Standard, A12, C, C6, P, X	B	**8.12** (206)	**14.12** (359)	**9.73** (247)	**6.00** (152)	**1.06** (27)	**1.06** (27)	**12.00** (305)	**1.06** (27)	**1.06** (27)	**0.31** (8)	—	—
		2-5	EH, MH	T, N, R6	B	**14.88** (378)	**14.12** (359)	**7.56** (192)	**12.75** (324)	**1.06** (27)	**1.06** (27)	**12.00** (305)	**1.06** (27)	**1.06** (27)	**0.31** (8)	—	—
		2-5	MH	Standard, A3, C, C6, P, X	B	**8.12** (206)	**14.12** (359)	**9.73** (247)	**6.00** (152)	**1.06** (27)	**1.06** (27)	**12.00** (305)	**1.06** (27)	**1.06** (27)	**0.31** (8)	—	—
100	SQG	2, 3 *[46]*	EH	Standard, A12, C, C6, F, P, X, T	B	**11.25** (286)	**25.15** (639)	**8.99** (288)	**8.60** (218)	**1.25** (32)	**1.25** (32)	**22.32** (567)	**1.42** (36)	**1.42** (36)	**0.44** (11)	—	—
			MH	Standard, F, X, T													
		2, 3	EH	N, R6, T, T10-T13 *[47]*	B	**18.15** (461)	**29.15** (740)	**9.24** (234)	**15.50** (394)	**9.24** (234)	**1.33** (34)	**26.50** (673)	**1.33** (34)	**1.33** (34)	**0.44** (11)	—	—
			MH	A3, C, C6, N, R6, T, T10-T13 *[48]*													
		4, 5	EH	Standard, A12, C, C6, F, P, X	B	**11.25** (286)	**25.15** (639)	**8.99** (288)	**8.60** (218)	**1.25** (32)	**1.25** (32)	**22.32** (567)	**1.42** (36)	**1.42** (36)	**0.44** (11)	—	—
			MH	Standard, F, X													
			EH	*[48]*	B	**18.15** (461)	**29.15** (740)	**9.24** (234)	**15.50** (394)	**9.24** (234)	**1.33** (34)	**26.50** (673)	**1.33** (34)	**1.33** (34)	**0.44** (11)	—	—
			MH	A3, C, C6 *[48]*													
			EH, MH	N, R6, T, T10-T13	B	**22.15** (563)	**39.15** (994)	**10.24** (260)	**19.50** (495)	**1.33** (34)	**1.33** (34)	**36.50** (927)	**1.33** (34)	**1.33** (34)	**0.44** (11)	—	—
200	SVG	All	EH, MH	Standard and All Forms	B	**22.15** (563)	**39.15** (994)	**10.24** (260)	**19.50** (495)	**1.33** (34)	**1.33** (34)	**36.50** (927)	**1.33** (34)	**1.33** (34)	**0.44** (11)	—	—
300	SXG	All	EH, MH	Standard and All Forms	B	**17.21** (437)	**44.21** (1123)	**12.83** (325)	**13.00** (330)	**2.11** (54)	**2.11** (54)	**40.00** (1016)	**2.11** (54)	**2.11** (54)	**0.56** (14)	—	—
400, 600	SYG, SZG	All	EH, MH	Standard and All Forms	B	**20.21** (513)	**65.75** (1670)	**13.10** (333)	**11.00** (972)	**4.61** (117)	**4.61** (117)	**64.50** (1638)	**0.63** (16)	**0.63** (16)	**0.69** (18)	—	—
800	SJG	2-3	With or Without Any Forms		C	**34.50** (876)	**93.00** (2362)	**23.50** (597)	Floor Mounting								

Table 16.220: Figures for NEMA 1 Non-Combination Lighting Contactors—See Table 16.219 NEMA 1 Non-Combination Lighting Contactors, page 16-81

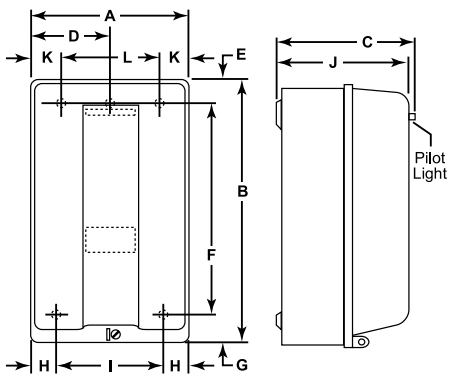

Figure A

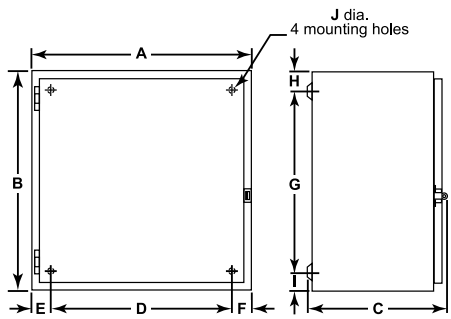

Figure B

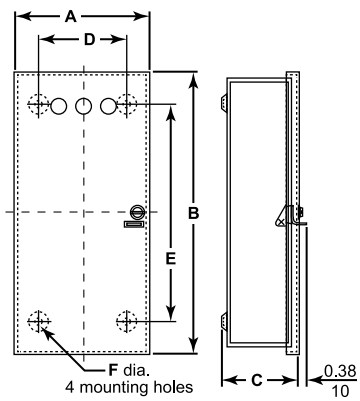

Figure C

[46] Factory transformer only.
[47] All Type K Forms.
[48] All Type K Forms.

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NEMA 1 Flush Mounting

Table 16.221: NEMA 1 Flush Mounted Enclosures

Rating (A)	Type	Form(s)		Dimensions A	B	C	D	E	F	G
30	LF LXF	Standard, F, Y48, R6		**15.19** 386	**8.94** 227	**7.63** 194	**12.88** 327	**5.44** 138	**10.94** 278	**5.13** 130
		A3, A12, C, C6, T, P		**24.00** 610	**17.50** 445	**15.00** 381	**19.25** 489	**7.12** 181	—	—
30	SMF	EH	Std., A12, C, C6, P, X	**13.44** 341	**7.19** 183	**5.88** 149	**11.13** 283	**4.75** 121	**9.19** 233	**4.50** 114
		MH	Std., X							
		EH	T, N	**24.00** 610	**17.50** 445	**15.00** 381	**19.25** 489	**5.75** 146	—	—
		MH	A3, C, C6, T, N, P, R6							
60	SPF	EH	Std., A12, C, C6, P, X	**15.19** 386	**8.94** 227	**7.63** 194	**12.88** 327	**5.44** 138	**10.94** 278	**5.13** 130
		MH	Std., X							
		EH	T, N	**24.00** 610	**17.50** 445	**15.00** 381	**19.25** 489	**5.75** 146	—	—
		MH	A3, C, C6, T, N, P, R6							
100	SQF	With or without any Forms		**31.00** 787	**16.75** 425	**14.25** 362	**26.25** 667	**8.00** 203	—	—

EH = Electrically Held. MH = Mechanically Held.

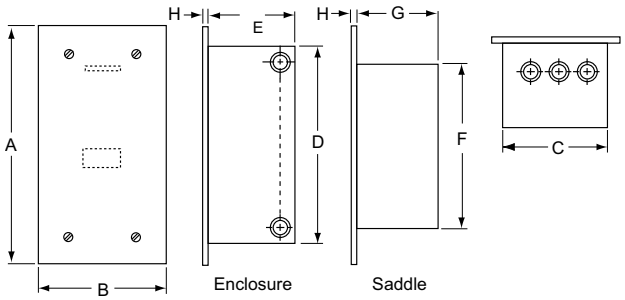

Figure 16.26: NEMA 1 Flush Mounted

Dimensions: **in.** mm

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NEMA 3R, 4, and 4X

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.222: NEMA 3R Enclosures

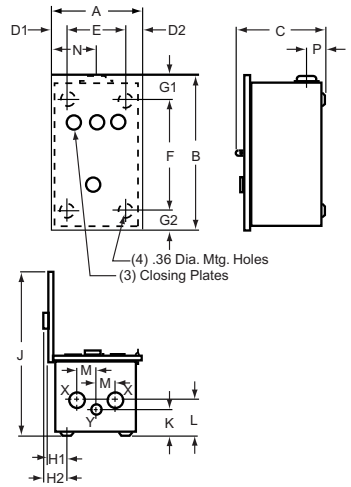
Rating (A)	Type	No. of Poles	A	B	C	D1	D2	E	F	G1	G2	H1	H2	J	K	L	M	N	P	K.O. X	K.O. Y
30	SMH	All	8.83 224	12.30 312	7.12 181	1.39 35	1.44 37	6.00 152	7.50 191	2.64 67	2.16 55	2.08 53	2.62 66	14.28 363	1.37 35	1.37 35	1.88 48	4.38 111	1.83 46	0.5 0.75 1	0.5 0.75 1
30	LH	All	9.83 250	16.30 414	8.62 219	1.39 35	1.44 37	7.00 178	11.50 292	2.64 67	2.16 55	2.08 53	2.62 66	16.78 426	1.31 33	1.75 44	2.13 54	4.88 124	1.83 46	1 1.25 1.5	0.5 0.75
60	SPH																				
100	SQH	All	12.83 326	25.30 643	8.62 219	1.39 35	1.44 37	10.00 254	20.50 521	2.64 67	2.16 55	2.08 53	2.62 66	19.78 502	1.31 33	1.94 49	2.44 62	6.38 162	1.83 46	1 1.25 2 2.5	0.5 0.75
200	SVH	All	12.83 326	40.30 1024	9.12 232	1.39 35	1.44 37	10.00 254	35.50 902	2.64 67	2.16 55	2.08 53	2.62 66	20.28 515	1.31 33	2.31 59	2.69 68	6.38 162	1.83 46	1 1.25 2 2.5	0.5 0.75

Table 16.223: NEMA 4 and 4X Stainless Steel Only Enclosures *[49]*

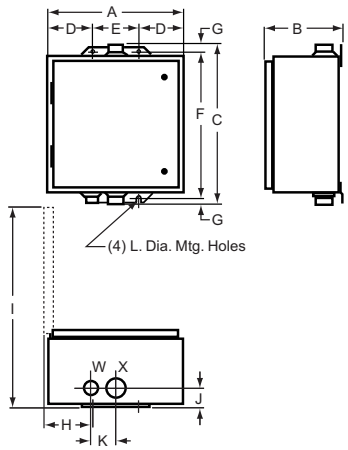
Rating (A)	Type	No. of Poles	Forms		Dimensions for Stainless Steel Enclosures												Bottom Hub Only	Top & Bottom Hub
					A	B	C	D	E	F	G	H	I	J	K	L	W	X
30	LW LXW	Any	Standard, F, R6, Y48		8.13 206	7.88 200	16.19 411	1.56 40	5.00 127	15.00 381	0.60 15	1.94 49	14.75 375	2.00 51	2.63 67	0.31 8	0.75	1.5
			A3, A12, C, C6, P, T		12.62 321	7.81 198	14.69 373	2.56 65	7.50 191	13.50 343	0.63 16	3.38 86	18.44 468	1.69 43	2.31 59	0.31 8	0.75	1
30	SMW	2–5	EH	Std., A12, C, C6, P, X	6.38 162	7.13 181	13.19 335	1.56 40	3.25 83	12.00 305	0.63 16	1.19 30	11.81 300	1.63 41	2.31 59	0.31 8	0.75	1
			MH	Std., F, X														
			EH	T	12.63 321	7.11 181	14.69 373	2.56 65	7.50 191	13.50 343	0.63 16	3.19 81	18.50 470	1.64 42	2.31 59	0.31 8	0.75	1
			EH	N, R6	14.88 378	7.25 184	16.31 414	2.56 65	9.75 248	15.00 381	0.63 16	3.19 81	20.88 530	2.06 52	2.63 67	0.31 8	0.75	1.5
			MH	A3, C, C6, T, N, P, R6														
60	SPW	2–5	EH	Std., A12, C, C6, P, X	8.13 206	7.88 200	16.19 411	1.56 40	5.00 127	15.00 381	0.60 15	1.94 49	14.75 375	2.00 51	2.63 67	0.31 8	0.75	1.5
			MH	Std., A3, C, C6, P, X														
			EH	T, N, R6	14.88 378	7.25 184	16.31 414	2.56 65	9.75 248	15.00 381	0.63 16	3.88 98	20.88 530	2.06 52	2.63 67	0.31 8	0.75	1.5
			MH	A3, C, C6, T, N, P, R6														
100	SQW	2–3	EH	Std., A12, C, C6, F, N, R6, P, T, T10-13, X	18.15 461	8.77 223	32.21 818	3.08 78	12.00 305	30.50 775	0.61 15	3.67 93	26.71 678	2.58 66	3.19 81	0.44 11	0.75	2.5
			MH	Std., A3, C, C6, F, N, P, R6, T, T10-13, X														
		4–5	EH	Std., A12, C, C6, F, P *[50]*	18.15 461	8.77 223	32.21 818	3.08 78	12.00 305	30.50 775	0.61 15	3.67 93	26.71 678	2.58 66	3.19 81	0.44 11	0.75	2.5
			MH	Std., A3, C, C6, P *[50]*														
			EH	N, R6, T, T10-13	22.15 563	9.77 248	42.21 1072	3.08 78	16.00 406	40.50 1029	0.61 15	3.67 93	31.71 805	2.33 59	2.88 73	0.44 11	0.75	2.5
			MH	N, R6, T, T10-13														
200	SVW	All	EH, MH	Standard and All Forms	22.15 563	9.77 248	42.21 1072	3.08 78	16.00 406	40.50 1029	0.61 15	3.67 93	31.71 805	2.33 59	2.88 73	0.44 11	0.75	2.5
300	SXW	All	EH, MH	Standard and All Forms	17.21 437	12.63 321	47.21 1199	4.11 104	9.00 229	46.00 1168	0.61 15	4.59 117	28.32 719	3.11 79	5.75 146	0.56 14	0.75	3.5
400, 600	SYW SZW	All	EH, MH	Standard and All Forms	20.21 513	12.13 308	65.21 1656	4.11 104	12.00 305	64.00 1626	0.61 15	4.59 117	30.82 783	2.67 68	4.50 114	0.56 14	0.75 *[51]*	Two 3 *[51]*
800	SJW	2–3	With or without any Forms		34.50 876	23.50 597	101.00 2565	Floor Mounting										

EH = Electrically Held. MH = Mechanically Held.

NEMA 3R Enclosures



NEMA 4 and 4X Enclosures



Dimensions: **in.** mm

[49] For glass polyester enclosures (through 100 A), see Table 16.105.
[50] All Type K Forms.
[51] X hub is 1/4" left of center. W hub shown is another X hub. K dimension is distance between two X hubs. Actual W hub is located 3-3/16" to the right of X hub shown.

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NEMA 12/3R and Night-Master™, NEMA 3R

Table 16.224: See Figures: NEMA 12/3R (30–600 A) and NEMA 12/3R (800 A) (EH = Electrically Held; MH = Mechanically Held)

Ampere Rating	Type	Number of Poles	Form(s)		Dimensions A	B	C	D	E	F	G	H	I	J
30	LA LXA	Any	Standard, F, R6, Y48		**8.13** 206	**8.50** 216	**15.75** 400	**1.56** 40	**5.00** 127	**15.00** 381	**0.31** 8	**2.13** 54	**14.75** 375	**0.31** 8
			A3, A12, C, C6, P, T		**14.88** 378	**7.88** 200	**16.00** 406	**2.56** 65	**9.75** 248	**15.00** 381	**0.5** 13	**3.66** 93	**21.25** 540	**0.31** 8
30	SMA	2-5	EH	Std., A12, C, C6, P, X	**6.38** 162	**8.53** 217	**12.75** 324	**1.56** 40	**3.25** 83	**12.00** 305	**0.38** 10	**3.56** 90	**12.50** 318	**0.31** 8
			MH	Std., F, P, X										
			EH	T	**11.88** 302	**7.75** 197	**13.50** 343	**2.56** 65	**6.75** 171	**12.75** 324	**0.38** 10	**3.66** 93	**18.12** 460	**0.31** 8
			EH	N, R6	**14.88** 378	**7.88** 200	**16.00** 406	**2.56** 65	**9.75** 248	**15.00** 381	**0.50** 13	**3.66** 93	**21.25** 540	**0.31** 8
			MH	A3, C, C6, T, N, P, R6										
60	SPA	2-5	EH	Std., A12, C, C6, P, X	**8.13** 206	**9.28** 236	**16.00** 406	**1.56** 40	**5.00** 127	**15.00** 381	**0.50** 13	**3.66** 93	**15.38** 391	**0.31** 8
			MH	Std., A3, C, C6, P, X										
			EH	T, N, R6	**14.88** 378	**7.88** 200	**15.75** 400	**2.56** 65	**9.75** 248	**15.00** 381	**0.38** 10	**3.66** 93	**21.25** 540	**0.31** 8
			MH	A3, C, C6, T, N, P, R6										
100	SQA	2, 3	EH	Std., A12, C, C6, F, N, R6, P, T, T10-13, X	**18.15** 461	**9.24** 235	**31.50** 800	**3.08** 78	**12.00** 305	**30.50** 775	**0.50** 13	**3.67** 93	**26.71** 678	**0.44** 11
			MH	Std., A3, C, C6, F, N, P, R6, T, T10-13, X										
		4, 5	EH	Std., A12, C, C6, F, N, P, *[52]*										
			MH	Std., A3, C, C6, P, *[52]*										
			EH	N, R6, T, T10-13, *[52]*	**22.15** 563	**10.24** 260	**41.50** 1054	**3.08** 78	**16.00** 406	**40.50** 1029	**0.50** 13	**3.67** 93	**31.71** 805	**0.44** 11
			MH	N, R6, T, T10-13, *[52]*										
200	SVA	All	EH and MH	Standard and All Forms	**22.15** 563	**10.24** 260	**41.50** 1054	**3.08** 78	**16.00** 406	**40.50** 1029	**0.50** 13	**3.67** 93	**31.71** 805	**0.44** 11
300	SXA	All	EH and MH	Standard and All Forms	**17.21** 437	**13.33** 339	**47.00** 1194	**4.11** 104	**9.00** 229	**46.00** 1168	**0.50** 13	**4.59** 117	**28.32** 719	**0.56** 14
400, 600	SYA, SZA	All	EH and MH	Standard and All Forms	**20.21** 513	**13.00** 330	**65.00** 1651	**4.11** 104	**12.00** 305	**64.00** 1626	**0.50** 13	**5.31** 135	**30.87** 784	**0.69** 18
800	SJA	2-3	With or without any Forms		**93.00** 2362	**34.50** 876	**23.50** 597	Floor Mounting						

Table 16.225: Night-Master™ Outdoor Lighting Contactors (Short Version)—NEMA 3R Enclosures (see Figure: Night-Master Style)

Ampere Rating	Description	Type Number	A	B	C	D	E	F	G	H	J *[53]*	K	L	M	Knockouts N	P	Q
30	Disconnect Switch and Circuit Breaker Types	SMC61, 62, 81	**23.50** 597	**15.00** 381	**8.42** 214	**10.50** 267	**19.00** 483	**22.38** 568	**7.00** 178	**2.18** 55	1.50 38	**2.13** 54	**2.13** 54	**2.13** 54	0.50–0.75	1–1.25 1.50	0.50–0.75
60		SPC61, 62, 81															
100		SQC61, 62, 81	**34.53** 877	**20.00** 508	**8.42** 214	**10.50** 267	**30.04** 763	**33.41** 849	**7.00** 178	**2.18** 55	**2.0** 51	**2.68** 68	**2.68** 68	**3.44** 87	0.50–0.75	1–1.25 2–2.50	1–1.25 1.5-2.0
200	Disconnect Switch Type	SVC61, 62	**48.37** 1229	**19.00** 483	**9.12** 232	**10.53** 267	**44.00** 1118	**47.25** 1200	**7.00** 178	**2.18** 55	**2.50** 64	**2.68** 68	**2.68** 68	**3.44** 87	0.50–0.75	1–1.25 2–2.50	1–1.25 1.5–2.0
	Circuit Breaker Type	SVC81															

Table 16.226: Night-Master™ Outdoor Lighting Contactors (Long Version)—NEMA 3R Enclosures (see Figure: Night-Master Style)

Ampere Rating	Description	Type Number	A	B	C	D	E	F	G	H	J *[53]*	K	L	M	Knockouts N	P	Q
30	Disconnect Switch and Circuit Breaker Types	SMC63, 64, 83	**38.88** 987	**15.00** 381	**8.42** 214	**10.42** 265	**34.38** 873	**37.76** 959	**7.00** 178	**2.18** 55	**1.50** 38	**2.13** 54	**2.13** 54	**2.13** 54	0.50–0.75	1–1.25 1.50	0.50–0.75
60		SPC63, 64, 83															
100		SQC63, 64, 83	**42.53** 1080	**20.00** 508	**8.42** 214	**10.42** 265	**38.04** 966	**41.41** 1052	**7.00** 178	**2.18** 55	**2.0** 51	**2.68** 68	**2.68** 68	**3.44** 87	0.50–0.75	1–1.25 2–2.50	1.–1.25 1.5–2.0
200	Disconnect Switch Type	SVC63, 64	**56.37** 1432	**19.00** 483	**9.12** 232	**10.53** 267	**52.00** 1321	**55.25** 1403	**7.00** 178	**2.18** 55	**2.50** 64	**2.68** 68	**2.69** 68	**3.44** 87	0.50–0.75	1–1.25 2–2.50	1–1.25 1.5–2.0
	Circuit Breaker Type	SVC83															

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

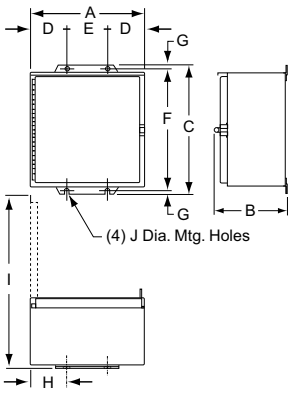

Figure 16.27: NEMA 12/3R (30–600 A)

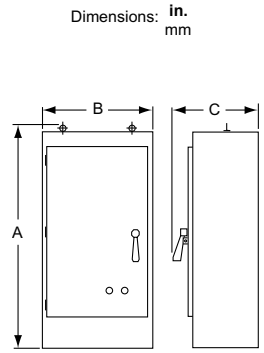

Figure 16.28: NEMA 12/3R (800 A)

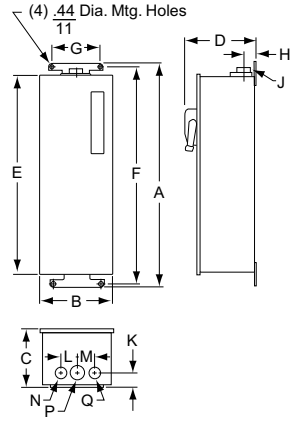

Figure 16.29: Night-Master Style

[52] All Type K Forms using Class 9001 Type K control units.
[53] Conduit size.

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Combination Lighting Contactors

Table 16.227: See Figure: NEMA 1 Enclosure, Combination Devices

Ampere Rating	Type	Dimensions *[54]*															Top & Bot.		Sides
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	W	X	Y
30	SMG6_, SMG8_	**9.50** 241	**22.50** 572	**8.37** 213	**6.38** 162	**20.50** 521	**14.68** 373	**1.81** 46	**1.69** 43	**3.37** 86	**3.38** 86	**1.06** 27	**3.25** 83	**2.18** 55	**1.25** 32	**0.87** 22	0.50-0.75	0.50-0.75	.50
	SMG7_, SMG9_	**13.75** 349	**23.00** 584	**8.36** 212	**10.63** 270	**21.00** 533	**20.07** 510	**1.87** 47	**1.88** 48	**3.76** 96	**2.06** 52	**1.06** 27	**3.25** 83	**2.18** 55	**1.25** 32	**0.87** 22	0.50-0.75-1.0	0.50-0.75-1.0	.50
60	SPG6_, SPG8_	**10.50** 267	**26.00** 660	**9.62** 244	**7.37** 187	**24.00** 610	**17.00** 432	**2.12** 54	**2.00** 51	**4.00** 102	**2.06** 52	**1.06** 27	**3.25** 83	**2.18** 55	**1.25** 32	**0.87** 22	1.0-1.25	0.50-0.75	.50
	SPG7_, SPG9_	**15.00** 381	**28.75** 730	**9.62** 244	**11.62** 295	**26.25** 667	**21.50** 546	**2.18** 55	**2.00** 51	**4.00** 102	**2.56** 65	**1.31** 33	**3.25** 83	**2.18** 55	**1.25** 32	**0.87** 22	1.0-1.25	0.50-0.75	.50

Table 16.228: See Figure: NEMA 1 Enclosure

Ampere Rating	Type	Dimensions *[54]*															Top & Bot.		Sides
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	W	X	Y
100	SQG6_, SQG7_ SQG81, SQG91	**15.25** 387	**39.50** 1003	**10.60** 269	**9.25** 235	**3.00** 76	**22.68** 576	**41.00** 1041	**2.69** 68	**5.38** 137	**2.83** 72	**3.74** 95	**5.00** 127	—	**1.21** 31	**0.90** 23	1.-1.25 2.-2.50	0.50-0.75	0.50
200	SVG6_, SVG7_ SVG81, SVG91	**16.00** 406	**50.00** 1270	**10.68** 271	**10.00** 254	**3.00** 76	**23.68** 601	**51.50** 1308	**2.69** 68	**5.38** 137	**2.83** 72	**3.74** 95	**5.00** 127	—	**1.21** 31	**0.90** 23	2.50	0.50-0.75	0.50
300	SXG6_, SXG7_	**20.00** 508	**75.00** 1905	**14.37** 365	**12.00** 305	**4.00** 102	**29.43** 748	**77.00** 1956	**3.19** 81	—	**3.52** 89	**7.00** 178	**9.25** 235	—	—	—	0.50-0.75	3.00	—
	SXG81, SXG91	**20.00** 508	**63.00** 1600	**14.37** 365	**12.00** 305	**4.00** 102	**27.43** 697	**65.00** 1651	**3.19** 81	—	**3.52** 89	**7.00** 178	**5.00** 127	—	—	—	0.50-0.75	3.00	—
400	SYG81, SYG91	**36.00** 914	**90.00** 2286	**17.00** 432	Floor Mounting Enclosure												—	—	—
600	SZG81, SZG91																		

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

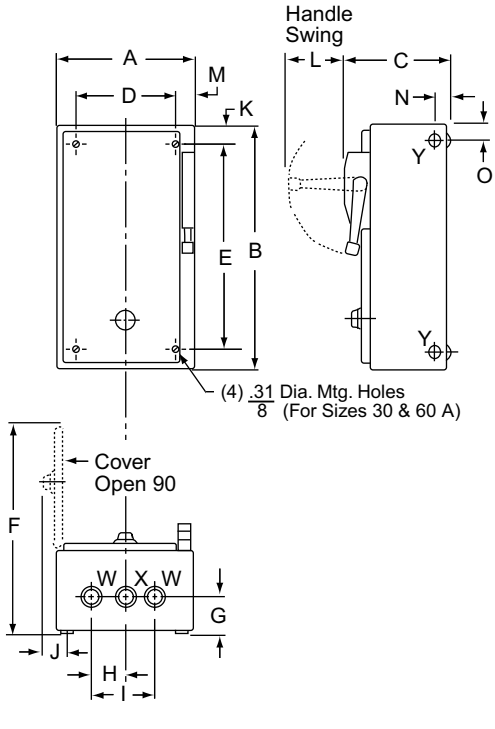

Figure 16.30: NEMA 1 Enclosure, Combination Devices

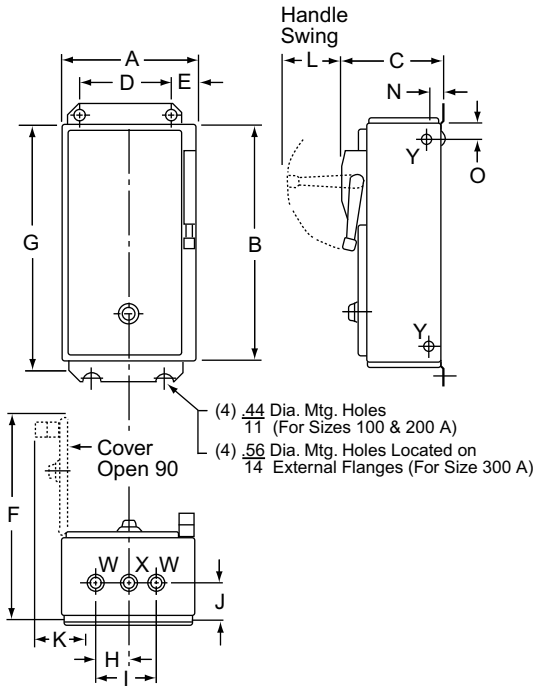

Figure 16.31: NEMA 1 Enclosure

[54] Dimensions are the same for **Form F4T** (standard control transformer), **Form F4T11** (100 VA extra capacity) and **Form F4T12** (200 VA extra capacity).

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Table 16.229: See Figure: NEMA 4, 4X Enclosure

Ampere Rating	Type	Dimensions *[55]*													
		A	B	C	D	E	F	G	H	I	J	K	L	W	X
30	SMW6_, SMW8_	**9.50** 241	**8.36** 212	**24.76** 629	**3.25** 83	**2.50** 64	**4.50** 114	**23.50** 597	**0.63** 16	**3.00** 76	**1.62** 41	**2.31** 59	**14.31** 363	0.75 Hub	1.0 Hub
	SMW7_, SMW9_	**13.75** 349	**8.36** 212	**25.26** 642	**3.25** 83	**4.75** 121	**4.25** 108	**24.00** 610	**0.63** 16	**5.25** 133	**1.62** 41	**2.31** 59	**20.14** 512	0.75 Hub	1.0 Hub
60	SPW6_, SPW8_	**10.50** 267	**9.61** 244	**28.26** 718	**3.25** 83	**2.50** 64	**5.50** 140	**27.00** 686	**0.63** 16	**3.00** 76	**2.00** 51	**2.63** 67	**16.56** 421	0.75 Hub	1.50 Hub
	SPW7_, SPW9_	**15.00** 381	**9.61** 244	**31.01** 788	**3.25** 83	**5.38** 137	**4.25** 108	**29.75** 756	**0.63** 16	**5.88** 149	**2.00** 51	**2.63** 67	**21.06** 535	0.75 Hub	1.50 Hub
100	SQW6_, SQW7_ SQW81, SQW91	**15.25** 387	**10.60** 269	**41.76** 1061	**5.00** 127	**2.50** 64	**10.25** 260	**40.50** 1029	**0.63** 16	**3.24** 82	**2.61** 66	**3.19** 81	**22.18** 563	0.75 Hub	2.50 Hub
200	SVW6_, SVW7_ SVW81, SVW91	**16.00** 406	**10.56** 268	**52.26** 1327	**5.00** 127	**2.50** 64	**11.00** 279	**51.00** 1295	**0.63** 16	**3.24** 82	**2.61** 66	**3.19** 81	**23.00** 584	0.75 Hub	2.50 Hub
300	SXW6_, SXW7_	**20.00** 508	**14.21** 361	**78.12** 1984	**9.25** 235	**4.00** 102	**12.00** 305	**77.00** 1956	**0.56** 14	**4.77** 121	**2.96** 75	**3.50** 89	**29.43** 748	0.75 Hub	3.50 Hub
	SXW81, SXW91	**20.00** 508	**14.21** 361	**66.12** 1679	**5.00** 127	**4.00** 102	**12.00** 305	**65.00** 1651	**0.56** 14	**4.77** 121	**2.96** 75	**3.50** 89	**27.43** 697	0.75 Hub	3.50 Hub
400	SYW81, SYW91	**36.00** 914	**17.71** 450	**98.00** 2489	Floor Mounting Enclosure									—	—
600	SZW81, SZW91														

Table 16.230: See Figure: NEMA 12/3R Enclosure

Ampere Rating	Type	Dimensions *[55]*									
		A	B	C	D	E	F	G	H	I	J
30	SMA6_, SMA8_	**9.50** 241	**8.36** 212	**24.26** 616	**3.25** 83	**2.50** 64	**4.50** 114	**23.50** 597	**0.38** 10	**3.25** 83	**14.31** 363
	SMA7_, SMA9_	**13.75** 349	**10.10** 257	**24.76** 629	**3.25** 83	**4.75** 121	**4.25** 108	**24.00** 610	**0.38** 10	**5.50** 140	**22.00** 559
60	SPA6_, SPA8_	**10.50** 267	**9.61** 244	**27.76** 705	**3.25** 83	**2.50** 64	**5.50** 140	**27.00** 686	**0.38** 10	**3.25** 83	**16.56** 421
	SPA7_, SPA9_	**15.00** 381	**10.98** 279	**30.51** 775	**3.25** 83	**5.38** 137	**4.25** 108	**29.75** 756	**0.38** 10	**6.13** 156	**23.43** 595
100	SQA6_, SQA7_ SQA81, SQA91	**15.25** 387	**10.59** 269	**42.00** 1067	**5.00** 127	**3.00** 76	**9.25** 235	**41.00** 1041	**0.50** 13	**3.75** 95	**22.31** 567
200	SVA6_, SVA7_ SVA81, SVA91	**16.00** 406	**10.52** 267	**52.50** 1334	**5.00** 127	**3.00** 76	**10.00** 254	**51.50** 1308	**0.50** 13	**3.75** 95	**23.00** 584
300	SXA6_, SXA7_	**20.00** 508	**14.21** 361	**78.00** 1981	**9.25** 235	**4.00** 102	**12.00** 305	**77.00** 1956	**0.50** 13	**7.75** 197	**29.43** 748
	SXA81, SXA91	**20.00** 508	**14.21** 361	**66.00** 1676	**5.00** 127	**4.00** 102	**12.00** 305	**65.00** 1651	**0.50** 13	**7.75** 197	**27.43** 697
400	SYA81, SYA91	**36.00** 914	**17.71** 450	**90.00** 2286	Floor Mounting Enclosure						
600	SZA81, SZA91										

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

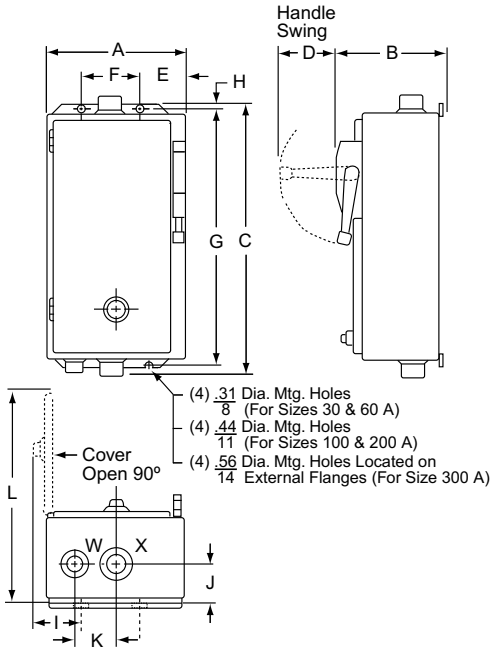

Figure 16.32: NEMA 4, 4X Enclosure

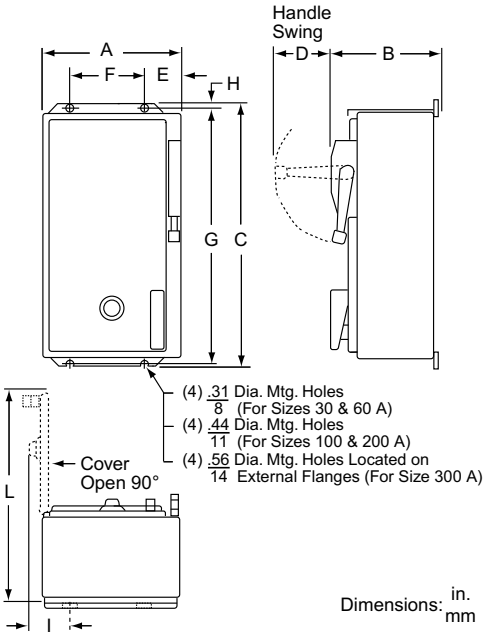

Figure 16.33: NEMA 12/3R Enclosure

[55] Dimensions are the same for **Form F4T** (standard control transformer), **Form F4T11** (100 VA extra capacity) and **Form F4T12** (200 VA extra capacity).

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8910DP22V09
Definite Purpose Contactor

8910DP42V14
Definite Purpose Contactor

8910DPA33V04
Definite Purpose Contactor

Definite purpose contactors are ideal for heating, air conditioning, refrigeration, data processing, and food service equipment. New compact 1 and 2-Pole contactors are available along with standard size 2, 3, and 4-Pole devices.

They feature quick connect terminals and binder head screws for easy wiring. Box lugs are standard on 40 A contactors and larger. An exclusive DIN track mounting option may reduce installation costs. Coils can be changed on the Type DPA contactors (50 to 90 A) quickly without a tool. Auxiliary contact modules snap on either side of the Type DPA contactors.

- Compact Design
- Industry Standard Mounting
- Double Break Contacts
- Low Coil VA
- Straight-Through Wiring
- Low Cost

Table 16.231: Coil Voltage Codes

Voltage		Code Type DP, DPA
60 Hz	50 Hz	
24	24	V14
24	—	—
120	110	V02
208	—	—
208-240	220	V09
230-240	220	—
277	—	V04
480	440	V06 *[1]*
600	550	V07 *[2]*

Table 16.232: Compact 1-Pole Contactors—600 Vac Maximum (replace ●●● with the voltage code)

Full Load Amperes	Locked Rotor Amperes			Resistive Load Amperes	N.O. Poles	Type *[3]*
	277 V	460 V	575 V			
20	120	100	80	30	1	DP11●●●
25	150	125	100	35	1	DP21●●●
30	150	125	100	40	1	DP31●●●
40	240	200	160	50 (277 V max.) 40 (above 277 V)	1	DP41●●●

Table 16.233: Compact 2-Pole Contactors—600 Vac Maximum (above 240 V, all lines must be switched) (replace ●●● with the voltage code)

Full Load Amperes	Locked Rotor Amperes			Resistive Load Amperes	N.O. Poles	Type *[3]*
	277 V	460 V	575 V			
20	120	100	80	30	2	DP12●●●
25	150	125	100	35	2	DP22●●●
30	150	125	100	40	2	DP32●●●
40	240	200	160	50	2	DP42●●●

Table 16.234: 2, 3, and 4-Pole Contactors—600 Vac Maximum (above 240 V, all lines must be switched) (replace ●●● with the voltage code)

Full Load Amperes	Locked Rotor Amperes			Resistive Load Amperes	Horsepower Ratings				N.O. Poles	Type *[3]*
	230 V	460 V	575 V		115 V 1Ø	230 V 1Ø	230 V 3Ø	460/575 V 3Ø		
20	120	100	80	30	1.5	3	7-1/2	7-1/2	2 3 4	DPA12●●● DPA13●●● DPA14●●●
25	150	125	100	35	2	5	10	15/20	2 3 4	DPA22●●● DPA23●●● DPA24●●●
30	180	150	120	40	2	5	10	15/20	2 3 4	DPA32●●● DPA33●●● DPA34●●●
40	240	200	160	50	3	7-1/2	10	20/25	2 3 4	DPA42●●● DPA43●●● DPA44●●●
50	300	250	200	65	3	10	15	30	2 3	DPA52●●● DPA53●●●
60	360	300	240	75	5	10	25	30	2 3	DPA62●●● DPA63●●●
75	450	375	300	94	5	15	25	40	2 3	DPA72●●● DPA73●●●
90	540	450	360	120	7-1/2	20	30	50	2 3	DPA92●●● DPA93●●●

[1] Not available for Type DP11 through DP31 single-pole devices.
[2] Not available for Type DP one- and two-pole devices.
[3] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes listed in Table 16.231.

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Table 16.235: 2 Normally Open & 2 Normally Closed 4-Pole Contactors—600 Vac Maximum (replace ●●● with the voltage code)

Full Load (A)	Resistive Load (A)	N.O. Poles	N.C. Poles [4]	Class 8910	
				Type [5]	Form
20	25	2	2	DPA14●●●	Y392
25	35	2	2	DPA24●●●	Y392
30	40	2	2	DPA34●●●	Y392

NOTE: N.C. poles on outside. N.C. poles open before N.O. poles close.

Table 16.236: Auxiliary Contacts, 5 A, 600 Vac Rated

For Use with Class 8910, Type	Contact Arrangement	Class 9999 Type
		20–90 A
DPA	1 N.O. 1 N.C. 1 N.O. & 1 N.C. 2 N.O.	D10 D01 D11 D20

Table 16.237: NEMA 1 General Purpose Enclosures for Type DP, DPA Contactors

Class 8910 Type	Full Load (A)	Poles	Class 9991 Type
DP	20–40	1 & 2	DPG1
DPA	20–40	2 & 3	DPG1
DPA	50 20–40	2 & 3 4	DPG2
DPA	60–75	2 & 3	DPG3
DPA	90	2 & 3	DPG4

Table 16.238: Terminals

Full Load (A)	Power Terminals	
	Type of Lug	Wire Range [6]
20–30 A	Binder Head	14–8
40 A	Box Lug	14–6
50–60 A	Box Lug	14–2
75–90 A	Box Lug	14–1/0

Table 16.239: Miscellaneous Parts

Description	Class 9999 Type
DIN mounting bracket attachment (Type DPA, 20–60 A)	DMB1
Type DP Series B Cover	DPC1

Table 16.240: Factory Modifications

Modification	Type	Form
Factory installed auxiliary contacts	—	[7]
Pressure wire connectors, 20–30 A	DPA	Y122
Box lugs, 20–30 A	DP DPA	Y124
DIN mounting bracket attached (35 mm style), 20–60 A	DP DPA	Y135
Contact cover for Type DP Series B	—	Y248
UL Listed label on device	DP	U1

Types DP, DPA Application Data

Factory Modifications

Auxiliary contacts can be factory installed along with a DIN mounting bracket option. Special terminations are also available.

Table 16.241: Application Data

Description	Specification
Mechanical Life (depending on the application)	500,000 operations
Electrical Life (depending on the application) Type DP Type DPA	 100,000 operations 200,000 operations
Duty Cycle	Continuous
Approvals: UL Component Recognized UL Listed (Form U1) CSA Certified DPA is CE marked	 File E3190, CCN NLDX2 File E3190, CCN NLDX File LR25490, Class 321104

NOTE: See page 16-122 for replacement contacts.

Table 16.242: Type DPA Coil Voltage Codes

Voltage, 60 Hz	Voltage, 50 Hz	Voltage Code
24	24	V14
120	110	V02
208–240	220	V09
277	—	V04
480	440	V06 [8]
600	550	V07 [8]

Table 16.243: Coil Replacement

No tools required (DPA50–60A)

Table 16.244: Class 8910 Type DPA Replacement Coils (replace ●●● with the voltage code)

Full Load (A)	Poles	Class 9998 Type [9]	Volt-Amperes [10]	
			Inrush	Sealed
50–60 A	2 & 3	DA2●●●	109	10
75–90 A	2 & 3	DA3●●●	214	19

[4] Above 240 V, all lines must be switched.
[5] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes in Table 16.242.
[6] Solid or stranded copper wire only.
[7] Contact your local Schneider Electric sales office.
[8] Available for Type DPA contactors only.
[9] Append the voltage code from Table 16.242. Example: The coil for Class 8910 Type DPA53V02, 120 V, 60 Hz is Class 9998 Type DA2**V02**.
[10] For Types DP11 through DP32: Inrush 30 VA; Sealed 5 VA.

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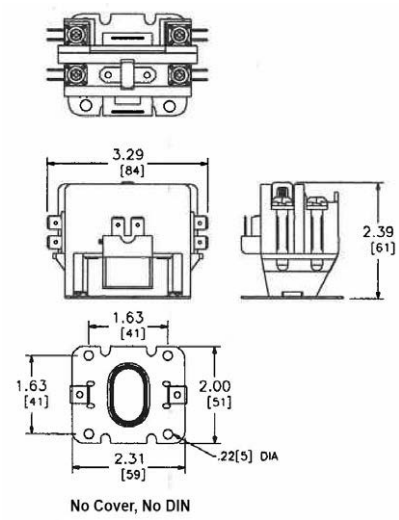
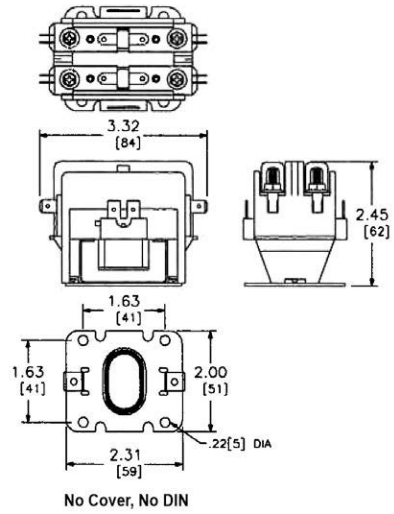
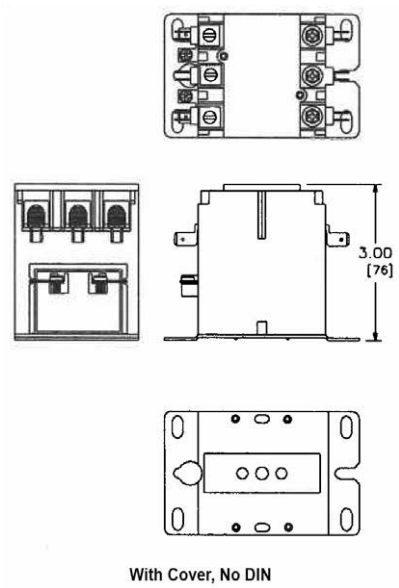
Types DP, DPA Approximate Dimensions



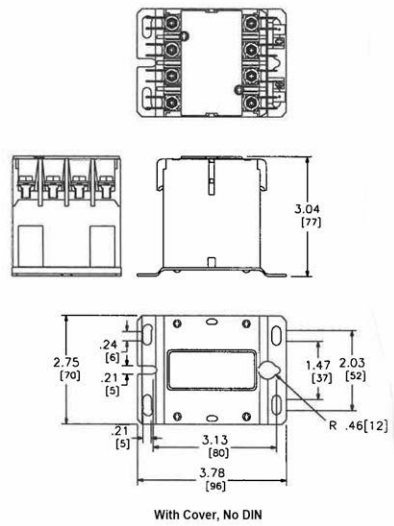
Type DP—1-Pole
20 through 40 Full Load Amperes



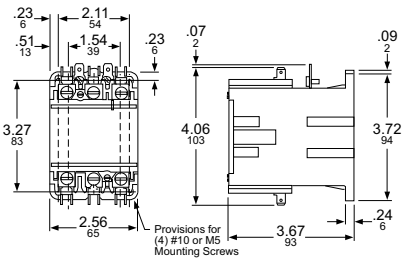
Type DP—2-Pole
20 through 40 Full Load Amperes



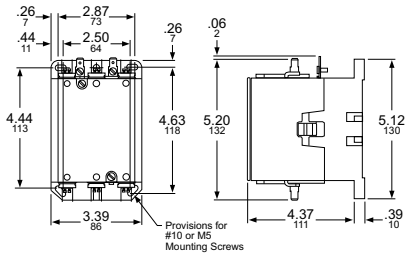
Type DPA—2 and 3-Pole
20 through 40 Full Load Amperes



Type DPA—4-Pole
20 through 40 Full Load Amperes



Type DPA—2 and 3-Pole
50 and 60 Full Load Amperes



Type DPA—2 and 3-Pole
75 and 90 Full Load Amperes

Dimensions: **in.**
mm

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8911DPSO33V09 Definite Purpose Starter

Type DPSG23V02

Types DPS and H through M

Class 8911 definite purpose starters are inexpensive starters for applications with relatively low duty cycles. Typical applications include air compressors, agricultural equipment, pumps, and HVAC equipment. Definite purpose starters offer:

- Low cost
- Small size
- Melting alloy overload block
- Trip-free reset mechanism
- Open type or enclosed
- 500,000 mechanical operations

Table 16.245: 2- and 3-Pole Starters—600 Vac Maximum

No. of Poles	Full Load (A)	Horsepower Ratings				Open Type	NEMA 1 Enclosed	No. of Thermal Units [1]
		115 V 1Ø	230 V 1Ø	230 V 3Ø	460/575 V 3Ø	Type [2], [3]	Type [2], [3]	
2-Pole Single Phase	20	1.5	3	—	—	DPSO12●●●	DPSG12●●●	1
	25	2	5	—	—	DPSO22●●●	DPSG22●●●	
	30	2	5	—	—	DPSO32●●●	DPSG32●●●	
	40	3	7.5	—	—	DPSO42●●●	DPSG42●●●	
	50	3	10	—	—	DPSO52●●●	DPSG52●●●	
3-Pole Poly-Phase	20	1.5	3	7.5	7.5	DPSO13●●●	DPSG13●●●	3
	25	2	5	10	15/20	DPSO23●●●	DPSG23●●●	
	30	2	5	10	15/20	DPSO33●●●	DPSG33●●●	
	40	3	7.5	10	20/25	DPSO43●●●	DPSG43●●●	
	50	3	10	15	30	DPSO53●●●	DPSG53●●●	

Table 16.246: Cross Reference Existing/Replacement Class 8911

Existing Device	Replacement Device
HO33	DPSO13
HG33	DPSG13
JO33	DPSO23
JG33	DPSG23
KO33	DPSO33
KG33	DPSG33
KO43	[4]
KG43	[4]
LO33	DPSO43
LG33	DPSG43
MO33	DPSO53
MG33	DPSG53
MO43	[4]
MG43	[4]

Table 16.247: Miscellaneous Parts and Kits

Description	Class & Type
Start-Stop push button kit [5]	8911DPB1
Hand-Off-Auto selector switch kit [6]	8911DSS1
Standard N.C. overload relay contact	9998SO1
N.C. and N.O. isolated overload relay alarm contacts	9999SO4
Overload relay jumper strap	9998SO31

Table 16.248: Replacement Magnet Coil for Class 8911 Type DPS

Full Load (A)	Poles	Class 9998 Type	Volt A	
			Inrush	Sealed
50 A	2 and 3	DA2 [7]	109	10

See page 16-122 for replacement contacts for DPS devices.

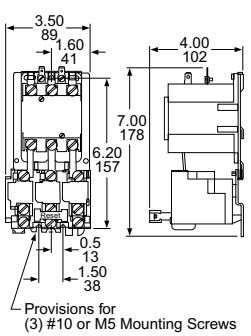
Table 16.249: Coil Voltage Codes

Voltage, 60 Hz	Voltage, 50 Hz	Voltage Code
24	24	V14
120	110	V02
208–240	220	V09
277	—	V04
480	440	V06
600	550	V07

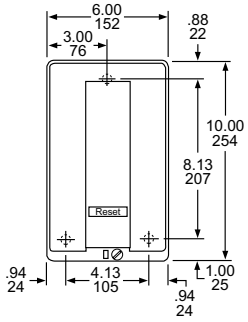
Table 16.250: Auxiliary Contacts for Type DPS Starters

Description	20–90 A
	Class 9999 Type
1 N.O.	D10
1 N.C.	D01
1 N.O./1 N.C.	D11
2 N.O.	D20

NOTE: Auxiliary contacts must be field installed.



Type DPSO—2 and 3-Pole and DSO 20–50 Full Load Amperes



Type DPSG—2 and 3-Pole 20–40 Full Load Amperes

Table 16.251: Ratings—Overload Contacts and Auxiliary Contacts

Device	Volts AC	Pilot Duty – AC Only (35% Power Factor)		Continuous Current Rating
		Make	Carry and Break	
9998 SO1 9999 SO4	120 or Less	30 A	3 A	5 A
9999 R20 & R21 9999 D10, D01, D11 & D20	120–600	3600 VA	360 VA	5 A

Table 16.252: How to Order

To Order Specify:	Catalog Number			
	Class	Typse	Coil Voltage Code	Form(s)
• Class Number • Type Number • Voltage Code • Form(s)	8911	DPSG33	V02	

[1] See page Thermal Units, page 16-130 for selection information on standard trip thermal units.
[2] Holding circuit contacts are not provided as standard; refer to Table 16.250 for kit.
[3] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes listed in Table 16.249.
[4] Type DPS 4-pole starter not available. Suggest 3-pole device with auxiliary contact.
[5] Does not include holding circuit interlock—order auxiliary contact.
[6] Use for 20 to 40 A starters. For 50 A starters, use the 9999BLX bracket.
[7] Append the coil voltage code from Table

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Type SSD4030

Type SSE4050

Class 8940 Type SS, XS Selection

Class 8940 Type SS and XS panels in NEMA 3R enclosures are specifically designed for pumping applications. Extra space is provided for field installation of auxiliary equipment.

- Type S Contactor provided as standard
- Approved for submersible pump applications
- Motor Logic™ Class 10/20 (Selectable) SSOLR through 200 hp–480 V, 100 hp–240 V. Included in the catalog number for Type SS (the H30 suffix is not required). (Includes rubber boot.)
- All prices include a Start push button and a Hand-Off-Auto selector switch
- Adjustable trip current
- Phase failure sensitive through 200 hp–480 V, 100 hp–240 V, Type SS only
- Ambient temperature compensated overload
- All devices are UL Listed, and marked “Suitable For Use As Service Equipment”

NOTE: Motor Logic™ SSOLRs are designed to protect 50/60 Hz, three-phase AC motors from overload and phase loss conditions. Open Delta systems or grounded B-phase systems are difficult to balance and could cause the Motor Logic SSOLR to trip. For applications of this nature, it is recommended that bimetallic overload relays (Form B12) be used.

Table 16.253: 3-Pole Polyphase—480 Vac Maximum (50–60 Hz)—Fusible or Thermal-Magnetic Circuit Breaker *[1]*

Volts	Maximum Hp Polyphase	Coil Voltage	Fuse Clip (A) *[2]*	Type
240	3, 5, 7.5 10, 15 20, 25, 30 40, 50 75 100 100 200 250, 300	240–60 220–50	30 60 100 200 LLL36400U31X *[3]* 400 LLL36600U31X *[3]* MJL36800 *[3]* PLL34120 *[3]*	SSC2007 *[4][5]* SSD2015 *[4][5]* SSE2030 *[4]* SSF2050 *[4]* XSG2075 *[6]* SSG2100 *[4]* XSG2100 *[6]* XSH2200 *[6]* XSJ2300 *[6]*
480	3, 5, 7-1/2, 10 15, 20, 25 30 40, 50 60, 75, 100 150 200 200 300, 350, 400 500, 600	480–60 440–50	30 60 60 100 200 LLL36400U31X*[3]* 400 LLL36600U31X *[3]* MJL36800 *[3]* PLL34120 *[3]*	SSC4010 *[4][5]* SSD4025 *[4][5]* SSD4030 *[4][5]* SSE4050 *[4]* SSF4100 *[4]* XSG4150 *[6]* SSG4200 *[4]* XSG4200 *[6]* XSH4400 *[6]* XSJ4600 *[6]*

Table 16.254: 3-Pole Polyphase—480 Vac Maximum (50–60 Hz)—Electronic Motor Circuit Protector (MCP)

Volts	Max. Hp Polyphase	Coil Voltage *[6]*	Circuit Breaker *[7]*	Type
240	30	240–60 220–50	HLL36100M73	XSE2030V03H30
	40		JLL36250M75	XSE2040V03H309 *[8]*
	50		JLL36250M75	XSF2050V03H30
480	40	480–60 440–50	HLL36100M73	XSE4040V06H30
	50			XSE4050V06H30
	75		JLL36250M75	XSE4075V06H309 *[8]*
	100		JLL36250M75	XSF4100V06H30

Table 16.255: Class 8940—UL Listed Short Circuit Ratings

NEMA Size	NEMA Fuse Class or Voltage	Enclosure	Available Amperes RMS Symmetrical
Fusible Type			
0–3	Class H or K	Standard	5,000
0–3	Class R	Standard	100,000
0–2	Class H or K	Standard	5,000
0–2	Class R	Standard	100,000
4–5	Class H or K	Standard	10,000
4–5	Class R	Standard	100,000
6	Class H or K	Standard	18,000
6	Class R	Standard	100,000
Thermal-Magnetic Circuit Breaker Type			
0-5	0-480 V	Standard	100,000
6, 7	0-480 V	Standard	65,000

NOTE: Standard enclosures include non-oversize NEMA 1, 4 & 4X Stainless, and 12.

For How to Order information, see page 16-27.

[1] To substitute an IEC ambient compensated bimetallic overload relay (up to size 5) for the Motor Logic SSOLR, request Form B12 and state motor hp (no charge). This applies to the above (SSx) devices only.
[2] Fuse clips are sized for use with dual-element time-delay fuses.
[3] Circuit breaker disconnect supplied. (See Section 7 for circuit breaker adjustment range.)
[4] A voltage code is not required for 240 V or 480 V common control with 8940SS controllers.
[5] To select a Motor Logic SSOLR with an FLA lower than the standard NEMA sizing, use the four-character **Form H30●**. See page 16-117.
[6] See Table 16.256 for coil voltage codes.
[7] See page 7-32 for circuit breaker adjustment range.
[8] FLA is 45–135.

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Type WC3S2V06

Type XE3S2V02B12S

Class 8940 Type W, X

Class 8940 style S2 pumping plant panels in NEMA 3R enclosures are specifically designed for oil field applications. All panels are supplied with an electonic motor circuit protector (MCP) or a visible blade, fused, disconnect switch. This line of pumping plant panels features:

- Rugged spring latches for easy access without a tool
- Side mounted control units for convenient operation
- Door retainer available for windy areas
- Price includes Hand-Off-Auto selector switch
- UL Listed for use as service equipment for motors
- Extra panel space for additional electrical controls
- All devices are UL Listed, and marked “SUITABLE FOR USE AS SERVICE EQUIPMENT”

Thermal units must be ordered separately. See page 16-130 for selection information.

NOTE: Motor Logic™ Class 20/30 (selectable) SSOLR, Form H30, must be included in the catalog number.

Table 16.258: 3-Pole Polyphase—480 Vac Maximum (50–60 Hz)

V	Max. Hp Poly-phase	Coil Voltage *[12]*	NEMA Size	Fusible Disconnect Type		Circuit Breaker Type	
				Fuse Clip (A) *[13]*	Type	Frame Size	Type
240	7-1/2	240–60 220–50	1	30	WC1S2V03H30 *[14]*	HLL36030M71	XC1S2V03H30 *[14]*
	10		2	60	WD1S2V03H30 *[14]*	HLL36050M72	XD1S2V03H30 *[14]*
	15					HLL36100M73	XD2S2V03H30 *[14]*
	30		3	100	WE1S2V03H30	HLL36100M73	XE1S2V03H30
	50		4	200	WF1S2V03H30	JLL36250M75	XF2S2V03H30
480	10	480–60 440–50	1	30	WC3S2V06H30	HLL36030M71	XC4S2V06H30
	15		2	60	WD3S2V06H30	HLL36030M71	XD3S2V06H30
	25		2			HLL36050M72	XD4S2V06H30
	50		3	100	WE3S2V06H30	HLL36100M73	XE3S2V06H30
	100		4	200	WF3S2V06H30	JLL36250M75	XF4S2V06H30

Table 16.259: Factory Modifications (Forms)

Description	Form Letter
Substitute Class 10 IEC overload relay – state motor hp (NEMA Sizes 0–4 only)	B12
Control transformer with fused primary: Types: • NPD, NPE, NPF, SSC, WC, XC (50 VA) • NPG, SSD, XD, WD (100 VA) • NPJ, SSE, XE, WE (150 VA) • SSF, XF, WF (300 VA) • SG, NSG, XSG (50 VA and an interposing control relay)	F4T
Factory-installed door wind latch assembly in a standard Class 8940 Type SSC, SSD, SSE, SSF, XSE, and XSF	G45
Elapsed time meter	G97
Substitute Class 10/20 (selectable) Motor Logic™ SSOLR *[15]*	H30
On Delay Timer	K25
Off Delay Timer	K26
Program timer with day omission feature	K141
Backspin timer (time delay upon energization)	K15
Start Pushbutton (S2 panels only)	A28
Slim panel (Types WC, WD, WE, XC, XD, XE only)	L8
Short panel (Types SSE, SSF, XE-S2 and XF-S2 only)	L9
Pilot light (specify lens color). Does not include auxiliary contact.	P *[16]*
Separate control	S
Auxiliary contacts (specify N.O. or N.C.)	X *[17]*
Special UL panel label for modified UL Listed devices on non-standard panels (requires approval by the manufacturing plant)	Y1
Lightning arrestor	Y1532
Move control operators from the enclosure side to the door	Y45
Phase failure, phase reversal relay with time delay including under and over voltage protection	R44
Substitute standard trip melting alloy overload relays	Y61
Substitute quick-trip melting alloy overload relay (Sizes 1 and 2 only)–Not available on IEC style contactors	Y611
Substitution of Class R rejection fuse clips for standard fuse clip. (8940 RD, RE, RF, RG, MD, ME, MF, MG, SSC, SSD, SSE, SSF, SSG, WC, WD, WE and WF)	Y1071

Table 16.256: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24 *[9] [10]*	—	V01
120 *[9]*	110 *[9]*	V02
208 *[9]*	—	V08
240	220	V03
—	380	V05
480	440	V06
600 *[9]*	550 *[9]*	V07
Specify	Specify	V99

Table 16.257: Replacement Overload Relay for Square D Class 8940 Pump Panel with IEC Style Bimetallic Overload Relays Mounted on Current Transformers

Ampere Range	Number of Poles	Form	Series	Type *[11]*
40–63 A	3	B12	B	9065TJF40
63–100 A	3	B12	B	9065TJF63
100–160 A	3	B12	B	9065TJF100
160–250 A	3	B12	B	9065TJF160

For How to Order Information, see page 16-27.

[9] **Form S** required for separate control.
[10] 24 V coils are not available on Size 4–7 starters. On Size 1–3 starters, 24 V coils are available using Form S.
[11] A retro-fit reset kit is required for pre-series B pump panels. See page 16-107 for selection.
[12] Coil voltage code must be supplied to order this product. See Table 16.256 for codes.
[13] Fuse clips are sized for use with dual-element time-delay fuses.
[14] To select a Motor Logic SSOLR with an FLA lower than the standard NEMA sizing, use the four-character **Form H30●**. See page 16-117.
[15] Motor Logic SSOLR are designed to protect 50/60 hertz three-phase AC motors from overload, phase unbalance and phase loss conditions. Open Delta systems or grounded B-phase systems are difficult to balance and could cause the Motor Logic SSOLR to trip. For applications of this nature, it is recommended that bi-metallic overload relays (Form B12) be used.
[16] Indicate pilot light color as **Form P1** (red) or **Form P2** (green). See page 16-115 for more selections.
[17] To determine the maximum number of auxiliary contacts which can be added to each Type S device and for the appropriate “X Form,” refer to Table 16.84 (for non-reversing single-speed devices) or to Table 16.167(for reversing or two-speed devices)

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Approximate Dimensions

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.260:

Type	Fig.	A	B	C	D	E	F	G	H	J	K	L	M	Knockouts			V
		in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	in. mm	Conduit	in. mm	R	S	T	in. mm
NPD/E/F SSC SSD	1	**39.05** 992	**13.73** 349	**6.67** 169	**9.70** 246	**33.05** 839	**37.93** 963	**7.00** 178	**2.41** 61	**3.00** 76	**3.00** 76	2.5	**2.41** 61	0.5–0.75	1.25–1.5	0.5–0.75	**1.41** 36
NPG/J SSE/F XSE/F	1	**49.00** 1245	**19.15** 486	**8.81** 224	**10.37** 263	**44.07** 1119	**47.88** 1216	**7.00** 178	**2.17** 55	**2.69** 68	**3.44** 87	2.5	**2.57** 65	0.5–0.75	1–1.25 1–2.5	1–1.25 1.5–2	**1.41** 36
WC—S2 WD—S2 XC—S2 XD—S2	1	**38.50** 978	**19.00** 483	**7.29** 185	**9.39** 239	**34.00** 864	**37.38** 949	**7.00** 178	**2.18** 55	**2.13** 54	**2.13** 54	1.5	**2.12** 54	0.5–0.75	1–1.25 1.5	0.5–0.75	—
WE—S2 WF—S2 XE—S2 XF—S2	1	**56.50** 1435	**23.00** 584	**8.23** 209	**10.33** 262	**52.00** 1321	**55.38** 1407	**7.00** 178	**2.18** 55	**2.69** 68	**3.44** 87	2	**2.68** 68	0.5–0.75	1–1.25 2–2.5	1–1.25 1.5–2	**1.50** 38
SSG XSG	1	**75.50** 1892	**22.00** 559	**13.80** 351	**17.55** 446	**73.00** 1854	**74.50** 13	**14.00** 356	N/A	**0.56** 14	N/A	N/A	N/A	N/A	N/A	N/A	**1.50** 38
XSH	2	**82.50** 2096	**36.00** 914	**20.00** 508	**23.25** 591	**80.00** 2032	**33.75** 857	**16.50** 419	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
XSJ	2	**92.50** 2350	**34.00** 864	**20.00** 508	**23.25** 591	**90.00** 2286	**31.75** 806	**16.50** 419	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTE: Illustrations may not represent the actual enclosure. They are intended for dimensional information only.

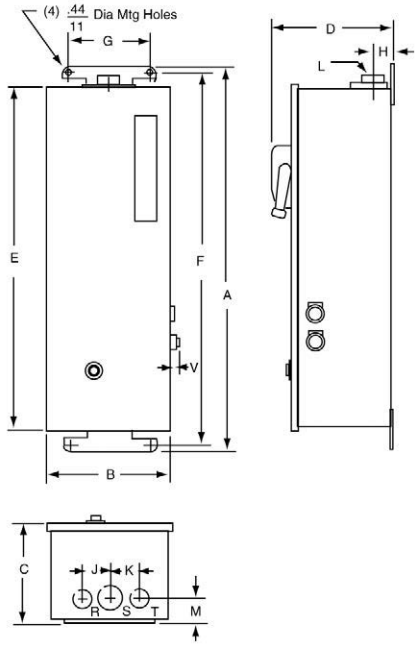

Figure 1

Dimensions: **in.** mm

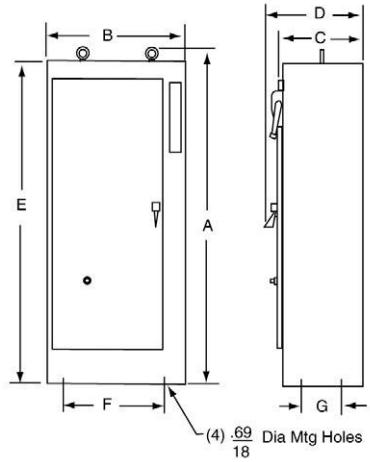

Figure 2

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Selection

Duplex Motor Controllers are used to control two motors, and consist of two starters in a common enclosure. Two separate disconnect switches or circuit breakers with operators are included with all combination devices. Unless **Form Y68** is specified, an alternation circuit (a Class 8501 Type XO40 relay) is included, which alternately operates first one motor and then the other on each successive closing of a pilot device. Both motors will be energized should a second pilot device close. All devices incorporate a terminal block to simplify wiring of pilot devices A and B. Typical applications include pump motors where a second pump is required for peak demand periods yet alternation is desirable to equalize pump wear.

Table 16.261: 3-Pole Polyphase—600 Vac Maximum (50–60 Hz)
Non-Combination Type—Without Disconnect—With Electric Alternation
(replace ●●● with the voltage code)
(Devices require 6 thermal units. See Thermal Unit Selection, page 16-130.)

NEMA Size	Maximum Rating Each Motor		NEMA 1 General Purpose Enclosure	NEMA 4/4X Watertight and Dusttight Enclosure Stainless Steel	NEMA 12 (NEMA 3 and 3R) [1] Dusttight and Driptight Industrial Use Enclosure	Open Type
	Voltage	Hp Polyphase	Type [2]	Type [2]	Type [2]	Type [2]
0	200–230 460–575	3 5	NBG10●●●	NBW10●●●	NBA10●●●	NBO10●●●
1	200–230 460–575	7.5 10	NCG20●●●	NCW20●●●	NCA20●●●	NCO20●●●
2	200 230 460–575	10 15 25	NDG30●●●	NDW30●●●	NDA30●●●	NDO30●●●
3	200 230 460–575	25 30 50	NEG40●●●	NEW40●●●	NEA40●●●	NEO40●●●
4	200 230 460–575	40 50 100	NFG50●●●	NFW50●●●	NFA50●●●	NFO50●●●

Table 16.262: 3-Pole Polyphase—600 Vac Maximum (50–60 Hz) Combination Thermal Magnetic Circuit Breaker Type—With Electric Alternation (replace ●●● with the voltage code) (Devices require 6 thermal units. See Thermal Unit Selection, page 16-130.)

Motor Starter Voltage	Max. Hp Polyphase	Coil Voltage	NEMA Size	Circuit Breaker		NEMA 1 General Purpose Enclosure	NEMA 4/4X Watertight and Dusttight Stainless Steel Enclosure	NEMA 12 (NEMA 3 and 3R)[1] Dusttight and Driptight Industrial Use Enclosure
				Frame Size	Ampere Rating	Type [2]	Type [2]	Type [2]
200 (208)	2 3	208–60	0	HLL36015 HLL36020	15 20	CBG06 ●●● CBG08●●●	CBW06 ●●● CBW08●●●	CBA06 ●●● CBA08●●●
	5 7.5		1	HLL36035 HLL36050	35 50	CCG12●●● CCG15●●●	CCW12●●● CCW15●●●	CCA12●●● CCA15●●●
	10		2	HLL36060	60	CDG22●●●	CDW22●●●	CDA22●●●
	15 20 25		3	HLL36100 HLL36125 HLL36150	100 125 150	CEG32●●● CEG36●●● CEG38●●●	CEW32●●● CEW36●●● CEW38●●●	CEA32●●● CEA36●●● CEA38●●●
	30 40		4	JLL36200 JLL36250	200 250	CFG41●●● CFG44●●●	CFW41●●● CFW44●●●	CFA41●●● CFA44●●●
230 (240)	2 3	240–60 220–50	0	HLL36015 HLL36020	15 20	CBG06●●● CBG08●●●	CBW06●●● CBW08●●●	CBA06●●● CBA08●●●
	5 7.5		1	HLL36035 HLL36045	35 45	CCG14●●● CCG16●●●	CCW14●●● CCW16●●●	CCA14●●● CCA16●●●
	10 15		2	HLL36060 HLL36090	60 90	CDG22●●● CDG24●●●	CDW22●●● CDW24●●●	CDA22●●● CDA24●●●
	25 30		3	HLL36150	150	CEG38●●●	CEW38●●●	CEA38●●●
	40 50		4	JLL36225 JLL36250	225 250	CFG43●●● CFG44●●●	CFW43●●● CFW44●●●	CFA43●●● CFA44●●●
460 (480)	5	480–60 440–50	0	HLL36015	15	CBG10●●●	CBW10●●●	CBA10●●●
	7.5 10		1	HLL36025 HLL36030	25 30	CCG18●●● CCG20●●●	CCW18●●● CCW20●●●	CCA18●●● CCA20●●●
	15 20 25		2	HLL36045 HLL36060 HLL36070	45 60 70	CDG26●●● CDG28●●● CDG30●●●	CDW26●●● CDW28●●● CDW30●●●	CDA26●●● CDA28●●● CDA30●●●
	30 50		3	HLL36080 HLL36150	80 150	CEG39●●● CEG40●●●	CEW39●●● CEW40●●●	CEA39●●● CEA40●●●
	75 100		4	JLL36200 JLL36250	200 250	CFG45●●● CFG47●●●	CFW45●●● CFW47●●●	CFA45●●● CFA47●●●

NOTE: For voltage codes used with control transformers, see page 16-116.

For How to Order Information, see page 16-27.

[1] NEMA 12 enclosures can be field modified for outdoor applications. For details, refer to Class 9991 on page 16-110.
[2] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes listed inTable 16.272.

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Table 16.263: 3-Pole Polyphase—600 Vac Maximum (50–60 Hz) Combination Disconnect Switch Type—With Electric Alternation (Devices require 6 thermal units. See Thermal Unit Selection, page 16-130.)

Motor Voltage (Starter Voltage)	Max. Hp Poly-phase	Coil Voltage	NEMA Size	Fuse Clip Size (A) *[3]*	NEMA 1 General Purpose Enclosure	NEMA 4/4X Watertight and Dusttight Enclosure Stainless Steel	NEMA 12 (NEMA 3 and 3R) *[4]* Dusttight and Driptight Industrial Use Enclosure
					Type *[5]*	Type *[5]*	Type *[5]*
200 (208)	3	208-60	0	None 30	UBG10●●● DBG08●●●	UBW10●●● DBW08●●●	UBA10●●● DBA08●●●
	7.5		1	None 60	UCG20●●● DCG18●●●	UCW20●●● DCW18●●●	UCA20●●● DCA18●●●
	10		2	None 60	UDG30●●● DDG28●●●	UDW30●●● DDW28●●●	UDA30●●● DDA28●●●
230 (240)	3	240-60 220-50	0	None 30	UBG10●●● DBG08●●●	UBW10●●● DBW08●●●	UBA10●●● DBA08●●●
	7.5		1	None 60	UCG20●●● DCG18●●●	UCW20●●● DCW18●●●	UCA20●●● DCA18●●●
	15		2	None 60	UDG30●●● DDG28●●●	UDW30●●● DDW28●●●	UDA30●●● DDA28●●●
460 (480)	5	480-60 440-50 575 (600)	0	None 30	UBG10●●● DBG10●●●	UBW10●●● DBW10●●●	UBA10●●● DBA10●●●
	10		1	None 30	UCG20●●● DCG20●●●	UCW20●●● DCW20●●●	UCA20●●● DCA20●●●
	25		2	None 60	UDG30●●● DDG30●●●	UDW30●●● DDW30●●●	UDA30●●● DDA30●●●
	50		3	None 100	UEG40●●● DEG40●●●	UEW40●●● DEW40●●●	UEA40●●● DEA40●●●

Factory Modifications (Forms)

Table 16.264: Factory Modifications (Forms)

Description *[6]*	Enclosure Type	Form	NEMA Size			
			0–1	2	3	4
Pilot Devices in Cover*[7]* Start-Stop push buttons—one provided for each motor. (**Form C** or **Form Y68** required.)	1, 4, 12	A	X	X	X	X
Hand-Off-Auto selector switch—one provided for each motor.	1, 4,12	C	X	X	X	X
No. 1 Lead—No. 2 Lead selector switch for manual selection of lead pump. (**Form Y68** required.) Red On pilot light—one provided for each motor.	Any 1, 4, 12	C13 P1	X X	X X	X X	X X
Push-to-test, red On pilot light—one provided for each motor. Non-standard markings for pilot devices. Test push button for each starter.	1, 4, 12 Any Any	P21 G12 Y29	X X X	X X X	X X X	X X X
Control Circuit Modifications Fused control circuit without transformer One fuse Two fuses Fused control circuit transformer, two fuses in primary, with 600, 480, 240 or 208 V primary and 120 V secondary –one provided for each starter.	 Any Any Any	 F F4 F4T	 X X X	 X X X	 X X X	 X X X
Fused control circuit transformer, two fuses in primary, one fuse in secondary—one provided for each starter. 100 VA additional capacity 200 VA additional capacity	Any Any Any	FF4T FF4T11 FF4T12	X X X	X X X	X X X*[8]*	X X*[8]* X*[8]*
Extra capacity control circuit transformer—two fuses in primary—one provided for each starter (see Table 16.265) 100 VA additional capacity 200 VA additional capacity Elapsed time meter for each starter	Any Any Any	F4T11 F4T12 G97	X X X	X X X	X X X	—*[9]* —*[9]* X
Pressure switch for each starter (Square D pressure switch 9012GAW25) Addition of 2 relays to modify controller for operation with single pole pilot devices Addition of 3 relays to modify controller for operation with single pole mercury float switches	Any Any Any	D R7 R8	X X X	X X X	X X X	X X X
Control circuit wired for separate 120 V source	Any	S	X	X	X	X
Addition of 1 N.O. unwired interlock per starter for use by customer (1 N.O. unwired interlock per starter is provided as standard.) Addition of 1 N.C. unwired interlock per starter for customer use	Any Any	X10 X01	X X	X X	X X	X X
Modified wiring for use with double pole mercury float switches **Deduct** for omission of electrical alternating circuit Additional Control circuit terminals—per wired terminal (5 point terminal block is standard) Unwired	Any Any Any Any	Y24 Y68 G56*[10]* G50*[10]*	X X X X	X X X X	X X X X	X X X X

Table 16.265: Capacity

NEMA Size	Standard Capacity (Form F4T)	100 VA Additional Capacity (Form F4T11)	200 VA Additional Capacity (Form F4T12)
	Class 9070 Type	Class 9070 Type	Class 9070 Type
0, 1	TF100	TF200	TF300
2	TF100	TF200	TF300
3	TF150	TF300	TF500
4	TF300	TF500	TF500

For How to Order Information, see page 16-27.

[3] The hp rating applies only when dual element time delay fuses are used.
[4] NEMA 12 enclosures can be field modified for outdoor applications. For details, refer to Class 9991 on page 16-110.
[5] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes listed in Table 16.272.
[6] These Forms are most commonly used. Other Forms may be available. Consult the Customer Care Center at 1-888-778-2733 for additional information.
[7] Not available on open style devices.
[8] Single primary voltage must be specified.
[9] Not available on this size. Use **Form FF4T●●**.
[10] Addition of terminal block 9080CA or 9080GR6 only. A 5–point terminal block is provided as standard for custom connection. A wiring diagram must be provided for factory wiring.

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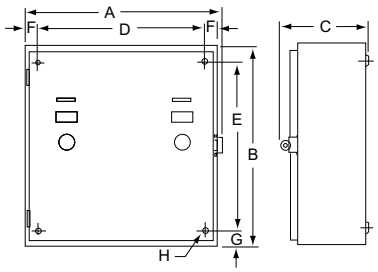

Figure 16.34: NEMA 1 Enclosure—Non-Combination

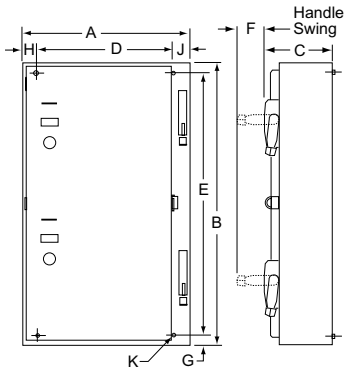

Figure 16.35: NEMA 1 Enclosure—Combination

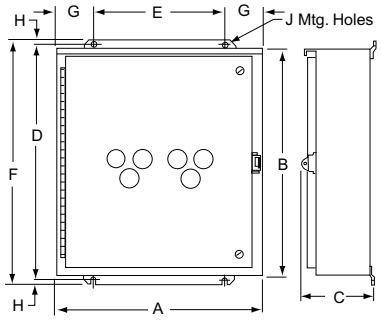

Figure 16.36: NEMA 4 and 12/3R Enclosure—Non-Combination

Table 16.272: Coil Voltage Codes

Voltage		Code
60 Hz	50 Hz	
24 *[11]*	—	V01
120 *[12]*	110	V02
208	—	V08
240	220	V03
—	380	V05
480	440	V06
600	550	V07
Specify	Specify	V99

Approximate Dimensions (in.)

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.266: NEMA 1 Enclosure—Non-Combination (Figure 1)

Starter Size	A	B	C	D	E	F	G	H
0, 1, or 2	20.5	24.13	8.69	17.88	21.5	1.31	1.31	0.31 Dia.
3 or 4	22.13	34	9.75	16	35.5	3.06	0.75	0.44 Dia.

Table 16.267: NEMA 1 Enclosure—Combination (Figure 2)

Starter Size	A	B	C	D	E	F	G	H	J	K
0, 1, or 2 (For Circuit Breaker and 30 A & 60 A Disconnect Switch)	20.38	35	9.63	17	32.5	3.31	1.25	1.25	1.25	0.44 Dia.
3 or 4 (For Circuit Breaker and 100 A Disconnect Switch)	32	44	10.75	24	46	4.88	1	2.5	2.5	0.56 Dia.

Table 16.268: NEMA 4 Enclosure—Non-Combination (Figure 3)

Starter Size	A	B	C	D	E	F	G	H	J
0, 1, or 2	20.5	24	8	25	15.38	26	2.56	0.5	0.31
3 or 4	22	34	9.13	35	17	36	2.5	0.5	0.56

Table 16.269: NEMA 4 Enclosure—Combination (Figure 4)

Starter Size	A	B	C	D	E	F	G	H	J	K
0, 1, or 2 (For Circuit Breaker and 30 A & 60 A Disconnect Switch)	20.5	35	9.56	36	15.38	37	2.56	0.5	0.31	3.31
3 or 4 (For Circuit Breaker and 100 A Disconnect Switch)	32	44	10.69	46	26	47	3	0.5	0.56	4.88

Table 16.270: NEMA 12/3R Enclosure—Non-Combination (Figure 3)

Starter Size	A	B	C	D	E	F	G	H	J
0, 1, or 2	20.5	24.25	8	25.5	14.38	26.5	3.06	0.5	0.44
3 or 4	22	34	9.13	35.5	16	36.5	3	0.5	0.44

Table 16.271: NEMA 12/3R Enclosure—Combination (Figure 4)

Starter Size	A	B	C	D	E	F	G	H	J	K
0, 1, or 2 (For Circuit Breaker and 30 A & 60 A Disconnect Switch)	20.5	35	9.56	36.5	14.38	37.5	3	0.5	0.44	3.31
3 or 4 (For Circuit Breaker and 100 A Disconnect Switch)	32.25	44.25	10.69	46	24	47	4.13	0.5	0.56	4.88

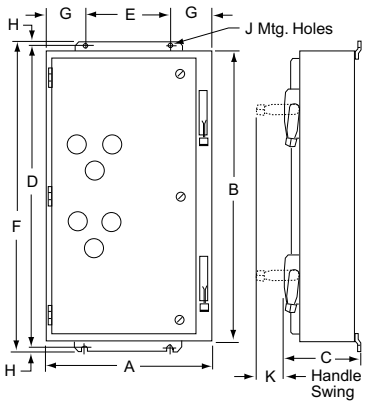

Figure 16.37: NEMA 4 and 12/3R Enclosure—Combination

NOTE: Illustrations may not represent the actual enclosure; they are intended for dimensional information only. Dimensions are in inches.

[11] 24 V coil is not available on Size 4. On Sizes 00–3, specify**Form S** (separate control).
[12] These voltage codes must include **Form S** (no additional charge).

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8965DPR33V02 Hoist Contactor
600 Vac, 25 A
DPR, Angled

Class 8965 Type DPR reversing/hoist contactors are designed for the control of motors in hoists, overhead doors, small elevators, commercial laundry equipment, and other related products which use reversing motors. They are rated to perform in the short periods of jogging experienced in hoist service.

The coils are designed to operate on line voltages of 85–110% of rated voltage, and are for applications at 50 or 60 Hz only. Coils are easily replaced with external base removed.

Auxiliary contacts can easily be fieldadded to any Class 8965 reversing contactor. Type DPR contactors accept one auxiliary contact module with up to two isolated circuits per side (two modules per device). When auxiliary contacts are ordered separately, two modules are normally used for each device; one for forward, one for reverse.

Table 16.273: Reversing/Hoist Contactors—600 Vac Maximum (replace ●●● with the voltage code)

No. of Poles	Horsepower Ratings *[1]*				Open Type
	115 V 1Ø	230 V 1Ø	230 V 3Ø	460/575 V 3Ø	Type *[2]*
3-Pole Polyphase	1 2 2 3	2 3 5 7-1/2	5 7-1/2 10 15	7-1/2 10 15 20	DPR13●●● DPR23●●● DPR33●●● DPR43●●●
4-Pole Polyphase	1 2 2 3	2 3 5 7-1/2	5 7-1/2 10 10	7-1/2 10 15 20	DPR14●●● DPR24●●● DPR34●●● DPR44●●●

Table 16.274: Auxiliary Contacts Separate Module *[3]*

Description	Class 9999 Type
1 N.O. 1 N.C. 1 N.O.–1 N.C. 2 N.O.	D10 D01 D11 D20

Table 16.275: Factory Installed

Description	Form
1 N.O. Each Side	X1010
1 N.C. Each Side	X0101
1 N.O.–1 N.C. Each Side	X1111
2 N.O. Each Side	X2020

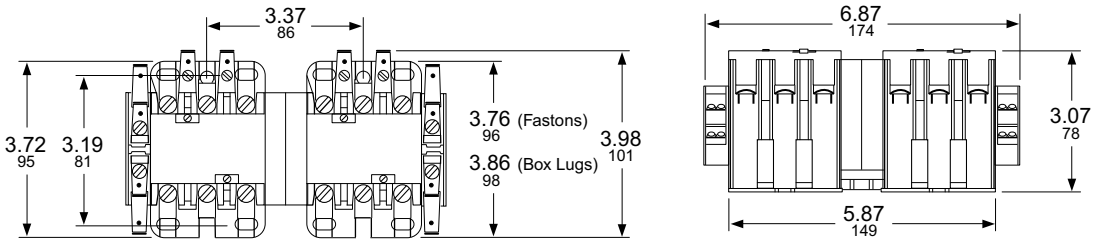
Table 16.276: Coil Voltage Codes

Volts, 60 Hz	Volts, 50 Hz	Voltage Code
24	24	V14
120	110	V02
208–240	220	V09
277	—	V04
480	440	V06
600	550	V07

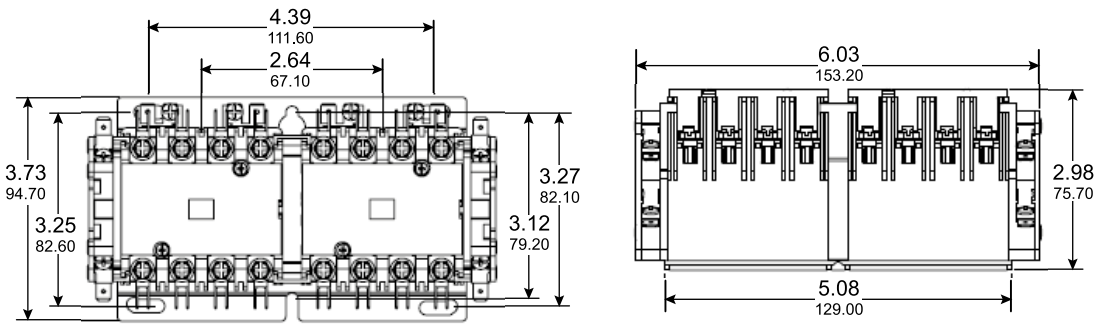
Table 16.277: Approvals

UL Component Recognized—File E42240, CCN NLDX
CSA Certified—File LR25490, Class 3211 04

Approximate Dimensions



Type DPR13 through DPR43



Type DPR14 through DPR44

[1] For rapid operation (jogging duty), use the next larger size contactor.
[2] Replace the three bullets (●●●) in the catalog number with the coil voltage code. Refer to the standard voltage codes listed in Table 16.276.
[3] Order two modules for Type DPR, one for each side.

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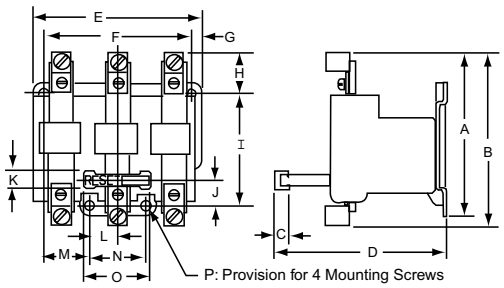
Type SEO5



Type SEO Dimensions

NEMA style thermal overload relays feature:

- Exclusive one-piece thermal unit
- Inverse time delay trip
- Trip free reset mechanism
- Replaceable contact units

Note that these overload relays do not include thermal units, which must be ordered and field installed separately. Slow trip (Class 30) and quick trip (Class 10) melting alloy thermal units are available for all Size 1, 2, 5 and 6, and some Size 3 and 4 applications.

Table 16.278: For Separate Mounting—Melting Alloy—600 V Maximum, AC or DC *[1]*

NEMA Size	Maximum Full Load Current (A)	Open Type for Separate Panel Mounting Left and Right Hand Types	Open Type Relay and Bracket Kit for Terminal Block Channel Mounting
			Type
Three Pole Construction (One Common N.C. Contact on Type S Only)—3 Thermal Units Required			
00–1	25	SEO5	SM2
2	45	SEO8	SM2
3	86	SEO12	—
4	133	SEO15	—

Table 16.279: Replacement Melting Alloy Overload Relays for Square D Class 8536 Starters

Locate Class 8536 Starter in this Column				Order Class 9065 Overload Relay from this Column	
NEMA Size	Type	Series	Number of Poles	Type	Number of Thermal Units Required
00	SA	A & B	2 3	SDO4 SDO5	1 3
0	SB	A	2 3–5	SDO4 SDO5	1 3 *[2]*
1	SC	A	2 3–5	SDO4 SDO5	1 3 *[2]*
1P	SC	A	2	SDO10	1
2	SD	A	2 3–5	SDO7 SDO8	1 3 *[2]*
3	SE	A	2 3 4 5	SDO11 SDO12 SDO13 SDO14	1 3 2 3
4	SF	A	3 4 5	SDO15 SDO16 SDO17	3 2 3
5	SG	A	3	Form Y500 and Series B, use SEO5	3
6	SH	A & B	3	SEO5	3

Table 16.280: Special Features for Melting Alloy Overload Relays

Description	Form
Substitute 1-N.O. isolated alarm contact and 1-N.C. contact per relay. (Type S starters only) *[3]*	Y342
Substitute 2-N.C. contacts for standard N.C. contact per relay. (Type S starters only) *[3]*	Y344
Modify Type SDO12 relays to accept Type FB quick trip or SB slow trip thermal units, and Type F and Type SDO15 relays to accept Type FB quick trip thermal units. (Rejects Type CC standard trip units) *[4]*	Y81

Table 16.281: Approximate Dimensions, NEMA Style Melting Alloy Overload Relays

Type	Dimensions (in.)																Shipping Weight (lb)
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
SEO5	3.31	—	0.47	3.97	3.53	2.81	0.22	0.69	2.31	0.5	0.5	0.5	0.84	1	1.38	#10	1
SEO8	3.31	—	0.47	3.97	3.5	2.81	0.19	0.69	2.31	0.5	0.5	0.13	0.84	1	1.38	#10	1.25
SEO12	—	5.59	0.56	5.75	5.31	4.75	0.28	1.44	3.56	0.75	0.56	0.88	1.5	1.75	2	#1/4	3
SEO15	—	6.97	0.56	5.75	5.31	4.75	0.28	2.13	3.56	0.75	0.56	0.88	1.5	1.75	2	#1/4	4

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

[1] The maximum power circuit rating for Type S separate-mounting overload relays is 600 Vac only. The maximum control circuit contact rating for Type S versions is 600 Vac only
[2] For 4-pole starters used on two-phase systems, order two thermal units plus one Class 9998 Type SO31 jumper strap kit for every two starters. Each kit includes two jumper straps.
[3] Field modification possible. Order 9999S04 (for **Form Y342**) or 9999S05 (for **Form Y344**).
[4] This Form cannot be field modified.

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Motor Logic Solid-State Overload Relays

Motor Logic solid-state overload relays (SSOLRs) feature: 3 to 1 adjustment for trip current; phase loss and unbalance protection; direct replacement for Type S melting alloy. They are ambient insensitive and self–powered. Switch selectable trip class; Class II ground fault detection; and direct replacement for Type S melting alloy. Electrical remote reset is also available.

NOTE: Motor Logic SSOLRs are designed to protect 50/60 Hz, three-phase AC motors from overload, phase unbalance, and phase loss conditions. Open Delta systems or grounded B-phase systems are difficult to balance and could cause the Motor Logic SSOLR to trip.

Table 16.282: Class 10/20 (Selectable): For Separate Mounting Solid-State Overload Relay, 600 Vac Maximum

NEMA Size *[5]* (3-Pole)	Full Load Current Range (A)	Open Type
		Trip Class 10/20
00B	1.5–4.5 *[6]*	SFB20
00C	3–9 *[6]*	SFC20
0	6–18 *[6]*	SF020
1	9–27 *[6]*	SF120
2	15–45	SF220
3	30–90	SF320
4	45–135	SF420

Table 16.283: Class 10/20 (Selectable): Replacement SSOLR for Retrofit of Square D Type S Starter Solid-State Overload Relay 600 Vac Maximum

Locate 8536 Starter in this column		Order Class 9065 Overload Relay from this column
NEMA Size *[5]*	Full Load Current Range (A)	Open Type
		Trip Class 10/20
00B *[6]*	1.5–4.5	SFB20
00C *[6]*	3–9	SFC20
0 *[6]*	6–18	SF020
1 *[6]*	9–27	SF120
2	15–45	ST220
3	30–90	ST320
4	45–135	ST420
5 *[7]*	90–270	ST520
5 *[8]*	90–270	SF520
6 *[7]*	180–540	ST620
7 *[7]*	270–810	ST720

[5] Size 00B and 00C are not actual NEMA sizes. These designations are used to differentiate the lower FLA of these devices from the NEMA Size 00 Motor Logic solid-state overload relay.
[6] Size 00B, 00C, 0, and 1 come without lugs. Lower amperage loads can be protected by looping the power wires. Lugs are available. See Table 16.357.
[7] Size 5, 6, and 7 replacement overload relays are only for existing NEMA style Type S starters with a Motor Logic overload relay. External CTs and additional components are not included.
[8] Size 5 is a complete drop-in replacement for Square D Type S melting alloy, bimetallic, and Y500 overload relays **only**.

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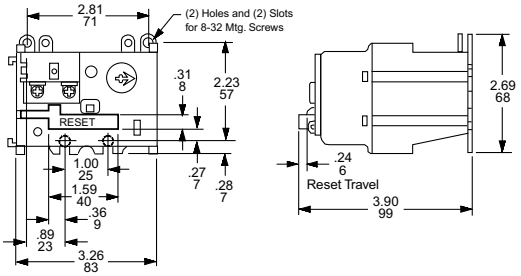
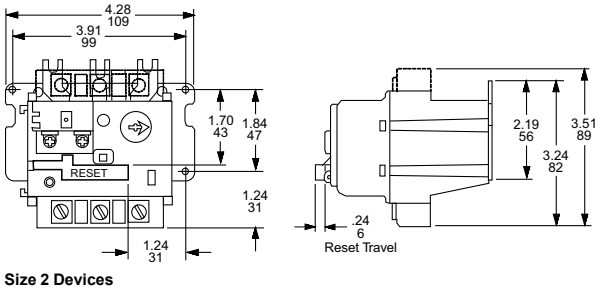
Approximate Dimensions

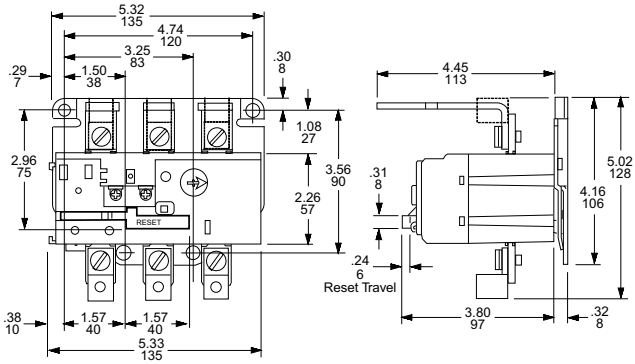


NEMA Size 00B, 00C, 0, and 1 Devices

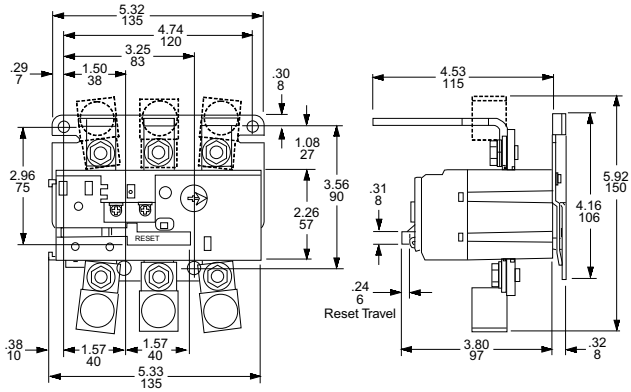
NOTE: Sizes 00B and 00C are not actual NEMA sizes. These designations are used to differentiate the lower FLA of these devices from the NEMA Size 00 Motor Logic solid-state overload relay.



Size 2 Devices

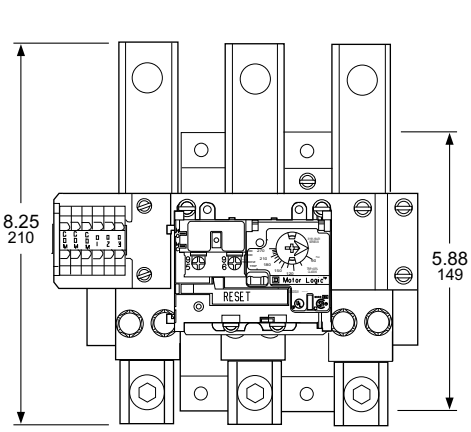


Size 3 Devices

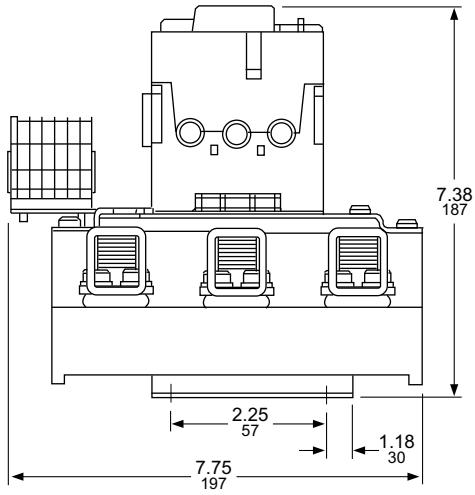


Size 4 Devices

Note: The dimensions are for reference only.



NEMA Size 5 Type S Device



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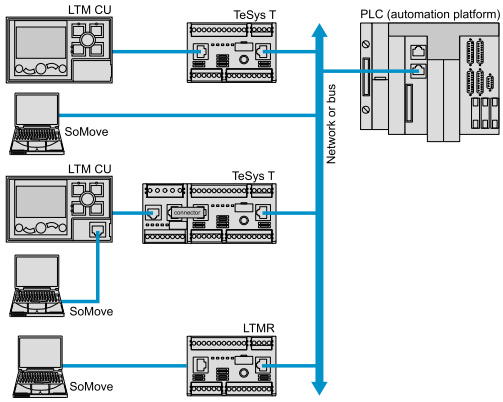
New!



Introduction

TeSys T is a motor management system that provides full motor monitoring, control, and protection when used with short circuit protection and a contactor. TeSys T manages most critical processes while reducing downtime and increasing productivity.

TeSys T is a flexible system that integrates seamlessly into your automation system through five major communication protocols. TeSys T predicts what will happen in the process, as it accurately monitors current, voltage, and power over a wide range.

TeSys T is a green motor management system with unique power monitoring capabilities for better energy management. TeSys T carries all appropriate and necessary third party certifications.

To get detailed information about TeSys T, visit our website at www.schneider-electric.us.com.

TeSys T detailed functionalities and possible configuration:

Communication:

TeSys T is a flexible motor management system that supports six major communication protocols: Modbus™, CANopen, DeviceNet™, Profibus™, Ethernet/IP, and Modbus/TCP.

These communication protocols allow the TeSys T controller to integrate seamlessly into your automation systems.

Ethernet/IP and Modbus/TCP provide FDR to enable quick replacement of products and minimize maintenance time.

Protection functions:

- thermal overload
- phase imbalance and phase failure
- thermal motor protection via PTC probes
- phase reversal
- ground fault detection
- long starting times and motor stalling
- automatic load shedding and restarting
- load fluctuations (current, voltage, power)
- variations of Cos j (power factor)

Metering functions:

- Measurements (rms values):
  - current on the 3 phases
  - voltage on the 3 phases (shedding)
  - motor temperature
  - ground fault sensing
- Values calculated:
  - average current
  - frequency
  - Power factor, power, power consumption

Motor control functions:

A motor managed by a TeSys T controller can be controlled:

- locally, using the logic inputs present on the product, or via the human machine interface (HMI)
- remotely, via the network

Motor control modes:

10 predefined motor control modes are incorporated in the controller. Each listed mode is available as 2 or 3 wire control.

- overload mode: monitoring of motors whose control is not managed by the controller
- independent mode: starting of full voltage non-reversing motors
- reverser mode: starting of full voltage reversing motors
- 2-step mode: 2-step starting of motors (star-delta, by autotransformer and by resistor)
- 2-speed mode: 2-speed starting of motors (Dahlander, pole changer)

A custom mode is available to allow the user to create a specific motor control mode that is not predefined in the controller.

Custom Logic has the basic functions of a small programmable logic controller (PLC). Programming can be done in Structured Text mode or in Block Diagrams through SoMove V2.2 software. To ensure consistency, the same software used to commission the TeSys T controller is used for Custom Logic programming.

Statistical and diagnostic functions:

- history of the last five detected faults
- motor statistics
- controller operations
- warning of pending faults

Table 16.284: Standards and Certifications

Product Type	LTMR Controllers	LTMEV40 Expansion Modules
Conforming to standards	IEC/EN 60947-4-1, UL 508, UL E164353 NKCR, CSA 22-2 n°14, CSA LR43364 Class 3211 03, IACS E10	
Product certifications	UL, CSA, BV, LROS, DNV, GL, RINA, ABS, RMRos, NOM, CCC, C-TIC'K, ATEX, GOST, KERI	

Possible Configurations:

TeSys T controller is a flexible motor management system using SoMove V2.2 commissioning tool. PowerSuite is the configuration software for the TeSys T controllers. See page 16-104 for details.

TeSys T is a motor management system that provides full motor monitoring, control, and protection when used with short circuit protection and a contactor. TeSys T manages most critical processes while reducing downtime and increasing productivity.

TeSys T is a flexible system that integrates seamlessly into your automation system through five major communication protocols. TeSys T predicts what will happen in the process, as it accurately monitors current, voltage, and power over a wide range.

TeSys T is a green motor management system with unique power monitoring capabilities for better energy management.

TeSys T carries all appropriate and necessary third party certifications.

To get detailed information about TeSys T, visit our website at www.schneider-electric.us.com.

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New!

LTMR Controller

LTMR27EBD

Table 16.285: Controllers

Setting Range (A)	Control Voltage (V)	Current Range (A)	Catalog Number
Modbus™ Protocol			
8	24 Vdc	0.4–8	LTMR08MBD
	100–240 Vac	0.4–8	LTMR08MFM
27	24 Vdc	1.35–27	LTMR27MBD
	100–240 Vac	1.35–27	LTMR27MFM
100	24 Vdc	5–100	LTMR100MBD
	100–240 Vac	5–100	LTMR100MFM
Ethernet TCP/IP Communication (Protocols: Ethernet/IP and Modbus/TCP)			
8	24 Vdc	0.4–8	LTMR08EBD
	100–240 Vac	0.4–8	LTMR08EFM
27	24 Vdc	1.35–27	LTMR27EBD
	100–240 Vac	1.35–27	LTMR27EFM
100	24 Vdc	5–100	LTMR100EBD
	100–240 Vac	5–100	LTMR100EFM
CANopen Protocol			
8	24 Vdc	0.4–8	LTMR08CBD
	100–240 Vac	0.4–8	LTMR08CFM
27	24 Vdc	1.35–27	LTMR27CBD
	100–240 Vac	1.35–27	LTMR27CFM
100	24 Vdc	5–100	LTMR100CBD
	100–240 Vac	5–100	LTMR100CFM
DeviceNet™ Protocol			
8	24 Vdc	0.4–8	LTMR08DBD
	100–240 Vac	0.4–8	LTMR08DFM
27	24 Vdc	1.35–27	LTMR27DBD
	100–240 Vac	1.35–27	LTMR27DFM
100	24 Vdc	5–100	LTMR100DBD
	100–240 Vac	5–100	LTMR100DFM
Probibus™ DP Protocol			
8	24 Vdc	0.4–8	LTMR08PBD
	100–240 Vac	0.4–8	LTMR08PFM
27	24 Vdc	1.35–27	LTMR27PBD
	100–240 Vac	1.35–27	LTMR27PFM
100	24 Vdc	5–100	LTMR100PBD
	100–240 Vac	5–100	LTMR100PFM

The controller is the central component in the motor management system. It manages the basic functions such as:

- measurement of 3-phase current via integral current transformers from 0.4 to 100 A (up to 810 A by external current transformers)
- measurement of ground current internally or external ground sensors
- measurement of motor temperature
- inputs and outputs for the various motor control modes, detected fault management, and other functions

Characteristics

As standard, the controller manages the following:

Control Modes

- overload mode
- independent mode
- reverser mode
- 2-speed mode
- 2-step mode
- Custom mode

Inputs/Outputs

- 6 discrete logic inputs
- 3 relay logic outputs (1 N.O. contact each)
- 1 relay output for detected fault signaling (1 N.O. + 1 N.C.) overload relay

Measurements

- connection for a thermistor probe
- connections for a ground sensor

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LTMEV40FM

Table 16.286: Expansion Module

Input Control Voltage	Number of Inputs	Supply to the Electronics	Catalog Number
24 Vdc	4	via the LTMR controller	LTMEV40BD
100–240 Vac	4		LTMEV40FM

LTM9KCU
(Holder Only)

LTMCU

Magelis Display

Table 16.287: HMI Modules and Software

Description	Supply Voltage	Catalog Number
Operator Control unit	via the LTMR controller	LTMCU
Holder for LTMCU (with magnetic back)	—	LTM9KCU
Magelis compact display	24 Vdc	XBTN410
Configuration software Windows 99, 2000, XP	—	VJDSNDTMSV13M

New!

Components

LTME Expansion Module

The expansion module adds the following functionalities to the TeSys T controller:

- voltage measurement between phases up to 690 V nominal
- 4 additional inputs

Inputs

- 4 discrete logic inputs (isolated)
- 2 types of power for the inputs: 24 Vdc and 100 to 240 Vac
- A 24 Vdc LTMR controller can be assembled with a 240 Vac expansion module and vice versa

The LTMVE must be connected to the LTMR controller by a connecting cable.

HMI—Human Machine Interface

Depending on the application, two types of HMI can be used with the motor management system.

- The LTMCU operator control unit:
  - Control/monitoring of a 1 to 1 LTMR controller
- A Magelis XBTN410 terminal
  - Control/monitoring of 1 to 8 LTMR controllers

LTMCU Compact Display

- Configure the parameters
- Display information
- Monitor the alarms and detected faults
- Local control of the motor via the local control interface (keys can be customized)
- Three different languages can be loaded into the LTMCU controller at the same time: English, French, Spanish are the defaults.

A language download utility (LangTool), together with all the other languages, are available on the website www.schneider-electric.com.

This tool allows the languages present in the LTMCU control until to be adapted.

The LTMCU HMI control unit has an additional front panel RJ45 port, protected by a flexible cover.

Magelis™ Display

Two applications have been predefined for the TeSys T controller. Depending on the application loaded, the HMI terminal makes it possible to:

- Configure and monitor a motor starter (LTM_1T1_V1.dop)
- Monitor and modify certain parameters up to 8 motor starters (LTM_1T8_X_V1.dop)

Vijeo Designer programming software is needed for loading applications into the XBT HMI terminal.

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New!

Components

LT6CT4001

DA1TT●●

Table 16.288: Current Transformers

Current Transformer Ratio *[1]*	Catalog Number
100:1	LT6CT1001
200:1	LT6CT2001
400:1	LT6CT4001
800:1	LT6CT8001

Table 16.289: Ground Fault Sensors

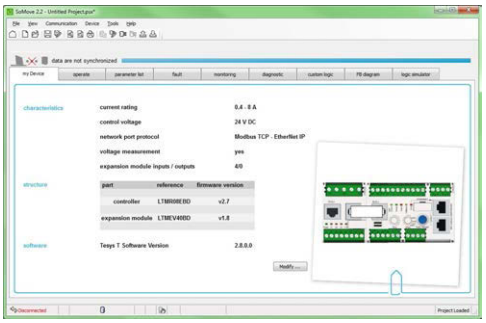
Rated Operational Current Ie (A)	Internal Toroid Ø (mm)	Catalog Number
Closed Toroids, Type A		
65	30	50437
85	50	50438
160	80	50439
250	120	50440
400	200	50441
630	300	50442
Split Toroids, Type QA		
85	46	50485
250	110	50486

NOTE: Dimensional drawings are in catalog DIA1ED2061002EN-US.

Table 16.290: PTC Thermistor Probes *[2]*

Description	Nominal Operating Temperature (NOT) °C	Color	Catalog Number *[3]*
Triple Probes	90	Green/green	DA1TT090
	110	Brown/brown	DA1TT110
	120	Gray/gray	DA1TT120
	130	Blue/blue	DA1TT130
	140	White/blue	DA1TT140
	150	Black/black	DA1TT150
	160	Blue/red	DA1TT160
	170	White/green	DA1TT170

Configuration with SoMove Software



The TeSys T configurator is incorporated in the SoMove software application, versions 2.2 and higher.

SoMove software allows configuration, commissioning and maintenance of motor starters protected by a TeSys T controller.

A library containing predefined motor control mode functions is available in order to:

- allow standardization
- avoid errors
- reduce motor starter setup times

By using logic functions, a custom mode makes it possible to:

- easily adapt these predefined motor control mode functions to the specific needs of your applications
- create new functions

The functions thus defined can be saved and used to build your function library for future applications.

To create special functions, a logic editor is incorporated in the configurator and allows a choice of 2 programming languages:

- function block
- structured text

Table 16.291: Configuration Tools

Description	Composition	Catalog Number
Connection kit for PC serial port for Modbus™ PLC multidrop connection	1 x 3 m length cable with two RJ45 connectors	VW3A8106
	1 RS232/RS485 converter with one 9-pin female SUB-D connector and one RJ45 connector.	
USB serial port adapter *[4]* for connecting a TeSys T controller to your PC	1 USB / serial port adapter *[4]*	TSXCUSB485
USB serial port cable for connecting a TeSys T controller to your PC	1 USB / serial port cable	TCSMCNAM3M002P

TeSys T and SMS PowerLogic:

TeSys T is integrated in PowerLogic SMS Version 4.0. and will address energy management needs by fully utilizing the TeSys T power/energy management features. For more information on PowerLogic products, see Power Monitor Control Section 4.

[1] For use with LTMR08●● controllers. Three current transformers are required for 3-phase applications.
[2] PTC: Positive Temperature Coefficient.
[3] Sold in lots of 10.
[4] Modbus RS–485 cable required, not included.

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8536SCO3V02H626

New!

Accessories

Table 16.292: Connection Accessories

Description		Length m (ft)	Catalog Number
For Ethernet TCP/IP connection			
Shielded twisted pair cables, UL and CA 22.1 approved			
Cables fitted with 2 x RJ45 connectors for connection to terminal equipment	Straight	2 (7)	490NTW00002U
		5 (16)	490NTW00005U
		12 (39)	490NTW00012U
		40 (131)	490NTW00040U
		80 (263)	490NTW00080U
For Modbus PLC connection			
Cables fitted with 2 x RJ45 connectors		0.3 (1)	VW3A8306R03
		1 (3)	VW3A8306R10
		3 (10)	VW3A8306R30
T-junctions		0.3 (1)	VW3A8306TF03
		1 (3)	VW3A8306TF10
RS485 line terminator		—	VW3A8306R
For CANopen connection			
Cables		50 (164)	TSXCANCA50
		100 (328)	TSXCANCA100
		300 (984)	TSXCANCA300
IP20 connectors SUB-D 9-pin female Line end adapter switch	Elbowed (90°)	—	TSXCANKCDF90T
	Straight	—	TSXCANKCDF180T
	Elbowed (90°) SUB-D 9-pin connector for connection to PC or diagnostic tool	—	TSXCANKCDF90TP
For DeviceNet connection			
Cables		50 (164)	TSXCANCA50
		100 (328)	TSXCANCA100
		300 (984)	TSXCANCA300
For Profibus DP connection			
Cables		100 (328)	TSXPBSCA100
		400 (1313)	TSXPBSCA400
Connectors	With line terminator	—	490NAD91103
	Without line terminator	—	490NAD91104
	With line terminator and terminal port	—	490NAD91105

Table 16.293: Connecting Cables

Description	Number and type of connectors	Length m (ft)	Catalog Number
LTMCU control unit	2 x RJ45	1 (3)	VW3A1104R10
		3 (10)	VW3A1104R30
		5 (16)	VW3A1104R50
XBTN410	SUB-D 25-pin female to RJ45	2.5 (8)	XBTZ938
LTME expansion module	2 x RJ45	0.04 (0.13)	LTMCC004
		0.3 (1)	LU9R03
		1 (3)	LU9R10
180 degree Ethernet external connector	1 x RJ45	–	LTM9CE180T

Table 16.294: Marking Accessories

Description	Composition	Sold in lots of	Catalog Number
Clip-in markers (maximum of 5 per unit)	Strips of 10 identical numbers (0 to 9)	25	AB1R● *[5]*
	Strips of 10 identical capital letters (A to Z)	25	AB1G● *[5]*

[5] When ordering, replace the ● in the catalog number with the number or letter required.

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Dimensions (mm)

Table 16.295: LTMR•• controllers

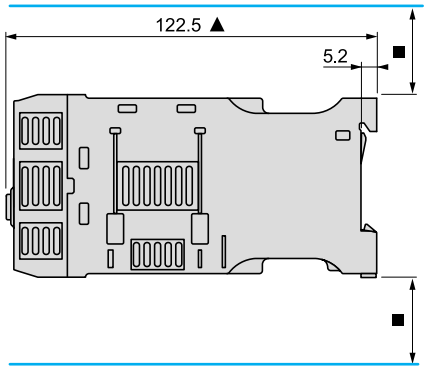
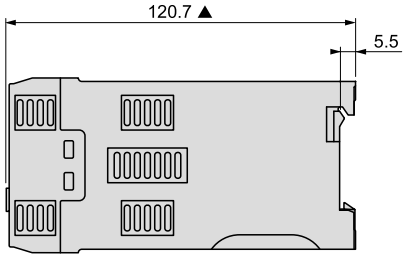
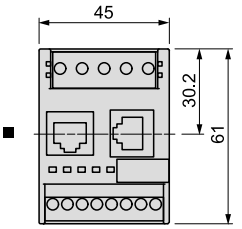


Table 16.296: LTMEV40•• expansion modules

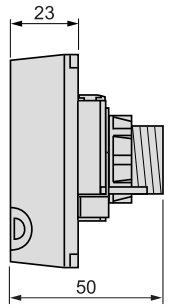


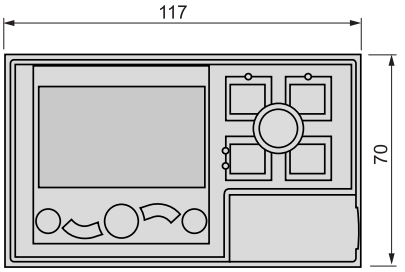


■ Leave a gap around the device of: 9 mm at 45 °C, 9 to 40 mm from 45 to 50 °C, 40 mm at 60 °C.

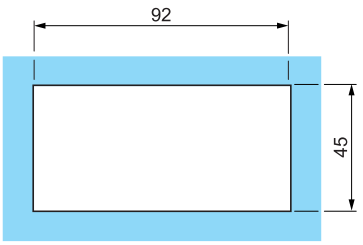
▲ 140 mm with an RJ45 connector for connection to an expansion module and a network; 166 mm with a Profibus DP/CANopen connector.

Table 16.297: LTMCU operator control unit

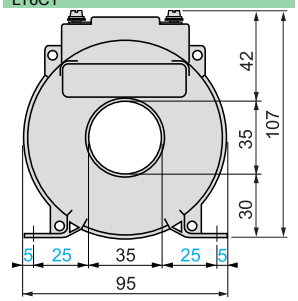


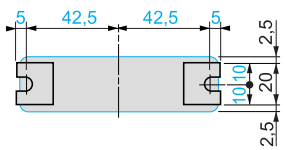


Panel mounting, cut-out

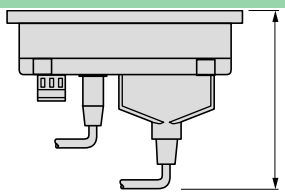


Current Transformers
LT6CT



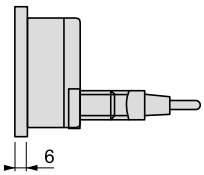


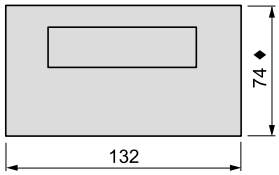
HMI Terminal
XBTN410



58 mm with SUB-D 25-pin elbowed cable XBTZ9680 for Twido®, TSX Micro™ and Premium™ PLCs or XBTZ998 for Advantys™ STB distributed I/O system.

104 mm with SUB-D 25-pin cable XBTZ68/Z9681 for Twido®, TSX Micro™ and Premium™ PLCs





♦ **104 mm** with mounting clips (provided with the product).

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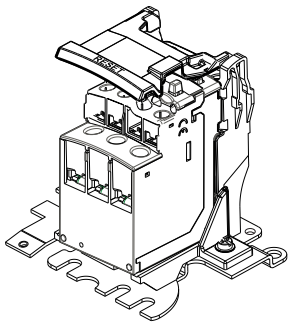
2/15/2017

New!

Adapted Bimetallic Overload Relay Mounting Bracket Adapter (NEMA Sizes 00–1)

New!



Stand-Alone Mounting Bracket (Mounted to the Overload Relay)

The adapted bimetallic Type S starter incorporates a mounting bracket for use with a self-contained adjustable bimetallic overload relay. A separately mounting version of the bracket is also available for use with contactors that do not offer the same terminal configuration as the Type S, or for applications with height restraints that demand mounting next to the contactor rather than directly below as is typical for most starter configurations.

The bimetallic thermal overload relays feature Class 10 or Class 20 protection with automatic and manual (hand) reset and a trip-free mechanism. These overload relays are ambient temperature compensated, and available with or without phase imbalance protection. The component is available as a replacement on a starter or as a separately mounted overload relay adapter. The overload relay (LRD or LR3D) can be purchased separately and installed in the field at a later date. For more information see Table 16.324.

NOTE: The LRD or LR3D bimetallic overload relay must be purchased separately.

Table 16.298: Replacement

Description	Sizes	Maximum Full Load Current (A) of Overload Relay	Catalog Number
Two Pole	00, 0, 1	27	SADR751
Three Pole	00, 0, 1	27	SADR75

Table 16.299: Stand Alone

Description	Sizes	Maximum Full Load Current (A) of Overload Relay	Catalog Number
Two Pole	00, 0, 1	27	SAD751
Three Pole	00, 0, 1	27	SAD75

External Reset Mechanisms, Class 9066

Type RB1

Type W1

Type RA2 Series B

Type SC1

Type RA kits provide a convenient external means for resetting overload relays mounted in control enclosures of almost any depth. Designed for use on NEMA 1, 4 or 12 enclosures, they can be used with any Square D open type magnetic starter or Class 9065 overload relay. All kits are individually packaged for easy stocking and include complete installation instructions.

Only a single mounting hole is required in the enclosure door. Each kit contains one or more threaded reset rods, grooved at intervals of 3/4" so they can be cut to the approximate length required without thread damage. Final adjustment is easily made after installation by rotating a plunger and tightening the lock nut. Mechanisms with more than one reset rod include a steel cross bar with mounting holes located at 1/2" intervals, providing a choice of rod locations to suit any application. All steel parts are electrically isolated from the enclosure and the operator.

Type RB kits make it possible to field install external reset mechanisms to Type S combination starters in NEMA 12 enclosures. They may also be used to replace external reset mechanisms on Type S combination starters in NEMA 1, 4 and 12 enclosures.

Table 16.300: Class 9066 External Reset Mechanisms

Where Used	Type of Enclosure	Reset Mechanism Kit	
		Description	Type
OEM Kit for commercial enclosures	NEMA 1, 12	With 1 Rod With 2 Rods With 3 Rods	RA1 RA2 RA3
Replacement on 8538, 8539 starters	NEMA 1, 12	Size 0 and 1 Size 2	RB1 RB2
On commercial enclosures or Type S combination starters	NEMA 4	W1 is a boot only and must be used with RA or RB Kit listed above	W1
Replacement on Class 8536 Type S starters	NEMA 1 with slip-on covers	Size 00, 0 and 1 Size 2 Size 3	SC1 SD1 SE1
Retro-fit kit Class 8940 Pump Panel	NEMA 3R	Reset for use with 9065TJF Series B OLR	RTJF

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Type SCW21
NEMA 4X Enclosure

Type SCA11
NEMA 12 Enclosure

Type SCW11
NEMA 4 Enclosure

Type SCH2
NEMA 3R Enclosure

Separate Enclosures, Class 9991

Separate enclosures can be used with open style devices for field assembly of enclosed controls. These enclosures, plus the open style components, are equivalent to a factory-assembled device. Separate enclosures are for use only with the following equipment:

- **NEMA 4 and 12** Class 9991 separate enclosures for Type S devices come standard with closing plates. See Table 16.302 for the specific number of closing plates. For applications requiring enclosures without closing plates, contact your nearest Schneider Electric sales office.
- **NEMA 3R** enclosures for field assembly of equipment for outdoor applications come with three closing plates, a reset mechanism, and a predrilled panel as standard. For a conduit connection to the top of these enclosures, select watertight hubs from the listing on Digest page 3-10 in accordance with applicable code requirements. Square D NEMA 12 enclosures can also be modified for outdoor use. For details, refer to the NEMA 12 enclosure modification information on page page 16-110. **NOTE**: Not for use in high-corrosive outdoor locations or sea coast environments.
- **NEMA 4X** enclosures for Type S devices, Sizes 0–2 and 30–60 A, come standard without closing plates. Cover mounted control units for NEMA 4X separate enclosures are available as a factory modification only.

When closing plates are removed from NEMA 4, 12, and 3R enclosure covers, the openings can be used for easy installation of Class 9001 Type K or SK cover-mounted control units. Convenient Class 9999 modification kits containing Class 9001 Type K control kits can be found on page page 16-124.

Table 16.301: How to Order

To Order Specify:	Catalog Number	
	Class	Type
• Class Number	9991	SCW11
• Type Number		

Table 16.302: Selection, Class 9991

For Use With		Enclosure Classification						
		NEMA Size or Ampere Rating	NEMA 4X Watertight, Dusttight and Corrosion-Resistant Glass-Polyester	NEMA 4 [1] Watertight and Dusttight Stainless Steel		NEMA 12/3R Dusttight and Driptight		NEMA 3R Rainproof, Sleet Resistant, Outdoor Use
Class	Types (All Pole Arrangements)		Type	Type	Number of Closing Plates	Type	Number of Closing Plates	Type
Manual Starters								
2510 [2]	MBO, MCO	MO M1 M1P	MW1	MW11	—	MA1	—	—
Magnetic Contactors								
8502 [3]	SAO, SBO, SCO	00, 0, 1	SCW20	SCW11	2	SCA11 [4]	2	SCH2
	SDO	2	SDW20	SDW11	2	SDA11 [4]	2	SDH1
	SEO	3	—	SEW11	3	SEA11 [4]	3	SEH1
	SFO	4	—	SFW11	3	SFA11 [4]	3	SFH1
Magnetic Starters								
8536	SAO, SBO, SCO	00, 0, 1	SCW21	SCW11	2	SCA11 [4]	2	SCH2
	SDO	2	SDW21	SDW11	2	SDA11 [4]	2	SDH1
	SEO	3	—	SEW11 [5]	3	SEA11 [4]	3	SEH1
	SFO	4	—	SFW11 [5]	3	SFA11 [4]	3	SFH1
Lighting Contactors, Non-Combination, Electrically and Mechanically Held								
8903 [3]	LO, LXO	20 A	SDW20	SDW11	2	SDA11 [4]	2	SDH1
	SMO	30 A	SCW20 [6]	SCW11	2	SCA11[4]	2	SCH2
	SPO	60 A	SCW20 [6]	SDW11	2	SDA11 [4]	2	SDH1
	SQO	100 A	—	SEW11 [5]	3	SEA11 [4]	3	SEH1
	SVO	200 A	—	—	—	—	—	SFH1
Reversing and Two-Speed, Horizontally Arranged Contactors and Starters								
8702 [3] 8736	SBO, SCO SDO	0, 1 2	—	SCW12 SDW12	3	SCA12 [4] SDA12 [4]	3	— —
8810	SBO & SCO	0, 1	—	SCW13	3	SCA13 [4]	3	—

[1] The standard cabinet has a brushed finish.
[2] Type MBO, Size MO only.
[3] For contactors, replace the reset assembly with a proper closing plate: for NEMA 4, use Class 9001 Type K52; for NEMA 3R and 12, use Class 9001 Type K51. (Class 9991 Types SCW20 and SDW20 are designed for contactors only, so reset closing plates are not required.)
[4] NEMA 12 enclosures can be field modified for outdoor non-corrosive and non–service entrance rated applications. See page 16-110 for more information.
[5] This enclosure is suitable only for starters with a **melting alloy**, **solid-state**, or **adapted bimetallic** overload relay.
[6] For electrically held devices only.

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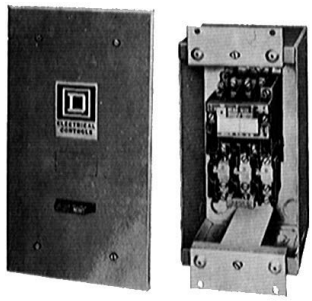

Flush Mounting Starter with Pull Box and Mounting Strap and Plaster Adjustment Feature

Type SCG8
NEMA 1 Enclosure

Flush Mounting, General Purpose Separate Enclosures

Flush mounting, general purpose separate enclosures for Type S Sizes 0–2, 30–60 A are provided with knock-outs in the cover for field assembly of one Class 9999 push button or selector switch kit and one Class 9999 pilot light kit. (Refer to Class 9999 for selection.) For Type S Size 3, 100 A, three closing plates are provided for installation of Class 9001 Type K oiltight control units. For enclosure dimensions, refer to Table 16.307.

Table 16.303: Flush Mounting Selection Table

For Use With		NEMA Size or Ampere Rating	Flush Mounting General Purpose (Components)			
			Flush Plates		Mounting Strap	Pull Box
Class	Types (All Pole Arrangements)		Standard	Stainless Steel *[7]*		
			Type	Type	Type	Type
2510	MBO, MCO	MO M1 M1P	MF1	(with pullbox and plaster adjustment)		
			MF2	(without pullbox but with mounting strap)		
Magnetic Contactors						
8502*[8]*	SBO, SCO	0, 1	SCF11	SCF12	SCF2	SCF1
	SDO	2	SDF11	SDF12	SDF2	SDF1
	SEO	3	SEF11	(Enclosure Complete)		
Magnetic Starters						
8536	SBO, SCO	0, 1	SCF11	SCF12	SCF2	SCF1
	SDO	2	SDF11	SDF12	SDF2	SDF1
Lighting Contactors Non-Combination Electrically and Mechanically Held						
8903*[8]*	LO, LXO	20 A	SDF13	—	SDF2	SDF1
	SMO 1–4	30 A	SCF11	—	SCF2	SCF1
	SMO 10–13	30 A	SCF13	—	SCF2	SCF1
	SPO 1–4	60 A	SDF11	—	SDF2	SDF1
	SPO 10–13	60 A	SDF13	—	SDF2	SDF1
	SQO 1–13	100 A	SEF11	(Enclosure Complete)		

NEMA 1 General Purpose separate enclosures in Table 16.304, when used with open style components, are equivalent to a standard factory assembled control device.

Table 16.304: NEMA 1 Selection Table

For Use With			NEMA 1 General Purpose Enclosure Class 9991
Class	Type	No. of Poles	Type
2510	F and K	All	EN1
	M–Sizes M0 and M1	All	MG1
	M–Size M1P	All	MG2
8501	CO	All	UE1
	XO	2–12, 2–4 **with** attachments	UE7
	XDO	2–8 **without** attachments	
8502	SAO, SBO, SCO	2–4	SCG7
	SDO	2–4	SDG7
	SEO	2–4	SEG7
	SFO	2–4	SFG8
8536	SAO, SBO, SCO	2–4	SCG8
	SDO	2–4	SDG8
	SEO	2–4	SEG8 *[8] [9]*
	SFO	2–4	SFG8 *[8] [9]*
	SGO	3	SGG8 *[10] [9]*
8702, 8736	SAO, SBO, SCO	All	SCG9 *[11]*
	SDO	All	SDG9 *[11]*
8903	LO, LXO	All	LXG1 *[12]*
	SMO	All	SCG7 *[13]*
	SPO	All	SDG7 *[13]*
	SQO	All	SFG8
	SVO	All	SFG4
8910	DP	1–2	DPG1
	DPA12, 13, 22, 23, 32, 33, 42, 43	2–3	DPG1
	DPA14, 24, 34, 44, 52, 53	2–4	DPG2
	DPA62, 63	2–3	DPG3
	DPA72, 73, 92, 93	2–3	DPG4
	H, J, K, L & M	All	UE6
8911	DPSO13, 23, 33, 43	3	DPSG1
	DPSO53	3	DPSG2
	DPSO63, 73, 93	3	SEG8
9050	AO (Single Head)	All	UE6
	HO	All	UE6
9070	EO51, EO61, EO71, K750, K1000	—	SDG4
	EO2, EO3, EO4, EO15, EO16 EO18, EO19, T75, T100, T150, T200, T250, T300, T350, T500	—	LG1
	EO1, EO17, T50	—	UE7

[7] The standard cabinet has a brushed finish.
[8] For contactors, replace the reset assembly with a proper closing plate. For flush mounting, use Class 9999 Type SG2—except for Class 9991 Type SDF11 enclosures, which require a Class 9001 Type K51 or K11 closing plate. (Class 9991 Types SEF11 and LF1 are designed for contactors only, so reset closing plates are not required.)
[9] This enclosure is suitable only for starters with a **melting alloy**, **solid-state**, or **adapted bimetallic** overload relay.
[10] Series B starter enclosure.
[11] For horizontally arranged Class 8702 contactors, replace the reset assembly with a Class 9001 Type K51 closing plate.
[12] If cover mounted control units are required, select an oversized enclosure listed in Table 16.305.
[13] For electrically held contactors only. See Table 16.305 for mechanically held contactors.

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Type SCW4
NEMA 4 Enclosure

Type SCG1
With Starter, Transformer and
Fuse Block Installed

Type SCA11
NEMA 12 Enclosure

Enclosure Selection

NEMA 1, 4, and Oversized Enclosures For the Addition of a Control Circuit Transformer

The Class 9991 enclosures listed in Table 16.305 accept an open type Class 8502 or 8536 Type S, NEMA Size 0, 1, 1P, or 2 contactor or starter along with a fused control circuit transformer (Form F4T) to allow field assembly of enclosed controllers. In the cover of the Class 9991 Type SCG1 enclosure, knock-outs are provided for field addition of Class 9999 cover-mounted control units. All other Class 8502 & 8536 enclosures include a panel with space and drilling for an open-type device and a fused control circuit transformer. In addition, three closing plates are included in each cover for easy installation of Class 9001 Type K or SK control units.

Oversized enclosures for open type Class 8903 Type L & LX, 20 A and Type S, 30 and 60 A electrically and mechanically held lighting contactors include a panel with space and drilling for an open- type contactor and fused control circuit transformer (Form F4T) and/or an auxiliary relay for use with single pole pilot devices (Form R6). When an auxiliary relay is required, use a Class 8501 Type XO11 relay. Three closing plates are provided as standard for easy installation of Class 9001 Type K or SK control units.
Note: A Class 9991 Type SCG1 NEMA 1 separate enclosure can also be used for Class 8903 Type SMO, 30 A electrically held lighting contactor if Form F4T (control transformer), with or without cover control units is required.

NEMA 12/3R Enclosures Modified for Outdoor Applications (not to be used in salt air or corrosive environments)

Field Modifications for NEMA 3 dusttight, raintight and sleet resistant outdoor applications are as follows: Watertight conduit hubs or equivalent provision for watertight connection at the conduit entrance shall be used.

Field Modifications for NEMA 3R rainproof and sleet resistant outdoor applications are as follows:

- Watertight conduit hubs or equivalent provision for watertight connection at the conduit entrance, when the conduit enters at a level higher than the lowest live part, shall be used.
- Drain holes of 1/8 inch diameter shall be added to the bottom of the enclosure.

Class 9001 Type K oiltight/watertight control units can be easily installed in NEMAs 4, 12, and oversized NEMA 1 separate enclosures provided with closing plates. When installing control units simply remove the closing plates and install the proper Class 9001 Type K components. Convenient control unit kits complete with assembled and pre-wired operators for quick installation are available as Class 9999 user modification kits. See Table 16.306 for contents of each control unit kit. Class 9001 Type SK NEMA 4X corrosion resistant control units may be used as an alternate.

Table 16.305: NEMA 1, 4, and 12 Enclosures

For Use With				Class 9991 Enclosure			Recommended Class 9070 *[14]* Transformer Selection					Fuse Block
Class	Type	NEMA Size or Ampere Rating	No. of Poles	General Purpose NEMA 1	Watertight and Dusttight Stainless Steel NEMA 4 *[15]*	Dusttight and Driptight Industrial Use NEMA 12 *[16]*	Standard		Extra Capacity			
									100 VA	150 VA	300 VA	
				Type	Type	Type	Type	VA	Type	Type	Type	
Magnetic Contactors and Starters *[17]*												
8502, 8536	SAO, SBO, SCO	00, 0, 1	1–3	SCG1	SCW4	SCA4	T50	50 VA	T100 *[18]*	T150 *[18]*	—	Class 9999 Type SFR4
			4–5				T100 *[18]*	100 VA	—	T150 *[18]*	—	
	SDO	2	2–5	SDG4	SDW4	SDA4	T100	100 VA	—	T150	T300	
Lighting Contactors, Non-Combination												
8903	LO, LXO	20 A	All	SDG3	SDW3	SDA3	T50	50 VA	—	—	—	
							T50	50 VA	T100 *[18]*	T150 *[18]*	—	
	SMO *[19]*	30 A	1–3				T100 *[18]*	100 VA	—	T150 *[18]*	—	
			4–5				T100	100 VA	—	T150	T300	
	SPO *[19]*	60 A	2–5									

Table 16.306: Control Unit Selection Table

Class 9999 Type	Control Function	Kit Contents	
		Class and Type	Description
SA3	Start-Stop Pushbutton	1-9001 KR1B 1-9001 KR1R 1-9001 KN201 1-9001 KN202 2-9001 KA1	Start Operator Stop Operator Start Legend Plate Stop Legend Plate Contact Block
SC8	Hand-Off-Auto Selector Switch	1-9001 KS43B 1-9001 KN260 1-9001 KA1	Selector Operator Switch Hand-Off-Auto Legend Plate Contact Block
SP28R	Pilot Light (120 V)	1-9001 KP1R31	Red Pilot Light

[14] For complete description, see the Class 9070 section. **Note:** The Class 9991 Type SCG1 enclosure comes standard with a Class 9999 Type SF4 fuse block.
[15] The standard cabinet has a brushed finish.
[16] NEMA 12 modified for outdoor use (see NEMA 12/3R Enclosures Modified for Outdoor Applications).
[17] For contactors (Class 8502), a separate closing plate is provided with each enclosure to replace the reset mechanism—with the exception of Class 9991 Type SCG1, which requires a separate reset closing plate: Class 9999 Type SG2.
[18] To mount in an SCG1 enclosure, a Class 9991 Type S1 adapter bracket is also required.
[19] Mechanically held.

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NEMA 1 Enclosures

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.307: NEMA 1—General Purpose Enclosures (Standard)

Class 9991 Type	For Use With				Dimensions (inches/millimeters)														Weight (lb)
	Class	Type	Size	No. of Poles	Fig. No.	Mounting Screws (in.)	A	B	C	D	E	F	G	H	I	J	K	L	
LXG1	8903	LO, LXO	20 A	2–12	1	—	7.81 198	12.69 322	6.03 153	—	1.09 28	10.50 267	1.09 28	1.09 28	5.63 143	5.75 146	1.09 28	5.63 143	8
DPG1	8910	DP	20–40 A	1–2	1	(4) #10	4.85 123	8.5 216	4.03 102	2.42 62	.109 3	5.75 146	.531 13	.92 23	3.00 76	3.75 95	—	—	2
		DPA		1–3															
SCG7	8903	SMO (E.H.)	30 A	All	1	(3) #10	6.00 152	10.00 254	5.28 134	3.00 76	.88 22	8.13 206	1.00 25	.94 24	4.13 105	5.00 127	—	—	4
	8502	SAO	00	2–3															
		SBO SCO	0 1	All															
SCG8	8536	SAO	00	2–3					5.56 141										
		SBO SCO	0 1	All															
DPG2	8910	DPA	—	—															
DPSG1	8911	DPS	—	—															
SDG7	8903	SPO (E.H.)	60 A	2–12	1	(4) 1/4	7.81 198	12.69 322	6.03 153	—	1.09 28	10.50 267	1.09 28	1.09 28	5.63 143	5.75 146	1.09 28	5.63 143	8
	8502	SDO	2	All															
SDG8	8536	SDO	2	All					6.31 160										
DPG3	8910	DPA	—	—															
DPSG2	8911	DPS	—	—															
SEG7	8502	SEO	3	All	1	(4) 3/8	11.44 291	21.81 554	8.00 203	—	1.53 39	18.75 476	1.53 39	1.53 39	8.38 213	7.75 197	1.53 39	8.38 213	23
SEG8	8536	SEO	3	All															
	8911	DPSG63 to 93	—	All															
DPG4	8910	DPA	—	—					8.38 213										
SFG8	8502	SFO	4	All	2	(4) 7/16	11.25 286	25.15 639	8.99 228	8.60 218	1.25 32	1.25 32	22.31 567	1.42 36	.44 11	—	—	—	34
	8536	SFO	4	All															
	8903	SQO (E.H. & M.H.)	100 A	All															
SCG9	8702 *[20]*	SBO, SCO	0 & 1	All	2	(4) 5/16	11.88 302	11.88 302	7.41 188	9.75 248	1.06 27	1.06 27	9.75 248	1.06 27	.31 8	—	—	—	16
	8922	ETBC20, ETBC36	—																
SDG9	8702 *[20]*	SCO	2	All	2	(4) 5/16	14.88 378	14.13 359	7.56 192	12.75 324	1.06 27	1.06 27	12.00 305	1.06 27	.31 8	—	—	—	24
	8922	ETBC60	—																

Table 16.308: NEMA 1—General Purpose Enclosures (Oversize)

Class 9991 Type	For Use With															
	Class	Type	Size	No. of Poles	Fig. No.	Mounting Screws (in.)	A	B	C	D	E	F	G	H	I	Weight (lb)
SDG3	8903	LO, LXO SMO (M.H.) SPO (Form F4T)	20 A 30 A 60 A	All	2	(4) 5/16	14.88 378	14.13 359	7.56 192	12.75 324	1.06 27	1.06 27	12.00 305	1.06 27	.31 8	15
SDG4	8502	SDO (Form F4T)	2	All												21
	8536	SDO (Form F4T)	2	All					7.66 194							
	9070	EO51, EO61, EO71, T750, T1000	—	—					7.56 192							
SCG1	8502	SBO, SCO (Form F4T)	0, 1	All	3	(4) 9/32	6.34 161	15.88 403	5.19 132	4.66 118	.84 21	14.38 365	.75 19	.28 7	.35 9	8
	8536	SBO, SCO (Form F4T)	0, 1	All												
	8903	SMO (E.H.) (Form F4T)	30 A	All												

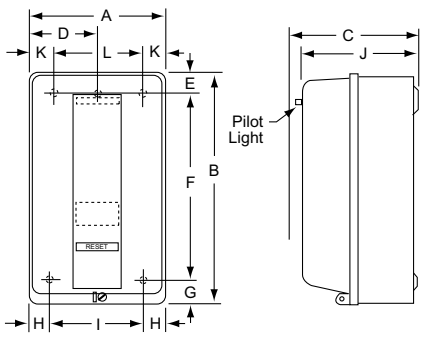

Figure 1

Dimensions: **in.**
mm

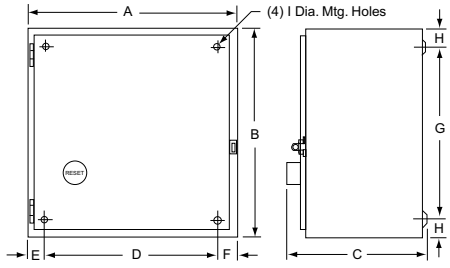

Figure 2

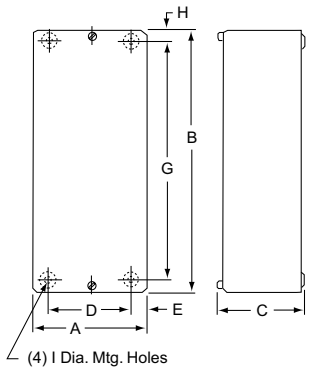

Figure 3

[20] The standard enclosure has space for a fused control transformer, **Form F4T**, on Sizes 0–2.

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NEMA 1 and 3R Enclosures

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.309: NEMA 1—General Purpose Enclosures

Class 9991 Type	For Use With			Dimensions (See Figure 4)										Weight (lb)
	Class	Type	No. of Poles	A	B	C	D	E	F	G	H	J	L	
UE1	8501	CO	All	3.63 92	5.28 134	3.31 84	1.88 48	3.63 92	1.06 27	1.50 38	1/4 in. *[21]*	1/2–3/4 in.		2
UE6	8910	H, J, K L & M	All	4.91 125	5.75 146	5.53 140	3.50 89	4.38 111	1.56 40	2.00 51	9/32 in.	1/2–3/4 in. 1–1-1/4 in.	1/2–3/4 in.	2
	9050	AO (Single Head)	All											
		HO	All											
UE7	8501	XO	2–12, 2–4 w/ Attachments	4.87 124	7.79 198	7.53 191	3.50 89	6.38 162	1.31 33	1.88 48	#10	1/2–3/4 in.		4
		XDO	2–8											
	9070	EO1, EO17 T25, & T50	—											
LG1	9070	EO2, EO3, EO4, EO15, EO16, EO18, EO19 T75, T100, T150, T200, T250, T300, T350, & T500	—	7.53 191	9.78 248	5.91 150	6.13 156	8.38 213	1.31 33	1.88 48	9/32 in.	1/2–3/4–1 in. *[22]*		10

Table 16.310: NEMA 3R—Rainproof and Sleet-Resistant Enclosures

Class 9991 Type	For Use With				Dimensions (see Figure 5)																	
	Class	Type	Size	No. of Poles	A	B	C	D1	D2	E	F	G1	G2	H1	H2	J	K	L	M	N	P	K.O. X	K.O. Y
SCH2	8502 8536	SBO, SCO	0, 1	All	8.83 224	12.30 312	7.12 181	1.39 35	1.44 37	6.00 152	7.50 191	2.61 66	2.19 56	2.08 53	2.62 66	14.28 363	1.37 35	1.37 35	1.88 48	4.38 111	1.83 46	1/2 3/4 1	1/2 3/4 1
	8903	SMO	30 A																				
SDH1	8502 8536	SDO	2	All	9.83 250	16.30 414	8.62 219	1.39 35	1.44 37	7.00 178	11.50 292	2.61 66	2.19 56	2.08 53	2.62 66	16.78 426	1.31 33	1.75 44	2.13 54	4.88 124	1.83 46	1 1-1/4 1-1/2	1/2 3/4
	8903	LO LXO	20 A																				
	8903	SPO	60 A																				
SEH1	8502 8536	SEO	3	All	12.63 321	25.30 643	8.62 219	1.39 35	1.44 37	10.00 254	20.60 523	2.61 66	2.19 56	2.08 53	2.62 66	19.78 502	1.31 33	2.31 59	2.69 68	6.38 162	1.83 46	1 1-1/4 2 2-1/2	1/2 3/4
	8903	SQO	100 A																				
SFH1	8502 8536	SFO	4	All	12.63 321	40.30 1024	9.12 232	1.39 35	1.44 37	10.00 254	35.50 902	2.61 66	2.19 56	2.08 53	2.62 66	20.28 515	1.31 33	2.31 59	2.69 68	6.38 162	1.83 46	1 1-1/4 2 2-1/2	1/2 3/4
	8903	SVO	200 A	2-3																			

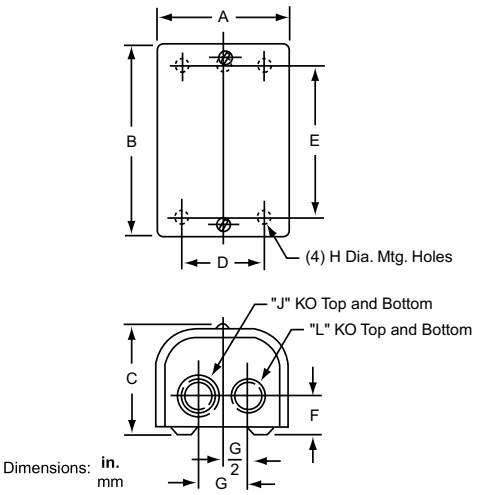

Figure 4

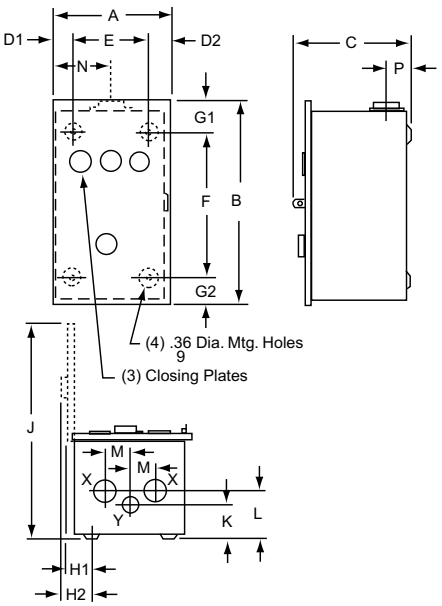

Figure 5

[21] Class 9991 Type UE1 has only 3 of the **H** diameter mounting holes: 2 in the bottom as shown, and 1 centered at the top.
[22] Class 9999 Type LG1 has 3 knockouts, top and bottom.

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NEMA 4 and 4X Enclosures

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.311: NEMA 4X—Watertight and Corrosion Resistant Enclosures

Class 9991 Type	For Use With				Dimensions (see Figure 6)												Hub Dia.		Weight (lb)
	Class	Type	Size	No. of Poles	A	B	C	D	E	F	G	H	I	J	K	L	Bot. Only W	Top & Bot. X	
SCW20	8903	SMO (E.H.)	30 A	All	6.50 165	6.44 164	12.13 308	.75 19	5.00 127	8.25 210	1.69 43	3.34 85	10.06 256	1.31 33	2.13 54	.31 8	3/4 in.	1 in.	7
	8502	SBO, SCO	0, 1	All															
SCW21	8536	SBO, SCO	0, 1	All															
SDW20	8903	LO, LXO	20 A	All	8.50 216	7.06 179	13.88 352	.75 19	7.00 178	10.50 267	1.69 43	3.91 99	11.94 303	1.63 41	2.38 60	.31 8	3/4 in.	1-1/2 in.	13
	8903	SPO (E.H.)	60 A	All															
	8502	SDO	2	All															
SDW21	8536	SDO	2	All															

Table 16.312: NEMA 4—Watertight Enclosures (Standard)

Class 9991 Type	For Use With				Dimensions (see Figure 6)												Hub Dia.		Weight (lb)
	Class	Type	Size	No. of Poles	A	B	C	D	E	F	G	H	I	J	K	L	Bot. Only W	Top & Bot. X	
SCW11	8903	SMO	30 A	All	6.38 162	7.13 181	13.19 335	1.56 40	3.25 83	12.00 305	.59 15	1.88 48	11.78 299	1.63 41	2.31 59	.31 8	3/4 in.	1 in.	12
	8502	SBO, SCO	0, 1	All															
	8536	SBO, SCO	0, 1	All	6.38 162	7.81 198	13.19 335	1.56 40	3.25 83	12.00 305	.59 15	1.88 48	11.78 299	1.63 41	2.31 59	.31 8			
SDW11	8903	LO, LXO	20 A	All	8.13 206	7.88 200	16.19 411	1.56 40	5.00 127	15.00 381	1.09 28	1.94 49	14.75 375	2.00 51	2.63 67	.31 8	3/4 in.	1-1/2 in.	18
	8903	SPO	60 A	All															
	8502	SDO	2	All															
	8536	SDO	2	All	8.13 206	8.56 217	16.19 411	1.56 40	5.00 127	15.00 381	1.09 28	2.88 73	14.75 375	2.00 51	2.63 67	.31 8			
SEW11	8903	SQO	100 A	All	18.15 461	8.77 223	32.21 818	3.08 78	12.00 305	30.50 775	.86 22	3.67 93	26.71 678	2.58 66	3.19 81	.44 11	3/4 in.	2-1/2 in.	51
	8502	SEO	3	All															
	8536	SEO	3	All	18.15 461	9.58 243	32.21 818	3.08 78	12.00 305	30.50 775	.86 22	4.48 114	26.71 678	2.58 66	3.19 81	.44 11			
SFW11	8536	SFO	4	All															
	8502	SFO	4	All	18.15 461	8.77 223	32.21 818	3.08 78	12.00 305	30.50 775	.86 22	3.67 93	26.71 678	2.58 66	3.19 81	.44 11			

Table 16.313: NEMA 4—Watertight Enclosures (Oversize)

Class 9991 Type	For Use With				Dimensions (see Figure 7)												Hub Dia.		Weight (lb)
	Class	Type	Size	No. of Poles	A	B	C	D	E	F	G	H	I	J	K	L	Bot. Only W	Top & Bot. X	
SCW2	8702 8736	SCO	1	All	12.63 321	7.81 198	14.69 373	2.56 65	7.50 191	13.50 343	.59 15	3.88 98	18.41 468	1.66 42	2.31 59	.31 8	3/4 in.	1 in.	23
SCW3	8810	SBO SCO	0 1	All															19
SCW4	8502 8536	SBO, SCO (Form F4T)	0, 1	All															24
SDW2	8702 8736	SDO	2	All	14.88 378	7.25 184	16.19 411	2.56 65	9.75 248	15.00 381	.38 10	3.88 98	20.88 530	1.72 44	2.63 67	.31 8	3/4 in.	1-1/2 in.	25
SDW3	8903	LO, LXO SMO, SPO (Form F4T)	20 A 30 A 60 A	All															29
SDW4	8502 8536	SDO (Form F4T)	2	All															28

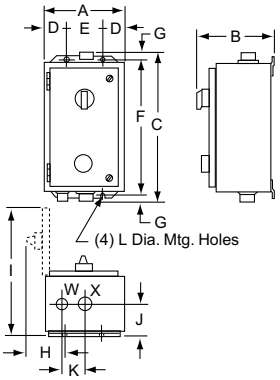

Figure 6

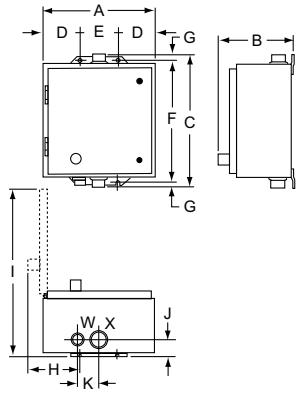

Figure 7

Dimensions: **in.** mm

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NEMA 12/3R and Flush Mounting General Purpose Enclosures

NOTE: These dimensions are for reference only. If you need precise measurements, contact the Customer Care Center at 1-888-778-2733.

Table 16.314: See Figure: NEMA 12/3R—Dusttight and Driptight Enclosures (Standard)

Class 9991 Type	For Use With			No. of Poles	Dimensions										Weight (lb)
	Class	Type	Size		A	B	C	D	E	F	G	H	I	J	
SCA11	8502	SBO, SCO	0, 1	All	6.38 162	8.53 217	12.75 324	1.56 40	3.25 83	12.00 305	.38 10	3.56 90	12.50 318	.31 8	10
	8536	SBO, SCO	0, 1	All											
	8903	SMO	30 A	All											
SDA11	8502	SDO	2	All	8.13 206	9.28 236	16.00 406	1.56 40	5.00 127	15.00 381	.50 13	3.56 90	15.38 391	.31 8	15
	8536	SDO	2	All											
	8903	LO, LXO	20 A	All											
	8903	SPO	60 A	All											
SEA11	8903	SQO	100 A	All	18.15 461	9.24 235	31.50 800	3.08 78	12.0 305	30.50 775	.50 13	3.67 93	26.71 678	.44 11	51
	8502	SEO	3	All											
	8536	SEO	3	All	18.15 461	9.58 243	31.50 800	3.08 78	12.0 305	30.50 775	.50 13	4.48 114	26.71 678	.44 11	
SFA11	8536	SFO	4	All											
	8502	SFO	4	All	18.15 461	9.24 235	31.50 800	3.08 78	12.0 305	30.50 775	.50 13	3.67 93	26.71 678	.44 11	

Table 16.315: See Figure: NEMA 12/3R—Dusttight and Driptight Enclosures (Oversized)

Class 9991 Type	For Use With			No. of Poles	Dimensions										Weight (lb)
	Class	Type	Size		A	B	C	D	E	F	G	H	I	J	
SCA2	8702 8736	SCO	1	All	11.88 302	7.75 197	13.5 343	2.56 65	6.75 171	12.75 324	.38 10	3.66 93	18.13 460	.31 8	17
SCA3	8810	SBO SCO	0 1	All											18
SCA4	8502 8536	SBO, SCO (Form F4T)	0, 1	All											19
SDA2	8702 8736	SDO	2	All	14.88 378	7.88 200	16.00 406	2.56 65	9.75 248	15.00 381	.50 13	3.66 93	21.25 540	.31 8	24
SDA3	8903	LO, LXO SMO, SPO (Form F4T)	20 A 30 A 60 A	All											27
SDA4	8502 8536	SDO (Form F4T)	2	All											27

Table 16.316: See Figure: Flush Mounting General Purpose Enclosures

Class 9991 Type	For Use With			No. of Poles	Dimensions								Weight (lb)
	Class	Type	Size		A	B	C	D	E	F	G	H	
SDF13 (w/SDF1 & SDF2)	8903	LO, LXO	20 A	All	15.19 386	8.94 227	7.63 194	12.88 327	5.44 138	10.94 278	5.13 130	.38 10	17
SCF11 (w/SDF1 & SDF2)	8502	SBO, SCO	0, 1	All	13.44 341	7.19 183	5.88 149	11.13 283	4.75 121	9.19 233	4.50 114	.38 10	10
	8536	SBO, SCO	0, 1	All									
	8903	SMO (E.H.)	30 A	All									
SDF11 (w/SDF1 & SDF2)	8502	SDO	2	All	15.19 386	8.94 227	7.63 194	12.88 327	5.44 138	10.94 278	5.13 130	.38 10	17
	8536	SDO	2	All									
	8903	SPO (E.H.)	60 A	All									
SEF11	8502	SEO	3	All	31.00 787	16.75 425	14.25 362	26.25 667	8.00 203	—	—	.18 5	48
	8903	SQO	100 A	All									

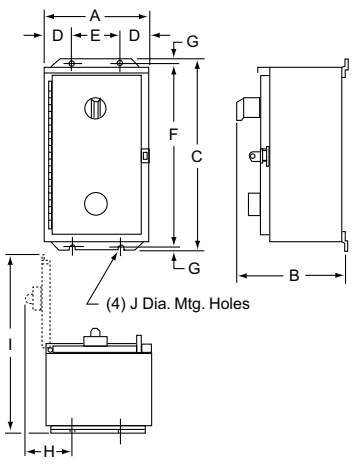

Figure 16.38: NEMA 12/3R—Dusttight and Driptight Enclosures (Standard)

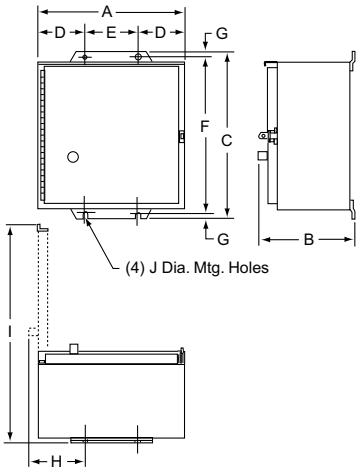

Figure 16.39: NEMA 12/3R—Dusttight and Driptight Enclosures (Oversized)

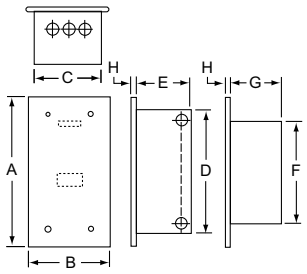

Figure 16.40: Flush Mounting General Purpose Enclosures

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Full Voltage Starters

Factory installed modifications are available for the classes of control equipment listed in the respective tables. Kits are also available for many field modifications and normal parts replacement on most control items. Refer to Classes 9998 and 9999 for complete listings.

NOTES

- Standard equipment dimensions and enclosure construction may not apply when certain special features are added. Such cases should be referred to the factory, with complete description, when precise dimensions are required.
- If a UL label is required, consult the Customer Care Center at 1-888-778-2733. Some Forms **are not** UL Listed.

Table 16.317: Full Voltage Starters

	Factory Modifications	Enclosure Type	Form
Pilot Devices in Cover Full Voltage Non-Reversing Controllers Only Classes 8502 8536 8538 8539	**Push Buttons** *[1]*		
	Start-Stop	1 *[2]*, 3R, 4, 4X, 12, 7, & 9	A
	Start-Stop (maintained contact) *[3] [4]*	1 *[2]*, 3R, 4, 4X, 12	A16
	Start-Stop push button and Hand-Off-Auto selector switch *[4]*	1 *[2]*, 3R, 4, 4X, 12	AC
	On-Off *[4]*	1 *[2]*, 3R, 4, 4X, 12	A3
	Single Oiltight Pushbutton (specify marking) *[4]*	1, 3R, 4, 4X, 12	A11
	Selector Switches		
	Hand-Off-Auto	1 *[2]*, 3R, 4, 4X, 12, 7, & 9	C
	On-Off *[4]*	1 *[2]*, 3R, 4, 4X, 12, 7, & 9	C6
	NON-STANDARD markings for Pilot Devices *[4]*	1, 3R, 4, 12	G12 *[5]*
	Addition of padlock attachment to Class 9001 operators *[4]*	1, 3R, 4, 12	G122
	Pilot Lights (specify color/type) *[6]* See Table 16.318.		
	With Operating Interlock: Add price of each interlock per light	1, 3R, 4, 4X, 12	X *[7]*
Pilot Devices in Cover Full Voltage Reversing and Multi-Speed Controllers Only Classes 8702 8736 8738 8739 8810 8811 8812	**Push Buttons** *[1]*		
	Forward-Reverse-Stop *[4]*	1, 4, 4X, 12, 7, 9	A1
	High-Low-Stop *[4]*	1, 4, 12	A2
	Fast-Off-Slow *[4]*	1, 4, 12	A9
	High-Low push button and Hand-Off-Auto selector *[4]*	1, 4, 12	A10C
	Single Oiltight Pushbutton (specify marking) *[4]*	1, 4, 4X, 12	A11
	Selector Switches		
	Hand-Off-Auto	1 *[2]*, 4, 4X, 12, 7, & 9	C
	On-Off *[4]*	1 *[2]*, 4, 4X 7, & 9	C6
	High-Off-Low	1, 4, 12	C7
	Forward-Off-Reverse *[4]*	1, 4, 4X, 12, 7, & 9	C14
	High-Low and Hand-Off-Auto *[4]*	1, 4, 12	CC17
	Slow-Fast *[4]*	1, 4, 4X, 12	C19
	Forward-Reverse *[4]*	1, 4, 4X, 12	C20
	High-Low-Off-Auto *[4]*	1, 4, 12	C25
	Non-Standard Markings for Pilot Devices *[4]*	Any	G12 *[5]*
	Pilot Lights *[6]* Available with Operating Interlock	1, 4, 4X, 12	X *[7]*

Table 16.318: Pilot Light Forms

	Standard	Push-to-Test	LED	LED-Push-to-Test
	Form	Form	Form	Form
Red ON	P1 *[8]*	P21	P51	P42
Red OFF	P71	P81	P91	P43
Red Unwired	P38	P28	P58	P44
Green ON	P72	P82	P92	P45
Green OFF	P2 *[8]*	P22	P52	P46
Green Unwired	P39	P29	P59	P47
Amber	P3	P23	P53	P63
Clear	P4	P24	P54	P64
Yellow	P35	P25	P55	P48
Blue	P36	P26	P56	P66
White	P37	P27	P57	P67
Red LOW—Green HI	P73	P83	P93	P77
Green LOW—Red HI	P74	P84	P94	P78
Red OFF—Green FWD/REV	P75	P85	P95	P79
Green OFF—Red FWD/REV	P76	P86	P96	P80

[1] All push buttons are momentary contact unless specified otherwise.
[2] Selection of various Form combinations may force the use of a larger enclosure.
[3] Specify the appropriate Class 9001 Type K or SK operator required.
[4] Not available for Size 00.
[5] Specify the marking and/or the required Class 9001 Type KN or SKN legend plate.
[6] Indicate the pilot light color as **Form P1** (red), **Form P2** (green), and so forth, as shown in Table 16.318. Unless otherwise requested, standard practice is to wire a red pilot light to indicate that the device is energized. No additional auxiliary contact is required. Also, standard practice is to wire a green pilot light to indicate that the device is de-energized. An additional normally closed auxiliary contact is supplied. A wiring diagram must be provided for other pilot light colors or arrangements.
[7] To determine the maximum number of auxiliary contacts that can be added to each Type S device, and for the appropriate X Form, refer to Table 16.84 (for non-reversing single-speed devices) or Table 16.167 (for reversing or two-speed devices). For Class 8600 reduced voltage controllers, consult the Customer Care Center at 1-888-778-2733.
[8] Only for pilot light. Available for Size 00.

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Full Voltage Contactors and Starters

Table 16.319: Control Circuit, Full Voltage and Multi-Speed Controllers Only

Classes 8502, 8536, 8538, 8539, 8702, 8736, 8738, 8739, 8810, 8811 and 8812													
Classes	Factory Modifications		Enclosure Type	Form	NEMA SIZE								
					00	0	1	2	3	4	5	6	7
8502 8536 8538 8539 8702 8736 8738 8739 8810 8811 8812	Separate Control Circuit—(specify voltage and frequency)		Any	S *[9]*	X	X	X	X	X	X	X	X	X
	Fused Control Circuit (without control transformer)												
	One fuse *[10]*		1, 3R, 4, 4X, 12	F	X	X	X	X	X	X	X	—	—
	Two fuses *[10]*		1, 3R, 4, 4X, 7, 9, 12	F4	X	X	X	X	X	X	X	—	—
	Control Circuit Transformers *[11]*—Standard capacity (50 or 60 Hz) Note: All orders requesting Form FT will be supplied as Form F4T.												
	FUSES												
	Primary	Secondary											
	2	1	1, 4, 4X, 12	FF4T	X	X	X	X	X	X	X *[12]*	X	X
	2	1	7 & 9	FF4T	X	X	X	X	X	X	X *[12]*	X	X
	2	2	1, 4, 4X, 12 *[10]*	F4F10T	X	X	X	X	X	X	X *[12]*	—	—
	Additional Capacity (50 or 60 Hz)												
	Two fuses in primary and one fuse in secondary												
	100 VA additional capacity		1, 4, 4X, 12	FF4T11	X	X	X	X	X	X *[12]*	X *[12]*	X	X
	100 VA additional capacity *[10]*		7 & 9	FF4T11	X	X	X	X	X	X *[12]*	X *[12]*	—	—
	200 VA additional capacity		1, 4, 4X, 12	FF4T12	X	X	X	X	X *[12]*	X *[12]*	X *[12]*	X	X
	300 VA additional capacity		1, 4, 4X, 12	FF4T13	X	X *[12]*	X *[12]*	X *[12]*	X *[12]*	X *[12]*	X *[12]*	X	X
	400 VA additional capacity		1, 4, 4X, 12	FF4T14	X	X *[12]*	X *[12]*	X *[12]*	X *[12]*	X *[12]*	X *[12]*	X *[12]*	X *[12]*
	500 VA additional capacity		1, 4, 4X, 12	FF4T15	X	X *[12]*	X *[12]*	X *[12]*	X *[12]*	X *[12]*	X *[12]*	X *[12]*	X *[12]*

Table 16.320: Marine Control

Class	Factory Modification	Enclosure Type	Form
8502 8536 8538 8539 8702 8736 8738 8739 8810 8941	Modification of standard device for use as marine control in accordance with UL508 *[13]*	12/3R 4/4X (stainless steel only)	M10

Table 16.321: Control Circuit Transformer Codes

AC-Operated Devices With Control Transformers	
Voltage 60 Hz (Primary–Secondary)	Code
120–12 *[14]*	V88
120–24 *[14]*	V89
208–120	V84
240–24 *[14]*	V82
240–120	V80
277–120	V85
480–24 *[14]*	V83
480–120	V81
480–240	V87
600–120	V86
Specify	V99

Selection of Control Circuit Transformers

The standard primary/secondary voltages for control circuit transformers are indicated in Table 16.321.

To order, select the desired device with the appropriate transformer Form designation. Then convert the previously selected voltage code (V●●) to reflect the desired primary/secondary voltage for the transformer. The secondary voltage should equal the previously selected coil voltage of the device.

Example:

You have selected 8536SDG1V02S. V02S means that you need a coil voltage of 120-60/110-50 wired for separate control. You would like to add **Form FF4T**, with transformer voltages of 480 V primary, 120 V secondary, and solid-state overload relay protection with selectable Class 10/20 trip class—Form **H30**. (The Form designations needed are **FF4**, **H30**, and **T**.)

The new and complete Class, Type, voltage code, and Form number will be:

Class	Type	Voltage Code	Form *[15]*
8536	SDG1	V81	FF4H30T

[9] All combination style devices—such as Class 8538, 8539, 8738, and 8739—that use **Form S** should also use **Form Y74** (auxiliary contact installed on the disconnect switch) in accordance with NEC Article 430-74.
[10] Not available for Sizes 6 and 7.
[11] See Table 16.321
[12] **Single** primary voltage must be specified.
[13] Not available for NEMA Sizes 0, 00, or 7. NEMA Sizes 00 and 0 cannot be used with marine controls.
[14] 12 V coils are not available on Sizes 3–7. 24 V coils are not available on Sizes 4–7.
[15] Specify Form numbers in alphabetical order. Each letter indicates the beginning of a new Form and may be followed by one or more numbers.

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Solid-State Overload Relay

The solid-state overload relay (SSOLR) is available on NEMA Size 00–7.
For Class 8536, 8538, 8539, 8736, 8738, 8739 and 8810 devices.

Form Description H # # #

Type S Starter with Motor Logic™ Solid-State Overload Relay (SSOLR)

3: Motor Logic SSOLR, Class 10/20 (Selectable)

0: No additional modifications
1: N.O. auxiliary contact (field convertible to N.C.)

Special Factory-Assembled SSOLR/Contactor Size Combinations (Base and Feature Units):
(must be specified on Size 00 starter orders)
Blank: Overload relay matched to the starter size (for example, Size 1 contactor and 9-27 A overload relay)
0: 6–18 A overload relay on the starter size indicated by the starter catalog number
1: 9–27 A overload relay on the starter size indicated by the starter catalog number
2: 15–45 A overload relay on the starter size indicated by the starter catalog number
3: 30–90 A overload relay on the starter size indicated by the starter catalog number
4: 45–135 A overload relay on the starter size indicated by the starter catalog number
8: 1.5–4.5 A overload relay on the starter size indicated by the starter catalog number (only offered on Feature Units)
9: 3–9 A overload relay on the starter size indicated by the starter catalog number

Special note for Class 8810 devices:

You **must** specify two separate Form numbers to get Motor Logic overload relays on two-speed starters.

The catalog number will be alphanumeric. Example:
- Open style, Size 4 two speed starter with Motor Logic SSOLRs
- Single winding, 460 V, constant or variable torque
- High speed FLA = 96 A
- Low speed FLA = 27 A (use Size 2 overload relay)

Catalog number to order: **8810SF01V02H30H302S**
Where:
- Form H20 is a Size 4 contactor with a 45–135 A Motor Logic SSOLR for high speed
- Form H202 is a 15–45 A Motor Logic SSOLR on the low speed contactor.

Table 16.322: Special Factory-Assembled Starter Combinations with Motor Logic SSOLR Protection

NEMA Contactor Size	SSOLR Size						
	00		0	1	2	3	4
	1.5–4.5 A	3–9 A	6–18 A	9–27 A	15–45 A	30–90 A	45–135 A
00	H308	H30	—	—	—	—	—
0	H308	H309	H30	—	—	—	—
1	H308	H309	H300	H30	—	—	—
2	—	H309	H300	H301	H30	—	—
3	—	—	—	—	—	H30	—
4	—	—	—	—	—	—	H30

Table 16.323: Forms, Motor Logic SSOLR Classes 8536, 8538, 8539, 8736, 8738, 8739, 8810, and 8940

Factory Modification: Motor Logic SSOLR Class 10/20 (Selectable)	NEMA Size and Overload Current Range								
	00	0	1	2	3	4	5	6	7
	3–9 A	6–18 A	9–27 A	15–45 A	30–90 A	45–135 A	90–270 A	180–540 A	270–810 A
Motor Logic SSOLR (No Additional Modifications)	H30	H30	H30	H30	H30	H30	H30	H30	(Std.)
Motor Logic SSOLR with Auxiliary Contact	H31	H31	H31	H31	H31	H31	H31	H31	H31

Table 16.324: *New!* Adapted Bimetallic Overload Relay for NEMA Type S Starter

This bimetallic overload relay is available on NEMA Sizes 00, 0 & 1 for Class 8536, 8538, 8539, 8736, 8738 and 8739 devices. To order a starter with the **adapter only**, add Form E to the catalog number (8536SBG2V02ES). When ordering with the adapter and bimetallic overload relay installed, use Table 16.325 as a guide.

Form Description E # ## #

Bimetallic Overload Relay

Class
1: Class 10 Balanced Loads (with single phase sensitivity)
2: Class 20 Balanced Loads (with single phase sensitivity)
3: Class 10 Unbalanced Loads (without single phase sensitivity)
4: Class 20 Unbalanced Loads (without single phase sensitivity)

FLA: Suffix from the TeSys D Overload Relays table below (for example, for 4–6 FLA, use suffix **10**)

Terminals: **0** for screw terminal and **6** for ring tongue terminals

Sample catalog number: **8536SCO3V02E2160S**
NEMA Size 1 starter controlling a 7.5 hp motor (11 FLA)—Bimetallic overload relay is LRD16L (9–13 FLA)

Table 16.325: TeSys D Overload Relays for Sizes 00–1 Type S Starters, Non-Reversing and Reversing, Classes 8536, 8538, 8539, 8736, 8738, and 8739

Current Setting Range Amperes	Class 20 *with* Single Phase Sensitivity	Class 20 *without* Single Phase Sensitivity	Class 20 *with* Single Phase Sensitivity	Class 20 *without* Single Phase Sensitivity	Factory Installed—Catalog Number Suffix (CP1 List)
	Screw Termination	Screw Termination	Ring Tongue Connector	Ring Tongue Connector	
0.40 to 0.63	LRD04L	LR3D04L	LRD04L6	LR3D04L6	04
0.63 to 1	LRD05L	LR3D05L	LRD05L6	LR3D05L6	05
1 to 1.6	LRD06L	LR3D06L	LRD06L6	LR3D06L6	06
1.6 to 2.5	LRD07L	LR3D07L	LRD07L6	LR3D07L6	07
2.5 to 4	LRD08L	LR3D08L	LRD08L6	LR3D08L6	08
4 to 6	LRD10L	LR3D10L	LRD10L6	LR3D10L6	10
5.5 to 8	LRD12L	LR3D12L	LRD12L6	LR3D12L6	12
7 to 10	LRD14L	LR3D14L	LRD14L6	LR3D14L6	14
9 to 13	LRD16L	LR3D16L	LRD16L6	LR3D16L6	16
12 to 18	LRD21L	LR3D21L	LRD21L6	LR3D21L6	21
17 to 24	LRD22L	LR3D22L	LRD22L6	LR3D22L6	22
23 to 32	LRD32L	LR3D32L	LRD32L6	LR3D32L6	32

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TeSys T Factory Modifications (Forms)

Table 16.326: Communication Codes

Communication Network	Code
Modbus	2
ProfiBus	3
CANopen	4
DeviceNet	5
Ethernet TCP/IP (communication protocols: Ethernet/IP and Modbus/TCP)	6

Table 16.327: TeSys T Motor Management System Modifications H6xx or H7xx for use with Class 8536 and 8736 (Open Starters)

Used on Size	Range	Form	
		Control Voltage	
		100–240 Vac	24 Vdc
1	0.4–8 A	H61X*[16]*	H71X*[16]*
1	1.35–27 A	H62X*[16]*	H72X*[16]*
2, 3	5.0–100 A	H63X*[16]*	H73X*[16]*
4	8–160 (CT 300:5 3 turns)	H65X*[16]*	H75X*[16]*
5	24–480 A (CT 300:5 1 turn)	H66X*[16]*	H76X*[16]*
6	48–960 A (CT 600:5 1 turn)	H67X*[16]*	H77X*[16]*

NOTES:
- The product configurator must be used to order TeSys T open starters.
- The auxiliary contact for the control of the starter coil has a maximum rating of 240 Vac.

Table 16.328: Full Voltage Controllers Only

Classes 8502, 8536, 8538, 8539, 8702, 8736, 8738, 8739, 8810, 8811 and 8812												
Factory Modifications		Enclosure Type	Form	NEMA Size								
				00	0	1	2	3	4	5	6	7
Power Poles (addition of one)	NEMA Size 1, 30 A, single pole, N.O.	Any	Y428	—	X	X	X *[17]*	X	X	X	X	X
	NEMA Size 1, 30 A, single pole, N.C.	Any	Y429	—	X	X	X *[17]*	X	X	X	X	X
	NEMA Size 1, 30 A, double pole, N.O./N.O.	Any	Y430	—	X	X	X *[17]*	X	X	X	X	X
	NEMA Size 1, 30 A, double pole, N.C./N.C.	Any	Y434	—	X	X	X *[17]*	X	X	X	X	X
	NEMA Size 1, 30 A, double pole, N.O./N.C.	Any	Y435	—	X	X	X *[17]*	X	X	X	X	X
	NEMA Size 2, single pole, N.O.	Any	Y436	—	—	—	X *[17]*	X	X	X	X	X
	NEMA Size 2, single pole, N.C.	Any	Y437	—	—	—	X *[17]*	X	X	X	X	X
	NEMA Size 2, double pole, N.O./N.O.	Any	Y438	—	—	—	X *[17]*	X	X	X	X	X
	NEMA Size 2, double pole, N.C./N.C.	Any	Y439	—	—	—	X *[17]*	X	X	X	X	X
	NEMA Size 2, double pole, N.O./N.C.	Any	Y440	—	—	—	X *[17]*	X	X	X	X	X
Miscellaneous	**Coil transient suppressor (120 V only), per coil.**	Any	Y145	X	X	X	X	X	X	X	X	X
	Addition of terminal blocks (specify wired or unwired).											
	Wired, per terminal, each	1, 4, 12	G56 *[18]*	—	X	X	X	X	X	X	X	X
	Unwired, per terminal, each	1, 4, 12	G50 *[18]*	—	X	X	X	X	X	X	X	X

[16] Where X is the communication option according to Table 16.326 at right (for example, H612).
[17] When adding a power pole to a Size 2 device, also specify **Form Y118** (stronger coil, Size 2 only).
[18] Addition of terminal block Type 9080CA or 9080GR6 only. The number of circuits is the same as the ending of the Form number (example: G505 is a 5–circuit unwired terminal block.) Available in groups of 5 only.

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Type S Contactor and Starter Forms

Table 16.329: Full Voltage Controllers *[19]*

Classes 8502, 8536, 8538, 8539, 8702, 8736, 8738, 8739, and 8810											
Factory Modifications		Enclosure Type	Form	NEMA Size							
				0	1 1 PW 1 YD	2 2 PW 2 YD	3 3 PW 3 YD	4 4 PW 4 YD	5 5 PW 5 YD	6 6 PW 6 YD	7 7 PW 7 YD
Auxiliary Relays	Control relay (4 and 8 poles)	1, 12	R174	X	X	X	X	X	X	X	X
		4, 4X *[20]*	R174	X	X	X	X	X	X	X	X
		7, 9	R174	X	X	X	X	X	X	—	—
		1, 12	R178	X	X	X	X	X	X	X	X
		4, 4X *[20]*	R178	X	X	X	X	X	X	X	X
		7, 9	R178	X	X	X	X	X	X	—	—
	Pneumatic Timing Relay – specify Class 9050 Type A or B										
	0.1 seconds to 1.0 minute—On delay	1	K25	X	X	X	X	X	X	X	X
		4, 4X *[20]*, 12, 3R	K25	X	X	X	X	X	X	X	X
		7, 9	K25	X	X	X	X	X	X	—	—
	0.1 seconds to 1.0 minute—Off delay	1	K26	X	X	X	X	X	X	X	X
		4, 4X *[20]*, 12, 3R	K26	X	X	X	X	X	X	X	X
		7, 9	K26	X	X	X	X	X	X	—	—
	1.0 to 3.0 minute—On delay	1, 4, 12, 3R	K37	X	X	X	X	X	X	X	X
		4X *[20]*, 7, 9	K37	X	X	X	X	X	X	—	—
	1.0 to 3.0 minute—Off delay	1, 4, 12, 3R	K38	X	X	X	X	X	X	X	X
		4X *[20]*, 7, 9	K38	X	X	X	X	X	X	—	—
	Solid-state timing relay (specify timing range) and timer (120 V control required)	1, 4, 4X, 7, 9, 12	K1070	X	X	X	X	X	X	X	X
	Motor-driven timing relay *[21] [22]*	1, 4, 12	K5	X	X	X	X	X	X	X	X
	Phase failure and phase reversal relay with time delay option including under and over voltage protection.	1, 4, 4X, 7/9, 12, 3R	R44	X	X	X	X	X	X	X	X
	Addition of a protective relay with options of phase failure with time delay, phase reversal and under/over voltage protection (RM3TR1). Both motor voltage and control voltage (V8• voltage code) must be specified with device even if Form S is specified. Form replaces Forms Y444, Y445, Y447, Y448 and Y449.										
	For multispeed controllers: Compelling relay (requires motor to be started in low speed)	1, 4, 7, 9, 12	R1	X	X	X	X	X	X	X	X
	Accelerating relay (provides timed acceleration to selected speed):										
	For Class 8810	1, 4, 7, 9, 12	R2	X	X	X	X	X	X	X	X
	For Class 8811	1, 4, 7, 9, 12	R2	X	X	X	X	X	X	X	X
	For Class 8812	1, 4, 7, 9, 12	R2	X	X	X	X	X	X	X	X
	Decelerating relay (imposes a timing delay during transfer from a higher to a lower speed):										
	For Class 8810	1, 4, 7, 9, 12	R3	X	X	X	X	X	X	X	X
	For Class 8811	1, 4, 7, 9, 12	R3	X	X	X	X	X	X	X	X
	For Class 8812	1, 4, 7, 9, 12	R3	X	X	X	X	X	X	X	X
	Antiplugging timers and relays	1, 4, 7, 9, 12	R10	X	X	X	X	X	X	X	X
Meters and Metering *[23]*	Ammeter in cover (includes current transformer if required)	1, 12	G91	X	X	X	X	X	X	X	X
	Ammeter and switch with two current transformers	1, 12	G92	—	X	X	X	X	X	X	X
	Ammeter and switch with three current transformers	1, 12	G93	—	X	X	X	X	X	X	X
	Voltmeter mounted	1, 12	G94	—	X	X	X	X	X	X	X
	Voltmeter and switch mounted	1, 12	G95	—	X	X	X	X	X	X	X
	Elapsed time meter	1, 12	G97	X	X	X	X	X	X	X	X
	Operation counter	1, 12	G99	X	X	X	X	X	X	X	X
Auxiliary Contacts	Additional starter (contactor) auxiliary contacts (Specify number of additional N.O. or N.C. contacts required per contactor.) Each will be X●● (for example, X01).	Any	X	X	X	X	X	X	X	X	X
	To determine the maximum number of auxiliary contacts that can be added to each Type S device, and for the appropriate X Form, refer to the tables in the Class 8536 section on page 16-29 (for non-reversing single-speed devices) or the Class 8736 section on page 16-59 (for reversing or two-speed devices). For Class 8600 Reduced Voltage controllers, consult Customer Care Center at 1-888-778-2733.										
	Auxiliary contacts installed on disconnect switch or circuit breaker operating mechanism.										
	SPDT	1, 4, 4X, 12	Y74	X	X	X	X	X	X	X	X
	DPDT	1, 4, 4X, 12	Y75	X	X	X	X	X	X	X	X
	(**Note:** The above contacts do not switch with the automatic tripping of the circuit breaker. If such operation is required, consult your nearest Schneider Electric sales office.)										
Enclosures	Space heater with N.C. auxiliary contact	1, 4, 4X, 12	G51	X	X	X	X	X	X	X	X
	Function identification plate, with marking as specified	Any	G11	X	X	X	X	X	X	X	X
	Drain and breather installed	7 and 9 *[24]*	Y41	X	X	X	X	X	X	X	—
	Cover gaskets added to NEMA 1 enclosures:										
	For Classes 8538 and 8539	1	Y47	X	X	Std.	Std.	Std.	Std.	—	—
	For Classes 8738 and 8739	1	Y47	Std.	Std.	Std.	Std.	Std.	Std.	—	—
	For other full voltage controllers	1	Y47	X	X	X	X	X	X	X	X
	For reduced voltage controllers	1	Y47	X	X	X	X	X	X	X	X
	Brushed stainless steel watertight device										
	Class 8606	—	Y56	—	—	X	X	X	X	X	X
	Classes 8630 and 8640	—	Y56	—	Std.	Std.	Std.	Std.	X	X	X

[19] NEMA 7 and 9 enclosures are available only with Class 2510, 8502, and 8702 devices.
[20] This adder, used with a NEMA 4X enclosure, applies only to Classes 8538, 8539, 8738, 8739, and 8810 non-reversing.
[21] If the controller has a control transformer, price that transformer with additional capacity for the relay provided.
[22] Specify the control and line voltage.
[23] The motor hp and voltage must be specified when placing an order. Meters are panel-mounted in NEMA 12 enclosures.
[24] Available only on Spin Top™ and cast aluminum NEMA 7 and 9 enclosures.

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Replacement AC Magnetic Coils

Table 16.330: Replacement AC Magnet Coils for Magnetic Contactors and Starters

Equipment To Be Serviced				Coil Prefix, or Class and Type	Hz	Suffix Number (Complete Coil Number Consists of the Prefix or the Class and Type, Followed by the Suffix)												Coil VA	
Device	Size	Type	Poles			24 V	110-115 V	120 V	208 V	220 V	240 V	277 V	380 V	440 V	480 V	550 V	600 V	In-rush	Sealed
Coils for Present Design Magnetic Contactors and Starters Classes 8502, 8536, 8538, 8539, 8606, 8630, 8640, 8647, 8650, 8651, 8702, 8736, 8738, 8739, 8810, 8811, 8812, 8903, 8910 *[1]* and 8940 (except NP)	30 A	L	2–6	9998L	60 50	23 24	— 44	44 45	50 52	*[2]* 53	53 54	55 —	— 60	— 62	62 63	— 65	65 66	150 140	30 30
			8–12	9998LH	60 50	23 24	— 44	44 45	50 —	*[2]* 53	53 54	55 —	— 60	— 62	62 —	— 65	65 —	180 170	35 35
		LX (Latch)	2–4	9998L	60 50	23 24	— 44	44 45	50 52	— 53	53 54	55 —	— 60	— 62	62 63	— 65	65 66	150 140	— —
			6–12	9998LH	60 50	23 24	— 44	44 45	50 —	— 53	53 54	55 —	— 60	— 62	62 —	— 65	65 —	180 170	— —
	00	SA *[3]* (Series B)	All	9998SAC	60 50	23 —	*[2]* 45	45 —	52 —	*[2]* 54	54 —	55 —	59 —	*[2]* 62	62 —	*[2]* 65	65 —	165 —	33 —
	00, 0, 1, 1-P, & 30 A	SA (Series A) SB, SC, & SM	All	31041400	60 50	20 22	*[2]* 42	42 43	48 —	*[2]* 51	51 53	52 —	56 57	58 60	60 *[2]*	61 62	62 64	245 232	27 26
	2 & 60 A	SD & SP	2 & 3	31063409	60 50	16 17	*[2]* 38	38 39	44 —	*[2]* 47	47 48	49 —	53 54	*[2]* 57	57 —	*[2]* 60	60 61	311 296	37 36
			4 & 5	31063400	60 50	16 17	*[2]* 38	38 39	44 —	*[2]* 47	47 48	49 —	53 54	*[2]* 57	57 —	*[2]* 60	60 61	438 429	38 37
	3 & 100 A	DPA12_, SE, SQ, & SYD138	2 & 3	31074400	60 50	16 17	*[2]* 38	38 39	44 —	*[2]* 47	47 48	49 —	53 54	*[2]* 57	57 —	*[2]* 60	60 61	700 678	46 47
			4 & 5	31091400	60 50	— —	*[2]* 38	38 39	44 —	*[2]* 47	47 48	49 —	53 54	*[2]* 57	57 58	*[2]* 60	60 61	1185 1260	85 89
	4 & 200 A	SF, SV, & SYD230	All	31091400	60 50	— —	*[2]* 38	38 39	44 —	*[2]* 47	47 48	49 —	53 54	*[2]* 57	57 58	*[2]* 60	60 61	1185 1260	85 89
	5 & 300 A	SG, SX, & SYD368 Series A	All	31096400	60 50	— —	*[2]* 09	09 10	15 —	*[2]* 18	18 —	19 —	21 22	*[2]* 24	24 —	*[2]* 29	29 30	2970 2970	212 250
		SG, SX, & SYD368 Series B	All	31096320	60 50	— —	50 50	50 50	51 —	52 52	52 52	53 —	54 54	55 55	55 55	— —	— —	1300 —	14 —
	6 & 7	SH & SJ	2–3	Coil Part Number 3110440050 (All System Voltages)														1780	48
	400, 600 & 800 A	SY, SZ, SJ (Elect. Held)																1960	59
		SY, SZ, SJ (Mech. Held)	2–3	31104418	60 50	— —	*[2]* 09	09 —	15 —	*[2]* 18	18 —	19 —	— —	*[2]* 24	24 —	*[2]* 29	29 —	1530 1250	— —

NOTE: Refer to Table 16.332 for mechanically held unlatch coils.

Table 16.331: Size 5 Coil Modification Kits

Catalog Number	Volage
9998SG120	120 V
9998SG208	208 V
9998SG240	240 V
9998SG277	277 V
9998SG380	380 V
9998SG480	480 V

NEMA Size 5, Type S, E-Coil Modification Kit

Applies to Classes 8502, 8536, 8538, 8539, 8606, 8630, 8640, 8647, 8650, 8651, 8702, 8736, 8738, 8739, 8810, 8811, 8812, 8910 and 8903. Consists of:

- E-coil
- Armature
- 15 A, 600 V fuse and holder (Class 9999SFR)
- Bottom magnet
- Instruction material

NOTE: No 600 V coil nor mechanically held lighting contactor.

[1] For 8910DPA1● to DPA9●, see page 16-88.
[2] Use a 60 Hz coil of the next higher voltage.
[3] Use on Type S Series B devices only.

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Relays, Timers, and Contactors

Table 16.332: Replacement AC Magnet Coils for Relays, Timers, and Contactors

Equipment To Be Serviced			Coil Prefix or Class and Type	Hz	Suffix Number (Complete Coil Number Consists of Prefix or Class and Type Followed by Suffix Number)												Coil VA	
Device	Type	Poles			24 V	110–115 V	120 V	208 V	220 V	240 V	277 V	380 V	440 V	480 V	550 V	600 V	In-rush	Sealed
Classes 8501 and 9050																		
8501 (Relays)	X	All	9998X *[4]*	60 50	23 24	— 44	44 —	51 52	52 53	53 —	55 —	— —	— 62	62 —	— 65	65 —	148 143	23 25
9050 (Timer)	A	All	2959-S49-	60 50	W25A W25B	W31B W32A	W32A W32B	W34A W34B	W34B W35A	W35A W35B	W35B W36A	— —	W37B W38A	W38A W38B	W38B W39A	W39A W39B	74 68	17 17
	B *[5]*	All	31017-400-	60 50	33 34	— —	54 55	61 —	61 63	63 64	65 —	— —	70 72	72 73	73 75	75 76	165 155	27 27
Mechanically Held *Unlatch* Coils—Classes 8508 and 8903 **NOTE**: A *latch* coil is also used with mechanically held devices. For selection, see Table 16.330.																		
8903 (Lighting Contactors)	LX	All	9998LX	60 50	23 —	— 44	44 —	51 —	— 53	53 —	55 —	— —	— 62	62 —	— 65	65 —	25 —	— —
	SM, SP	All	2959-S13	60 50	W23B W24B	*[6]* W30B	W30B W31B	W33A —	*[6]* W33B	W33B W34B	W34A —	— W36A	*[6]* W36B	W36B —	*[6]* W37B	W37B —	80 —	— —
	SQ, SV, SX, SY, SZ	All	31096-416	60 50	03 —	*[6]* 09	09 —	15 —	*[6]* 18	18 —	20 —	— 22	*[6]* 24	24 —	*[6]* 28	28 —	550 —	— —
	SJ	All	31123-403	60 50	03 —	*[6]* 09	09 —	15 —	*[6]* 18	18 —	20 —	— 22	*[6]* 24	24 —	*[6]* 28	28 —	2100 —	— —

Table 16.333: Replacement DC Magnet Coils for Magnetic Relays and Timers

Equipment To Be Serviced			Coil Prefix or Class and Type	Suffix Number (Complete Coil Number Consists of Prefix or Class and Type Followed by Suffix Number.)												Coil Burden Watts
Class	Type	Poles		6 V	12 V	18 V	24 V	32 V	48 V	64 V	72 V	90 V	110 V	115/125 V	220 V	230/250 V	
8501 (Relays)	XD	All	9998XD	19	28	34	37	40	46	49	52	55	—	58	—	67	18
	XDL	—	9998XDL	19	28	34B	37B	40B	46B	49B	52B	55B	—	58B	—	67B	50
	XUD	All	9998XUD	19	28	—	37	—	46	—	—	—	—	58 *[7]*	—	67 *[7]*	16
9050 (Timers)	C	—	31018-400-	22	31	—	40	—	49	—	—	—	—	61	—	70	14
	H	—	4491S1	W21	W24	—	W27	—	W30	—	—	—	—	W34	—	W37	14

Table 16.334: Replacement Coil for 8903 Panel Board Lighting Contactors

Class	Type	Replacement Solenoid	Catalog Number
8903	PB	120 V	9998PBV02
		208 V	9998PBV08
		240/277 V	9998PBV39
		480 V	9998PBV28

[4] To order an unlatch coil, add **L** to the Type number and **B** to the suffix. Example: For a 120 V 60 Hz unlatch coil, order 9998X**L**44**B**.
[5] Series C (double pole) and Series E (single pole).
[6] Use a 60 Hz coil of the next higher voltage.
[7] Not dual rated. 125 Vdc or 250 Vdc only.

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Contactor and Starter Replacement Part Kits

Class 9998 replacement parts kits are available for servicing Square D relays, contactors, and starters as well as pressure, vacuum, and float switches. Each kit contains the necessary movable and stationary contacts, contact springs (when required—NEMA Size 3 and above do not include contact springs, and springs are not available), and additional hardware required to service the devices listed below. When servicing devices having more poles than contained in the corresponding kit, it may be necessary to order an additional kit.

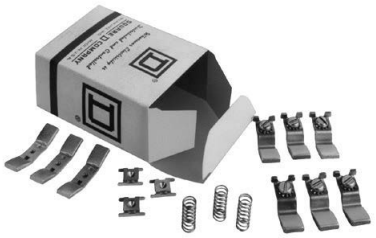

Table 16.335: Magnetic Contactor and Starter Contact Kits for Present Designs

Equipment To Be Serviced			No. of Poles in Kit	Class 9998 Parts Kit Type No.
Class	Type	NEMA Size or Ampere Rating		
8502 8536 8538 8539 8547 8549 8606 8630 8640 8647 8702 8736 8738 8739 8810 8811 8812 8940	SA- (Series B)	00	3	SJ1
	SB-	0	3 4	SL2 SL12
	SB-, SC-(Power Pole Adder)	0 & 1	1	SL22
	SC-	1 & 1P 1	3 4	SL3 SL13
	SD-	2	3 4	SL4 SL14
	SD-(Power Pole Adder)	2	1	SL24
	SE-	3	2 3	SL6 SL7
	SF-	4	2 3	SL8 SL9
	SG-	5	2 3	SL10 SL11
	SH-	6	2 3	SL25 SL26
	SJ-	7	2 3	SL30 SL31
8903	L (Series C) & LX (Series B)	30 A	4	RA5B
	SM-	30 A	3 4	SL3 SL13
	SP-	60 A	3 4	SL4 SL14
	SQ-	100 A	2 3	SL6 SL7
	SV-	200 A	2 3	SL8 SL9
	SX-	300 A	2 3	SL10 SL11
	SY-	400 A	2 3	SL25 SL26
	SZ-	600 A	2 3	SL32 SL33
	SJ-	800 A	2 3	SL30 SL31
	PBM, PBP	30, 60 A	2	PB2
	PBN, PBQ	75, 100 A		
	PBM, PBP	30, 60 A	3	PB3
	PBN, PBQ	75, 100 A		
	PBR, PBV, PBW	150, 200, 225 A	2	PB14
	PBR, PBV, PBW	150, 200, 225 A	3	PB15

Table 16.336: Class 8965 Replacement Contact Kits

Device Type	Device Series	Class 9998 Kit Type	Device Series	Class 9998 Kit Type
DPR53 DPR63	A A	DRC5 *[1]* DRC6 *[1]*	—	—
RO10	A & B	RA10	C	RA14
RO11	A & B	RA11	C	RA15
RO12	A & B	RA12	C	RA16
RO13	A & B	RA13	C	RA17

Table 16.337: Manual Starter Contact Kits

Equipment To Be Serviced			No. of Poles in Kit	Class 9998 Parts Kit Type No.
Class	Type	NEMA Size		
2510 Manual Starters	M-, T-	M-0	3	ML1
		M-1 & M-1P	3	ML2

Table 16.338: Replacement Control Transformers (150 VA) Class 8502, 8536 Type S Size 6

Voltage		Part Number
60 Hz	50 Hz	
240/480–120	220/440–110	3110451250
208–120	—	3110451252
277–120	—	3110451253
—	380–110	3110451254
600–120	550–110	3110451251
120–120	110–110	3110451255
240–120	220–110	3110451256

Table 16.339: Replacement Control Transformers (200 VA) Class 8502, 8536 Type S Size 7

Voltage		Part Number
60 Hz	50 Hz	
240/480–120	220/440–110	3112350150
208–120	—	3112350152
277–120	—	3112350153
—	380–110	3112350154
600–120	550–110	3112350151
120–120	110–110	3112350155
240–120	220–110	3112350156

Table 16.340: Magnetic Contactor and Starter Contact Kits for Obsolete Designs

Equipment To Be Serviced			No. of Poles in Kit	Class 9998 Parts Kit Type No.
Class	Type	NEMA Size		
8502 & 8536*[2]*	SA-, (Series A)	00	3 4	SL2 SL12
8903	LL, L (Series A, B) & LX (Series A)	20 A	4	RA5

Table 16.341: Class 8910, 8911 & 8965 Replacement Contact Kits

Device To Be Serviced			Class 9998	
Class 8910 Type	Class 8911 Type	Series	1-Pole Type	3-Pole Type
SYD138 SYD230 SYD368	— — —	— — —	— — —	SL27 SL28 SL29
DPA_50A DPA_60A DPA_75A DPA_90A	DPSO5_ — — —	A, B A, B A A	DRC5 DRC6 DRC7 DRC9	— — — —

Table 16.342: How to Order

To Order Specify:	Catalog Number	
	Class	Type
• Class Number	9998	SL6
• Type Number		

[1] Single-pole kits.
[2] Includes reversing, two-speed, and similar devices. Select the coil based on the NEMA size of the basic starter or contactor.

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Class 9998 Type SO1

Contact Units for Melting Alloy Overload Relays

One normally closed contact, Class 9998 Type SO1, is provided in each overload relay block on Type S starters Sizes 00-6. The Class 9998 Type SO1 contact unit listed in Table 16.343 is provided as standard in each Class 9065 melting alloy overload relay. Contact modules can be easily replaced and are identified in Table 16.343. Isolated overload relay alarm circuit contacts are available as an optional feature. A pilot light or alarm bell can be wired in series with this contact to indicate that the overload relay has tripped. For further information on isolated alarm contacts refer to Class 9999 Types SO4 and SO5, page 16-127.

Table 16.343: Class 9998 Type SO1 Contact Units for Melting Alloy Overload Relays

Magnetic Starter			Description *[3]*	Parts Kit Number
NEMA Size	Type	Series		
00–4 and 6	SA–SF SH	A & B	Standard N.C. contact unit	Class 9998 Type SO1*[4]*

Class 9998 Type UB Universal Baseplate

A universal baseplate may be used to retrofit a Square D Type S NEMA starter into an application which is currently using a competitive NEMA starter. The universal baseplate is a metal plate which attaches to the panel in the location of the starter to be replaced. The Type S starter then mounts to the baseplate. It is available for NEMA Sizes 00 through 4, and mounting screws are provided with each plate.

The universal baseplate adapter allows the Type S starter to replace the competitive starters in Table 16.344:

Table 16.344: Competitive Starter Replacement

Competitor Starter	NEMA Size	Base-plate	NEMA Size	Base-plate	NEMA Size	Base-plate	NEMA Size	Base-plate
Allen Bradley 509	0, 1	UB01	2	UB02	3	UB03	4	UB04
Allen Bradley 709	1		2		3		4	
Cutler Hammer Freedom Series	00, 0, 1		2		3		4	
Furnas ESP100	0, 1		2		3		4	
Furnas INNOVA	0, 1		2		3		4	
General Electric CR306	00, 0, 1		2		3		4	
Telemecanique “A” Line and Pre-type “S”	0, 1	UB11	2	UB12	3	UB13	4	UB14

Melting Alloy Overload Relay Jumper Strap Kits

Jumper strap kits are for use on three-phase manual or magnetic starters with melting alloy overload relays only, where a three-phase starter is used to control a single-phase motor. These kits will include two jumper straps, a wiring diagram showing how to wire a three-phase starter to control a single-phase motor, and single-phase (one thermal unit) selection tables.

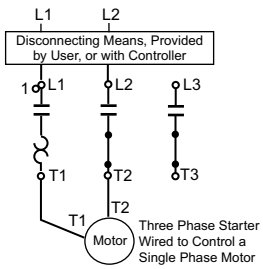

Table 16.345: Melting Alloy Overload Relay Jumper Strap Kits

Class	For Starter		Class 9998 Kit Type *[5]*
	Size	Type	
ALL	00, 0, 1, 2 and M0 & M1	SA, SB, SC, SD and M & T (Manual)	SO31
	3,4	SE, SF	SO32
	5	SG	None Available

Table 16.346: How to Order

To Order Specify:	Catalog Number	
	Class	Type
• Class Number	9998	UB01
• Type Number		

[3] Refer to page Table 16.350 for contact ratings.
[4] The Type SO1 is also the replacement contact unit for Class 9065 Type M melting alloy overload relays.
[5] CP1 discount schedule.

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Cover-Mounted Control Unit Selection

Class 9999 push button, selector switch and pilot light cover-mounted control unit kits can be easily field installed in a NEMA 1, 3R, 4 or 12 Type S contactor or starter enclosure cover. Knockouts or removable closing plates are furnished with many enclosure covers for convenient field installation of control units. Kits are supplied with leads and clearly illustrated instructions. The Class 9999 cover mounted control unit kits are identical to the units which are factory installed.

Table 16.347: Cover-Mounted Control Unit Selection

For Use With					NEMA 1 Kit 8538, 8539, and 8903 Pre-Series K						NEMA 1 and 12/3R Kit 8538, 8539, and 8903 Series K and Later *[1]*			NEMA 4/4X Kit (Stainless)*[1]*		
					Red or Green Pilot Light*[2]*		Push Button		Selector Switch		Red or Green Pilot Light	Push Button	Selector Switch	Red or Green Pilot Light	Push Button	Selector Switch
Class	Type	NEMA Size or Ampere Rating	No. of Poles	V	With Control Transformer (Form F4T)	Standard	Start-Stop	On-Off	Hand-Off-Auto	On-Off	120 V 60 Hz	Start-Stop or On-Off	Hand-Off-Auto	120 V 60 Hz	Start-Stop or On-Off	Hand-Off-Auto
					Type	Type	Type	Type	Type	Type	Type	Type	Type	Type	Type	Type
8502 & 8536	SA, SB, SC	00, 0, 1, 1P	All	6–600 V 50–60 Hz	SP28R *[3]*	SP2R	SA2	SA10	SC2	SC22	SP28R *[2]* *[3]* (incandescent) SPL28R (LED–Red) SPL28G (LED–Green)	SA3*[4]*	SC8	SP29R *[2]* *[3]* (incandescent) SPL29R (LED–Red) SPL29G (LED–Green)	SA13	SC9
	SD	2	All		SP28R *[3]*	SP3R										
	SE	3	2–3		SP28R *[3]*	SP4R										
			4–5		SP28R *[3]*	SP5R										
	SF	4	All		SP28R *[3]*	SP28R *[3]*	SA3	SA3	SC8	—						
	SG–SJ	5–7	All		SP28R *[3]*	SP28R *[3]*										
8538 8539 8702 8736	SB, SC	0, 1	All		SP12R	SP12R	SA2	SA10	SC2	SC22						
	SD	2	All		SP13R	SP13R										
	SE	3	All		SP14R	SP14R										
	SF	4	All		SP15R	SP15R										
	SG–SJ	5–7	All		SP28R *[3]*	SP28R *[3]*	SA3	SA3	SC8	—						
[5] 8903 (Electrically Held)	L	20 A	All		SP28R *[3]*	—	—	SA10 *[6]*	—	SC22 *[6]*						
	SM	30 A	All		SP28R *[3]*	SP2R	SA2 *[4]*	SA10 *[4]*	SC2	SC22						
	SP	60 A	All		SP28R *[3]*	SP3R										
	SQ	100 A	All		SP28R *[3]*	SP28R *[3]*	SA3 *[4]*	SA3 *[4]*	SC8	—						
	SJ, SV, SX, SY, SZ	200–800 A	All		SP28R *[3]*	SP28R *[3]*	SA3 *[4]*	SA3 *[4]*	SC8	—						

NOTE: Field modification kits are **not** available for the polyester enclosures.

Class 9999 Type SP2R Pilot Light Kit

Class 9999 Type SA2 Push Button Kit

Class 9999 Type SC2 Selector Switch Kit

Class 9999 Type SA3 Push Button Kit

Table 16.348: NEMA 1 Enclosure Closing Plates

For Use With			Description	Type
Class	Type	NEMA Size or Ampere Rating		
8502, 8536, 8903	SA–SE or SM–SP	00–3 or 30–60A	For Pilot Light or Reset—Slip-on Cover NEMA 1 Enclosure	SG2
			For Push Button or Selector Switch—Slip-on Cover NEMA 1 Enclosure	SG3
8538 & 8539 Pre-series "K"	SB–SF	0–4	For Push Button or Selector Switch—Hinged Cover NEMA 1 Enclosure	SG1
			For Pilot Light—Hinged Cover NEMA 1 Enclosure	SG2
8538, 8539 Series J and later	SB–SF	0–4	Pushbutton or Pilog Light NEMA Combination Starter	9001K51
8903	SM–SV	30–400 A	Combination Lighting Contactor	9001K51

Table 16.349: How to Order

To Order Specify:	Catalog Number	
	Class	Type
• Class Number	9999	SP29R
• Type Number		

[1] User-made openings are required in order to field install these modification kits on standard Class 8502 and 8536 Type S Sizes 0–2, and Class 8903 Sizes 30–60 A, NEMA 4 and 12 enclosures.

[2] Each pilot light kit contains one red and one green lens cap.

[3] The coil voltage must be the same as the pilot light rating. The kit contains one 60 Hz red pilot light control unit, Class 9001 Type KP1R31120V. For other voltages, refer to Class 9001 Type KP.

[4] Also requires an N.O. auxiliary contact for the holding circuit contact when used on Class 8903 electrically held lighting contactors.

[5] For Class 8903 (mechanically held contactor) control unit kits, refer to the Class 8903 section, page Cover Mounted Control Units, page 16-79.

[6] To mount a control unit in a NEMA 1 enclosure, a Class 9999 Type BLX bracket is also required.

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Internal Auxiliary

External Single-Circuit Auxiliary Contact

Auxiliary Contacts for Manual and Magnetic Contactors and Starters

Internal Contacts

Class 9999 Type SX11 internal contact kit is a replacement unit for the N.O. holding circuit contact supplied as standard on Type S Sizes 00–2 three phase starters and contactors. The Class 9999 Type SX12 is a replacement unit for the N.C. electrical contact which is furnished as standard on Type S, Sizes 00–2 mechanically interlocked devices (e.g., Class 8736 reversing starters). Internal contacts are also used on Class 2510 Types M & T manual starters. The internal contacts can be used for other applications as long as the electrical rating is not exceeded. See Table 16.350 for electrical ratings.

External Contacts

Class 9999 Type SX6 external auxiliary contact is supplied as standard for the N.O. holding circuit contact on Type S Sizes 3–7 starters and contactors. Additional auxiliary contacts can be added to Type S contactors, starters and lighting contactors. These contacts mount on either side of the basic contactor and are available with convertible or non-convertible contacts. The contacts of the convertible version can be changed from N.O. to N.C. or vice versa in the field. The non-convertible version has fixed contacts, either N.O. or N.C.

To determine the number of auxiliary contacts that can be added to each Type S contactor or starter, refer to the Class 8536 or Class 8736 section.

See Table 16.350 for electrical ratings.

Table 16.350: Maximum Ratings for Type S Auxiliary Contacts and Timers

Class 9999 Type	Contact Ratings				Class 9999 Type	Contact Ratings			
	Volts AC	AC Only (35% Power Factor)		Continuous		Volts AC	AC Only (35% Power Factor)		Continuous
		Make	Break				Make	Break	
SX11, SX12	120 or Less	30 A	3 A	3 A	SX6-SX10 SX13-SX17	120 or Less	60 A	6 A	10 A
	120-600	3600 VA	360 VA	3 A		120–600	7200 VA	720 VA	10 A

Table 16.351: Class 8502, 8536 and 8903 Type S

For Use With		Kit Description	Ordering Information
Type	NEMA Size		Class 9999 Type
External—Field Convertible			
SA-SJ	00–7	1-N.O. Contact 1-N.C. Contact 1-N.O. and 1-N.C. Isolated Contacts 1-N.O. Overlapping Contact 1-N.C. Overlapping Contact	SX6 SX7 SX8 SX9 *[7]* SX10 *[7]*
External—Non-Convertible			
SA-SJ	00–7	1-N.O. Contact 1-N.C. Contact 1-N.O. & 1 N.C. Isolated Contacts 1-N.O. Overlapping Contact 1-N.C. Overlapping Contact	SX13 SX14 SX15 SX16 *[7]* SX17 *[7]*
Internal—Non-Convertible			
SA-SD	00–2	1-N.O. Contact 1-N.C. Contact	SX11 *[8]* SX12 *[8]*

Table 16.352: Class 8965 Reversing/Hoist Contactors—Auxiliary Contacts

Device To Be Serviced	Auxiliary Contact Kit		
Class 8965 Type	Contact Arrangement	Type of Connector	Class 9999 Type
DPR	1 N.O.	Screw/ Quick-Connect	D10
	1 N.C.		D01
	1 N.O./1 N.C.		D11
	2 N.O.		D20
RO2 & RG2 RO10 Form X1 RO11 Form X1	1 N.O. each side	Slip-on	R10
RO3 & RG3 RO10 Form X2 RO11 Form X2	1 N.C. each side		R11
RO5 & RG5 RO12 Form X1 RO13 Form X1	1 N.O. each side	Screw	R12
RO6 & RG6 RO12 Form X2 RO13 Form X2	1 N.C. each side		R13

Table 16.353: Class 8910 and 8911 Definite Purpose Contactors and Starters—Auxiliary Contacts

Device To Be Serviced	Auxiliary Contact Kit		
Class 8910 or 8911 Type	Contact Arrangement	Class 9999	
		Series B (20-90 A)	Series C (20-40 A)
DPA DPS	1 N.O.	D10	DD10
	1 N.C.	D01	DD01
	1 N.O./1 N.C.	D11	DD11
	2 N.O.	D20	DD20

Table 16.354: How to Order

To Order Specify:	Catalog Number	
	Class	Type
• Class Number	9999	SX6
• Type Number		

[7] Types SX9 and SX10 or Types SX16 and SX17 must be used together and mounted on the same side of the contactor. They are suitable for applications where it is necessary for a normally open contact to overlap a normally closed contact.

[8] Types SX11 and SX12 are not for use on NEMA Sizes 3 or larger. Internal contacts can also be used on Class 2510 Types M and T manual starters.

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Motor Logic—Class 9999

Isolated Auxiliary Contacts for Motor Logic Overload Relays

Overload relay auxiliary contacts are available factory installed or in kit form for field installation on Motor Logic overload relays. These contacts may be used for isolated alarm contact applications.

Table 16.355: Isolated Auxiliary Contacts for Motor Logic Overload Relays

For Use With		Parts Kit Description	Class 9999 Type
Class & Type	NEMA Size *[9]*		
8536 SA-SJ	00B through 7	N.O. or N.C. Auxiliary Contact (Field Convertible)	AC04
9065 SS, SR, SF, ST	00B through 7		

Table 16.356: DIN Adapter

For Use With		Parts Kit Description	Class 9999 Type
Class & Type	NEMA Size *[9]*		
9065 SS or SF	00B, 00C, 0, and 1	DIN Adapter	DA01

Table 16.357: Lug-Lug and Lug-Extender Kits

For Use With		Parts Kit Description	Class 9999 Type
Class & Type	NEMA Size *[9]*		
9065 SS or SF	00B, 00C, 0, and 1	Lug-Lug Kit for separate mounting	LL0
9065 SS or SF	00B, 00C, 0, and 1	Lug-Extender Kit for retrofitting existing NEMA S starters	LB0

Class 9999 Type SB6
Single Power Pole Adder

Class 9999 Type SB9
Double Power Pole Adder

DIN Adapter

The DIN adapter provides a method to mount the Motor Logic overload relay to a 35 mm DIN rail.

Lug-Lug and Lug-Extender Kits

A Class 9999 LL0 Lug-Lug Kit can be field installed on separately mounted overload relays. The standard Size 00B, 00C, 0, and 1 Class 9065 Type SS and SF overload relays are supplied without lugs. A Class 9999 LB0 Lug-Extender Kit is designed for Size 00B, 00C, 0, and 1 Retrofit Starter Applications. This kit allows the lugs to be in the same location as the Class 9065 melting alloy overload relay, eliminating the need for additional wire length.

Remote Reset Module

The Remote Reset Module can be easily field installed on solid-state overload relays. This module will allow the overload relay to be reset from a remote location.

Table 16.358: Remote Reset Module

For Use With		Parts Kit Description	Class 9999 Type
Class and Type	NEMA Size *[9]*		
536 SA-SJ	00B through 7	Remote Reset Module	RR04 *[10]*
9065 SS, SR, SF, ST	00B through 7		
8536 SE-SF	3 and 4	Top Mounting Bracket	RB34 *[10][11]*
9065 SS, SR, SF, ST	3 and 4		

Power Pole Adders

One single- or double-circuit power pole kit can be field added to a basic two- or three-pole Type S contactor or starter Sizes 0, 1 and 2, or lighting contactors 30–60 A. See Table 16.359 for selection. The ratings for these power pole adders correspond to the NEMA contact ratings found on page 16-120. A two- or three-pole contactor or starter accepts only one single- or double-circuit unit. A power pole cannot be used on four- or five-pole devices, or on devices that are mechanically interlocked.

When adding a power pole to a Size 0 or 1 device, remove the return springs according to the instructions that come with the device.

When adding a power pole to a Size 2 or 60 A device, a coil change is required. Select a four- or five-pole coil from page 16-120, or specify Form Y118 as noted in the footnote below.

When adding Size 0–2 power pole kits to a Size 3–7 or 100–800 A device, an adapter bracket (9999 SBT1) is required. The Class 9999 Types SB6–SB15 power pole kits are suitable for copper wire only. Types SB21–SB25 come with lugs suitable for copper or aluminum wire.

Table 16.359: Power Pole Adders—Selection

For Use With		Power Pole Adder Kit	
Type	Size	Description	Class 9999 Type
SB, SC, and SM	0, 1, and 30 A	One N.O. power pole adder	SB6
SD	2		SB11 *[12]*
SP	60 A		SB21 *[12]*
SB, SC, and SM	0, 1, and 30 A	One N.C. power pole adder	SB7
SD	2		SB12 *[12]*
SP	60 A		SB22 *[12]*
SB, SC, and SM	0, 1, and 30 A	One N.O. and one N.C. power pole adder	SB8
SD	2		SB13 *[12]*
SP	60 A		SB23 *[12]*
SB, SC, and SM	0, 1, and 30 A	Two N.O. power pole adders	SB9
SD	2		SB14 *[12]*
SP	60 A		SB24 *[12]*
SB, SC, and SM	0, 1, and 30 A	Two N.C. power pole adders	SB10
SD	2		SB15 *[12]*
SP	60 A		SB25 *[12]*
SE–SJ and SQ–SZ and SJ	3–7 and 100–800 A	Adapter bracket	SBT1

[9] Size 00B and 00C are not actual NEMA sizes. These designations are used to differentiate the lower FLA of these devices from the NEMA Size 00 Motor Logic solid-state overload relay.
[10] 120 Vac power required.
[11] For mounting the remote reset module on the top of the overload relay.
[12] To order a Size 2 or 60 A power pole kit complete with a new starter coil, specify **Form Y118,** the voltage, and the frequency (for example, Class 9999 Type SB11 **Y118,** 120 V, 60 Hz).

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Class 9999 Type SF4
Fuse Kit

Control Circuit Fuse Holder

The control circuit fuse holder is designed to be used on Type S contactors and starters, Sizes 00–7, when either one or two control circuit fuses, 600 V maximum, are required. The Type SF3 and SF4 fuse holders will accept standard 600 V Bussmann Type KTK or equivalent fuses (13/32" x 1-1/2"); 6 A maximum. The SFR3 and SFR4 will accept Class CC 600 V Bussmann Type KTK-R or equivalent fuses only.

Table 16.360: Control Circuit Fuse Holder—Selection

Description (fuses not included)	Class 9999 Type
Single Fuse Unit	SF3
Single Fuse Unit for Class CC Fuse	SFR3
Two Fuse Unit	SF4
Two Fuse Unit for Class CC Fuses	SFR4

Class 9999 Type ST1
Transient Suppression Module

Table 16.361: How to Order

To Order Specify:	Catalog Number	
	Class	Type
• Class Number • Type Number	9999	SM1

Transient Suppression Module

The transient suppression module is designed to be used where the transient voltage, generated when opening the coil circuit, interferes with the proper operation of nearby integrated or solid-state control circuits. The module consists of an RC circuit and is designed to suppress the coil voltage transients to approximately 200% of peak coil supply voltage. The module is wired across the coil for Type S, Sizes 00–5 and is designed for coil voltages of 120 V only.

Table 16.362: Transient Suppression Module—Selection

Description	Class 9999 Type
For Sizes 00–2	ST1
For Sizes 3–5	ST2

Type SO4

Isolated Alarm Contacts For Melting Alloy Overload Relays

Isolated overload relay alarm contacts are available factory-installed or in kit form for field installation in NEMA Size 00–6 Type S*[13]* starters, and Class 9065 Type SE melting alloy overload relays. NEMA Size 7 Type S devices use a solidstate overload relay which has isolated alarm contacts as a standard feature. The alarm contacts allow the starter to be used in applications that require isolated contacts, such as inputs to a computer.

Class 9999 Types SO4 and SO5 modules are interchangeable with the standard module (Class 9998 Type SO1) and can be installed on starters already in service. The case is made of clear plastic (polycarbonate) to allow for visual inspection of contacts.

Table 16.363: Contact Unit for Melting Alloy Overload Relays

Magnetic Starter		Parts Kit Description	Class 9999 Type
NEMA Size	Type		
00-6 *[13]*	SA-SH	N.O. Isolated Alarm Contact Plus Standard N.C. Overload Contact	SO4
		N.C. Isolated Alarm Contact Plus Standard N.C. Overload Contact	SO5

Solid Neutral

The Class 9999 Type SN kit can be used on Class 8903 Type S lighting contactors and other controllers where field addition of a solid neutral is required. Each kit has lugs suitable for both copper and aluminum wire, and mounts with two screws.

Table 16.364: Solid Neutral Selection

Number of Lugs	Wire Capacity Per Lug (Cu/Al)	Class 9999 Type
4	14–2/0	SN1
3	one 4–600 MCM or two 1/0–250 MCM	SN2
3 (Dual)	two 2–600 MCM	SN3
2 (Dual)	two 6–350 MCM	SN4

Tie Point Terminal Block

Tie Point Terminal Block

The tie point terminal block provides easy wiring of a Hand-Off-Auto selector switch or Start-Stop push buttons with separate control. The T7 terminal block requires no panel space. It simply snaps on Sizes 00–4 Type S contactors and starters by two tabs and is secured to the left hand coil terminal.

Table 16.365: How to Order

To Order Specify:	Catalog Number	
	Class	Type
• Class Number • Type Number	9999	SO4

Table 16.366: Tie Point Terminal Block Selection

Magnetic Contactor or Starter		Class 9999 Type
NEMA Size	Type	
00–4	SA-SF	T7

[13] Isolated alarm contacts **cannot** be added in the field to the Size 5 Type S starter. Current transers and a Size 1 overload block must be used. For factory installation specify **Form Y342**.

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Type SM1

Type SM12

Mechanical Interlock

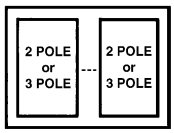
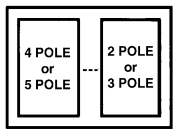
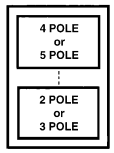
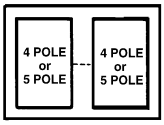
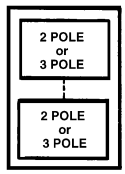
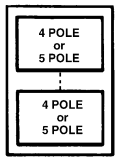
General: Type S contactors or starters can be mechanically interlocked so that only one device is energized at a time. The mechanical interlock is an interference (non-jamming) type, locking at the beginning of the stroke of any starter or contactor.

Type S Sizes 00, 0, 1, and 2—The mechanical interlock is mounted on the underside of the reversing baseplate. Two pins extend from the mechanical interlock through openings in the baseplate and engage the contact carrier of each contactor. Two styles of mechanical interlocks are used: one version for three pole contactors, a different version for four or five pole contactors. *When adding a power pole to the left side of an existing Size 0, 1, or 2 three-pole reversing contactor, a new mechanical interlock must also be installed. When added to the right side only, the power pole is not mechanically interlocked with the left-hand contactor.*

Type S Sizes 3 and 4—The mechanical interlock is separate from the mounting pan on Sizes 3 and 4. Cams on the mechanical interlocks are operated by the contact carrier of each contactor. The mechanical interlock is attached to the underside of the two contactor baseplates on Sizes 3 and 4.

NOTE: The mechanical interlock kits in Table 16.367 can be used to interlock 2–5 pole contactors. Mechanical interlocks for horizontal and vertical arrangement are listed in various pole arrangements.
Mechanical interlock Types SM1 through SM10 for Sizes 00-2 devices use overload relay mounting brackets to support the overload relay portion of the starter. See Table 16.368.

Table 16.367: Mechanical Interlock for Two Contactors

			Contactor NEMA Size	Class 9999 Type
 Horizontal Type SM1 for Size 00–1 Type SM6 for Size 2 Type SM12 for Sizes 3 & 4	 Horizontal Type SM2 for Size 0 or 1[14] Type SM7 for Size 2 Type SM12 for Sizes 3 & 4	 Vertical Type SM2 for Size 0 or 1[14] Type SM10 for Size 2 Type SM11 for Size 3 Type SM13 for Size 4	00, 0, 1 0, 1 0, 1 0, 1 0, 1	SM1 SM2 SM3 SM4 SM5
 Horizontal Type SM3 for Size 0 or 1 Type SM8 for Size 2 Type SM12 for Sizes 3 & 4	 Vertical Type SM4 for Size 0 or 1 Type SM9 for Size 2 Type SM11 for Size 3 Type SM13 for Size 4	 Vertical Type SM5 for Size 0 or 1 Type SM11 for Size 3 Type SM13 for Size 4	2 2 2 2 2 3 3, 4 4	SM6 SM7 SM8 SM9 SM10 SM11 SM12 SM13

Overload Relay Mounting Bracket

Table 16.368: Overload Relay Mounting Bracket

Kit Description	Class 9999 Type
Bracket for one overload relay used with horizontal mechanical interlocks, Types SM1 through SM10	SO11
Bracket for two overload relays used with vertical mechanical interlocks, Types SM2, SM4, SM5, SM9 and SM10	SO12

Table 16.369: How to Order

To Order Specify:	Catalog Number	
	Class	Type
• Class Number	9999	SM1
• Type Number		

[14] The Type SM2 interlock is factory assembled for horizontal mounting, but can easily be converted to vertical mounting. Conversion instructions are included.

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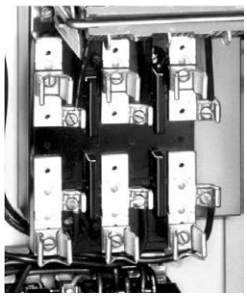
Class 9422 TC33 Fuse Block

Class 9999 Type TC10



Class 9999 Type S2
Interchangeable Fuse Clips

Fuse Block Replacement Parts Kits

Class 8538 (Series D and newer), Class 8738 (Series E and newer), and Class 8903 (Series C and newer) Type S non-fusible combination starters and lighting contactors (sizes 0–2, 30 to 60 A) can be converted to the fusible type by installing a Class 9422 Fuse Clip Kit. Both fusible and non-fusible combination devices have the same size enclosure in NEMAs 1, 4, and 12 construction, which permits this conversion. The 9422 Fuse Clip Kits contain line and load fuse clips, load base, and fuse pullers.

Table 16.370: Class 9422 Replacement Fuse Clip Kits

Device Used on	Disconnect Ampere Rating	NEMA Class H, K, J, R Fuses			
		Fuse Clip Ratings (A)		Class and Type	Class R Fuse Clip Kits
Size or Ampere Rating		250 V Max.	600 V Max.		
0, 1, and 30 A	30	0–30	—	9422TC30 *[15]*	RFK03 *[16]*
0, 1, and 30 A	30	31–60	0–30	9422TC33 *[15]*	RFK06 *[16]*
2 and 60 A	60	31–60	0–30	9422TC33	RFK06 *[16]*
2 and 60 A	60	—	31–60	9422TD63	RFK06H *[16]*

Table 16.371: Class 9999 Replacement Fuse Clip Kits (8538 Pre-Series D, 8738 Pre-Series E)

Device Used on	Disconnect Ampere Rating	NEMA Class H Fuses			NEMA Class R Fuses			NEMA Class J Fuses	
		Fuse Clip Ratings (A)		Type	Fuse Clip Ratings (A)		Type	Fuse Clip Ratings (A) 600 V Max.	Type
Size or Ampere Rating		250 V Max.	600 V Max.		250 V Max.	600 V Max.			
0, 1, and 30 A	30	0–30 — 31–60	— 0–30 0–30	S1 S2 S2	0–30 — 31–60	— 0–30 0–30	SR1 SR2 SR2	— 0–30 0–30	— SJ2 SJ2
2 and 60 A	60	31–60 —	0–30 31–60	S2 S3	31–60 —	0–30 31–60	SR2 SR3	0–30 31–60	SJ2 SJ3
3 and 100 A	100	61–100 101–200	61–100 —	S4 *[17]* S5 *[17]*	61–100 101–200	61–100 —	SR4 *[18]* SR4 *[18]*	61–100 —	SJ4 —
4 and 200 A	200	101–200	101–200	S5 *[17]*	101–200	101–200	SR4 *[18]*	—	—
5 and 300 A	400	—	—	—	201–400	201–400	SR5 *[18]*	—	—
6 and 400, 600 A	600	—	—	—	401–600	401–600	SR5 *[18]*	—	—

Table 16.372: Class 9999 Auxiliary Contact Kits for Disconnect Switches and Circuit Breakers

Class	Type	SPDT Type	DPDT Type
8538, 8738	SB, SC (Series C)	R45	R46
8539, 8739	SB, SC, SD, SE, SF, SG	R26	R27
8538	SBA, SCA, SBG, SCG (Series K)	TC11	TC21
8738	SBA, SCA, SBG, SCG (Series K)	TC10	TC20
8538	SB*[19]*, SC*[19]*, SD*[19]* (Series B)	R6	R7
8538	SBAS8, SCAS8, SBGS8, SCGS8, (Series K)	TC10	TC20
8538, 8738	SD (Series C)	R43	R44
8538	SDA, SDA*[19]*, SDG, SDG*[19]* (Series K)	TC10	TC20
8738	SDA, SDG (Series K)	TC10	TC20
8538, 8738	SE (Series B and C)	R41	R42
8538, 8738	SE, SF (Series A)	R8	R9
8538, 8738	SF (Series B and C)	R39	R40
8538, 8738	SG	R35	R36

Class	Type	SPDT Type	DPDT Type
Disconnect Switches			
9422	BTCF, BTCN, BTDF, BTEF, BTEN	TC11	TC21
9422	TCF, TCN, TDF, TDN, TEF, TEN	TC10	TC11
9422	TF	R8	R9
Circuit Breaker Operating Mechanisms			
9421	LF, LK, LL, LM, LN, LP, LR, LT, LW	R47	R48
9422	RM, RN, RP, RQ, RR, RT	R26	R27
9422	CFA, CKA, CLA, CSF, CMP	R26	R27

Table 16.373: How to Order

To Order Specify:	Catalog Number	
	Class	Type
• Class Number	9999	R6
• Type Number		

[15] When using with a 9422FTCN or FTCF disconnect switch in Class 8538 or 8738 combination starters, remove and discard the metal base plate.
[16] No Class number required. Discount schedule DE1.
[17] Cannot be used in Series B or newer 8538 devices.
[18] Fuse clips are not provided in the Type SR4 and SR5 kits. On new installations, Class 9999 Type S fuse clips must also be purchased. Three non-removable pins are included and can be installed only in the latest production devices, which have a hole in the lower fuse clips.
[19] Class 8538 Type numbers ending in suffix **S8**.

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General

All tables are based on the operation of the motor and controller in the same ambient temperature, 40 °C (104 °F) or less. Always be certain the correct thermal units are installed in the starter before operating the motor. Each thermal unit shall be installed such that its catalog number is visible. See page 16-134 for information on installing thermal units. On melting alloy thermal units the ratchet wheel must engage the pawl assembly.

Selection Procedure

1. Determine motor data:
   a. Full load current rating
   b. Service factor
   NOTE: If motor full load current (FLC) is not known, a tentative thermal unit selection could be made, based on horsepower and voltage. Refer to page 16-134.
2. Motor and controller in *same ambient temperature:*
   a. All starter classes, except Class 8198:
      1. For 1.15 to 1.25 service factor motors use 100% of motor FLC for thermal unit selection.
      2. For 1.0 service factor motors use 90% of motor FLC for thermal unit selection.
   b. Class 8198 only:
      1. For 1.0 service factor motors use 100% of motor FLC for thermal unit selection.
      2. For 1.15 to 1.25 service factor motors use 110% of motor FLC for thermal unit selection.
3. Motor and controller in *different ambient temperatures:*
   a. Multiply motor FLC by the multiplier in Selection of Thermal Units for Special Applications, page 16-130. Use the resultant full load current for thermal unit selection.
4. Locate the proper selection table from the index, pages page 16-131 and page 16-132.
   a. The proper thermal unit number will be found adjacent, to the right of the range of full load currents in which the motor FLC or resultant full load current falls.
5. See page 16-133 for calculation of trip current rating.

Slow Trip Thermal Unit Selection

To select Type SB slow trip thermal units, the selection table for a standard Type B thermal unit may be used with the following modifications: For continuous rated motors having service factors of 1.15 to 1.25, select thermal units from the standard Type B table using 93% (102% for Class 8198) of the full load current shown on the motor nameplate and then substitute an SB for the B in the thermal unit type number.

Example: A motor with a full load current of 12 A controlled by an 8536SCG3 would require B22 thermal units for standard trip applications and SB19.5 thermal units for slow trip applications. The SB is selected by multiplying 12 A times 93% for 11.16 A and using this value to select B19.5. Then add the S prefix to arrive at SB19.5.

For continuous rated motors having a service factor of 1.0, select thermal units in the same manner using 84% (93% for Class 8198) of full load current shown on the motor nameplate.

NOTE: SB thermal units are used on Size 0, 1, 2, and only some Size 3 applications. Check thermal unit tables for current ranges.

Table 16.374: Thermal Unit Trip Types

Melting Alloy	
Type of Trip	**Thermal Unit Type**
Standard	A
	B
	C
	CC
	DD
Quick	FB
Slow	SB

Table 16.375: Selection of Thermal Units for Special Applications

Class of Controller	Continuous Duty Motor Service Factor	Melting Alloy		
		Ambient Temperature of Motor		
		Same as Controller Ambient	Constant 10 °C (18 °F) Higher Than Controller Ambient	Constant 10 °C (18 °F) Lower Than Controller Ambient
		Full Load Current Multiplier		
All Classes, Except 8198	1.15 to 1.25	1.0	0.9	1.05
	1.0	0.9	0.8	0.95
Class 8198	1.15 to 1.25	1.1	1.0	1.15
	1.0	1.0	0.9	1.05

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Thermal Unit Selection

NOTE: For thermal unit selection tables for other devices including obsolete devices, consult the Customer Care Center at 1-888-778-2733.

Table 16.376: Thermal Unit Selection

Controller					Thermal Unit Selection Table Number Hand Reset Melting Alloy		
Starter Type	Class	Type	Series[1]	Size	Standard Trip (20)	Quick Trip (10)	Slow Trip (30)
Manual Starters FHP	2510 2512 8908	F	A	FHP	43 [2]	—	—
Manual Starters (Small Enclosure)	2510	M, T	A	M–0 M–1 M–1P	1 1 1	72 72 72	[3] [3] [3]
Manual Starters (Large Enclosure)	2510 2511 2512 8925	M, T	A	M–0 M–1 M–1P	2 2 2	73 73 73	[3] [3] [3]
DC Magnetic Starters EC & M Crane Control Product	7135 7136 7735 7736	C, D	—	1, 2	65	—	[3]
		E	—	3	9	—	—
		F	—	4	10	—	—
		G	—	5	12	—	—
AC Magnetic Starters (Small Enclosure)	8536 8904 [4] (Starter In Own Enclosure) 8933 8998 8999 (Model 3 Control Center) I-LINE® and QMB Motor Starter Centers	A (8536 only)	B, C	00	17 [2]	—	—
		SA	A, B	00	13	—	[3]
		SB	A	0	13	74	[3]
		SC	A	1	13	74	[3]
			A	1P	41	—	[3]
		SD	A	2	56	75	[3]
		SE	A	3	18	76 [5]	134 [3][5]
		SF	A	4	54	77 [5]	—
		SG	A	5	49	—	—
			B [6]	5	59	83	—
		SH	A, B	6	21	—	—
	8998 8999 (Model 4 Control Center)	SC	A	1 Fusible	66	74	—
				1 Circuit Breaker	15	74	—
		SD	A	2 Fusible	67	75	—
				2 Circuit Breaker	58 [7]	75	—
		SE	A	3 Small Enclosure	16	76 [5]	134 [3][5]
				3 Large Enclosure	68 [7]	76 [5]	133 [5][3]
		SF	A	4	61	77 [5]	—
		SG	A	5	24	—	—
		SH	A	6	20	—	—
	8998 (Model 5 and Model 6 MCCs)	SC [8]	A	1	109	—	—
				1 COMPAC 6	104	—	—
		SD [8]	A	2	110	—	—
		SE [8]	A	3	111	—	—
		SF [8]	A	4	112	—	—
		SG [8]	A	5	113	—	—
			B	5 CT	103	—	—
		SH [8]	A	6	114	—	—
	8911	DPSG	C	20–30 A	135	—	—
				40 A	145	—	—
			A	50 A	146	—	—

(table continued on the next page)

NOTE: For thermal unit selection tables for other devices, including obsolete devices, consult the Customer Care Center at 1-888-778-2733.

[1] Series letters listed refer to the marking on the nameplate of the basic openstyle starter. When the starter comes in a controller containing other devices, the controller may have a different series letter marked on the enclosure nameplate.
[2] Type A thermal units for full-load currents lower than those listed in this table are available. For complete information, consult Customer Care Center at 1-888-778-2733.
[3] This device will accept Type SB slow trip (Class 30) thermal units. For selection, see page 16-130.
[4] Small enclosure tables apply for **Class 8904** non-combination and non-reversing starters. For combination and reversing **Class 8904** starters, refer to the large enclosure selections, index above.
[5] **Form Y81** must be specified to use quick trip (Class 10) or slow trip (Class 30) thermal units on Size 3 starters and quick-trip (Class 10) thermal units on Size 4 starters.
[6] Divide the motor FLC by 60, and use this quotient to select the appropriate thermal units.
[7] Use for autotransformer starters (fusible and circuit breaker).
[8] Refers to the Type number of the starter in the MCC, not the Type number of the MCC.

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Thermal Unit Selection

Table 16.377: Thermal Unit Selection

Controller					Thermal Unit Selection Table Number Hand Reset Melting Alloy		
Starter Type	Class	Type	Series[9]	Size	Standard Trip (20)	Quick Trip (10)	Slow Trip (30)
AC Magnetic Starters (Large Enclosure)	8198	G, S	—	—	5	—	[10]
	8536 (Starter Used in Multi-Motor Panel)	A (8536 only)	B, C	00	14 [11]	—	—
	8538 8904[12]	SA	A, B	00	53	—	[10]
	8539 8906	SB, NB	A	0	15	78	[10]
	8606 8907	SC, NC	A	1	15	78	[10]
	8630 [13] 8920	SD, ND	A	2	58	79	[10]
	8640 [14] 8922	SE, NE	A	3	16	80 [15]	133 [15][10]
	9089 8924	SF, NF	A	4	61	81 [15]	—
	8647 8925	SG	A	5	24	—	—
	8650 8930		B [16]	5	59	83	—
	8736 8941 8738 8739	SH	A, B	6	20	—	[10]
	8810 8811 8812	CB, DB, SB, UB	A	0	15	78	[10]
		CC, DC, SC, UC	A	1	15	78	[10]
		CD, DD, SD, UD	A	2	58	79	[10]
		CE, DE, SE, UE	A	3	16	80 [15]	133 [15][10]
		CF, DF, SF, UF	A	4	61	81 [15]	—
		CG, DG, SG, UG	A	5	24	—	—
			B [16]	5	59	83	—
		CH, DH, SH, UH	A	6	20	—	[10]
	8940 WELL-GUARD™ Control	WC, XC	A	1	13	78	—
		WD, XD, MD, RD, VD	A	2	56	79	—
		WE, XE, ME, RE, VE	A	3	18	80 [15]	—
		PF, WF, XF, MF, RF, VF, PE	A	4	54	81 [15]	—
	8911	DPSO	C	20–30 A	136	—	—
				40 A	147	—	—
			A	50 A	148	—	—
AC Magnetic Part-Winding	8998 (Model 5 and Model 6 MCCs)	SC [17]	A	1	127	—	—
		SD [17]	A	2	128	—	—
		SE [17]	A	3	129	—	—
		SF	A	4	105	—	—
		SG	A	5	115	—	—
			B [16]	5 CT	116	—	—
Separately Mounted Overload Relays	9065	C	A	1 (25 A)	44	82	[10]
		F	B	4 (133 A)	19	85 [15]	—
		G	A	5 (266 A)	22	—	—
		MEO	A	(32 A)	86	—	—
		S	A	1 (26 A)	59	83	[10]
				2 (45 A)	69	84	[10]
				3 (86 A)	34	—	—
				4 (133 A)	28	—	—
		T	A	2 (45 A)	31	—	[10]
		U	—	3 (86 A)	40	—	—

NOTE: For thermal unit selection tables for other devices including obsolete devices, consult the Customer Care Center at 1-888-778-2733.

[9] Series letters listed refer to the marking on the nameplate of the basic openstyle starter. When the starter comes in a controller containing other devices, the controller may have a different series letter marked on the enclosure nameplate.
[10] This device will accept Type SB slow trip (Class 30) thermal units. For selection, see page 16-130.
[11] Type A thermal units for full-load currents lower than those listed in this table are available. For complete information, consult Customer Care Center at 1-888-778-2733.
[12] Large enclosure tables apply for **Class 8904** combination and reversing starters. For non-combination and non-reversing **Class 8904** starters refer to small enclosure selections, page 16-131.
[13] For **Class 8630** starters, divide the delta-connected motor full-load current by 1.73, and use this quotient to select thermal units.
[14] For **Class 8640** and **Class 8940**starters (MD, PD, ME, PE, MF, PF, MG and PG), use the full-load current of each motor winding as a basis for thermal unit selection—normally one-half the total motor current.
[15] **Form Y81** must be specified to use quick trip (Class 10) or slow trip (Class 30) thermal units on Size 3 starters and quick-trip (Class 10) thermal units on Size 4 starters.
[16] Divide the motor FLC by 60, and use this quotient to select the appropriate thermal units.
[17] Refers to the Type number of the starter in the MCC, not the Type number of the MCC.

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Calculation of the Trip Current Rating

Trip Current Rating—The trip current rating is a nominal value that approximates the minimum current to trip an overload relay in an ambient temperature, outside of the enclosure, of 40 °C (104 °F). In all selection tables except Class 8198, the trip current rating is 1.25 times the minimum full load current shown for the thermal unit selected. For Class 8198, the trip current rating is 1.15 times the minimum full load current. This applies to bimetallic overload relays with the trip adjustment set at 100 percent.

Calculation Procedure

1. Use the selection table for the specific controller involved.
2. Find the minimum motor full load current listed for the thermal unit in question.
3. Multiply that current by 1.25 (1.15 for Class 8198). The result is the trip current rating.

Example 1: Determine the thermal unit selection and trip current rating for thermal units in a Class 8536 Type SCG3 Size 1 magnetic starter used to control a three-phase, 1.15 service factor motor with a full load current of 17.0 Amperes, where the motor and controller are both located in a 40°C (104°F) ambient temperature.

1. From Table 13 the proper selection is B32.
2. The minimum motor full load current is 16. 0 Amperes.
3. Trip current rating is 16.0 x 1.25= 20.0 Amperes.

Protection Level is the relationship between trip current rating and full load current. Protection level, in percent, is the trip current rating divided by the motor full load current times 100. In Example 1 the protection level for the B32 thermal unit is: 20.0/17.0 x 100= 118%.

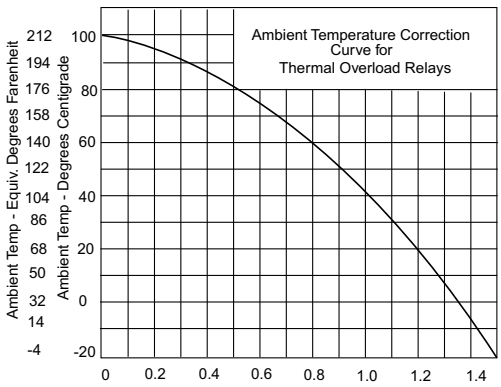
National Electrical Code, Section 430-32, allows a maximum protection level of 125% for the motor in the above example.

Minimum Trip Current (also called ultimate current) may vary from the trip current rating value, since ratings are established under standardized test conditions. Factors which influence variations include: the number of thermal units installed, enclosure size, proximity to heat producing devices, size of conductors installed, ambient (room) temperature, and others.

Except for ambient temperature-compensated overload relays, an ambient temperature higher than 40°C would lower the trip current, and a lower temperature would increase it. This variation is not a factor in selecting thermal units for the average application, since most motor ratings are based on an ambient temperature of 40 °C, and motor capacity varies with temperature in about the same proportion as the change in trip current. Temperature-compensated relays maintain a nearly constant trip current over a wide range of ambient temperature, and are intended for use where the relay, because of its location, cannot sense changes in the motor ambient temperature.

Calculation of the Trip Current for Ambient Temperatures Other Than 40 °C

For a controller ambient temperature other than 40 °C (104 °F) trip current can be calculated by applying a correction factor from the curve in Figure 1. The approximate trip current for a particular ambient temperature is the product of (1) the multiplier M corresponding to the temperature and (2) the 40 °C trip current rating.



NOTE: Ambient temperature is the temperature surrounding the starter enclosure. Normal temperature rise inside the enclosure has been taken into account in preparing the thermal unit selection tables.

Example 2: Determine the trip current for the motor and controller in Example 1, except the controller is in a 30 °C (86 °F) ambient temperature. From the curve in Figure 1 the multiplier M is 1.1 at 30 °C. The approximate trip current is 16.0 × 1.25 × 1.1 = 22 A.

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Approximate Thermal Unit Selection Based On Horsepower and Voltage

General—Thermal units selected using approximate full-load currents from Table 16.378 will provide a trip current between 101% and 125% of full-load current for many 4-pole, single speed, normal torque, 60 Hz motors. Since full-load current rating of different makes and types of motors vary so widely, these selections may not be suitable.

Thermal units should be selected on the basis of motor nameplate full-load current and service factor. Thermal unit sizes originally selected on an approximate basis should always be rechecked and corrected at the time of installation if required.

How to use Table 16.378:

- Locate the motor horsepower and voltage.
- Determine the approximate full-load current fromTable 16.378.
- Use the approximate full-load current in place of actual nameplate full-load current and follow the Selection Procedure on page 16-130.

Table 16.378: Use This Table Only When the Motor Full-Load Current Is Not Known

Motor Horsepower	Motor Full-Load Current					
	Three Ø				Single Ø	
	200 V	230 V	460 V	575 V	115 V	230 V
1/6	—	—	—	—	4.4	2.2
1/4	—	—	—	—	5.8	2.9
1/3	—	—	—	—	7.2	3.6
1/2	2.5	2.2	1.1	0.9	9.8	4.9
3/4	3.7	3.2	1.6	1.3	13.8	6.9
1	4.8	4.2	2.1	1.7	16	8
1-1/2	6.9	6.0	3.0	2.4	20	10
2	7.8	6.8	3.4	2.7	24	12
3	11.0	9.6	4.8	3.9	34	17
5	17.5	15.2	7.6	6.1	56	28
7-1/2	25.3	22	11	9	80	40
10	32.2	28	14	11	—	50
15	48.3	42	21	17	—	—
20	62.1	54	27	22	—	—
25	78.2	68	34	27	—	—
30	92	80	40	32	—	—
40	120	104	52	41	—	—
50	150	130	65	52	—	—
60	177	154	77	62	—	—
75	221	192	96	77	—	—
100	285	248	124	99	—	—
125	359	312	156	125	—	—
150	414	360	180	144	—	—
200	552	480	240	192	—	—

NOTE: These currents should not be used for selection of fuses, circuit breakers or wire sizes. See NEC tables 430-248 through 430-250. For motors rated 208-220 volts, use 230 V column. For motors rated 440 to 550 volts, use 460 and 575 V columns, respectively.

Mounting of the Thermal Units

Always be certain the correct thermal units are installed in the starter before operating the motor. Thermal units should always be mounted so that their type designation can be read from the front of the starter (see Figure 1). Melting alloy thermal units should be mounted so that the tooth of the pawl assembly can engage the teeth of the ratchet wheel when the reset button is pushed.

Mounting surfaces of starter and thermal units should be clean and care should be taken to insure that thermal unit mounting screws are fastened securely.

Figure 1

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Thermal Unit Selection Tables

Thermal Unit Table 1
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T.U.	3 T.U.	
0.33–0.36	0.29–0.32	B 0.44
0.37–0.40	0.33–0.36	B 0.51
0.41–0.45	0.37–0.39	B 0.57
0.46–0.52	0.40–0.47	B 0.63
0.53–0.59	0.48–0.56	B 0.71
0.60–0.66	0.57–0.63	B 0.81
0.67–0.73	0.64–0.69	B 0.92
0.74–0.81	0.70–0.77	B 1.03
0.82–0.91	0.78–0.86	B 1.16
0.92–1.02	0.87–0.96	B 1.30
1.03–1.14	0.97–1.11	B 1.45
1.15–1.29	1.12–1.23	B 1.67
1.20–1.42	1.24–1.37	B 1.88
1.43–1.64	1.38–1.55	B 2.10
1.65–1.80	1.56–1.75	B 2.40
1.81–2.10	1.76–1.92	B 2.65
2.11–2.30	1.93–2.16	B 3.00
2.31–2.61	2.17–2.50	B 3.30
2.62–2.99	2.51–2.81	B 3.70
3.00–3.37	2.82–3.16	B 4.15
3.38–3.94	3.17–3.40	B 4.85
3.95–4.24	3.41–3.76	B 5.50
4.25–4.54	3.77–4.00	B 6.25
4.55–5.29	4.01–4.68	B 6.90
5.30–5.73	4.69–5.18	B 7.70
5.74–6.35	5.19–5.51	B 8.20
6.36–7.08	5.52–6.19	B 9.10
7.09–7.83	6.20–7.12	B 10.2
7.84–8.47	7.13–8.15	B 11.5
8.48–9.83	8.16–8.60	B 12.8
9.84–10.5	8.61–9.21	B 14.0
10.6–11.4	9.22–10.1	B 15.5
11.5–12.8	10.2–11.2	B 17.5
12.9–13.9	11.3–12.0	B 19.5
14.0–16.1	—	B 22.0
16.2–18.0	—	B 25.0
Following Selections for Size M-1 & M-1P Only.		
—	11.3–12.1	B 19.5
—	12.2–13.6	B 22.0
16.2–17.6	13.7–15.3	B 25.0
17.7–20.6	15.4–17.3	B 28.0
20.7–23.1	17.4–19.1	B 32.0
23.2–26.0	19.2–21.7	B 36.0
—	21.8–24.2	B 40.0
—	24.3–26.0	B 45.0
Following Selections for Size M-1P Only		
23.2–27.1	—	B 36.0
27.2–29.2	—	B 40.0
29.3–33.0	—	B 45.0
33.1–36.0	—	B 50.0

Thermal Unit Table 2
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T.U.	3 T.U.	
0.35–0.38	0.30–0.32	B 0.44
0.39–0.43	0.33–0.37	B 0.51
0.44–0.48	0.38–0.39	B 0.57
0.49–0.56	0.40–0.48	B 0.63
0.57–0.63	0.49–0.57	B 0.71
0.64–0.71	0.58–0.64	B 0.81
0.72–0.78	0.65–0.70	B 0.92
0.79–0.88	0.71–0.78	B 1.03
0.89–0.99	0.79–0.87	B 1.16
1.00–1.15	0.88–0.98	B 1.30
1.16–1.23	0.99–1.13	B 1.45
1.24–1.43	1.14–1.25	B 1.67
1.44–1.51	1.26–1.40	B 1.88
1.52–1.75	1.41–1.58	B 2.10
1.76–1.93	1.59–1.79	B 2.40
1.94–2.25	1.80–1.91	B 2.65
2.26–2.47	1.92–2.20	B 3.00
2.48–2.81	2.21–2.55	B 3.30
2.82–3.20	2.56–2.87	B 3.70
3.21–3.63	2.88–3.24	B 4.15
3.64–4.19	3.25–3.48	B 4.85
4.20–4.53	3.49–3.85	B 5.50
4.54–4.89	3.86–4.10	B 6.25
4.90–5.68	4.11–4.79	B 6.90
5.69–6.27	4.80–5.31	B 7.70
6.28–6.85	5.32–5.65	B 8.20
6.86–7.73	5.66–6.35	B 9.10
7.74–8.50	6.36–7.31	B 10.2
8.51–9.29	7.32–8.34	B 11.5
9.30–10.4	8.35–8.84	B 12.8
10.5–11.3	8.85–9.47	B 14.0
11.4–12.3	9.48–10.4	B 15.5
12.4–13.9	10.5–11.5	B 17.5
14.0–15.0	11.6–12.0	B 19.5
15.1–18.0	—	B 22.0
Following Selections for Size M-1 & M-1P Only.		
—	11.6–12.4	B 19.5
15.1–17.4	12.5–14.0	B 22.0
17.5–19.2	14.1–15.8	B 25.0
19.3–22.0	15.9–17.8	B 28.0
22.1–24.6	17.9–19.7	B 32.0
24.7–26.0	19.8–22.4	B 36.0
—	22.5–25.1	B 40.0
—	25.1–26.0	B 45.0
Following Selections for Size M-1P Only.		
24.7–29.1	—	B 36.0
29.2–31.7	—	B 40.0
31.8–36.0	—	B 45.0

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Thermal Unit Table 3
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T.U.	3 T.U.	
0.29–0.31	0.28–0.29	B 0.44
0.32–0.36	0.30–0.33	B 0.51
0.37–0.39	0.34–0.36	B 0.57
0.40–0.47	0.37–0.44	B 0.63
0.48–0.56	0.45–0.52	B 0.71
0.57–0.63	0.53–0.59	B 0.81
0.64–0.69	0.60–0.64	B 0.92
0.70–0.77	0.65–0.71	B 1.03
0.78–0.86	0.72–0.80	B 1.16
0.87–0.97	0.81–0.90	B 1.30
0.98–1.12	0.91–1.03	B 1.45
1.13–1.24	1.04–1.14	B 1.67
1.25–1.39	1.15–1.27	B 1.88
1.40–1.57	1.28–1.44	B 2.10
1.58–1.78	1.45–1.63	B 2.40
1.79–1.96	1.64–1.79	B 2.65
1.97–2.20	1.80–2.01	B 3.00
2.21–2.41	2.02–2.19	B 3.30
2.42–2.75	2.20–2.52	B 3.70
2.76–3.25	2.53–2.95	B 4.15
3.26–3.50	2.96–3.17	B 4.85
3.51–3.87	3.18–3.50	B 5.50
3.88–4.13	3.51–3.73	B 6.25
4.14–4.69	3.74–4.22	B 6.90
4.70–5.20	4.23–4.68	B 7.70
5.21–5.53	4.69–4.98	B 8.20
5.54–6.23	4.99–5.59	B 9.10
6.24–7.18	5.60–6.43	B 10.2
7.19–8.20	6.44–7.41	B 11.5
8.21–8.98	7.42–8.02	B 12.8
8.99–9.63	8.03–8.59	B 14.0
9.64–10.6	8.60–9.52	B 15.5
10.7–11.8	9.53–10.5	B 17.5
11.9–12.7	10.6–11.2	B 19.5
12.8–14.3	11.3–12.0	B 22.0
14.4–16.1	—	B 25.0
16.2–18.0	—	B 28.0
Following Selections for Size M-1 & M-1P Only.		
—	11.3–12.7	B 22.0
—	12.8–14.3	B 25.0
16.2–18.3	14.4–16.1	B 28.0
18.4–20.2	16.2–17.8	B 32.0
20.3–23.0	17.9–20.1	B 36.0
23.1–26.0	20.2–22.6	B 40.0
—	22.7–25.5	B 45.0
—	25.6–26.0	B 50.0
Following Selections for Size M-1P Only		
25.9–29.0	—	B 45.0
29.1–30.8	—	B 50.0
30.9–32.7	—	B 56.0
32.8–36.0	—	B 62.0

Thermal Unit Table 4
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T.U.	3 T.U.	
0.32–0.33	0.29–0.30	B 0.44
0.34–0.38	0.31–0.35	B 0.51
0.39–0.41	0.36–0.37	B 0.57
0.42–0.50	0.38–0.45	B 0.63
0.51–0.61	0.46–0.54	B 0.71
0.62–0.68	0.55–0.61	B 0.81
0.69–0.74	0.62–0.66	B 0.92
0.75–0.83	0.67–0.74	B 1.03
0.84–0.93	0.75–0.83	B 1.16
0.94–1.05	0.84–0.93	B 1.30
1.06–1.21	0.94–1.07	B 1.45
1.22–1.34	1.08–1.19	B 1.67
1.35–1.50	1.20–1.33	B 1.88
1.51–1.70	1.34–1.51	B 2.10
1.71–1.93	1.52–1.70	B 2.40
1.94–2.12	1.71–1.87	B 2.65
2.13–2.38	1.88–2.10	B 3.00
2.39–2.61	2.11–2.29	B 3.30
2.62–2.99	2.30–2.63	B 3.70
3.00–3.53	2.64–3.09	B 4.15
3.54–3.80	3.10–3.32	B 4.85
3.81–4.21	3.33–3.67	B 5.50
4.22–4.49	3.68–3.91	B 6.25
4.50–5.10	3.92–4.43	B 6.90
5.11–5.66	4.44–4.91	B 7.70
5.67–6.03	4.92–5.23	B 8.20
6.04–6.79	5.24–5.88	B 9.10
6.80–7.84	5.89–6.77	B 10.2
7.85–8.96	6.78–7.90	B 11.5
8.97–9.82	7.91–8.44	B 12.8
9.83–10.4	8.45–9.05	B 14.0
10.5–11.6	9.06–9.99	B 15.5
11.7–12.9	10.0–11.0	B 17.5
13.0–13.9	11.1–11.9	B 19.5
14.0–15.7	12.0–12.0	B 22.0
15.8–18.0	—	B 25.0
Following Selections for Size M-1 & M-1P Only.		
—	12.0–13.4	B 22.0
—	13.5–15.1	B 25.0
17.8–20.1	15.2–17.0	B 28.0
20.2–22.2	17.1–18.9	B 32.0
22.3–25.3	19.0–21.4	B 36.0
25.4–26.0	21.5–24.0	B 40.0
—	24.1–26.0	B 45.0
Following Selections for Size M-1P Only.		
25.4–28.4	—	B 40.0
28.5–33.1	—	B 45.0
33.2–36.0	—	B 50.0

Thermal Unit Table 5
(index and instructions: page 16-130 to page 16-134)

Current Transformer Ratio										Thermal Unit Number
25/5	50/5	75/5	100/5	150/5	200/5	250/5	300/5	400/5	500/5	
Motor FLC										
10.6–11.7	21.1–23.6	31.7–35.4	42.3–47.2	63.4–70.9	84.5–94.6	106.–117.	127.–141.	169.–188.	211.–236.	B 3.00
11.8–13.2	23.7–26.5	35.5–39.8	47.3–53.1	71.0–79.7	94.7–105.	118.–132.	142.–159.	189.–212.	237.–265.	B 3.30
13.3–14.8	26.6–29.6	39.9–44.5	53.2–59.4	79.8–89.1	106.–118.	133.–148.	160.–177.	213.–237.	266.–296.	B 3.70
14.9–17.2	29.7–34.5	44.6–51.8	59.5–69.2	89.2–103.	119.–138.	149.–172.	178.–207.	238.–276.	297.–345.	B 4.15
17.3–19.6	34.6–39.2	51.9–58.9	69.3–78.6	104.–117.	139.–156.	173.–196.	208.–235.	277.–314.	346.–360.	B 4.85
19.7–22.3	39.3–44.6	59.0–67.0	78.7–89.3	118.–133.	157.–178.	197.–223.	236.–267.	315.–357.	—	B 5.50

Thermal Unit Table 9
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
15.3–16.7	C 20.0
16.8–19.8	C 22.0
19.9–22.8	C 26.0
22.9–25.8	C 30.0
25.9–30.4	C 34.0
30.5–31.9	C 40.0
32.0–34.2	C 42.0
34.3–38.8	C 45.0
38.9–44.2	C 51.0
44.3–50.2	C 58.0
50.3–57.1	C 66.0
57.2–63.2	C 75.0
63.3–68.6	C 83.0
68.7–78.6	C 90.0
78.7–86.9	C 103.0
87.0–100.0	C 114.0

Thermal Unit Table 10
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
43.6–47.3	CC 54.5
47.4–51.3	CC 59.4
51.4–54.6	CC 64.3
54.7–59.7	CC 68.5
59.8–65.1	CC 74.6
65.2–70.1	CC 81.5
70.2–75.1	CC 87.7
75.2–82.2	CC 94.0
82.3–89.2	CC 103.0
89.3–96.5	CC 112.0
96.6–104.	CC 121.0
105.–113.	CC 132.0
114.–123.	CC 143.0
124.–132.	CC 156.0
133.–150.	CC 167.0

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Thermal Unit Table 12
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
92.–100.	DD 112.0
101.–109.	DD 121.0
110.–119.	DD 128.0
120.–131.	DD 140.0
132.–139.	DD 150.0
140.–156.	DD 160.0
157.–166.	DD 185.0
167.–180.	DD 213.0
181.–189.	DD 220.0
190.–209.	DD 230.0
210.–225.	DD 250.0
226.–238.	DD 265.0
239.–263.	DD 280.0
264.–300.	DD 300.0

Thermal Unit Table 13
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)			Thermal Unit Number
1.T.U.	2 T.U.	3 T.U.	
0.29–0.31	0.29–0.31	0.28–0.30	B 0.44
0.32–0.34	0.32–0.34	0.31–0.34	B 0.51
0.35–0.38	0.35–0.38	0.35–0.37	B 0.57
0.39–0.45	0.39–0.45	0.38–0.44	B 0.63
0.46–0.54	0.46–0.54	0.45–0.53	B 0.71
0.55–0.61	0.55–0.61	0.54–0.59	B 0.81
0.62–0.66	0.62–0.66	0.60–0.64	B 0.92
0.67–0.73	0.67–0.73	0.65–0.72	B 1.03
0.74–0.81	0.74–0.81	0.73–0.80	B 1.16
0.82–0.94	0.82–0.94	0.81–0.90	B 1.30
0.95–1.05	0.95–1.05	0.91–1.03	B 1.45
1.06–1.22	1.06–1.22	1.04–1.14	B 1.67
1.23–1.34	1.23–1.34	1.15–1.27	B 1.88
1.35–1.51	1.35–1.51	1.28–1.43	B 2.10
1.52–1.71	1.52–1.71	1.44–1.62	B 2.40
1.72–1.93	1.72–1.93	1.63–1.77	B 2.65
1.94–2.14	1.94–2.14	1.78–1.97	B 3.00
2.15–2.40	2.15–2.40	1.98–2.32	B 3.30
2.41–2.72	2.41–2.72	2.33–2.51	B 3.70
2.73–3.15	2.73–3.15	2.52–2.99	B 4.15
3.16–3.55	3.16–3.55	3.00–3.42	B 4.85
3.56–4.00	3.56–4.00	3.43–3.75	B 5.50
4.01–4.40	4.01–4.40	3.76–3.98	B 6.25
4.41–4.88	4.41–4.88	3.99–4.48	B 6.90
4.89–5.19	4.89–5.19	4.49–4.93	B 7.70
5.20–5.73	5.20–5.73	4.94–5.21	B 8.20
5.74–6.39	5.74–6.39	5.22–5.84	B 9.10
6.40–7.13	6.40–7.13	5.85–6.67	B 10.2
7.14–7.90	7.14–7.90	6.68–7.54	B 11.5
7.91–8.55	7.91–8.55	7.55–8.14	B 12.8
8.56–9.53	8.56–9.53	8.15–8.72	B 14.0
9.54–10.6	9.54–10.6	8.73–9.66	B 15.5
10.7–11.8	10.7–11.8	9.67–10.5	B 17.5
11.9–13.2	11.9–12.0	10.6–11.3	B 19.5
13.3–14.9	—	11.4–12.0	B 22.0
15.0–16.6	—	—	B 25.0
16.7–18.0	—	—	B 28.0
Following Selections for Size 1 Only			
—	11.9–13.2	—	B 19.5
—	13.3–14.9	11.4–12.7	B 22.0
—	15.0–16.6	12.8–14.1	B 25.0
16.7–18.9	16.7–18.9	14.2–15.9	B 28.0
19.0–21.2	19.0–21.2	16.0–17.5	B 32.0
21.3–23.0	21.3–23.0	17.6–19.7	B 36.0
23.1–25.5	23.1–25.5	19.8–21.9	B 40.0
25.6–26.0	25.6–26.0	22.0–24.4	B 45.0
—	—	24.5–26.0	B 50.0

Thermal Unit Table 14
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)			Thermal Unit Number
1.T.U.	2 T.U.	3 T.U.	
0.43–0.47	0.41–0.45	0.40–0.41	A .49
0.48–0.51	0.46–0.50	0.42–0.46	A .54
0.52–0.56	0.51–0.55	0.47–0.51	A .59
0.57–0.64	0.56–0.62	0.52–0.57	A .65
0.65–0.69	0.63–0.67	0.58–0.62	A .71
0.70–0.76	0.68–0.72	0.63–0.67	A .78
0.77–0.84	0.73–0.81	0.68–0.75	A .86
0.85–0.91	0.82–0.88	0.76–0.80	A .95
0.92–1.01	0.89–0.97	0.81–0.89	A 1.02
1.02–1.15	0.98–1.08	0.90–1.02	A 1.16
1.16–1.23	1.09–1.18	1.03–1.09	A 1.25
1.24–1.37	1.19–1.32	1.10–1.21	A 1.39
1.38–1.45	1.33–1.40	1.22–1.29	A 1.54
1.46–1.56	1.41–1.48	1.30–1.37	A 1.63
1.57–1.67	1.49–1.60	1.38–1.48	A 1.75
1.68–1.77	1.61–1.72	1.49–1.58	A 1.86
1.78–1.92	1.73–1.84	1.59–1.72	A 1.99
1.93–2.09	1.85–2.00	1.73–1.85	A 2.15
2.10–2.31	2.01–2.22	1.86–2.05	A 2.31
2.32–2.56	2.23–2.45	2.06–2.29	A 2.57
2.57–2.92	2.46–2.82	2.30–2.62	A 2.81
2.93–3.16	2.83–3.08	2.63–2.84	A 3.61
3.17–3.48	3.09–3.39	2.85–3.10	A 3.95
3.49–3.83	3.40–3.75	3.11–3.46	A 4.32
3.84–4.24	3.76–4.16	3.47–3.85	A 4.79
4.25–4.62	4.17–4.51	3.86–4.16	A 5.30
4.63–4.92	4.52–4.83	4.17–4.46	A 5.78
4.93–5.61	4.84–5.49	4.47–5.08	A 6.20
5.62–5.85	5.50–5.67	5.09–5.35	A 6.99
5.86–6.36	5.68–6.16	5.36–5.82	A 7.65
6.37–6.99	6.17–6.75	5.83–6.34	A 8.38
7.00–7.67	6.76–7.00	6.35–6.95	A 9.25
7.68–8.15	—	6.96–7.00	A 9.85
8.16–9.00	—	—	A 11.0

Thermal Unit Table 15
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)			Thermal Unit Number
1.T.U.	2 T.U.	3 T.U.	
0.31–0.33	0.31–0.33	0.29–0.31	B 0.44
0.34–0.36	0.34–0.36	0.32–0.36	B 0.51
0.37–0.40	0.37–0.40	0.37–0.38	B 0.57
0.41–0.48	0.41–0.48	0.39–0.46	B 0.63
0.49–0.57	0.49–0.57	0.47–0.55	B 0.71
0.58–0.64	0.58–0.64	0.56–0.61	B 0.81
0.65–0.70	0.65–0.70	0.62–0.66	B 0.92
0.71–0.77	0.71–0.77	0.67–0.75	B 1.03
0.78–0.85	0.78–0.85	0.76–0.83	B 1.16
0.86–0.99	0.86–0.99	0.84–0.93	B 1.30
1.00–1.10	1.00–1.10	0.94–1.06	B 1.45
1.11–1.28	1.11–1.28	1.07–1.18	B 1.67
1.29–1.41	1.29–1.41	1.19–1.31	B 1.88
1.42–1.58	1.42–1.58	1.32–1.47	B 2.10
1.59–1.80	1.59–1.80	1.48–1.67	B 2.40
1.81–2.03	1.81–2.03	1.68–1.83	B 2.65
2.04–2.25	2.04–2.25	1.84–2.04	B 3.00
2.26–2.51	2.26–2.51	2.05–2.38	B 3.30
2.52–2.83	2.52–2.83	2.39–2.60	B 3.70
2.84–3.29	2.84–3.29	2.61–3.13	B 4.15
3.30–3.75	3.30–3.75	3.14–3.59	B 4.85
3.76–4.22	3.76–4.22	3.60–3.94	B 5.50
4.23–4.65	4.23–4.65	3.95–4.19	B 6.25
4.66–5.16	4.66–5.16	4.20–4.72	B 6.90
5.17–5.53	5.17–5.53	4.73–5.21	B 7.70
5.54–6.09	5.54–6.09	5.22–5.51	B 8.20
6.10–6.80	6.10–6.80	5.52–6.17	B 9.10
6.81–7.60	6.81–7.60	6.18–7.07	B 10.2
7.61–8.35	7.61–8.35	7.08–8.05	B 11.5
8.36–9.04	8.36–9.04	8.06–8.69	B 12.8
9.05–9.99	9.05–9.99	8.70–9.32	B 14.0
10.0–11.1	10.0–11.1	9.33–10.2	B 15.5
11.2–12.3	11.2–12.0	10.3–11.3	B 17.5
12.4–13.7	—	11.4–12.0	B 19.5
13.8–15.4	—	—	B 22.0
15.5–18.0	—	—	B 25.0
Following Selections for Size 1 Only			
—	11.2–12.3	—	B 17.5
—	12.4–13.7	11.4–12.1	B 19.5
—	13.8–15.4	12.2–13.7	B 22.0
15.5–17.2	15.5–17.2	13.8–15.2	B 25.0
17.3–19.4	17.3–19.4	15.3–17.2	B 28.0
19.5–21.7	19.5–21.7	17.3–18.9	B 32.0
21.8–23.9	21.8–23.9	19.0–21.4	B 36.0
24.0–26.0	24.0–26.0	21.5–23.7	B 40.0
—	—	23.8–26.0	B 45.0

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Thermal Unit Table 16
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)			Thermal Unit Number
1.T.U.	2 T.U.	3 T.U.	
16.2–17.5	15.1–16.2	14.3–15.4	CC 20.9
17.6–18.8	16.3–17.3	15.5–16.4	CC 22.8
18.9–20.5	17.4–19.5	16.5–18.5	CC 24.6
20.6–22.2	19.6–20.7	18.6–19.6	CC 26.3
22.3–23.7	20.8–22.3	19.7–21.1	CC 28.8
23.8–25.4	22.4–24.0	21.2–22.7	CC 31.0
25.5–27.3	24.1–25.7	22.8–24.4	CC 33.3
27.4–29.3	25.8–27.5	24.5–26.1	CC 36.4
29.4–31.5	27.6–29.6	26.2–28.1	CC 39.6
31.6–33.9	29.7–31.7	28.2–30.0	CC 42.7
34.0–36.2	31.8–33.9	30.1–32.1	CC 46.6
36.3–39.3	34.0–36.6	32.2–34.7	CC 50.1
39.4–42.3	36.7–39.3	34.8–37.3	CC 54.5
42.4–45.3	39.4–42.3	37.4–40.1	CC 59.4
45.4–48.3	42.4–44.9	40.2–42.6	CC 64.3
48.4–52.0	45.0–48.3	42.7–45.8	CC 68.5
52.1–54.9	48.4–50.9	45.9–48.3	CC 74.6
55.0–59.7	51.0–55.5	48.4–52.6	CC 81.5
59.8–65.4	55.6–59.9	52.7–56.8	CC 87.7
65.5–69.6	60.0–64.2	56.9–60.9	CC 94.0
69.7–74.8	64.3–68.7	61.0–65.1	CC 103.0
74.9–79.7	68.8–71.4	65.2–67.7	CC 112.0
79.8–83.1	71.5–74.8	67.8–70.9	CC 121.0
83.2–86.0	74.9–78.0	71.0–73.9	CC 132.0
—	78.1–80.7	74.0–76.5	CC 143.0
—	80.8–86.0	76.6–80.2	CC 156.0
—	—	80.3–83.1	CC 167.0
—	—	83.2–86.0	CC 180.0

Thermal Unit Table 17
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)			Thermal Unit Number
1.T.U.	2 T.U.	3 T.U.	
0.42–0.46	0.39–0.43	0.38–0.40	A .49
0.47–0.50	0.44–0.47	0.41–0.44	A .54
0.51–0.55	0.48–0.52	0.45–0.49	A .59
0.56–0.62	0.53–0.58	0.50–0.55	A .65
0.63–0.67	0.59–0.64	0.56–0.60	A .71
0.68–0.73	0.65–0.68	0.61–0.65	A .78
0.74–0.81	0.69–0.77	0.66–0.72	A .86
0.82–0.89	0.78–0.84	0.73–0.79	A .95
0.90–0.98	0.85–0.93	0.80–0.88	A 1.02
0.99–1.12	0.94–1.05	0.89–0.98	A 1.16
1.13–1.20	1.06–1.13	0.99–1.07	A 1.25
1.21–1.34	1.14–1.25	1.08–1.17	A 1.39
1.35–1.41	1.26–1.33	1.18–1.25	A 1.54
1.42–1.51	1.34–1.42	1.26–1.33	A 1.63
1.52–1.62	1.43–1.52	1.34–1.44	A 1.75
1.63–1.73	1.53–1.63	1.45–1.53	A 1.86
1.74–1.86	1.64–1.75	1.54–1.65	A 1.99
1.87–2.02	1.76–1.90	1.66–1.79	A 2.15
2.03–2.25	1.91–2.13	1.80–1.99	A 2.31
2.26–2.46	2.14–2.33	2.00–2.18	A 2.57
2.47–2.77	2.34–2.73	2.19–2.45	A 2.81
2.78–2.99	2.74–2.86	2.46–2.65	A 3.61
3.00–3.26	2.87–3.14	2.66–2.90	A 3.95
3.27–3.59	3.15–3.47	2.91–3.19	A 4.32
3.60–3.99	3.48–3.83	3.20–3.56	A 4.79
4.00–4.42	3.84–4.16	3.57–3.83	A 5.30
4.43–4.61	4.17–4.43	3.84–4.08	A 5.78
4.62–5.23	4.44–5.00	4.09–4.64	A 6.20
5.24–5.39	5.01–5.16	4.65–5.00	A 6.99
5.40–5.88	5.17–5.56	5.01–5.36	A 7.65
5.89–6.56	5.57–6.22	5.37–5.87	A 8.38
6.57–7.18	6.23–6.89	5.88–6.43	A 9.25
7.19–7.80	6.90–7.00	6.44–6.79	A 9.85
7.81–9.00	—	6.80–7.00	A 11.0

Thermal Unit Table 18
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)			Thermal Unit Number
1.T.U.	2 T.U.	3 T.U.	
15.5–16.4	14.4–15.3	13.6–14.5	CC 20.9
16.5–17.6	15.4–16.4	14.6–15.5	CC 22.8
17.7–19.1	16.5–18.4	15.6–17.4	CC 24.6
19.2–20.4	18.5–19.6	17.5–18.5	CC 26.3
20.5–22.1	19.7–21.0	18.6–19.9	CC 28.8
22.2–23.4	21.1–22.7	20.0–21.5	CC 31.0
23.5–25.6	22.8–24.2	21.6–22.9	CC 33.3
25.7–27.3	24.3–25.9	23.0–24.5	CC 36.4
27.4–29.4	26.0–27.8	24.6–26.3	CC 39.6
29.5–31.5	27.9–29.8	26.4–28.2	CC 42.7
31.6–33.7	29.9–31.7	28.3–30.0	CC 46.6
33.8–36.5	31.8–34.2	30.1–32.3	CC 50.1
36.6–39.1	34.3–36.9	32.4–34.9	CC 54.5
39.2–41.7	37.0–39.8	35.0–37.6	CC 59.4
41.8–44.8	39.9–42.3	37.7–40.0	CC 64.3
44.9–48.0	42.4–45.3	40.1–42.8	CC 68.5
48.1–50.7	45.4–47.9	42.9–45.3	CC 74.6
50.8–54.9	48.0–51.9	45.4–49.1	CC 81.5
55.0–59.9	52.0–56.5	49.2–53.4	CC 87.7
60.0–63.3	56.6–60.7	53.5–57.4	CC 94.0
63.4–67.2	60.8–64.8	57.5–61.3	CC 103.0
67.3–72.4	64.9–67.1	61.4–63.5	CC 112.0
72.5–74.9	67.2–70.1	63.6–66.3	CC 121.0
75.0–77.4	70.2–72.9	66.4–69.0	CC 132.0
77.5–80.7	73.0–74.9	69.1–70.9	CC 143.0
80.8–83.1	75.0–77.9	71.0–73.7	CC 156.0
83.2–86.0	78.0–80.9	73.8–76.5	CC 167.0
—	81.0–82.9	76.6–78.4	CC 180.0
—	83.0–86.0	78.5–86.0	CC 196.0

Thermal Unit Table 19
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
43.6–47.3	CC 54.5
47.4–51.3	CC 59.4
51.4–54.6	CC 64.3
54.7–59.7	CC 68.5
59.8–65.1	CC 74.6
65.2–70.1	CC 81.5
70.2–75.1	CC 87.7
75.2–82.2	CC 94.0
82.3–89.2	CC 103.0
89.3–96.5	CC 112.0
96.6–104.	CC 121.0
105.–113.	CC 132.0
114.–123.	CC 143.0
124.–133.	CC 156.0

Thermal Unit Table 20
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
133.–148.	B 1.30
149.–174.	B 1.45
175.–195.	B 1.67
196.–219.	B 1.88
220.–239.	B 2.10
240.–271.	B 2.40
272.–308.	B 2.65
309.–348.	B 3.00
349.–397.	B 3.30
398.–429.	B 3.70
430.–495.	B 4.15
496.–520.	B 4.85

Thermal Unit Table 21
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Load
128.–140.	B 1.30
141.–163.	B 1.45
164.–179.	B 1.67
180.–201.	B 1.88
202.–227.	B 2.10
228.–251.	B 2.40
252.–278.	B 2.65
279.–308.	B 3.00
309.–346.	B 3.30
347.–380.	B 3.70
381.–426.	B 4.15
427.–454.	B 4.85
455.–489.	B 5.50
490.–520.	B 6.25

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Thermal Unit Table 22
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
92.0–100. 101.–109. 110.–119. 120.–131. 132.–139.	DD 112.0 DD 121.0 DD 128.0 DD 140.0 DD 150.0
140.–156. 157.–166. 167.–180. 181.–189. 190.–209.	DD 160.0 DD 185.0 DD 213.0 DD 220.0 DD 230.0
210.–225. 226.–238. 239.–266.	DD 250.0 DD 265.0 DD 280.0

Thermal Unit Table 24
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
88.2–95.1 95.2–101. 102.–111. 112.–119. 120.–131.	DD 112.0 DD 121.0 DD 128.0 DD 140.0 DD 150.0
132.–149. 150.–170. 171.–180. 181.–197. 198.–204.	DD 160.0 DD 185.0 DD 220.0 DD 240.0 DD 250.0
205.–213. 214.–237. 238.–243. 244.–266.	DD 265.0 DD 280.0 DD 300.0 DD 320.0

Thermal Unit Table 26
(index and instructions: page 16-130 to page 16-134)

Size 7 Type J	Size 8 Type K	Thermal Unit Number
Current Transformer Ratio		
120/5	2000/5	
Motor FLC		
166.–187. 188.–211. 212.–232. 233.–267. 268.–301.	277.–312. 313.–352. 353.–388. 389.–445. 446.–503.	B 1.03 B 1.16 B 1.30 B 1.45 B 1.67
302.–336. 337.–383. 384.–425. 426.–466. 467.–522.	504.–561. 562.–640. 641.–708. 709.–777. 778.–870.	B 1.88 B 2.10 B 2.40 B 2.65 B 3.00
523.–587. 588.–656. 657.–764.	871.–978. 979.–1093. 1094.–1215.	B 3.30 B 3.70 B 4.15

Thermal Unit Table 28
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
2 or 3 T.U.		
Large Enclosure	Small Enclosure	
45.3–48.2 48.3–52.4 52.5–56.4 56.5–61.2 61.3–66.1	40.3–42.8 42.9–46.2 46.3–49.8 49.9–54.9 55.0–57.9	CC 64.3 CC 68.5 CC 74.6 CC 81.5 CC 87.7
66.2–71.4 71.5–77.0 77.1–80.7 80.8–87.7 87.8–94.9	58.0–62.5 62.6–67.3 67.4–73.4 73.5–78.9 79.0–84.9	CC 94.0 CC 103.0 CC 112.0 CC 121.0 CC 132.0
95.0–102. 103.–110. 111.–117. 118.–133. —	85.0–91.0 91.1–97.2 97.3–104. 105.–121. 122.–133.	CC 143.0 CC 156.0 CC 167.0 CC 180.0 CC 196.0

Thermal Unit Table 31
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
0.31–0.35 0.36–0.39 0.40–0.44	B 0.44 B 0.51 B 0.57
0.45–0.50 0.51–0.61 0.62–0.68	B 0.63 B 0.71 B 0.81
0.69–0.73 0.74–0.82 0.83–0.92	B 0.92 B 1.03 B 1.16
0.93–1.03 1.04–1.19 1.20–1.34	B 1.30 B 1.45 B 1.67
1.35–1.50 1.51–1.74 1.75–1.97	B 1.88 B 2.10 B 2.40
1.98–2.14 2.15–2.47 2.48–2.91	B 2.65 B 3.00 B 3.30
2.92–3.31 3.32–3.75 3.76–4.05	B 3.70 B 4.15 B 4.85
4.06–4.94 4.95–5.52 5.53–6.11	B 6.25 B 6.90 B 7.70
6.12–6.52 6.53–7.31 7.32–8.43	B 8.20 B 9.10 B 10.2
8.44–9.83 9.84–10.7 10.8–11.6	B 11.5 B 12.8 B 14.0
11.7–12.9 13.0–14.3 14.4–15.7	B 15.5 B 17.5 B 19.5
15.8–17.8 17.9–20.3 20.4–23.3	B 22.0 B 25.0 B 28.0
23.4–26.6 26.7–30.3 30.4–35.3	B 32.0 B 36.0 B 40.0
35.4–41.5 41.6–45	B 45.0 B 50.0

Thermal Unit Table 34
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
15.1–16.2 16.3–17.5 17.6–19.1 19.2–20.7 20.8–22.2	CC 20.9 CC 22.8 CC 24.6 CC 26.3 CC 28.8
22.3–24.0 24.1–25.7 25.8–27.8 27.9–30.1 30.2–32.5	CC 31.0 CC 33.3 CC 36.4 CC 39.6 CC 42.7
32.6–35.1 35.2–38.0 38.1–41.1 41.2–44.0 44.1–47.2	CC 46.6 CC 50.1 CC 54.5 CC 59.4 CC 64.3
47.3–51.1 51.2–55.8 55.9–59.5 59.6–64.5 64.6–69.5	CC 68.5 CC 74.6 CC 81.5 CC 87.7 CC 94.0
69.6–75.0 75.1–78.1 78.2–82.3 82.4–86.0	CC 103.0 CC 112.0 CC 121.0 CC 132.0

Thermal Unit Table 40
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
15.3–16.7 16.8–19.8 19.9–22.8 22.9–25.8 25.9–30.4	C 20.0 C 22.0 C 26.0 C 30.0 C 34.0
30.5–31.9 32.0–34.2 34.3–38.8 38.9–44.2 44.3–50.2	C 40.0 C 42.0 C 45.0 C 51.0 C 58.0
50.3–57.1 57.2–63.2 63.3–68.6 68.7–78.6 78.7–86.0	C 66.0 C 75.0 C 83.0 C 90.0 C 103.0

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Thermal Unit Table 41
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
0.81–0.92	B 1.16
0.93–1.07	B 1.30
1.08–1.14	B 1.45
1.15–1.26	B 1.67
1.27–1.49	B 1.88
1.50–1.73	B 2.10
1.74–1.89	B 2.40
1.90–2.16	B 2.65
2.17–2.37	B 3.00
2.38–2.66	B 3.30
2.67–2.99	B 3.70
3.00–3.40	B 4.15
3.41–3.94	B 4.85
3.95–4.15	B 5.50
4.16–4.49	B 6.25
4.50–5.15	B 6.90
5.16–5.77	B 7.70
5.78–6.61	B 8.20
6.62–7.14	B 9.10
7.15–7.97	B 10.2
7.98–8.15	B 11.5
8.16–9.32	B 12.8
9.33–9.97	B 14.0
9.98–10.7	B 15.5
10.8–12.0	B 17.5
12.1–13.9	B 19.5
14.0–15.7	B 22.0
15.8–18.4	B 25.0
18.5–21.6	B 28.0
21.7–24.0	B 32.0
24.1–28.6	B 36.0
28.7–30.7	B 40.0
30.8–33.5	B 45.0
33.6–36.0	B 50.0

Thermal Unit Table 43
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
0.41–0.44	A .49
0.45–0.49	A .54
0.50–0.53	A .59
0.54–0.58	A .65
0.59–0.65	A .71
0.66–0.71	A .78
0.72–0.78	A .86
0.79–0.85	A .95
0.86–0.96	A 1.02
0.97–1.04	A 1.16
1.05–1.16	A 1.25
1.17–1.29	A 1.39
1.30–1.37	A 1.54
1.38–1.47	A 1.63
1.48–1.56	A 1.75
1.57–1.65	A 1.86
1.66–1.79	A 1.99
1.80–1.95	A 2.15
1.96–2.15	A 2.31
2.16–2.38	A 2.57
2.39–2.75	A 2.81
2.76–2.84	A 3.61
2.85–3.06	A 3.95
3.07–3.45	A 4.32
3.46–3.70	A 4.79
3.71–4.07	A 5.30
4.08–4.32	A 5.78
4.33–4.90	A 6.20
4.91–5.35	A 6.99
5.36–5.85	A 7.65
5.86–6.41	A 8.38
6.42–6.79	A 9.25
6.80–7.57	A 9.85
7.58–8.15	A 11.0
8.16–8.98	A 11.9
8.99–9.67	A 13.2
9.68–9.95	A 14.1
9.96–10.8	A 14.8
10.9–12.1	A 16.2
12.2–13.1	A 17.9
13.2–13.9	A 19.8
14.0–15.0	A 21.3
15.1–16.0	A 25.2

Thermal Unit Table 44
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
0.34–0.38	B 0.44
0.39–0.43	B 0.51
0.44–0.48	B 0.57
0.49–0.53	B 0.65
0.54–0.62	B 0.71
0.63–0.69	B 0.81
0.70–0.78	B 0.92
0.79–0.88	B 1.03
0.89–0.99	B 1.16
1.00–1.10	B 1.30
1.11–1.26	B 1.45
1.27–1.43	B 1.67
1.44–1.59	B 1.88
1.60–1.81	B 2.10
1.82–2.00	B 2.40
2.01–2.28	B 2.65
2.29–2.52	B 3.00
2.53–2.87	B 3.30
2.88–3.28	B 3.70
3.29–3.75	B 4.15
3.76–4.27	B 4.85
4.28–4.77	B 5.50
4.78–5.27	B 6.25
5.28–5.91	B 6.90
5.92–6.25	B 7.70
6.26–6.83	B 8.20
6.84–7.65	B 9.10
7.66–8.55	B 10.2
8.56–9.56	B 11.5
9.57–10.3	B 12.8
10.4–11.3	B 14.0
11.4–12.4	B 15.5
12.5–14.1	B 17.5
14.2–15.7	B 19.5
15.8–17.9	B 22.0
18.0–20.1	B 25.0
20.2–22.5	B 28.0
22.6–25.0	B 32.0

Thermal Unit Table 49
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
82.5–88.2	DD 112.0
88.3–95.9	DD 121.0
96.0–102.	DD 128.0
103.–109.	DD 140.0
110.–121.	DD 150.0
122.–139.	DD 160.0
140.–154.	DD 185.0
155.–163.	DD 220.0
164.–175.	DD 240.0
176.–184.	DD 250.0
185.–195.	DD 265.0
196.–215.	DD 280.0
216.–224.	DD 300.0
225.–243.	DD 320.0
244.–266.	DD 340.0

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Thermal Unit Table 53
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T. U.	3 T. U.	
0.31–0.33	0.29–0.31	B 0.44
0.34–0.36	0.32–0.36	B 0.51
0.37–0.40	0.37–0.38	B 0.57
0.41–0.48	0.39–0.46	B 0.63
0.49–0.57	0.47–0.55	B 0.71
0.58–0.64	0.56–0.61	B 0.81
0.65–0.70	0.62–0.66	B 0.92
0.71–0.77	0.67–0.75	B 1.03
0.78–0.85	0.76–0.83	B 1.16
0.86–0.99	0.84–0.93	B 1.30
1.00–1.10	0.94–1.06	B 1.45
1.11–1.28	1.07–1.18	B 1.67
1.29–1.41	1.19–1.31	B 1.88
1.42–1.58	1.32–1.47	B 2.10
1.59–1.80	1.48–1.67	B 2.40
1.81–2.03	1.68–1.83	B 2.65
2.04–2.25	1.84–2.04	B 3.00
2.26–2.51	2.05–2.38	B 3.30
2.52–2.83	2.39–2.60	B 3.70
2.84–3.29	2.61–3.13	B 4.15
3.30–3.75	3.14–3.59	B 4.85
3.76–4.22	3.60–3.94	B 5.50
4.23–4.65	3.95–4.19	B 6.25
4.66–5.16	4.20–4.72	B 6.90
5.17–5.53	4.73–5.21	B 7.70
5.54–6.09	5.22–5.51	B 8.20
6.10–6.80	5.52–6.17	B 9.10
6.81–7.60	6.18–7.00	B 10.2
7.61–8.35	—	B 11.5
8.36–9.00	—	B 12.8

Thermal Unit Table 54
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
2 T. U.	3 T. U.	
43.6–45.5	41.1–43.5	CC 64.3
45.6–49.6	43.6–46.8	CC 68.5
49.7–53.1	46.9–50.0	CC 74.6
53.2–57.6	50.1–54.9	CC 81.5
57.7–62.4	55.0–57.5	CC 87.7
62.5–67.5	57.6–61.8	CC 94.0
67.6–71.1	61.9–66.2	CC 103.0
71.2–75.9	66.3–72.4	CC 112.0
76.0–81.9	72.5–78.1	CC 121.0
82.0–84.6	78.2–80.7	CC 132.0
84.7–90.7	80.8–86.5	CC 143.0
90.8–98.4	86.6–93.9	CC 156.0
98.5–105.	94.0–100.	CC 167.0
106.–117.	101.–112.	CC 180.0
118.–123.	113.–117.	CC 196.0
124.–133.	118.–123.	CC 208.0
—	124.–133.	CC 219.0

Thermal Unit Table 56
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 or 2 T. U.	3 T. U.	
3.29–3.74	3.18–3.40	B 4.85
3.75–4.23	3.41–3.76	B 5.50
4.24–4.68	3.77–4.00	B 6.25
4.69–5.22	4.01–4.57	B 6.90
5.23–5.67	4.58–5.03	B 7.70
5.68–6.13	5.04–5.32	B 8.20
6.14–6.91	5.33–5.97	B 9.10
6.92–7.70	5.98–6.88	B 10.2
7.71–8.56	6.89–7.82	B 11.5
8.57–9.39	7.83–8.47	B 12.8
9.40–10.4	8.48–9.15	B 14.0
10.5–11.6	9.16–10.1	B 15.5
11.7–12.9	10.2–11.2	B 17.5
13.0–14.6	11.3–12.0	B 19.5
14.7–16.5	12.1–13.6	B 22.0
16.6–18.5	13.7–15.2	B 25.0
18.6–21.0	15.3–17.1	B 28.0
21.1–23.6	17.2–19.0	B 32.0
23.7–26.3	19.1–21.5	B 36.0
26.4–29.3	21.6–24.1	B 40.0
29.4–35.1	24.2–27.0	B 45.0
35.2–36.1	27.1–28.7	B 50.0
36.2–39.1	28.8–30.4	B 56.0
39.2–41.5	30.5–32.2	B 62.0
41.6–45.0	32.3–35.4	B 70.0
—	35.5–38.2	B 79.0
—	38.3–45.0	B 88.0

Thermal Unit Table 58
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 or 2 T. U.	3 T. U.	
3.37–3.82	3.28–3.51	B 4.85
3.83–4.33	3.52–3.89	B 5.50
4.34–4.79	3.90–4.14	B 6.25
4.80–5.33	4.15–4.73	B 6.90
5.34–5.79	4.74–5.22	B 7.70
5.80–6.27	5.23–5.53	B 8.20
6.28–7.03	5.54–6.21	B 9.10
7.04–7.88	6.22–7.17	B 10.2
7.89–8.73	7.18–8.19	B 11.5
8.74–9.55	8.20–8.90	B 12.8
9.56–10.6	8.91–9.57	B 14.0
10.7–11.8	9.58–10.6	B 15.5
11.9–13.1	10.7–11.8	B 17.5
13.2–14.9	11.9–12.7	B 19.5
15.0–16.9	12.8–14.4	B 22.0
17.0–18.8	14.5–16.1	B 25.0
18.9–21.5	16.2–18.2	B 28.0
21.6–24.1	18.3–20.2	B 32.0
24.2–26.8	20.3–22.8	B 36.0
26.9–29.9	22.9–25.6	B 40.0
30.0–35.5	25.7–28.8	B 45.0
35.6–36.5	28.9–30.6	B 50.0
36.6–39.6	30.7–32.4	B 56.0
39.7–41.5	32.5–34.6	B 62.0
41.6–45.0	34.7–38.6	B 70.0
—	38.7–45.0	B 79.0

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Thermal Unit Table 59
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 or 2 T. U.	3 T. U.	
0.34–0.38	0.29–0.31	B 0.44
0.39–0.43	0.32–0.35	B 0.51
0.44–0.47	0.36–0.38	B 0.57
0.48–0.53	0.39–0.46	B 0.63
0.54–0.60	0.47–0.55	B 0.71
0.61–0.68	0.56–0.62	B 0.81
0.69–0.76	0.63–0.67	B 0.92
0.77–0.86	0.68–0.75	B 1.03
0.87–0.97	0.76–0.84	B 1.16
0.98–1.07	0.85–0.95	B 1.30
1.08–1.23	0.96–1.09	B 1.45
1.24–1.39	1.10–1.21	B 1.67
1.40–1.55	1.22–1.35	B 1.88
1.56–1.77	1.36–1.53	B 2.10
1.78–1.96	1.54–1.73	B 2.40
1.97–2.15	1.74–1.90	B 2.65
2.16–2.41	1.91–2.14	B 3.00
2.42–2.71	2.15–2.34	B 3.30
2.72–3.03	2.35–2.67	B 3.70
3.04–3.53	2.68–3.22	B 4.15
3.54–4.01	3.23–3.48	B 4.85
4.02–4.56	3.49–3.87	B 5.50
4.57–5.03	3.88–4.14	B 6.25
5.04–5.59	4.15–4.73	B 6.90
5.60–5.95	4.74–5.28	B 7.70
5.96–6.58	5.29–5.64	B 8.20
6.59–7.31	5.65–6.39	B 9.10
7.32–8.15	6.40–7.43	B 10.2
8.16–9.13	7.44–8.55	B 11.5
9.14–9.91	8.56–9.40	B 12.8
9.92–10.7	9.41–10.0	B 14.0
10.8–12.1	10.1–11.2	B 15.5
12.2–13.5	11.3–12.5	B 17.5
13.6–15.1	12.6–13.5	B 19.5
15.2–17.0	13.6–15.4	B 22.0
17.1–18.9	15.5–17.5	B 25.0
19.0–21.5	17.6–19.9	B 28.0
21.6–24.0	20.0–22.2	B 32.0
24.1–26.0	22.3–25.5	B 36.0
—	25.6–26.0	B 40.0

Thermal Unit Table 61
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
2 T. U.	3 T. U.	
46.8–50.0	45.3–48.2	CC 64.3
50.1–54.2	48.3–52.4	CC 68.5
54.3–58.3	52.5–56.4	CC 74.6
58.4–63.6	56.5–61.2	CC 81.5
63.7–68.5	61.3–66.1	CC 87.7
68.6–74.0	66.2–71.4	CC 94.0
74.1–79.8	71.5–77.0	CC 103.0
79.9–83.0	77.1–79.0	CC 112.0
83.1–88.9	79.1–84.7	CC 121.0
89.0–95.6	84.8–91.1	CC 132.0
95.7–102.	91.2–98.1	CC 143.0
103.–109.	98.2–104.	CC 156.0
110.–119.	105.–113.	CC 167.0
120.–133.	114.–123.	CC 180.0
—	124.–133.	CC 196.0

Thermal Unit Table 65
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
0.31–0.35	B 0.44
0.36–0.39	B 0.51
0.40–0.44	B 0.57
0.45–0.50	B 0.63
0.51–0.58	B 0.71
0.59–0.65	B 0.81
0.66–0.73	B 0.92
0.74–0.82	B 1.03
0.83–0.92	B 1.16
0.93–1.03	B 1.30
1.04–1.19	B 1.45
1.20–1.34	B 1.67
1.35–1.50	B 1.88
1.51–1.67	B 2.10
1.68–1.89	B 2.40
1.90–2.14	B 2.65
2.15–2.36	B 3.00
2.37–2.65	B 3.30
2.66–2.97	B 3.70
2.98–3.47	B 4.15
3.48–3.94	B 4.85
3.95–4.44	B 5.50
4.45–4.94	B 6.25
4.95–5.52	B 6.90
5.53–5.88	B 7.70
5.89–6.52	B 8.20
6.53–7.31	B 9.10
7.32–8.21	B 10.2
8.22–9.18	B 11.5
9.19–9.90	B 12.8
10.0–11.0	B 14.0
11.1–12.4	B 15.5
12.5–13.9	B 17.5
14.0–15.7	B 19.5
15.8–17.8	B 22.0
17.9–20.0	B 25.0
20.1–22.9	B 28.0
23.0–25.0	B 32.0
Following Selections for Size 2 Only.	
23.0–25.7	B 32.0
25.8–28.6	B 36.0
28.7–32.2	B 40.0
32.3–35.8	B 45.0
35.9–40.1	B 50.0
40.2–44.4	B 56.0
44.5–50.0	B 62.0

Thermal Unit Table 66
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
0.31–0.32	B 0.44
0.33–0.36	B 0.51
0.37–0.41	B 0.57
0.42–0.49	B 0.63
0.50–0.54	B 0.71
0.55–0.61	B 0.81
0.62–0.67	B 0.92
0.68–0.76	B 1.03
0.77–0.87	B 1.16
0.88–0.98	B 1.30
0.99–1.05	B 1.45
1.06–1.25	B 1.67
1.26–1.33	B 1.88
1.34–1.56	B 2.10
1.57–1.71	B 2.40
1.72–1.97	B 2.65
1.98–2.15	B 3.00
2.16–2.42	B 3.30
2.43–2.78	B 3.70
2.79–3.28	B 4.15
3.29–3.88	B 4.85
3.89–4.13	B 5.5
4.14–4.43	B 6.25
4.44–4.96	B 6.90
4.97–5.35	B 7.70
5.36–5.91	B 8.20
5.92–6.79	B 9.10
6.80–7.56	B 10.2
7.57–7.83	B 11.5
7.84–8.09	B 12.8
8.10–9.51	B 14.0
9.52–10.1	B 15.5
10.2–11.3	B 17.5
11.4–13.1	B 19.5
13.2–14.9	B 22.0
15.0–16.1	B 25.0
16.2–17.8	B 28.0
17.9–19.1	B 32.0
19.2–22.4	B 36.0
22.5–23.5	B 40.0
23.6–26.0	B 45.0

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Thermal Unit Table 67
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Motor FLC (A)	Thermal Unit Number
3.79–4.14	B 5.50
4.15–4.44	B 6.25
4.45–5.22	B 6.90
5.23–5.29	B 7.70
5.30–5.99	B 8.20
6.00–6.82	B 9.10
6.83–7.68	B 10.2
7.69–7.92	B 11.5
7.93–8.47	B 12.8
8.48–9.99	B 14.0
10.0–10.8	B 15.5
10.9–12.3	B 17.5
12.4–12.9	B 19.5
13.0–15.1	B 22.0
15.2–16.7	B 25.0
16.8–17.9	B 28.0
18.0–20.1	B 32.0
20.2–23.8	B 36.0
23.9–25.8	B 40.0
25.9–28.3	B 45.0
28.4–29.6	B 50.0
29.7–32.1	B 56.0
32.2–34.4	B 62.0
34.5–38.3	B 70.0
38.4–39.9	B 79.0
40.0–45.0	B 88.0

Thermal Unit Table 68
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
14.9–16.1	CC 20.9
16.2–17.3	CC 22.8
17.4–19.5	CC 24.6
19.6–20.7	CC 26.3
20.8–22.4	CC 28.8
22.5–23.9	CC 31.0
24.0–25.8	CC 33.3
25.9–27.6	CC 36.4
27.7–29.7	CC 39.6
29.8–31.8	CC 42.7
31.9–34.2	CC 46.6
34.3–37.0	CC 50.1
37.1–39.6	CC 54.5
39.7–42.5	CC 59.4
42.6–45.0	CC 64.3
45.1–48.6	CC 68.5
48.7–51.2	CC 74.6
51.3–56.0	CC 81.5
56.1–60.1	CC 87.7
60.2–64.3	CC 94.0
64.4–68.9	CC 103.0
69.0–71.9	CC 112.0
72.0–75.4	CC 121.0
75.5–78.9	CC 132.0
79.0–82.1	CC 143.0
82.2–86.0	CC 156.0

Thermal Unit Table 69
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 or 2 T. U.	3 T. U.	
3.46–3.90	3.38–3.65	B 4.85
3.91–4.44	3.66–4.07	B 5.50
4.45–4.91	4.08–4.36	B 6.25
4.92–5.51	4.37–5.19	B 6.90
5.52–5.84	5.20–5.59	B 7.70
5.85–6.54	5.60–5.98	B 8.20
6.55–7.33	5.99–6.78	B 9.10
7.34–8.31	6.79–7.91	B 10.2
8.32–9.22	7.92–9.12	B 11.5
9.23–10.0	9.13–10.0	B 12.8
10.1–11.2	10.1–10.7	B 14.0
11.3–12.5	10.8–12.0	B 15.5
12.6–14.2	12.1–13.5	B 17.5
14.3–16.1	13.6–14.6	B 19.5
16.2–18.4	14.7–16.7	B 22.0
18.5–20.5	16.8–18.9	B 25.0
20.6–23.2	19.0–21.6	B 28.0
23.3–26.6	21.7–24.1	B 32.0
26.7–29.6	24.2–27.6	B 36.0
29.7–33.5	27.7–31.2	B 40.0
33.6–37.2	31.3–35.5	B 45.0
37.3–41.5	35.6–37.8	B 50.0
41.6–45.0	37.9–41.5	B 56.0
—	41.6–45.0	B 62.0

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Thermal Unit Table 72
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Motor FLC (A)		Thermal Unit Number
1 T. U.	3 T. U.	
2.38–2.62	2.38–2.62	FB 3.33
2.63–2.94	2.63–2.94	FB 3.71
2.95–3.31	2.95–3.31	FB 4.1
3.32–3.43	3.32–3.43	FB 4.5
3.44–3.81	3.44–3.81	FB 4.75
3.82–4.32	3.82–4.32	FB 5.3
4.33–4.75	4.33–4.75	FB 6.1
4.76–5.38	4.76–5.38	FB 6.75
5.39–5.75	5.39–5.75	FB 7.45
5.76–5.97	5.76–5.97	FB 7.8
5.98–6.30	5.98–6.30	FB 8.21
6.31–6.55	6.31–6.55	FB 8.6
6.56–6.89	6.56–6.89	FB 9.0
6.90–7.14	6.90–7.14	FB 9.5
7.15–7.36	7.15–7.36	FB 10.0
7.37–8.30	7.37–8.30	FB 10.6
8.31–8.59	8.31–8.59	FB 11.2
8.60–9.01	8.60–9.01	FB 12.1
9.02–9.68	9.02–9.68	FB 13.1
9.69–9.99	9.69–9.99	FB 13.9
10.0–10.9	10.0–10.9	FB 14.8
11.0–11.3	11.0–11.3	FB 15.6
11.4–12.4	11.4–12.0	FB 16.4
12.5–12.9	—	FB 17.6
13.0–14.0	—	FB 18.4
14.1–14.5	—	FB 19.4
14.6–15.7	—	FB 21.1
15.8–16.6	—	FB 22.6
16.7–18.0	—	FB 23.6
Following Selections for Size M–1 & M–1P Only.		
—	11.4–12.4	FB 16.4
—	12.5–12.9	FB 17.6
—	13.0–14.0	FB 18.4
—	14.1–14.5	FB 19.4
—	14.6–15.7	FB 21.1
—	15.8–16.6	FB 22.6
16.7–17.6	16.7–17.6	FB 23.6
17.7–18.3	17.7–18.3	FB 24.8
18.4–19.4	18.4–19.4	FB 26.7
19.5–20.5	19.5–20.5	FB 28.3
20.6–21.7	20.6–21.7	FB 29.6
21.8–22.8	21.8–22.8	FB 30.5
22.9–24.3	22.9–24.3	FB 32.5
24.4–24.7	24.4–24.7	FB 34.1
24.8–25.4	24.8–25.4	FB 35.0
25.5–26.0	25.5–26.0	FB 36.6
Following Selections for Size M–1P Only.		
26.1–27.7	—	FB 38.3
27.8–28.9	—	FB 40.2
29.0–30.6	—	FB 42.0
30.7–32.5	—	FB 44.0
32.6–36.0	—	FB 46.0

Thermal Unit Table 73
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T. U.	3 T. U.	
2.42–2.67	2.42–2.67	FB 3.33
2.68–3.00	2.68–3.00	FB 3.71
3.01–3.36	3.01–3.36	FB 4.1
3.37–3.53	3.37–3.53	FB 4.5
3.54–3.91	3.54–3.91	FB 4.75
3.92–4.41	3.92–4.41	FB 5.3
4.42–4.83	4.42–4.83	FB 6.1
4.84–5.45	4.84–5.45	FB 6.75
5.46–5.89	5.46–5.89	FB 7.45
5.90–6.04	5.90–6.04	FB 7.8
6.05–6.55	6.05–6.55	FB 8.21
6.56–6.72	6.56–6.72	FB 8.6
6.73–7.00	6.73–7.00	FB 9.0
7.01–7.39	7.01–7.39	FB 9.5
7.40–7.54	7.40–7.54	FB 10.0
7.55–8.41	7.55–8.41	FB 10.6
8.42–8.91	8.42–8.91	FB 11.2
8.92–9.16	8.92–9.16	FB 12.1
9.17–10.0	9.17–10.0	FB 13.1
10.1–10.3	10.1–10.3	FB 13.9
10.4–11.4	10.4–11.4	FB 14.8
11.5–11.8	11.5–11.8	FB 15.6
11.9–12.9	11.9–12.9	FB 16.4
13.0–13.4	—	FB 17.6
13.5–14.2	—	FB 18.4
14.3–15.1	—	FB 19.4
15.2–18.0	—	FB 21.1
Following Selections for Size M–1 & M–1P Only.		
—	11.5–11.8	FB 15.6
—	11.9–12.9	FB 16.4
—	13.0–13.4	FB 17.6
—	13.5–14.2	FB 18.4
—	14.3–15.1	FB 19.4
15.2–17.1	15.2–17.1	FB 21.1
17.2–18.0	17.2–18.0	FB 22.6
18.1–18.9	18.1–18.9	FB 23.6
19.0–19.7	19.0–19.7	FB 24.8
19.8–20.9	19.8–20.9	FB 26.7
21.0–21.9	21.0–21.9	FB 28.3
22.0–23.1	22.0–23.1	FB 29.6
23.2–24.3	23.2–24.3	FB 30.5
24.4–25.5	24.4–25.5	FB 32.6
25.6–26.0	25.6–26.0	FB 34.1
Following Selections for Size M–1P Only.		
26.1–26.8	—	FB 35.0
26.9–27.3	—	FB 36.6
27.4–28.7	—	FB 38.3
28.8–30.2	—	FB 40.2
30.3–31.9	—	FB 42.0
32.0–36.0	—	FB 44.0

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Thermal Unit Table 74
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Motor FLC (A)		Thermal Unit Number
1 T. U.	3 T. U.	
2.23–2.47 2.48–2.76 2.77–3.04	2.23–2.47 2.48–2.76 2.77–3.04	FB 3.33 FB 3.71 FB 4.1
3.05–3.24 3.25–3.61 3.62–4.19	3.05–3.24 3.25–3.61 3.62–4.19	FB 4.5 FB 4.75 FB 5.3
4.20–4.62 4.63–5.14 5.15–5.39	4.20–4.62 4.63–5.14 5.15–5.39	FB 6.1 FB 6.75 FB 7.45
5.40–5.69 5.70–5.99 6.00–6.29	5.40–5.69 5.70–5.99 6.00–6.29	FB 7.8 FB 8.21 FB 8.6
6.30–6.64 6.65–6.99 7.00–7.39	6.30–6.64 6.65–6.99 7.00–7.39	FB 9.0 FB 9.5 FB 10.0
7.40–7.79 7.80–7.94 7.95–8.49	7.40–7.79 7.80–7.94 7.95–8.49	FB 10.6 FB 11.2 FB 12.1
8.50–8.99 9.00–9.59 9.60–10.1	8.50–8.99 9.00–9.59 9.60–10.1	FB 13.1 FB 13.9 FB 14.8
10.2–10.6 10.7–11.3 11.4–12.0	10.2–10.6 10.7–11.3 11.4–12.0	FB 15.6 FB 16.4 FB 17.6
12.0–12.6 12.7–13.8 13.9–14.7	— — —	FB 18.4 FB 19.4 FB 21.1
14.8–15.2 15.3–16.2 16.3–18.0	— — —	FB 22.6 FB 23.6 FB 24.8
Following Selections for Size 1 Only.		
— — 13.9–14.7	12.0–12.6 12.7–13.8 13.9–14.7	FB 18.4 FB 19.4 FB 21.1
14.8–15.2 15.3–16.2 16.3–17.4	14.8–15.2 15.3–16.2 16.3–17.4	FB 22.6 FB 23.6 FB 24.8
17.5–18.5 18.6–19.6 19.7–20.2	17.5–18.5 18.6–19.6 19.7–20.2	FB 26.7 FB 28.3 FB 29.6
20.3–21.5 21.6–22.4 22.5–23.2	20.3–21.5 21.6–22.4 22.5–23.2	FB 30.5 FB 32.6 FB 34.1
23.3–24.3 24.4–25.4 25.5–26.0	23.3–24.3 24.4–25.4 25.5–26.0	FB 35.0 FB 36.6 FB 38.3

Thermal Unit Table 75
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
3.22–3.57 3.58–4.14 4.15–4.56	FB 4.75 FB 5.3 FB 6.1
4.57–5.10 5.11–5.39 5.40–5.64	FB 6.75 FB 7.45 FB 7.8
5.65–5.96 5.97–6.25 6.26–6.58	FB 8.21 FB 8.6 FB 9.0
6.59–6.91 6.92–7.41 7.42–7.82	FB 9.5 FB 10.0 FB 10.6
7.83–8.32 8.33–8.89 8.90–9.47	FB 11.2 FB 12.1 FB 13.1
9.48–10.0 10.1–10.5 10.6–11.1	FB 13.9 FB 14.8 FB 15.6
11.2–12.0 12.1–12.7 12.8–13.5	FB 16.4 FB 17.6 FB 18.4
13.6–14.6 14.7–15.7 15.8–16.5	FB 19.4 FB 21.1 FB 22.6
16.6–17.4 17.5–18.8 18.9–20.1	FB 23.6 FB 24.8 FB 26.7
20.2–21.0 21.1–21.6 21.7–23.3	FB 28.3 FB 29.6 FB 30.5
23.4–24.3 24.4–25.0 25.1–26.3	FB 32.6 FB 34.1 FB 35.0
26.4–27.6 27.7–29.1 29.2–30.4	FB 36.6 FB 38.3 FB 40.2
30.5–32.0 32.1–33.3 33.4–35.2	FB 42.0 FB 44.0 FB 46.0
35.3–37.0 37.1–38.5 38.6–40.7	FB 48.0 FB 50.5 FB 52.5
40.8–45.0	FB 55.5

Thermal Unit Table 76
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
19.9–20.8 20.9–22.2 22.3–23.8	FB 26.7 FB 28.3 FB 29.6
23.9–25.4 25.5–27.2 27.3–29.2	FB 30.5 FB 32.6 FB 34.1
29.3–31.9 32.0–33.8 33.9–36.1	FB 38.3 FB 40.2 FB 42.0
36.2–38.5 38.6–41.4 41.5–43.6	FB 44.0 FB 46.0 FB 48.0
43.7–45.9 46.0–48.2 48.3–50.7	FB 50.5 FB 52.5 FB 55.5
50.8–53.9 54.0–56.7 56.8–60.8	FB 58.0 FB 60.0 FB 63.5
60.9–67.6 67.7–73.6 73.7–82.9	FB 69.0 FB 77.0 FB 84.0
83.0–86.0	FB 92.0

Thermal Unit Table 77
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
48.0–50.9 51.0–53.7 53.8–57.0	FB 50.5 FB 52.5 FB 55.5
57.1–60.4 60.5–64.0 64.1–71.9	FB 58.0 FB 60.0 FB 63.5
72.0–83.9 84.0–93.1 93.2–104	FB 69.0 FB 77.0 FB 84.0
105–109 110–123 124–133	FB 92.0 FB 105.0 FB 115.0

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Thermal Unit Table 78
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T. U.	2 T. U. or 3 T. U.	
2.26–2.51 2.52–2.82 2.83–3.09	2.26–2.51 2.52–2.82 2.83–3.09	FB 3.33 FB 3.71 FB 4.1
3.10–3.30 3.31–3.69 3.70–4.27	3.10–3.30 3.31–3.69 3.70–4.27	FB 4.5 FB 4.75 FB 5.3
4.28–4.72 4.73–5.25 5.26–5.53	4.28–4.72 4.73–5.25 5.26–5.53	FB 6.1 FB 6.75 FB 7.45
5.54–5.81 5.82–6.14 6.15–6.44	5.54–5.81 5.82–6.14 6.15–6.44	FB 7.8 FB 8.21 FB 8.6
6.45–6.81 6.82–7.19 7.20–7.59	6.45–6.81 6.82–7.19 7.20–7.59	FB 9.0 FB 9.5 FB 10.0
7.60–7.99 8.00–8.17 8.18–8.74	7.60–7.99 8.00–8.17 8.18–8.74	FB 10.6 FB 11.2 FB 12.1
8.75–9.31 9.32–9.94 9.95–10.5	8.75–9.31 9.32–9.94 9.95–10.5	FB 13.1 FB 13.9 FB 14.8
10.6–11.1 11.2–11.9 12.0–12.4	10.6–11.1 11.2–12.0 —	FB 15.6 FB 16.4 FB 17.6
12.5–13.1 13.2–14.3 14.4–15.3	— — —	FB 18.4 FB 19.4 FB 21.1
15.4–15.9 16.0–18.0	— —	FB 22.6 FB 23.6
Following Selections for Size 1 Only.		
— — —	12.0–12.4 12.5–13.1 13.2–14.3	FB 17.6 FB 18.4 FB 19.4
14.4–15.3 15.4–15.9 16.0–16.9	14.4–15.3 15.4–15.9 16.0–16.9	FB 21.1 FB 22.6 FB 23.6
17.0–18.3 18.4–19.5 19.6–20.5	17.0–18.3 18.4–19.5 19.6–20.5	FB 24.8 FB 26.7 FB 28.3
20.6–21.1 21.2–22.6 22.7–23.7	20.6–21.1 21.2–22.6 22.7–23.7	FB 29.6 FB 30.5 FB 32.6
23.8–24.3 24.4–26.0	23.8–24.3 24.4–26.0	FB 35.0

Thermal Unit Table 79
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
3.31–3.67 3.68–4.23 4.24–4.69	FB 4.75 FB 5.3 FB 6.1
4.70–5.21 5.22–5.49 5.50–5.74	FB 6.75 FB 7.45 FB 7.8
5.75–6.07 6.08–6.35 6.36–6.71	FB 8.21 FB 8.6 FB 9.0
6.72–7.03 7.04–7.53 7.54–7.91	FB 9.5 FB 10.0 FB 10.6
7.92–8.53 8.54–9.14 9.15–9.71	FB 11.2 FB 12.1 FB 13.1
9.72–10.2 10.3–10.8 10.9–11.5	FB 13.9 FB 14.8 FB 15.6
11.6–12.3 12.4–13.0 13.1–13.9	FB 16.4 FB 17.6 FB 18.4
14.0–15.1 15.2–16.1 16.2–16.9	FB 19.4 FB 21.1 FB 22.6
17.0–17.9 18.0–19.4 19.5–20.7	FB 23.6 FB 24.8 FB 26.7
20.8–21.7 21.8–22.3 22.4–23.9	FB 28.3 FB 29.6 FB 30.5
24.0–25.1 25.2–25.9 26.0–27.1	FB 32.6 FB 34.1 FB 35.0
27.2–28.6 28.7–30.1 30.2–31.7	FB 36.6 FB 38.3 FB 40.2
31.8–33.3 33.4–34.5 34.6–36.5	FB 42.0 FB 44.0 FB 46.0
36.6–38.5 38.6–39.9 40.0–45.0	FB 48.0 FB 50.5 FB 52.5

Thermal Unit Table 80
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
20.5–21.7 21.8–23.1 23.2–24.8	FB 26.7 FB 28.3 FB 29.6
24.9–26.5 26.6–28.4 28.5–30.4	FB 30.5 FB 32.6 FB 34.1
30.5–32.8 32.9–34.9 35.0–37.3	FB 38.3 FB 40.2 FB 42.0
37.4–39.8 39.9–42.5 42.6–45.8	FB 44.0 FB 46.0 FB 48.0
45.9–48.2 48.3–50.6 50.7–53.1	FB 50.5 FB 52.5 FB 55.5
53.2–56.5 56.6–59.4 59.5–63.4	FB 58.0 FB 60.0 FB 63.5
63.5–71.0 71.1–78.8 78.9–86.0	FB 69.0 FB 77.0 FB 84.0

Thermal Unit Table 81
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
52.2–55.6 55.7–58.8 58.9–62.5	FB 50.5 FB 52.5 FB 55.5
62.6–66.0 66.1–70.1 70.2–78.6	FB 58.0 FB 60.0 FB 63.5
78.7–92.0 92.1–102 103–114	FB 69.0 FB 77.0 FB 84.0
115–123 124–133	FB 92.0 FB 105.0

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Thermal Unit Table 82
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Motor FLC (A)	Thermal Unit Number
2.36–2.63 2.64–2.96 2.97–3.23	FB 3.33 FB 3.71 FB 4.1
3.24–3.45 3.46–3.86 3.87–4.44	FB 4.5 FB 4.75 FB 5.3
4.45–4.95 4.96–5.47 5.48–5.75	FB 6.1 FB 6.75 FB 7.45
5.76–6.09 6.10–6.42 6.43–6.75	FB 7.8 FB 8.21 FB 8.6
6.76–7.16 7.17–7.43 7.44–7.99	FB 9.0 FB 9.5 FB 10.0
8.00–8.46 8.47–9.19 9.20–9.74	FB 10.6 FB 11.2 FB 12.1
9.75–10.3 10.4–10.8 10.9–11.6	FB 13.1 FB 13.9 FB 14.8
11.7–12.2 12.3–13.1 13.2–13.7	FB 15.6 FB 16.4 FB 17.6
13.8–14.3 14.4–15.5 15.6–16.7	FB 18.4 FB 19.4 FB 21.1
16.8–17.6 17.7–18.6 18.7–19.9	FB 22.6 FB 23.6 FB 24.8
20.0–21.1 21.2–25.0	FB 92.0 FB 105.0

Thermal Unit Table 83
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
2.30–2.60 2.61–2.87 2.88–3.17	FB 3.33 FB 3.71 FB 4.1
3.18–3.37 3.38–3.76 3.77–4.29	FB 4.5 FB 4.75 FB 5.3
4.30–4.75 4.76–5.26 5.27–5.51	FB 6.1 FB 6.75 FB 7.45
5.52–5.78 5.79–6.13 6.14–6.41	FB 7.8 FB 8.21 FB 8.6
6.42–6.75 6.76–7.09 7.10–7.57	FB 9.0 FB 9.5 FB 10.0
7.58–7.90 7.91–8.81 8.82–9.47	FB 10.6 FB 11.2 FB 12.1
9.48–10.0 10.1–10.7 10.8–11.4	FB 13.1 FB 13.9 FB 14.8
11.5–12.1 12.2–13.1 13.2–13.7	FB 15.6 FB 16.4 FB 17.6
13.8–14.7 14.8–16.0 16.1–17.3	FB 18.4 FB 19.4 FB 21.1
17.4–18.2 18.3–19.4 19.5–20.7	FB 22.6 FB 23.6 FB 24.8
20.8–22.3 22.4–23.5 23.6–24.2	FB 26.7 FB 28.3 FB 29.6
24.3–26.0	FB 30.5

Thermal Unit Table 84
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
3.38–3.78 3.79–4.37 4.38–4.87	FB 4.75 FB 5.3 FB 6.1
4.88–5.51 5.52–5.73 5.74–6.09	FB 6.75 FB 7.45 FB 7.8
6.10–6.44 6.45–6.75 6.76–7.15	FB 8.21 FB 8.6 FB 9.0
7.16–7.57 7.58–8.07 8.08–8.47	FB 9.5 FB 10.0 FB 10.6
8.48–8.81 8.82–9.46 9.47–10.1	FB 11.2 FB 12.1 FB 13.1
10.2–10.8 10.9–11.4 11.5–12.1	FB 13.9 FB 14.8 FB 15.6
12.2–13.1 13.2–13.8 13.9–14.8	FB 16.4 FB 17.6 FB 18.4
14.9–16.1 16.2–17.4 17.5–18.3	FB 19.4 FB 21.1 FB 22.6
18.4–19.5 19.6–21.0 21.1–22.5	FB 23.6 FB 24.8 FB 26.7
22.6–23.7 23.8–24.5 24.6–26.4	FB 28.3 FB 29.6 FB 30.5
26.5–27.7 27.8–28.7 28.8–29.9	FB 32.6 FB 34.1 FB 35.0
30.0–31.8 31.9–33.5 33.6–35.1	FB 36.6 FB 38.3 FB 40.2
35.2–37.1 37.2–38.8 38.9–41.1	FB 42.0 FB 44.0 FB 46.0
41.2–45.0	FB 48.0

Thermal Unit Table 85
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
42.9–45.4 45.6–48.3 48.4–52.4	FB 44.0 FB 46.0 FB 48.0
52.5–55.9 56.0–59.8 59.9–63.8	FB 50.5 FB 52.5 FB 55.5
63.9–67.9 68.0–72.6 72.7–83.2	FB 58.0 FB 60.0 FB 63.5
83.3–94.7 94.8–105 106–116	FB 69.0 FB 77.0 FB 84.0
117–121 122–133	FB 92.0 FB 105.0

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Thermal Unit Table 86
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
0.43–0.44	A .49
0.45–0.47	A .54
0.48–0.53	A .59
0.54–0.61	A .65
0.62–0.65	A .71
0.66–0.71	A .78
0.72–0.79	A .86
0.80–0.86	A .95
0.87–0.96	A 1.02
0.97–1.04	A 1.16
1.05–1.17	A 1.25
1.18–1.31	A 1.39
1.32–1.38	A 1.54
1.39–1.47	A 1.63
1.48–1.57	A 1.75
1.58–1.65	A 1.86
1.66–1.77	A 1.99
1.78–1.93	A 2.15
1.94–2.18	A 2.31
2.19–2.46	A 2.57
2.47–2.68	A 2.81
2.69–2.87	A 3.61
2.88–3.07	A 3.95
3.08–3.59	A 4.32
3.60–3.79	A 4.79
3.80–4.27	A 5.30
4.28–4.59	A 5.78
4.60–4.90	A 6.20
4.91–5.06	A 6.99
5.07–5.44	A 7.65
5.45–6.24	A 8.38
6.25–7.21	A 9.25
7.22–7.69	A 9.85
7.70–8.24	A 11.0
8.25–8.81	A 11.9
8.82–9.32	A 13.2
9.33–9.99	A 14.1
10.0–10.5	A 14.8
10.6–11.5	A 16.2
11.6–12.2	A 17.9
12.3–13.3	A 21.3
13.4–15.8	A 25.2
15.9–18.4	A 27.1
18.5–20.5	A 29.5
20.6–21.5	A 31.9
21.6–23.9	A 33.8
24.0–26.8	A 35.9
26.9–28.2	A 40.0
28.3–29.8	A 42.3
29.9–32.0	A 44.7

Thermal Unit Table 87
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
0.40–0.41	A .49
0.42–0.45	A .54
0.46–0.51	A .59
0.52–0.58	A .65
0.59–0.63	A .71
0.64–0.68	A .78
0.69–0.76	A .86
0.77–0.83	A .95
0.84–0.93	A 1.02
0.94–1.01	A 1.16
1.02–1.14	A 1.25
1.15–1.28	A 1.39
1.29–1.34	A 1.54
1.35–1.44	A 1.63
1.45–1.55	A 1.75
1.56–1.61	A 1.86
1.62–1.71	A 1.99
1.72–1.85	A 2.15
1.86–2.04	A 2.31
2.05–2.38	A 2.57
2.39–2.60	A 2.81
2.61–2.77	A 3.61
2.78–2.98	A 3.95
2.99–3.40	A 4.32
3.41–3.64	A 4.79
3.65–4.08	A 5.30
4.09–4.38	A 5.78
4.39–4.68	A 6.20
4.69–4.79	A 6.99
4.80–5.11	A 7.65
5.12–5.84	A 8.38
5.85–6.70	A 9.25
6.71–7.18	A 9.85
7.19–7.70	A 11.0
7.71–8.14	A 11.9
8.15–8.56	A 13.2
8.57–9.15	A 14.1
9.16–9.80	A 14.8
9.81–10.6	A 16.2
10.7–11.0	A 17.9

Thermal Unit Table 88
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
0.39–0.40	A .49
0.41–0.44	A .54
0.45–0.49	A .59
0.50–0.57	A .65
0.58–0.61	A .71
0.62–0.66	A .78
0.67–0.73	A .86
0.74–0.80	A .95
0.81–0.90	A 1.02
0.91–0.97	A 1.16
0.98–1.09	A 1.25
1.10–1.23	A 1.39
1.24–1.57	A 1.86
1.58–1.66	A 1.99
1.67–1.79	A 2.15
1.80–1.99	A 2.31
2.00–2.31	A 2.57
2.32–2.50	A 2.81
2.51–2.66	A 3.61
2.67–2.85	A 3.95
2.86–3.26	A 4.32
3.27–3.49	A 4.79
3.50–3.92	A 5.30
3.93–4.20	A 5.78
4.21–4.49	A 6.20
4.50–4.64	A 6.99
4.65–4.94	A 7.65
4.95–5.62	A 8.38
5.63–6.39	A 9.25
6.40–6.82	A 9.85
6.83–7.27	A 11.0
7.28–7.71	A 11.9
7.72–8.13	A 13.2
8.14–8.64	A 14.1
8.65–9.15	A 14.8
9.16–9.97	A 16.2
9.98–11.0	A 17.9

Thermal Unit Table 89
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
10.0–11.1	B 17.5
11.2–12.0	B 19.5
12.1–13.3	B 22.0
13.4–15.1	B 25.0
15.2–17.1	B 28.0
17.2–18.6	B 32.0
18.7–21.4	B 36.0
21.5–25.7	B 40.0
25.8–28.2	B 45.0
28.3–29.7	B 50.0
29.8–31.2	B 56.0
31.3–32.1	B 62.0
32.2–35.7	B 70.0
35.8–40.7	B 79.0
40.8–48.0	B 88.0

Thermal Unit Table 90
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
4.88–5.13	A 7.65
5.14–5.85	A 8.38
5.86–6.67	A 9.25
6.68–7.09	A 9.85
7.10–7.62	A 11.0
7.63–8.04	A 11.9
8.05–8.46	A 13.2
8.47–9.11	A 14.1
9.12–9.69	A 14.8
9.70–10.5	A 16.2
10.6–11.6	A 17.9
11.7–12.3	A 21.3
12.4–14.6	A 25.2
14.7–16.8	A 27.1
16.9–17.9	A 29.5
18.0–18.7	A 31.9
18.8–19.8	A 33.8
19.9–21.4	A 35.9
21.5–22.8	A 40.0
22.9–23.8	A 42.3
23.9–26.0	A 44.7

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Thermal Unit Table 91
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Motor FLC (A)	Thermal Unit Number
4.80–5.07	A 7.65
5.08–5.73	A 8.38
5.74–6.48	A 9.25
6.49–6.90	A 9.85
6.91–7.25	A 11.0
7.26–7.81	A 11.9
7.82–8.29	A 13.2
8.30–8.81	A 14.1
8.82–9.40	A 14.8
9.41–10.0	A 16.2
10.1–11.1	A 17.9
11.2–11.7	A 21.3
11.8–13.7	A 25.2
13.8–16.0	A 27.1
16.1–16.9	A 29.5
17.0–17.7	A 31.9
17.8–18.7	A 33.8
18.8–20.2	A 35.9
20.3–21.4	A 40.0
21.5–22.5	A 42.3
22.6–23.8	A 44.7
23.9–26.0	A 48.0

Thermal Unit Table 92
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
10.5–11.7	B 17.5
11.8–12.5	B 19.5
12.6–14.0	B 22.0
14.1–15.8	B 25.0
15.9–18.0	B 28.0
18.1–19.6	B 32.0
19.7–23.5	B 36.0
23.6–27.4	B 40.0
27.5–30.5	B 45.0
30.6–32.2	B 50.0
32.3–34.0	B 56.0
34.1–35.2	B 62.0
35.3–39.5	B 70.0
39.6–43.9	B 79.0
44.0–48.0	B 88.0

Thermal Unit Table 93
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
23.8–25.2	CC 36.4
25.3–26.8	CC 39.6
26.9–28.4	CC 42.7
28.5–30.3	CC 46.6
30.4–32.1	CC 50.1
32.2–34.2	CC 54.5
34.3–36.3	CC 59.4
36.4–40.2	CC 64.3
40.3–43.1	CC 68.5
43.2–45.9	CC 74.6
46.0–49.2	CC 81.5
49.3–51.6	CC 87.7
51.7–54.2	CC 94.0
54.3–55.7	CC 103.0
55.8–60.3	CC 112.0
60.4–63.5	CC 121.0
63.6–67.1	CC 132.0
67.2–70.3	CC 143.0
70.4–74.1	CC 156.0
74.2–78.3	CC 167.0
78.4–83.3	CC 180.0
83.4–86.0	CC 196.0

Thermal Unit Table 94
(index and instructions:page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
25.8–27.5	CC 36.4
27.6–29.4	CC 39.6
29.5–31.4	CC 42.7
31.5–33.2	CC 46.6
33.3–36.2	CC 50.1
36.3–38.8	CC 54.5
38.9–41.6	CC 59.4
41.7–44.7	CC 64.3
44.8–47.9	CC 68.5
48.0–50.9	CC 74.6
51.0–54.4	CC 81.5
54.5–57.4	CC 87.7
57.5–60.6	CC 94.0
60.7–63.9	CC 103.0
64.0–68.4	CC 112.0
68.5–73.4	CC 121.0
73.5–78.7	CC 132.0
78.8–83.8	CC 143.0
83.9–86.0	CC 156.0

Thermal Unit Table 95
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
42.5–44.7	CC 64.3
44.8–47.9	CC 68.5
48.0–51.2	CC 74.6
51.3–55.2	CC 81.5
55.3–59.4	CC 87.7
59.5–63.8	CC 94.0
63.9–68.8	CC 103.0
68.9–73.8	CC 112.0
73.9–77.7	CC 121.0
77.8–82.5	CC 132.0
82.6–86.6	CC 143.0
86.7–91.9	CC 156.0
92.0–97.2	CC 167.0
97.3–104	CC 180.0
105–114	CC 196.0
115–123	CC 208.0
124–150	CC 219.0

Thermal Unit Table 96
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
49.5–52.0	CC 64.3
52.1–54.8	CC 68.5
54.9–58.7	CC 74.6
58.8–63.3	CC 81.5
63.4–68.3	CC 87.7
68.4–73.6	CC 94.0
73.7–79.4	CC 103.0
79.5–85.5	CC 112.0
85.6–89.7	CC 121.0
89.8–94.8	CC 132.0
94.9–99.9	CC 143.0
100–105	CC 156.0
106–111	CC 167.0
112–126	CC 180.0
127–131	CC 196.0
132–141	CC 208.0
142–150	CC 219.0

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Thermal Unit Table 103
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Motor FLC (A)	Thermal Unit Number
40.8–45.5	B 1.03
45.6–49.9	B 1.16
51.0–57.5	B 1.30
57.6–65.9	B 1.45
66.0–73.1	B 1.67
73.2–81.5	B 1.88
81.6–92.3	B 2.10
92.4–104	B 2.40
105–114	B 2.65
115–128	B 3.00
129–140	B 3.30
141–160	B 3.70
161–193	B 4.15
194–209	B 4.85
210–232	B 5.50
233–248	B 6.25
249–266	B 6.90

Thermal Unit Table 104
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number	Max. Fuse Rating (A)	
0.65–0.73	B 1.03	1.50	
0.74–0.82	B 1.16	1.50	
0.93–0.91	B 1.30	1.60	
0.92–1.04	B 1.45	2.00	
1.05–1.16	B 1.67	2.00	
1.17–1.26	B 1.88	2.25	
1.27–1.47	B 2.10	2.60	
1.48–1.65	B 2.40	3.00	
1.66–1.89	B 2.65	3.50	
1.90–2.17	B 3.00	4.00	
2.18–2.49	B 3.30	4.50	
2.50–2.79	B 3.70	5.00	
2.80–3.13	B 4.15	5.60	
3.14–3.36	B 4.85	6.00	
3.37–3.69	B 5.50	7.00	
3.70–3.92	B 6.25	7.00	
3.93–4.42	B 6.90	8.00	
4.43–4.99	B 7.70	9.00	
5.00–5.27	B 8.20	10.0	
5.28–5.84	B 9.10	12.0	
5.85–6.61	B 10.2	12.0	
6.62–7.42	B 11.5	15.0	
7.43–8.02	B 12.8	15.0	
8.03–8.53	B 14.0	15.0	
8.54–9.34	B 15.5	17.5	
9.35–10.1	B 17.5	17.5	
10.2–10.8	B 19.5	20.0	
10.9–12.0	B 22.0	25.0	
12.1–13.0	B 25.0	25.0	
13.1–15.5	B 28.0	30.0	
		600 V Max.	250 V Max.
15.6–17.9	B 32.0	30	30
18.0–21.4	B 36.0	30	40
21.5–25.1	B 40.0	30	40
25.2–27.0	B 45.0	30	40

Thermal Unit Table 105
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
105–112	CC 74.6
113–122	CC 81.5
123–131	CC 87.7
132–142	CC 94.0
143–153	CC 103.0
154–157	CC 112.0
158–169	CC 121.0
170–181	CC 132.0
182–195	CC 143.0
196–209	CC 156.0
210–227	CC 167.0
228–247	CC 180.0
248–266	CC 196.0

Thermal Unit Table 109
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
0.56–0.63 0.64–0.68 0.69–0.77 0.78–0.85	B 0.81 B 0.92 B 1.03 B 1.16
0.86–0.97 0.98–1.09 1.10–1.21 1.22–1.33 1.34–1.53	B 1.30 B 1.45 B 1.67 B 1.88 B 2.10
1.54–1.73 1.74–1.89 1.90–2.17 2.18–2.53	B 2.40 B 2.65 B 3.00 B 3.30
2.54–2.87 2.88–3.22 3.23–3.49 3.50–3.85	B 3.70 B 4.15 B 4.85 B 5.50
3.86–4.11 4.12–4.70 4.71–5.21 5.22–5.53	B 6.25 B 6.90 B 7.70 B 8.20
5.54–6.17 6.18–7.02 7.03–7.92 7.93–8.61	B 9.10 B 10.2 B 11.5 B 12.8
8.62–9.17 9.18–10.0 10.1–11.0 11.1–11.8	B 14.0 B 15.5 B 17.5 B 19.5
11.9–13.5 13.6–15.3 15.4–17.4 17.5–19.4	B 22.0 B 25.0 B 28.0 B 32.0
19.5–22.2 22.3–25.1 25.2–27.0	B 36.0 B 40.0 B 45.0

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Thermal Unit Table 110
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Motor FLC (A)	Thermal Unit Number
3.94–4.45	B 6.90
4.46–4.97	B 7.70
4.98–5.28	B 8.20
5.29–5.97	B 9.10
5.98–6.89	B 10.2
6.90–7.92	B 11.5
7.93–8.71	B 12.8
8.72–9.27	B 14.0
9.28–10.2	B 15.5
10.3–11.4	B 17.5
11.5–12.3	B 19.5
12.4–13.9	B 22.0
14.0–15.8	B 25.0
15.9–17.9	B 28.0
18.0–19.9	B 32.0
20.0–22.8	B 36.0
22.9–25.4	B 40.0
25.5–28.9	B 45.0
29.0–30.8	B 50.0
30.9–32.5	B 56.0
32.6–34.9	B 62.0
35.0–39.7	B 70.0
39.8–44.7	B 79.0

Thermal Unit Table 111
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
14.0–14.9	CC 20.9
15.0–16.2	CC 22.8
16.3–17.2	CC 24.6
17.3–18.7	CC 26.3
18.8–20.2	CC 28.8
20.3–21.7	CC 31.0
21.8–23.3	CC 33.3
23.4–25.2	CC 36.4
25.3–27.1	CC 39.6
27.2–29.4	CC 42.7
29.5–31.6	CC 46.6
31.7–34.0	CC 50.1
34.1–36.8	CC 54.5
36.9–39.8	CC 59.4
39.9–42.3	CC 64.3
42.4–45.7	CC 68.5
45.8–49.2	CC 74.6
49.3–52.8	CC 81.5
52.9–56.8	CC 87.7
56.9–61.2	CC 94.0
61.3–66.1	CC 103.0
66.2–71.2	CC 112.0
71.3–76.7	CC 121.0
76.8–82.9	CC 132.0
83.0–90.0	CC 143.0

Thermal Unit Table 112
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
44.0–46.8	CC 64.3
46.9–50.6	CC 68.5
50.7–54.5	CC 74.6
54.6–58.4	CC 81.5
58.5–62.9	CC 87.7
63.0–67.7	CC 94.0
67.8–72.9	CC 103.0
73.0–78.1	CC 112.0
78.2–83.9	CC 121.0
84.0–91.1	CC 132.0
91.2–97.5	CC 143.0
97.6–104	CC 156.0
105–113	CC 167.0
114–133	CC 180.0

Thermal Unit Table 113
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
88.2–95.1	DD 112.0
95.2–101	DD 121.0
102–111	DD 128.0
112–119	DD 140.0
120–131	DD 150.0
132–149	DD 160.0
150–170	DD 185.0
171–180	DD 220.0
181–197	DD 240.0
198–204	DD 250.0
205–213	DD 265.0
214–237	DD 280.0
238–243	DD 300.0
244–266	DD 320.0

Thermal Unit Table 114
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
133–148	B 1.30
149–174	B 1.45
175–195	B 1.67
196–219	B 1.88
220–239	B 2.10
240–271	B 2.40
272–308	B 2.65
309–348	B 3.00
349–397	B 3.30
398–429	B 3.70
430–495	B 4.15
496–520	B 4.85

Thermal Unit Table 115
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
176–190	DD 112.0
191–203	DD 121.0
203–223	DD 128.0
224–239	DD 140.0
240–253	DD 150.0
254–299	DD 160.0
300–341	DD 185.0
342–361	DD 220.0
362–395	DD 240.0
396–409	DD 250.0
410–427	DD 265.0
428–475	DD 289.0
476–487	DD 300.0
488–532	DD 320.0

Thermal Unit Table 116
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A))	Thermal Unit Number
81.6–91.1	B 1.03
91.2–101	B 1.16
102–115	B 1.30
116–131	B 1.45
132–146	B 1.67
147–163	B 1.88
164–184	B 2.10
185–209	B 2.40
210–229	B 2.65
230–257	B 3.00
258–281	B 3.30
282–321	B 3.70
322–387	B 4.15
388–419	B 4.35
420–465	B 5.60
466–497	B 6.25
496–532	B 6.90

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Thermal Unit Table 127
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
1.12–1.27	B 0.81
1.28–1.37	B 0.92
1.38–1.55	B 1.03
1.56–1.71	B 1.16
1.72–1.95	B 1.30
1.96–2.19	B 1.45
2.20–2.43	B 1.67
2.44–2.67	B 1.88
2.68–3.07	B 2.10
3.08–3.47	B 2.40
3.48–3.79	B 2.65
3.80–4.35	B 3.00
4.36–5.07	B 3.30
5.08–5.75	B 3.70
5.76–6.45	B 4.15
6.46–6.99	B 4.85
7.00–7.71	B 5.50
7.72–8.23	B 6.25
8.24–9.41	B 6.90
9.42–10.43	B 7.70
10.44–11.07	B 8.20
11.08–12.35	B 9.10
12.36–14.05	B 10.2
14.06–15.85	B 11.5
15.86–17.23	B 12.8
17.24–18.35	B 14.0
18.36–20.1	B 15.5
20.2–22.1	B 17.5
22.2–23.7	B 19.5
23.8–27.1	B 22.0
27.2–30.7	B 25.0
30.8–34.9	B 28.0
35.0–38.9	B 32.0
39.0–44.5	B 36.0
44.6–50.3	B 40.0
50.4–54.0	B 45.0

Thermal Unit Table 128
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
7.88–8.91	B 6.90
8.92–9.95	B 7.70
9.96–10.57	B 8.20
10.58–11.95	B 9.10
11.96–13.79	B 10.2
13.80–15.85	B 11.5
15.86–17.43	B 12.8
17.44–18.55	B 14.0
18.56–20.5	B 15.5
20.6–22.9	B 17.5
23.0–24.7	B 19.5
24.8–27.9	B 22.0
28.0–31.7	B 25.0
31.8–35.9	B 28.0
36.0–39.9	B 32.0
40.0–45.7	B 36.0
45.8–50.9	B 40.0
51.0–61.7	B 45.0
61.8–65.1	B 50.0
65.2–69.9	B 56.0
70.0–79.5	B 62.0
79.6–89.4	B 70.0

Thermal Unit Table 129
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
28.0–29.9	CC 20.9
30.0–32.5	CC 22.8
32.6–34.5	CC 24.6
34.6–37.5	CC 26.3
37.6–40.5	CC 28.8
40.6–43.5	CC 31.0
43.6–46.7	CC 33.3
46.8–50.5	CC 36.4
50.6–54.3	CC 39.6
54.4–58.9	CC 42.7
59.0–63.3	CC 46.6
63.4–68.1	CC 50.1
68.2–73.7	CC 54.5
73.8–79.7	CC 59.4
79.8–84.7	CC 64.5
84.8–91.5	CC 68.5
91.6–98.5	CC 74.6
98.6–105.7	CC 81.5
105.8–113.7	CC 87.7
113.8–122.5	CC 94.0
122.6–132.3	CC 103.0
132.4–142.5	CC 112.0
142.6–153.5	CC 121.0
153.6–165.9	CC 132.0
166.0–180.0	CC 143.0

Thermal Unit Table 133
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
4.60–5.23	B 6.90
5.24–5.86	B 7.70
5.87–6.25	B 8.20
6.26–7.09	B 9.10
7.10–8.25	B 10.2
8.26–9.49	B 11.5
9.50–10.3	B 12.8
10.4–11.2	B 14.0
11.3–12.5	B 15.5
12.6–13.8	B 17.5
13.9–15.0	B 19.5
15.1–16.9	B 22.0
17.0–19.1	B 25.0
19.2–22.0	B 28.0
22.1–24.4	B 32.0
24.5–28.0	B 36.0
28.1–31.8	B 40.0
31.9–36.0	B 45.0
36.1–38.5	B 50.0
38.6–41.2	B 56.0
41.3–44.4	B 62.0
44.5–50.3	B 70.0
50.4–56.9	B 79.0
57.0–59.0	B 88.0

Thermal Unit Table 134
(index and instructions:page 16-130 to page 16-134)

Motor FLC (A)	Thermal Unit Number
4.30–4.98	B 6.90
4.99–5.57	B 7.70
5.58–5.94	B 8.20
5.95–6.71	B 9.10
6.72–7.79	B 10.2
7.80–8.93	B 11.5
8.94–9.77	B 12.8
9.78–10.5	B 14.0
10.6–11.7	B 15.5
11.8–13.0	B 17.5
13.1–14.0	B 19.5
14.1–15.0	B 22.0
15.1–17.2	B 25.0
17.3–19.9	B 28.0
20.0–22.3	B 32.0
22.4–26.0	B 36.0
26.1–29.8	B 40.0
29.9–34.0	B 45.0
34.1–36.7	B 50.0
36.8–39.5	B 56.0
39.6–42.1	B 62.0
42.2–46.6	B 70.0
46.7–51.5	B 79.0
51.6–54.0	B 88.0

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Thermal Unit Table 135
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T. U.	3 T. U.	
0.77–0.88	0.85–0.95	B 1.30
0.89–1.02	0.96–1.09	B 1.45
1.03–1.19	1.10–1.21	B 1.67
1.20–1.37	1.22–1.35	B 1.88
1.38–1.62	1.36–1.56	B 2.10
1.63–1.90	1.57–1.76	B 2.40
1.91–2.12	1.77–1.94	B 2.65
2.13–2.46	1.95–2.22	B 3.00
2.47–2.83	2.23–2.57	B 3.30
2.84–3.19	2.58–2.87	B 3.70
3.20–3.61	2.88–3.21	B 4.15
3.62–3.89	3.22–3.50	B 4.85
3.90–4.32	3.51–3.79	B 5.50
4.33–4.57	3.80–4.04	B 6.25
4.58–5.19	4.05–4.53	B 6.90
5.20–5.79	4.54–5.03	B 7.70
5.80–6.16	5.04–5.36	B 8.20
6.17–6.94	5.37–5.97	B 9.10
6.95–7.99	5.98–6.89	B 10.2
7.80–8.99	6.90–7.79	B 11.5
9.00–9.98	7.80–8.53	B 12.8
9.99–10.6	8.54–9.09	B 14.0
10.7–11.6	9.10–9.99	B 15.5
11.7–13.1	10.0–10.9	B 17.5
13.2–14.2	11.0–11.7	B 19.5
14.3–15.4	11.8–13.4	B 22.0
15.5–17.6	13.5–15.4	B 25.0
17.7–20.0	15.5–17.9	B 28.0
–	18.0–20.0	B 32.0
For Type DPSG12 & DPSG13, 20 A Starter. Select Thermal Units from above.		
20.1–22.7	18.0–20.2	B 32.0
22.8–25.0	20.3–23.2	B 36.0
–	23.3–25.0	B 40.0
For Type DPSG22 & DPSG23, 25 A Starter. Select any of the Thermal Units from above.		
22.8–26.1	–	B 36.0
26.2–29.6	23.3–25.8	B 40.0
29.7–30.0	25.9–28.6	B 45.0
For Type DPSG32 & DPSG33, 30 A Starter. Select any of the Thermal Units from above.		

Thermal Unit Table 136
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T. U.	3 T. U.	
0.98–1.09	0.88–0.98	B 1.30
1.10–1.24	0.99–1.13	B 1.45
1.25–1.41	1.14–1.26	B 1.67
1.42–1.59	1.27–1.38	B 1.88
1.60–1.81	1.39–1.62	B 2.10
1.82–2.04	1.63–1.82	B 2.40
2.05–2.19	1.83–2.04	B 2.65
2.20–2.52	2.05–2.36	B 3.00
2.53–2.90	2.37–2.72	B 3.30
2.91–3.29	2.73–3.07	B 3.70
3.30–3.69	3.08–3.44	B 4.15
3.70–3.99	3.45–3.69	B 4.85
4.00–4.42	3.70–4.11	B 5.50
4.43–4.69	4.12–4.34	B 6.25
4.70–5.37	4.35–4.89	B 6.90
5.38–5.94	4.90–5.44	B 7.70
5.95–6.34	5.45–5.80	B 8.20
6.35–7.05	5.81–6.47	B 9.10
7.06–8.14	6.48–7.45	B 10.2
8.15–9.39	7.46–8.49	B 11.5
9.40–10.3	8.50–9.29	B 12.8
10.4–11.1	9.30–9.99	B 14.0
11.2–12.2	10.0–10.8	B 15.5
12.3–13.5	10.9–12.1	B 17.5
13.6–14.7	12.2–13.1	B 19.5
14.8–16.1	13.2–14.6	B 22.0
16.2–18.3	14.7–16.4	B 25.0
18.4–20.0	16.5–18.9	B 28.0
–	19.0–20.0	B 32.0
For Type DPSO12 & DPSO13, 20 A Starter. Select Thermal Units from above.		
18.4–20.9	–	B 28.0
21.0–23.6	19.0–20.9	B 32.0
23.7–25.0	21.0–24.1	B 36.0
–	24.2–25.0	B 40.0
For Type DPSO22 & DPSO23, 25 A Starter. Select any of the Thermal Units from above.		
23.7–27.2	–	B 36.0
27.3–30.0	24.2–27.2	B 40.0
	27.3–30.0	B 45.0
For Type DPSO32 & DPSO33, 30 A Starter. Select any of the Thermal Units from above.		

Thermal Unit Table 145
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T.U.	3 T.U.	
1.00–1.11	0.91–1.02	B1.30
1.12–1.27	1.03–1.15	B1.45
1.28–1.36	1.16–1.27	B1.67
1.37–1.53	1.28–1.39	B1.88
1.54–1.78	1.40–1.61	B2.10
1.79–2.02	1.62–1.84	B2.40
2.03–2.20	1.85–2.03	B2.65
2.21–2.52	2.04–2.34	B3.00
2.53–2.94	2.35–2.69	B3.30
2.95–3.30	2.70–3.02	B3.70
3.31–3.70	3.03–3.39	B4.15
3.71–4.02	3.40–3.65	B4.85
4.03–4.46	3.66–4.04	B5.50
4.47–4.69	4.05–4.28	B6.25
4.70–5.37	4.29–4.85	B6.90
5.38–5.94	4.86–5.38	B7.70
5.95–6.34	5.39–5.71	B8.20
6.35–7.09	5.72–6.39	B9.10
7.10–8.46	6.40–7.53	B10.2
8.47–9.32	7.54–8.34	B11.5
9.33–10.2	8.35–9.14	B12.8
10.3–10.9	9.15–9.74	B14.0
11.0–12.1	9.75–10.7	B15.5
12.2–13.4	10.8–11.8	B17.5
13.5–14.2	11.9–12.2	B19.5
14.3–16.0	12.3–14.4	B22.0
16.1–18.1	14.5–16.4	B25.0
18.2–20.5	16.5–18.9	B28.0
20.6–23.5	19.0–21.3	B32.0
23.6–27.2	21.4–23.3	B36.0
27.3–30.8	23.4–27.9	B40.0
30.9–35.0	28.0–31.4	B45.0
35.1–37.2		B50.0
37.3–40.0		B56.0
For Type DPSG42 & DPSG43, 40 A Starter. Select any of the Thermal Units from above.		

Thermal Unit Table 146
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T.U.	3 T.U.	
3.90–4.22	3.60–3.89	B5.50
4.23–4.49	3.90–4.15	B6.25
4.50–5.14	4.16–4.76	B6.90
5.15–5.78	4.77–5.30	B7.70
5.79–6.23	5.31–5.70	B8.20
6.24–7.03	5.71–6.46	B9.10
7.04–8.23	6.47–7.65	B10.2
8.24–9.31	7.66–8.55	B11.5
9.32–10.1	8.56–9.36	B12.8
10.2–10.7	9.37–9.9	B14.0
10.8–11.9	10.0–10.9	B15.5
12.0–13.1	11.0–12.0	B17.5
13.2–13.9	12.1–12.8	B19.5
14.0–15.9	12.9–14.2	B22.0
16.0–18.0	14.3–16.0	B25.0
18.1–20.8	16.1–18.5	B28.0
20.9–23.1	18.6–21.2	B32.0
23.2–26.9	21.3–24.9	B36.0
27.0–31.4	25.0–28.0	B40.0
31.5–36.0	28.1–31.7	B45.0
36.1–38.8	31.8–34.6	B50.0
38.9–41.7	34.7–37.4	B56.0
41.8–46.3	37.5–40.0	B62.0
46.4–50.0	40.1–46.4	B70.0
—	46.5–50.0	B79.0
For Type DPSG52 & DPSG53, 50 A Starter. Select any of the Thermal Units from above.		

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Thermal Unit Table 147
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Motor FLC (A)		Thermal Unit Number
1 T.U.	3 T.U.	
1.04–1.14	0.93–1.04	B1.30
1.15–1.29	1.05–1.18	B1.45
1.30–1.43	1.19–1.33	B1.67
1.44–1.56	1.34–1.43	B1.88
1.57–1.79	1.44–1.67	B2.10
1.80–2.03	1.68–1.88	B2.40
2.04–2.26	1.89–2.09	B2.65
2.27–2.51	2.10–2.41	B3.00
2.52–3.03	2.42–2.79	B3.30
3.04–3.31	2.80–3.15	B3.70
3.32–3.73	3.16–3.54	B4.15
3.74–4.07	3.55–3.75	B4.85
4.08–4.49	3.76–4.22	B5.50
4.50–4.76	4.23–4.46	B5.25
4.77–5.44	4.47–5.09	B6.90
5.45–6.04	5.10–5.61	B7.70
6.05–6.46	5.62–5.99	B8.20
6.47–7.24	6.00–6.70	B9.10
7.25–8.64	6.71–8.19	B10.20
8.65–9.59	8.20–8.79	B11.5
9.60–10.5	8.80–9.66	B12.8
10.6–11.3	9.67–10.2	B14.0
11.4–12.6	10.3–11.4	B15.5
12.7–13.9	11.5–12.6	B17.5
14.0–14.9	12.7–13.5	B19.5
15.0–16.5	13.6–15.1	B22.0
16.6–18.9	15.2–17.2	B25.0
19.0–22.2	17.3–19.9	B28.0
22.3–24.6	20.0–22.5	B32.0
24.7–28.6	22.6–26.2	B36.0
28.7–32.4	26.3–29.9	B40.0
32.5–37.3		B45.0
37.4–39.5		B50.0
39.6–40.0		B56.0

For Type DPSO42 & DPSO43, 40 A Starter.
Select any of the Thermal Units from above.

Thermal Unit Table 148
(index and instructions: page 16-130 to page 16-134)

Motor FLC (A)		Thermal Unit Number
1 T.U.	3 T.U.	
4.14–4.45	3.70–4.09	B5.50
4.46–4.88	4.10–4.35	B6.25
4.89–5.44	4.36–5.07	B6.90
5.45–6.08	5.08–5.79	B7.70
6.09–6.42	5.80–6.27	B8.20
6.43–7.28	6.28–7.16	B9.10
7.29–8.42	7.17–8.58	B10.2
8.43–9.64	8.59–9.55	B11.5
9.65–10.4	9.56–10.2	B12.8
10.5–11.2	10.3–10.9	B14.0
11.3–12.3	11.0–11.9	B15.5
12.4–13.7	12.0–13.1	B17.5
13.8–14.8	13.2–14.0	B19.5
14.9–16.5	14.1–14.8	B22.0
16.6–18.7	14.9–17.0	B25.0
18.8–21.4	17.1–19.6	B28.0
21.5–24.3	19.7–22.1	B32.0
24.4–28.0	22.2–26.0	B36.0
28.1–33.3	26.1–29.4	B40.0
33.4–37.6	29.5–34.0	B45.0
37.7–41.1	34.1–36.4	B50.0
41.2–44.1	36.5–39.2	B56.0
44.2–47.8	39.3–42.4	B62.0
47.9–50.0	42.5–49.3	B70.0
—	49.4–50.0	B79.0

For Type DPSO52 & DPSO53, 50 A Starter.
Select any of the Thermal Units from above.

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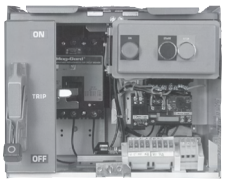
Section 17

Motor Control Centers



Model 6 Unit

Model 6 Motor Control Center

Structure and Unit Features 17-2

Features, Merchandised Units 17-2
- Model 6 Structure Features 17-2
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Combination Starters 17-5

Combination Starter Units 17-5
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- Combination Starter Units with Fusible Switch Disconnects 17-6
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Model 6 MCC 17-8

Branch Feeder Units Catalog Numbering System 17-8
- Branch Feeder Units Catalog Numbering System 17-8
- Model 6 Blank Doors 17-8

Overview

Designed and manufactured to tackle the toughest power and process control challenges, the Model 6 Motor Control Center features industry-finest innovations that provide unmatched performance, high reliability, and low maintenance. The Model 6 Motor Control Center has integrated industry-leading components into the smallest and most flexible footprint possible to meet your power, control, and automation needs. The Model 6 offers superior quality, increased uptime, and features that improve the protection of your personnel and facility from electrical safety hazards.

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Model 6 Structure Features

- Horizontal main bus uses captive splice bar assembly; allows splicing without removing units
- Horizontal bus is located at the top of the structure for easy installation, inspection and maintenance
- Available ampacity 600 A, 800 A, 1200 A, 2000 A, and 2500 A
- Sliding non-conductive horizontal bus barrier
- 300 A, 600 A, and 1200 A vertical bus
- Vertical bus openings on 3-inch centers
- Optional automatic vertical bus shutters are available
- Base mounting channel includes lever notches for ease of alignment
- Full depth vertical wireway available, either 4-inch or 9-inch width
- Vertical ground bus is standard

Model 6 Arc Resistant

The Model 6 Arc Resistant Enclosure provides reliable arc flash containment through passive technology and design and has been witnessed and verified by UL for design and performance to the ANSI/IEEE C37.20.7 standard. Most of the standard offer configurations and units are available, making the Model 6 Arc Resistant MCC the industry's most complete offer.

Certification and Validation:

- Tested and certified performance to the industry's Arc Resistant Standard (ANSI/IEEE C37.20.7)
- Internal arc testing validated and witnessed by UL
- Industry's highest MCC arc duration rating of 100 milliseconds (6 Cycles)

Technical Specifications and Highlights:

- Up to 65 kA at 600 VAC Rated
- Accessibility Type 2A
- Main bus up to 2000 A amps
- Optional insulated bus (Epoxy or Heat Shrink)
- Optional automatic bus shutters
- Optional exhaust plenums
- Reinforced enclosure: 12 gage steel doors and covers, additional fasteners and hinges
- Reinforced frame with additional internal supports
- Pathways inside the enclosure manage arc by-products and pressure
- iMCC remote monitoring and controlling
- Masterpact type LF (designed to limit arc energy) circuit breakers are available in upstream gear

Model 6 Motor Control Center

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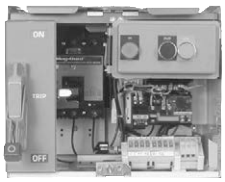

Model 6

Model 6 Unit Features

- Cast metal handle, color coded for clear indication of disconnect position (including “Tripped”)
- Twin-handle cam mechanism standard on all plug-on units (except Compac™ 6)
- Rugged unit construction features solid rear sides and hinged bottom plates
- Forward tilted pull-apart control terminal blocks standard with NEMA Type B or C wiring
- Starter units available with Class 8536 Type S NEMA or D-Line IEC
- Available overload relays on starter include: melting alloy, bimetallic, Motor Logic™ , and TeSys T™
- Control station plate for pilot devices is mounted on front of unit
- Easily accessible control transformer
- Starter mounted on right-hand side of unit, adjacent to wireway, for ease of cable termination

Table 17.1: Available units include:

- Automation equipment
- Altivar™ AC drives
- Altistart™ soft starts
- Surge Protection Device (SPD) units
- PowerLogic™ circuit monitor and power meter
- Compac 6 starters and branch feeders
- Reduced voltage starters
- Distribution transformers and panelboards
- Empty mounting units
- Masterpact™ drawout main circuit breakers
- Master terminal compartments
- Automatic transfer switches
- Full voltage non-reversing
- Full voltage reversing
- Circuit breaker branch feeders
- Fusible switch branch feeders
- Full voltage 2-speed
- Programmable logic controllers
- Incoming devices
- Tie breakers

Intelligent Motor Control Center—Model 6 iMCC

Maximize customer value with the industry’s most comprehensive energy and asset management capabilities.

Standard Architectures

SIMPLE, standardized network designs create consistency and familiarity, reduce changes, accelerate startup and commissioning, and ultimately drive efficiency in existing operations and future expansions.

Reduced Lead Times

FASTER quotations, drawings, pricing, submittals, and manufacturing allow for shorter cycle times and increased flexibility to make changes later in the project as designs mature and requirements change.

Ethernet Communications

OPEN protocols in Modbus™ TCP and EtherNet/IP eliminate expensive proprietary software, hardware, and services. Both protocols provide the speed, reliability, and network services to easily and efficiently manage the entire network. Ethernet-based networks easily integrate with business systems for management across the enterprise.

Integrated Wonderware Solution

COMPLETE Wonderware solution allows the end user to perform comprehensive asset and energy management through simple, organized, and role-based screens. Power and process data can be viewed in real time or in trended report, which increases user awareness and delivers actionable data. Local or remote configuration, monitoring, and control provides optimal flexibility. Maximizing uptime, slashing troubleshooting, and delivering true predictive maintenance strategies become a reality with all the right information at the right time. Seamless integration into enterprise-level Invensys-based SCADA/DCS systems will save countless hours of unnecessary programming, engineering, and troubleshooting during both startup and operation.

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Merchandised Units (shipment in as low as 3 days)

Model 6 Industrial Package units (white) are available for ordering by catalog number. A listing of types available by quick shipment may be found on the following pages. This limited offering includes popular combinations of types and options. Catalog numbers consist of class number (8998), disconnect and device types, horsepower or ampacity ratings and options (for example, 8998SBA001XFTMA). See table below. All units are UL Listed.

Combination Starter Units Catalog Numbering System

Units rated as follows:

- Model 6 Industrial Package, 480 V, 60 Hz, NEMA 12 enclosure
- Type 1B wiring, 100,000 AIR rating, 1 N.O./1 N.C. auxiliary interlock on each contactor

Table 17.2: Numbering System *[1]*

First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth
8998	S	B	A	005	A	FT	MA
Class	**Type**	**Disconnect**	**Device**	**Motor Hp**	**Pilot Device Function**	**Control Power**	**Overload Relay**
8998	S- Standard Size H- High Density (Compac 6)*[2]*	B- Circuit Breaker (PowerPact™ MCP) F- Fusible (Class R except Compac 6 Class J)	A-FVNR C-FVR*[3]*	001=1 hp 002=2 hp 003=3 hp 005=5 hp 007=7.5 hp 010=10 hp 015=15 hp*[3]* 025=25 hp*[3]* 040=40 hp*[3]* 050=50 hp*[3]* 060=60 hp*[3]* 075=75 hp*[3]* 100=100 hp*[3]*	X=None A=Start-Stop PB, On/Off Lights*[4]* C=HOA Sel.Switch, On/Off Lights*[2]*	FT- 480-120 V CPT*[5]* FS- 120 V Fused Separate Ctl w/intlk	MA-Melting Alloy (Thermal Units not Included) SS-Motor Logic SSOL

NOTE: For more information, contact your nearest Schneider Electric sales office.

[1] Complete Model 6 Motor Control Centers are available from the factory.
[2] Not available with FVR
[3] Not available with Compac 6
[4] Includes forward, reverse and stop push-buttons; and forward and reverse pilot lights with FVR starters
[5] Includes extra 50 VA CPT on Sz 1 FVNR (T1)

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Combination Starters Units with Motor Circuit Protector Disconnects

Model 6 NEMA-rated FVNR combination starter units use PowerPact™ Motor Circuit Protectors.

Ratings: 480 V, NEMA 12, Type 1B-D wiring, 100,000 AIR. Units include 1 N.O./1 N.C. auxiliary contacts. Units with pilot devices use 22 mm type. Units without pilot devices include a station plate with knockouts for five 22 mm devices.

Thermal units are not included with melting alloy overloads.

Table 17.3: FVNR Combination Starter Units with Motor Circuit Protector Disconnects

Ratings			Control Transformer			Fused Separate Control		
			No Pilot Devices	Start-Stop PB, Red On/Green Off Lights	HOA Red On/Green Off Lights	No Pilot Devices	Start-Stop PB, Red On/Green Off Lights	HOA Red On/Green Off Lights
NEMA Size	Hp	Space (IN)	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
Full Voltage Non-Reversing (FVNR) Starters With Motor Circuit Protector Disconnect and Melting Alloy Overload Relay								
1	1	12	SBA001XFTMA	SBA001AFTMA	SBA001CFTMA	SBA001XFSMA	SBA001AFSMA	SBA001CFSMA
	2		SBA002XFTMA	SBA002AFTMA	SBA002CFTMA	SBA002XFSMA	SBA002AFSMA	SBA002CFSMA
	3		SBA003XFTMA	SBA003AFTMA	SBA003CFTMA	SBA003XFSMA	BA003AFSMA	SBA003CFSMA
	5		SBA005XFTMA	SBA005AFTMA	SBA005CFTMA	SBA005XFSMA	SBA005AFSMA	SBA005CFSMA
	7.5		SBA007XFTMA	SBA007AFTMA	SBA007CFTMA	SBA007XFSMA	SBA007AFSMA	SBA007CFSMA
	10		SBA010XFTMA	SBA010AFTMA	SBA010CFTMA	SBA010XFSMA	SBA010AFSMA	SBA010CFSMA
2	15	12	SBA015XFTMA	SBA015AFTMA	SBA015CFTMA	SBA015XFSMA	SBA015AFSMA	SBA015CFSMA
	25		SBA025XFTMA	SBA025AFTMA	SBA025CFTMA	SBA025XFSMA	SBA025AFSMA	SBA025CFSMA
3	40	18	SBA040XFTMA	SBA040AFTMA	SBA040CFTMA	SBA040XFSMA	SBA040AFSMA	SBA040CFSMA
	50		SBA050XFTMA	SBA050AFTMA	SBA050CFTMA	SBA050XFSMA	SBA050AFSMA	SBA050CFSMA
4	60	21	SBA060XFTMA	SBA060AFTMA	SBA060CFTMA	SBA060XFSMA	SBA060AFSMA	SBA060CFSMA
	75		SBA075XFTMA	SBA075AFTMA	SBA075CFTMA	SBA075XFSMA	SBA075AFSMA	SBA075CFSMA
	100		SBA100XFTMA	SBA100AFTMA	SBA100CFTMA	SBA100XFSMA	SBA100AFSMA	SBA100CFSMA
Full Voltage Non-Reversing (FVNR) Starters With Motor Circuit Protector Disconnect and Solid State Overload Relay (Motor Logic™)								
1	1	12	SBA001XFTSS	SBA001AFTSS	SBA001CFTSS	SBA001XFSSS	SBA001AFSSS	SBA001CFSSS
	2		SBA002XFTSS	SBA002AFTSS	SBA002CFTSS	SBA002XFSSS	SBA002AFSSS	SBA002CFSSS
	3		SBA003XFTSS	SBA003AFTSS	SBA003CFTSS	SBA003XFSSS	SBA003AFSSS	SBA003CFSSS
	5		SBA005XFTSS	SBA005AFTSS	SBA005CFTSS	SBA005XFSSS	SBA005AFSSS	SBA005CFSSS
	7.5		SBA007XFTSS	SBA007AFTSS	SBA007CFTSS	SBA007XFSSS	SBA007AFSSS	SBA007CFSSS
	10		SBA010XFTSS	SBA010AFTSS	SBA010CFTSS	SBA010XFSSS	SBA010AFSSS	SBA010CFSSS
2	15	12	SBA015XFTSS	SBA015AFTSS	SBA015CFTSS	SBA015XFSSS	SBA015AFSSS	SBA015CFSSS
	25		SBA025XFTSS	SBA025AFTSS	SBA025CFTSS	SBA025XFSSS	SBA025AFSSS	SBA025CFSSS
3	40	18	SBA040XFTSS	SBA040AFTSS	SBA040CFTSS	SBA040XFSSS	SBA040AFSSS	SBA040CFSSS
	50		SBA050XFTSS	SBA050AFTSS	SBA050CFTSS	SBA050XFSSS	SBA050AFSSS	SBA050CFSSS
4	60	21	SBA060XFTSS	SBA060AFTSS	SBA060CFTSS	SBA060XFSSS	SBA060AFSSS	SBA060CFSSS
	75		SBA075XFTSS	SBA075AFTSS	SBA075CFTSS	SBA075XFSSS	SBA075AFSSS	SBA075CFSSS
	100		SBA100XFTSS	SBA100AFTSS	SBA100CFTSS	SBA100XFSSS	SBA100AFSSS	SBA100CFSSS

Table 17.4: FVR Combination Starter Units with Motor Circuit Protector Disconnects

Ratings			Control Transformer		Fused Separate Control	
			No Pilot Devices	Forward-Rev.-Stop PB, Forward/Reverse Lights	No Pilot Devices	Forward-Rev.-Stop PB, Forward/Reverse Lights
NEMA Size	Hp	Space (IN)	Catalog Number	Catalog Number	Catalog Number	Catalog Number
Full Voltage Reversing (FVR) Starters With Motor Circuit Protector Disconnect and Melting Alloy Overload Relay						
1	1	18	SBC001XFTMA	SBC001AFTMA	SBC001XFSMA	SBC001AFSMA
	2		SBC002XFTMA	SBC002AFTMA	SBC002XFSMA	SBC002AFSMA
	3		SBC003XFTMA	SBC003AFTMA	SBC003XFSMA	SBC003AFSMA
	5		SBC005XFTMA	SBC005AFTMA	SBC005XFSMA	SBC005AFSMA
	7.5		SBC007XFTMA	SBC007AFTMA	SBC007XFSMA	SBC007AFSMA
	10		SBC010XFTMA	SBC010AFTMA	SBC010XFSMA	SBC010AFSMA
2	15	18	SBC015XFTMA	SBC015AFTMA	SBC015XFSMA	SBC015AFSMA
	25		SBC025XFTMA	SBC025AFTMA	SBC025XFSMA	SBC025AFSMA
3	40	27	SBC040XFTMA	SBC040AFTMA	SBC040XFSMA	SBC040AFSMA
	50		SBC050XFTMA	SBC050AFTMA	SBC050XFSMA	SBC050AFSMA
4	60	33	SBC060XFTMA	SBC060AFTMA	SBC060XFSMA	SBC060AFSMA
	75		SBC075XFTMA	SBC075AFTMA	SBC075XFSMA	SBC075AFSMA
	100		SBC100XFTMA	SBC100AFTMA	SBC100XFSMA	SBC100AFSMA
Full Voltage Reversing (FVR) Starters With Motor Circuit Protector Disconnect and Solid State Overload Relay (Motor Logic)						
1	1	18	SBC001XFTSS	SBC001AFTSS	SBC001XFSSS	SBC001AFSSS
	2		SBC002XFTSS	SBC002AFTSS	SBC002XFSSS	SBC002AFSSS
	3		SBC003XFTSS	SBC003AFTSS	SBC003XFSSS	SBC003AFSSS
	5		SBC005XFTSS	SBC005AFTSS	SBC005XFSSS	SBC005AFSSS
	7.5		SBC007XFTSS	SBC007AFTSS	SBC007XFSSS	SBC007AFSSS
	10		SBC010XFTSS	SBC010AFTSS	SBC010XFSSS	SBC010AFSSS
2	15	18	SBC015XFTSS	SBC015AFTSS	SBC015XFSSS	SBC015AFSSS
	25		SBC025XFTSS	SBC025AFTSS	SBC025XFSSS	SBC025AFSSS
3	40	27	SBC040XFTSS	SBC040AFTSS	SBC040XFSSS	SBC040AFSSS
	50		SBC050XFTSS	SBC050AFTSS	SBC050XFSSS	SBC050AFSSS
4	60	33	SBC060XFTSS	SBC060AFTSS	SBC060XFSSS	SBC060AFSSS
	75		SBC075XFTSS	SBC075AFTSS	SBC075XFSSS	SBC075AFSSS
	100		SBC100XFTSS	SBC100AFTSS	SBC100XFSSS	SBC100AFSSS

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Combination Starter Units with Fusible Switch Disconnects

Model 6 NEMA-rated FVNR combination starter units listed below use fusible switches with Class R fuse clips (fuses not included).

Ratings: 480 V, NEMA 12, Type 1B-D wiring, 100,000 AIR. Units include 1 N.O./1 N.C. auxiliary contacts. Units with pilot devices use 22 mm type. Units without pilot devices include a station plate with knockouts for five 22 mm devices.

Thermal units are not included with melting alloy overloads.

Table 17.5: FVNR Combination Starter Units with Fusible Switch Disconnects

Ratings			Control Transformer			Fused Separate Control		
			No Pilot Devices	Start-Stop PB, Red On/Green Off Lights	HOA Red On/Green Off Lights	No Pilot Devices	Start-Stop PB, Red On/Green Off Lights	HOA Red On/Green Off Lights
NEMA Size	Hp	Space (IN)	Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.
Full Voltage Non-Reversing (FVNR) Starters With Fusible Switch Disconnect and Melting Alloy Overload Relay								
1	1	12	SFA001XFTMA	SFA001AFTMA	SFA001CFTMA	SFA001XFSMA	SFA001AFSMA	SFA001CFSMA
	2		SFA002XFTMA	SFA002AFTMA	SFA002CFTMA	SFA002XFSMA	SFA002AFSMA	SFA002CFSMA
	3		SFA003XFTMA	SFA003AFTMA	SFA003CFTMA	SFA003XFSMA	SFA003AFSMA	SFA003CFSMA
	5		SFA005XFTMA	SFA005AFTMA	SFA005CFTMA	SFA005XFSMA	SFA005AFSMA	SFA005CFSMA
	7.5		SFA007XFTMA	SFA007AFTMA	SFA007CFTMA	SFA007XFSMA	SFA007AFSMA	SFA007CFSMA
	10		SFA010XFTMA	SFA010AFTMA	SFA010CFTMA	SFA010XFSMA	SFA010AFSMA	SFA010CFSMA
2	15	12	SFA015XFTMA	SFA015AFTMA	SFA015CFTMA	SFA015XFSMA	SFA015AFSMA	SFA015CFSMA
	25		SFA025XFTMA	SFA025AFTMA	SFA025CFTMA	SFA025XFSMA	SFA025AFSMA	SFA025CFSMA
3	40	18	SFA040XFTMA	SFA040AFTMA	SFA040CFTMA	SFA040XFSMA	SFA040AFSMA	SFA040CFSMA
	50		SFA050XFTMA	SFA050AFTMA	SFA050CFTMA	SFA050XFSMA	SFA050AFSMA	SFA050CFSMA
4	60	30	SFA060XFTMA	SFA060AFTMA	SFA060CFTMA	SFA060XFSMA	SFA060AFSMA	SFA060CFSMA
	75		SFA075XFTMA	SFA075AFTMA	SFA075CFTMA	SFA075XFSMA	SFA075AFSMA	SFA075CFSMA
	100		SFA100XFTMA	SFA100AFTMA	SFA100CFTMA	SFA100XFSMA	SFA100AFSMA	SFA100CFSMA
Full Voltage Non-Reversing (FVNR) Starters With Fusible Switch Disconnect and Solid State Overload Relay (Motor Logic™)								
1	1	12	SFA001XFTSS	SFA001AFTSS	SFA001CFTSS	SFA001XFSSS	SFA001AFSSS	SFA001CFSSS
	2		SFA002XFTSS	SFA002AFTSS	SFA002CFTSS	SFA002XFSSS	SFA002AFSSS	SFA002CFSSS
	3		SFA003XFTSS	SFA003AFTSS	SFA003CFTSS	SFA003XFSSS	SFA003AFSSS	SFA003CFSSS
	5		SFA005XFTSS	SFA005AFTSS	SFA005CFTSS	SFA005XFSSS	SFA005AFSSS	SFA005CFSSS
	7.5		SFA007XFTSS	SFA007AFTSS	SFA007CFTSS	SFA007XFSSS	SFA007AFSSS	SFA007CFSSS
	10		SFA010XFTSS	SFA010AFTSS	SFA010CFTSS	SFA010XFSSS	SFA010AFSSS	SFA010CFSSS
2	15	12	SFA015XFTSS	SFA015AFTSS	SFA015CFTSS	SFA015XFSSS	SFA015AFSSS	SFA015CFSSS
	25		SFA025XFTSS	SFA025AFTSS	SFA025CFTSS	SFA025XFSSS	SFA025AFSSS	SFA025CFSSS
3	40	18	SFA040XFTSS	SFA040AFTSS	SFA040CFTSS	SFA040XFSSS	SFA040AFSSS	SFA040CFSSS
	50		SFA050XFTSS	SFA050AFTSS	SFA050CFTSS	SFA050XFSSS	SFA050AFSSS	SFA050CFSSS
4	60	30	SFA060XFTSS	SFA060AFTSS	SFA060CFTSS	SFA060XFSSS	SFA060AFSSS	SFA060CFSSS
	75		SFA075XFTSS	SFA075AFTSS	SFA075CFTSS	SFA075XFSSS	SFA075AFSSS	SFA075CFSSS
	100		SFA100XFTSS	SFA100AFTSS	SFA100CFTSS	SFA100XFSSS	SFA100AFSSS	SFA100CFSSS

Table 17.6: FVR Combination Starter Units with Fusible Switch Disconnects

Ratings			Control Transformer		Fused Separate Control	
			No Pilot Devices	Forward-Rev.-Stop PB, Forward/Reverse Lights	No Pilot Devices	Forward-Rev.-Stop PB, Forward/Reverse Lights
NEMA Size	Hp	Space (IN)	Catalog No.	Catalog No.	Catalog No.	Catalog No.
Full Voltage Reversing (FVR) Starters With Fusible Switch Disconnect and Melting Alloy Overload Relay						
1	1	18	SFC001XFTMA	SFC001AFTMA	SFC001XFSMA	SFC001AFSMA
	2		SFC002XFTMA	SFC002AFTMA	SFC002XFSMA	SFC002AFSMA
	3		SFC003XFTMA	SFC003AFTMA	SFC003XFSMA	SFC003AFSMA
	5		SFC005XFTMA	SFC005AFTMA	SFC005XFSMA	SFC005AFSMA
	7.5		SFC007XFTMA	SFC007AFTMA	SFC007XFSMA	SFC007AFSMA
	10		SFC010XFTMA	SFC010AFTMA	SFC010XFSMA	SFC010AFSMA
2	15	18	SFC015XFTMA	SFC015AFTMA	SFC015XFSMA	SFC015AFSMA
	25		SFC025XFTMA	SFC025AFTMA	SFC025XFSMA	SFC025AFSMA
3	40	27	SFC040XFTMA	SFC040AFTMA	SFC040XFSMA	SFC040AFSMA
	50		SFC050XFTMA	SFC050AFTMA	SFC050XFSMA	SFC050AFSMA
4	60	39	SFC060XFTMA	SFC060AFTMA	SFC060XFSMA	SFC060AFSMA
	75		SFC075XFTMA	SFC075AFTMA	SFC075XFSMA	SFC075AFSMA
	100		SFC100XFTMA	SFC100AFTMA	SFC100XFSMA	SFC100AFSMA
)Full Voltage Reversing (FVR) Starters with Fusible Switch Disconnect and Solid State Overload Relay (Motor Logic						
1	1	18	SFC001XFTSS	SFC001AFTSS	SFC001XFSSS	SFC001AFSSS
	2		SFC002XFTSS	SFC002AFTSS	SFC002XFSSS	SFC002AFSSS
	3		SFC003XFTSS	SFC003AFTSS	SFC003XFSSS	SFC003AFSSS
	5		SFC005XFTSS	SFC005AFTSS	SFC005XFSSS	SFC005AFSSS
	7.5		SFC007XFTSS	SFC007AFTSS	SFC007XFSSS	SFC007AFSSS
	10		SFC010XFTSS	SFC010AFTSS	SFC010XFSSS	SFC010AFSSS
2	15	18	SFC015XFTSS	SFC015AFTSS	SFC015XFSSS	SFC015AFSSS
	25		SFC025XFTSS	SFC025AFTSS	SFC025XFSSS	SFC025AFSSS
3	40	27	SFC040XFTSS	SFC040AFTSS	SFC040XFSSS	SFC040AFSSS
	50		SFC050XFTSS	SFC050AFTSS	SFC050XFSSS	SFC050AFSSS
4	60	39	SFC060XFTSS	SFC060AFTSS	SFC060XFSSS	SFC060AFSSS
	75		SFC075XFTSS	SFC075AFTSS	SFC075XFSSS	SFC075AFSSS
	100		SFC100XFTSS	SFC100AFTSS	SFC100XFSSS	SFC100AFSSS

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Compac™ 6 Combination Starter Units with Motor Circuit Protector Disconnects

NEMA-rated Compac 6, half-height FVNR combination starters use G frame Mag-Gard™ Motor Circuit Protectors.

Ratings: 480 V, NEMA 12, Type 1B-D wiring, 100,000 AIR. Units include 1 N.O./1 N.C. auxiliary contacts. Units with pilot devices use 22 mm type.

Units without pilot devices include a station plate with knockouts for four 22 mm devices. Thermal units are not included with melting alloy overloads.

Table 17.7: Compac 6 Combination Starter Units with Motor Circuit Protector Disconnects

Ratings			Control Transformer			Fused Separate Control		
			No Pilot Devices	Start-Stop PB, Red On/Green Off Lights	HOA, Red On/Green Off Lights	No Pilot Devices	Start-Stop PB, Red On/Green Off Lights	HOA, Red On/Green Off Lights
NEMA Size	Hp	Space (IN)	Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.
Full Voltage Non-Reversing (FVNR) Starters With Motor Circuit Protector Disconnect and Melting Alloy Overload Relay								
1	1	6	HBA001XFTMA	HBA001AFTMA	HBA001CFTMA	HBA001XFSMA	HBA001AFSMA	HBA001CFSMA
	2		HBA002XFTMA	HBA002AFTMA	HBA002CFTMA	HBA002XFSMA	HBA002AFSMA	HBA002CFSMA
	3		HBA003XFTMA	HBA003AFTMA	HBA003CFTMA	HBA003XFSMA	HBA003AFSMA	HBA003CFSMA
	5		HBA005XFTMA	HBA005AFTMA	HBA005CFTMA	HBA005XFSMA	HBA005AFSMA	HBA005CFSMA
	7.5		HBA007XFTMA	HBA007AFTMA	HBA007CFTMA	HBA007XFSMA	HBA007AFSMA	HBA007CFSMA
	10		HBA010XFTMA	HBA010AFTMA	HBA010CFTMA	HBA010XFSMA	HBA010AFSMA	HBA010CFSMA
Full Voltage Non-Reversing (FVNR) Starters With Motor Circuit Protector Disconnect and Solid State Overload Relay (Motor Logic™)								
1	1	6	HBA001XFTSS	HBA001AFTSS	HBA001CFTSS	HBA001XFSSS	HBA001AFSSS	HBA001CFSSS
	2		HBA002XFTSS	HBA002AFTSS	HBA002CFTSS	HBA002XFSSS	HBA002AFSSS	HBA002CFSSS
	3		HBA003XFTSS	HBA003AFTSS	HBA003CFTSS	HBA003XFSSS	HBA003AFSSS	HBA003CFSSS
	5		HBA005XFTSS	HBA005AFTSS	HBA005CFTSS	HBA005XFSSS	HBA005AFSSS	HBA005CFSSS
	7.5		HBA007XFTSS	HBA007AFTSS	HBA007CFTSS	HBA007XFSSS	HBA007AFSSS	HBA007CFSSS
	10		HBA010XFTSS	HBA010AFTSS	HBA010CFTSS	HBA010XFSSS	HBA010AFSSS	HBA010CFSSS

Compac 6 Combination Starter Units with Fusible Switch Disconnects

NEMA-rated Compac 6, half-height FVNR combination starters listed below use fusible switches with Class J fuse clips (fuses not included).

Ratings: 480 V, NEMA 12, Type 1B-D wiring, 100,000 AIR. Units include 1 N.O./1 N.C. auxiliary contacts.

Units with pilot devices use 22 mm type. Units without pilot devices include a station plate with knockouts for four 22 mm devices. Thermal units are not included with melting alloy overloads.

Table 17.8: Compac 6 Combination Starter Units with Fusible Switch Disconnects

Ratings			Control Transformer			Fused Separate Control		
			No Pilot Devices	Start-Stop PB, Red On/Green Off Lights	HOA, Red On/Green Off Lights	No Pilot Devices	Start-Stop PB, Red On/Green Off Lights	HOA, Red On/Green Off Lights
NEMA Size	Hp	Space (IN)	Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.	Catalog No.
Full Voltage Non-Reversing (FVNR) Starters with Fusible Switch Disconnect and Melting Alloy Overload Relay								
1	1	6	HFA001XFTMA	HFA001AFTMA	HFA001CFTMA	HFA001XFSMA	HFA001AFSMA	HFA001CFSMA
	2		HFA002XFTMA	HFA002AFTMA	HFA002CFTMA	HFA002XFSMA	HFA002AFSMA	HFA002CFSMA
	3		HFA003XFTMA	HFA003AFTMA	HFA003CFTMA	HFA003XFSMA	HFA003AFSMA	HFA003CFSMA
	5		HFA005XFTMA	HFA005AFTMA	HFA005CFTMA	HFA005XFSMA	HFA005AFSMA	HFA005CFSMA
	7.5		HFA007XFTMA	HFA007AFTMA	HFA007CFTMA	HFA007XFSMA	HFA007AFSMA	HFA007CFSMA
	10		HFA010XFTMA	HFA010AFTMA	HFA010CFTMA	HFA010XFSMA	HFA010AFSMA	HFA010CFSMA
Full Voltage Non-Reversing (FVNR) Starters With Fusible Switch Disconnect and Solid State Overload Relay (Motor Logic)								
1	1	6	HFA001XFTSS	HFA001AFTSS	HFA001CFTSS	HFA001XFSSS	HFA001AFSSS	HFA001CFSSS
	2		HFA002XFTSS	HFA002AFTSS	HFA002CFTSS	HFA002XFSSS	HFA002AFSSS	HFA002CFSSS
	3		HFA003XFTSS	HFA003AFTSS	HFA003CFTSS	HFA003XFSSS	HFA003AFSSS	HFA003CFSSS
	5		HFA005XFTSS	HFA005AFTSS	HFA005CFTSS	HFA005XFSSS	HFA005AFSSS	HFA005CFSSS
	7.5		HFA007XFTSS	HFA007AFTSS	HFA007CFTSS	HFA007XFSSS	HFA007AFSSS	HFA007CFSSS
	10		HFA010XFTSS	HFA010AFTSS	HFA010CFTSS	HFA010XFSSS	HFA010AFSSS	HFA010CFSSS

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Branch Feeder Units Catalog Numbering System

Units rated as follows:

- 480 V, 60 Hz, NEMA Type 12 Enclosure, Industrial Package
- Short Circuit rating: 100,000 AIR

Table 17.9: Circuit Breaker Branch Feeder Units

First Position	Second Position	Third Position	Fourth Position	Fifth Position	
8998	S	B	F	015	
Class	**Type**	**Disconnect**	**Device**	**Feeder Amps**	
8998	S- Standard Size H- Compac™ 6	B- Breaker (Thermal-Mag)	F- Feeder	015 020 030 040 050 060 070	080 100 125 150 200 250
Amps	**Breaker Frame**	**Space (IN)**	**Catalog No.**		
15	HL	6	HBF015		
20			HBF020		
30			HBF030		
40			HBF040		
50			HBF050		
60			HBF060		
70			HBF070		
80			HBF080		
100			HBF100		
125			HBF125		
150			HBF150		
200	JL		HBF200		
250			HBF250		
15	HL	12	SBF015		
20			SBF020		
30			SBF030		
40			SBF040		
50			SBF050		
60			SBF060		
70			SBF070		
80			SBF080		
100			SBF100		
125			SBF125		
150			SBF150		
200	JL	18	SBF200		
250			SBF250		

Table 17.10: Fusible Branch Feeder Units

First Position	Second Position	Third Position	Fourth Position	Fifth Position
8998	S	F	F	015
Class	**Type**	**Disconnect**	**Device**	**Feeder Amps**
8998	S- Standard Size H- Compac 6	F- Fusible*[1]*	F- Feeder	030 060 100 200*[2]*
Amps	**Fuse Clips**	**Space (IN)**	**Catalog No.**	
30 60	Class J	6 (Compac 6)	HFF030 HFF060	
100			HFF100	
30 60	Class R	12	SFF030 SFF060	
100			SFF100	
200		24	SFF200	

Model 6 Blank Doors

These doors may be used to cover an unused space in the MCC. A blank door will be required when placing a new unit in an existing space that is larger than the new unit.

Table 17.11: Model 6 Blank Doors

Catalog Number	Description
8998CP03	3–Inch High Blank Cover Plate
8998CP06	6–Inch High Blank Door
8998CP09	9–Inch High Blank Door
8998CP12	12–Inch High Blank Door
8998CP15	15–Inch High Blank Door
8998CP18	18–Inch High Blank Door
8998CP24	24–Inch High Blank Door

[1] Class R except Compac 6, fuses not included.
[2] Not available with Compac 6.

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Section 18

Contactors and Starters-IEC

TeSys D Contactors

TeSys F Contactors

TeSys GV3P

TeSys GV2P

TeSys U

TeSys H

TeSys U Self-Protected Combo Starter

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  - TeSys™ K Non-Reversing Mini-Contactors 18-2
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  - TeSys™ K Reversing Mini-Contactors 18-4
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TeSys™ K Non-Reversing Mini-Contactors

LC1K09

Table 18.1: AC Operating Coils

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Rating (A)	Type of Connection	Auxiliary Contacts		Catalog Number[1][2][3][4]
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1			N.O.	N.C.	
115 V	230 V	200 V	230 V	460 V	575 V							
1/2	1	1.5	1.5	3	3	6	20	10	Screw-clamp	1	—	LC1K0610
										—	1	LC1K0601
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	1	—	LC1K0910
										—	1	LC1K0901
1	2	3	3	7.5	10	12	20	20	Screw-clamp	1	—	LC1K1210
										—	1	LC1K1201

Table 18.2: TeSys K Contactors with Spring Terminal Clamps[5]

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Ratings (A)	Catalog Number[1]
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1		
115 V	230 V	200 V	230 V	460 V	575 V				
1/3	1	1.5	1.5	3	3	6	20	10	LC●K06●●3
1/3	1.5	2	2	5	5	9	20	10	LC●K09●●3
1/3	1.5	2	2	5	5	12	20	10	LC●K12●●3

Table 18.3: Coil Voltage Codes for AC Contactors

Up to and including 240 V coil with integral suppression device available. Add 2 to the code required (for example, J72).

Vac 50/60 Hz	12	24	42	48	110	120	127	200/208	220/230	230	230/240	277	380/400	400/415	440	480	600
Code	J7	B7	D7	E7	F7	G7	FC7	L7	M7	P7	U7	UE7	Q7	N7	R7	T7	X7

Table 18.4: DC Operating Coils

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Rating (A)	Type of Connection	Auxiliary Contacts		Catalog Number[2][3][4][6]
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1			N.O.	N.C.	
115 V	230 V	200 V	230 V	460 V	575 V							
1/2	1	1.5	1.5	3	3	6	20	10	Screw-clamp	1	—	LP1K0610
										—	1	LP1K0601
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	1	—	LP1K0910
										—	1	LP1K0901
1	2	3	3	7.5	10	12	20	20	Screw-clamp	1	—	LP1K1210
										—	1	LP1K1201

Table 18.5: Coil Voltage Codes for DC Contactors

Coil with integral suppression device available. Add 3 to the code required (for example, JD3). [7]

Vdc	12	20	24	36	48	60	72	100	110	125	200	220	230	240	250
Code	JD	ZD	BD	CD	ED	ND	SD	KD	FD	GD	LD	MD	MPD	MUD	UD

[1] Complete the catalog number with the coil voltage code from Table 18.3 Coil Voltage Codes for AC Contactors, page 18-2 (for example, LC1K0610**G7**).
[2] For spring terminal clamps, add a **3** before the coil voltage code (for example, LC2K06103G7). Spring terminal clamps reduce some of the HP and continuous current ratings of the TeSys K contactors. For ratings, please refer to Table 18.2 TeSys K Contactors with Spring Terminal Clamps, page 18-2.
[3] For solder pin terminals, add a **5** before the coil voltage code (for example, LC1K09105B7).
[4] For slip-on terminals, add a **7** before the coil voltage code (for example, LC1K12107M7).
[5] Applies to all TeSys K contactors (LC1K, LC2K, LC7K, LC8K, LP1K, LC2K, LP4K and LP5K).
[6] Complete the catalog number with the coil voltage code from Table 18.5 Coil Voltage Codes for DC Contactors, page 18-2 (for example, LP1K09004**BD**).
[7] 3 W inrush.

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LP4K09

Table 18.6: DC–Low Consumption Operating Coils (devices have built-in transient suppression)

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Rating (A)	Type of Connection	Auxiliary Contacts		Catalog Number*[8][9][10][11]*
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1			N.O.	N.C.	
115 V	230 V	200 V	230 V	460 V	575 V							
1/2	1	1.5	1.5	3	3	6	20	10	Screw-clamp	1	—	LP4K0610
										—	1	LP4K0601
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	1	—	LP4K0910
										—	1	LP4K0901
1	2	3	3	7.5	10	12	20	20	Screw-clamp	1	—	LP4K1210
										—	1	LP4K1201

Table 18.7: Coil Voltage Codes for DC Contactors—Low Consumption *[12]*

Vdc	12	24	48	72
Code	JW3	BW3	EW3	SW3

TeSys™ K Overload Relays

LR2K0316

Table 18.8: Overload Relays for 3-Pole Contactors with Screw-Clamp Terminals

Current Setting Range (A)	Catalog Number	
0.11 to 0.16	LR2K0301	**LR2K overload relays:** • AC or DC protection • Ambient compensated bimetallic • Class 10 • Single phase sensitivity • Manual or auto reset • Full load current dial
0.16 to 0.23	LR2K0302	
0.23 to 0.36	LR2K0303	
0.36 to 0.54	LR2K0304	
0.54 to 0.8	LR2K0305	
0.8 to 1.2	LR2K0306	
1.2 to 1.8	LR2K0307	
1.8 to 2.6	LR2K0308	
2.6 to 3.7	LR2K0310	
3.7 to 5.5	LR2K0312	
5.5 to 8	LR2K0314	
8 to 11.5	LR2K0316	
10 to 14	LR2K0321*[13]*	

Accessories: TeSys™ K Contactors and Accessories, page 18-14
Dimensions: TeSys K Contactor Dimensions, page 18-63

E164862

CCN NLDX

(screw terminals)

LR43364

Class 3211 04

E164862

CCN NLDX2

(slip-on and solder-pin terminals)

[8] Complete the catalog number with the coil voltage code from Table 18.7 Coil Voltage Codes for DC Contactors—Low Consumption , page 18-3 (for example, LC2K0610**BD**).
[9] For spring terminal clamps, add a **3** before the coil voltage code (for example, LC2K0610**3**G7). Spring terminal clamps reduce some of the HP and continuous current ratings of the TeSys K contactors. For ratings, please refer to Table 18.2 TeSys K Contactors with Spring Terminal Clamps, page 18-2.
[10] For solder pin terminals, add a **5** before the coil voltage code (for example, LP1K0910**5**BW3).
[11] For slip-on terminals, add a **7** before the coil voltage code (for example, LP1K12107BW3).
[12] 1.8 W inrush.
[13] Not UL Listed.

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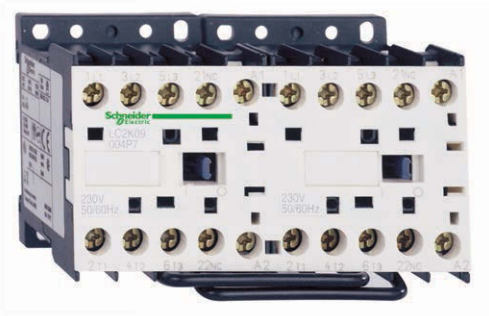
TeSys™ K Reversing Mini-Contactors



LC2K0910

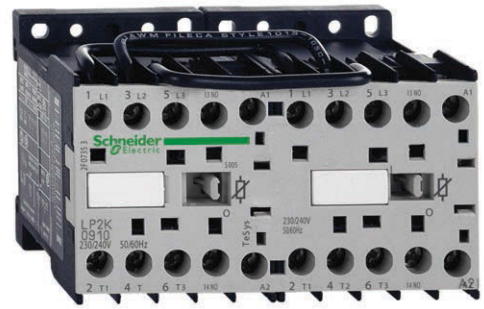
Table 18.9: AC Operating Coils

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Rating (A)	Type of Connection	Auxiliary Contacts		Catalog Number *[14] [15][16][17]*
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1			N.O.	N.C.	
115 V	230 V	200 V	230 V	460 V	575 V							
1/2	1	1.5	1.5	3	3	6	20	10	Screw-clamp	1	—	LC2K0610
										—	1	LC2K0601
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	1	—	LC2K0910
										—	1	LC2K0901
1	2	3	3	7.5	10	12	20	20	Screw-clamp	1	—	LC2K1210
										—	1	LC2K1201

Table 18.10: Coil Voltage Codes for AC Contactors

Up to and including 240 V coil with integral suppression device available. Add 2 to the code required. Example: J72.

Vac 50/60 Hz	12	24	42	48	110	120	127	200/208	220/230	230	230/240	277	380/400	400/415	440	480	600
Code	J7	B7	D7	E7	F7	G7	FC7	L7	M7	P7	U7	UE7	Q7	N7	R7	T7	X7



LP2K0910

Table 18.11: DC Operating Coils

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Rating (A)	Type of Connection	Auxiliary Contacts		Catalog Number *[15][16][17][18]*
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1			N.O.	N.C.	
115 V	230 V	200 V	230 V	460 V	575 V							
1/2	1	1.5	1.5	3	3	6	20	10	Screw-clamp	1	—	LP2K0610
										—	1	LP2K0601
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	1	—	LP2K0910
										—	1	LP2K0901
1	2	3	3	7.5	10	12	20	20	Screw-clamp	1	—	LP2K1210
										—	1	LP2K1201

Table 18.12: Coil Voltage Codes for DC Contactors

Coil with integral suppression device available. Add 3 to the code required. Example: JD3. *[19]*

Vdc	12	20	24	36	48	60	72	100	110	125	200	220	230	240	250
Code	JD	ZD	BD	CD	ED	ND	SD	KD	FD	GD	LD	MD	MPD	MUD	UD

[14] Complete the catalog number with the coil voltage code from Table 18.10 Coil Voltage Codes for AC Contactors, page 18-4 (for example, LC2K0610**G7**).
[15] For spring terminal clamps, add a **3** before the coil voltage code (for example, LC2K0610**3**G7). Spring terminal clamps reduce some of the HP and continuous current ratings of the TeSys K contactors. For ratings, please refer to TeSys K Contactors with Spring Terminal Clamps, page 18-2.
[16] For solder pin terminals, add a **5** before the coil voltage code (for example, LC2K0910**5**B7).
[17] For slip-on terminals, add a **7** before the coil voltage code (for example, LC2K1210**7**M7).
[18] Complete the catalog number with the coil voltage code from Table 18.12 Coil Voltage Codes for DC Contactors, page 18-4 (for example, LC2K0610**BD**).
[19] 3 W inrush.

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Table 18.13: DC–Low Consumption Operating Coils (devices have built-in transient suppression)

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Rating (A)	Type of Connection	Auxiliary Contacts		Catalog Number[20][21][22][23]
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1			N.O.	N.C.	
115 V	230 V	200 V	230 V	460 V	575 V							
1/2	1	1.5	1.5	3	3	6	20	10	Screw-clamp	1	—	LP5K0610
										—	1	LP5K0601
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	1	—	LP5K0910
										—	1	LP5K0901
1	2	3	3	7.5	10	12	20	20	Screw-clamp	1	—	LP5K1210
										—	1	LP5K1201

Table 18.14: Coil Voltage Codes for DC Contactors—Low Consumption[24]

Vdc	12	24	48	72
Code	JW3	BW3	EW3	SW3

LC2K090045

Table 18.15: AC Operating Coils

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Rating (A)	Type of Connection	Power Poles		Catalog Number[25][26][27][28]
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1			N.O.	N.C.	
115 V	230 V	200 V	230 V	460 V	575 V							
4-Pole Mini Contactor												
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	4	—	LC1K09004
										2	2	LC1K09008
1	2	3	3	7.5	10	12	20	20	Screw-clamp	4	—	LC1K12004
4-Pole Mechanically Interlocked Contactors												
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	4	—	LC2K09004
1	2	3	3	7.5	10	12	20	20	Screw-clamp	4	—	LC2K12004

Table 18.16: Coil Voltage Codes for AC Contactors
Up to and including 240 V coil with integral suppression device available. Add 2 to the code required. Example: J72.

Vac 50/60 Hz	12	24	42	48	110	120	127	200/208	220/230	230	230/240	277	380/400	400/415	440	480	660/690
Code	J7	B7	D7	E7	F7	G7	FC7	L7	M7	P7	U7	UE7	Q7	N7	R7	T7	Y7

Table 18.17: DC Operating Coils

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Rating (A)	Type of Connection	Power Poles		Catalog Number[29][26][27][28]
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1			N.O.	N.C.	
115 V	230 V	200 V	230 V	460 V	575 V							
4-Pole Mini Contactor												
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	4	—	LP1K09004
										2	2	LP1K09008
1	2	3	3	7.5	10	12	20	20	Screw-clamp	4	—	LP1K12004
4-Pole Mechanically Interlocked Contactors												
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	4	—	LP2K09004
1	2	3	3	7.5	10	12	20	20	Screw-clamp	4	—	LP2K12004

Table 18.18: Coil Voltage Codes for DC Contactors
Coil with integral suppression device available. Add 3 to the code required. Example: JD3[30]

Vdc	12	20	24	36	48	60	72	100	110	125	200	220	230	240	250
Code	JD	ZD	BD	CD	ED	ND	SD	KD	FD	GD	LD	MD	MPD	MUD	UD

Overload Relays: 3-Pole Reversing Mini-Contactors, page 18-4
Accessories: TeSys K Contactors and Accessories, page 18-14
Dimensions: TeSys K Contactor Dimensions, page 18-63

[20] Complete the catalog number with the coil voltage code fromTable 18.14 Coil Voltage Codes for DC Contactors—Low Consumption, page 18-5 (for example, LP4K09004**BW3**).
[21] For spring terminal clamps, add a **3** before the coil voltage code (for example, LC2K06103G7). Spring terminal clamps reduce some of the HP and continuous current ratings of the TeSys K contactors. For ratings, please refer to TeSys K Contactors with Spring Terminal Clamps, page 18-2.
[22] For solder pin terminals, add a **5** before the coil voltage code (for example, LC1K090045B7).
[23] For slip-on terminals, add a **7** before the coil voltage code (for example, LC1K120047M7).
[24] 1.8 W inrush.
[25] Complete the catalog number with the coil voltage code from Table 18.16 Coil Voltage Codes for AC Contactors, page 18-5 (for example, LC1K09004**G7**).
[26] For spring terminal clamps, add a **3** before the coil voltage code (for example, LC2K06103G7). Spring terminal clamps reduce some of the HP and continuous current ratings of the TeSys K contactors. For ratings, please refer to TeSys K Contactors with Spring Terminal Clamps, page 18-2.
[27] For solder pin terminals, add a **5** before the coil voltage code (for example, LC1K090045B7).
[28] For slip-on terminals, add a **7** before the coil voltage code (for example, LC1K120047M7).
[29] Complete the catalog number with the coil voltage code from Table 18.18 Coil Voltage Codes for DC Contactors, page 18-5 (for example, LP2K09004**BD**).
[30] 3 W inrush.

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Table 18.19: DC–Low Consumption Operating Coils (devices have built-in transient suppression)

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Rating (A)	Type of Connection	Power Poles		Catalog Number[31][32][33][34]
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1			N.O.	N.C.	
115 V	230 V	200 V	230 V	460 V	575 V							
4-Pole Mini Contactor												
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	4	—	LP4K09004
										2	2	LP4K09008
1	2	3	3	7.5	10	12	20	20	Screw-clamp	4	—	LP4K12004
4-Pole Mechanically Interlocked Contactors												
1/2	1.5	2	3	5	5	9	20	20	Screw-clamp	4	—	LP5K09004
1	2	3	3	7.5	10	12	20	20	Screw-clamp	4	—	LP5K12004

Table 18.20: Coil Voltages for DC Contactors—Low Consumption*[35]*

Vdc	12	24	48	72
Code	JW3	BW3	EW3	SW3

Overload Relays: TeSys™ K Reversing Mini-Contactors, page 18-4
Accessories: TeSys K Contactors and Accessories, page 18-14
Dimensions: TeSys K Contactor Dimensions, page 18-63

[31] Complete the catalog number with the coil voltage code from Table 18.20 Coil Voltages for DC Contactors—Low Consumption, page 18-6 (for example, LP4K09004**BW3**).
[32] For spring terminal clamps, add a **3** before the coil voltage code (for example, LC2K06103G7). Spring terminal clamps reduce some of the HP and continuous current ratings of the TeSys K contactors. For ratings, please refer to TeSys K Contactors with Spring Terminal Clamps, page 18-2.
[33] For solder pin terminals, add a **5** before the coil voltage code (for example, LP4K090045BW3.
[34] For slip-on terminals, add a **7** before the coil voltage code (for example, LP4K120047M7).
[35] 1.8 W inrush.

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TeSys™ D Catalog Number Interpretation

Table 18.21: TeSys D Contactors—Interpretation of the Catalog Number *[36]*

LC	____	D	____	____	____	____
Full Voltage, Non-Reversing	1					
Full Voltage, Reversing	2					
TeSys D 3 Pole Contactors, 9–150 A						
Contactor AC-3 Full Load Amperes (FLA)						
9 A FLA			09			
12 A FLA			12			
18 A FLA			18			
25 A FLA			25			
32 A FLA			32			
38 A FLA			38			
40 A FLA			40			
50 A FLA			50			
65 A FLA			65			
80 A FLA			80			
95 A FLA			95			
115 A FLA			115			
150 A FLA			150			
Everlink Power Connection (40–65 A only)				A		
No Everlink Power Connection (9–38 A, 80–150 A)				Blank		
Termination Options (choose one)						
Screw Termination					Blank	
Spring Terminations *[37]*					3	
Ring Tongue Terminations *[38]*					6	
Slip-on Terminations (9–12 A only)					9	

Coil Voltage (choose one)

AC Coils (50/60 Hz)		DC Coils (standard)		DC Coils low consumption available for 9–38 A only	
Voltage	**Coil Code**	**Voltage**	**Coil Code**	**Voltage**	**Coil Code**
12 V	J7	12 V	JD	5 V	AL
21 V	Z7	21 V	ZD	12 V	JL
24 V	B7	24 V	BD	21 V	ZL
36 V	C7	36 V	CD	24 V	BL
42 V	D7	48 V	ED	48 V	EL
48 V	E7	60 V	ND	72 V	SL
60 V	EE7	72 V	SD	96 V	DL
100 V	K7	110 V	FD	110 V	FL
110 V	F7	125 V	GD	220 V	ML
115 V	FE7	220 V	MD	250 V	UL
120 V	G7	250 V	UD		
127 V	FC7	440 V	RD		
200 V	L7				
208 V	LE7				
220 V	M7				
230 V	P7				
240 V	U7				
277 V	W7				
380 V	Q7				
400 V	V7				
415 V	N7				
440 V	R7				
480 V	T7				
500 V	S7				
575 V	SC7				
600 V	X7				
660 V	Y5 (50 Hz only)				

[36] Use this table **only** to interpret current catalog numbers. Some combinations are not available.

[37] For spring terminal versions of LC1D09–LC1D65A, add **3** to the catalog number prior to adding the voltage code (for example, LC1D12G7 becomes LC1D12**3**G7, and LC1D40AG7 becomes LC1D40A**3**G7. Note that 40–65 A spring terminals are only on the control terminations and not on power terminations).

[38] For ring tongue versions of LC1D09–LC1D65A and LC1DT20–LC1DT80A, add **6** to the catalog number prior to adding the voltage code (for example, LC1D09G7 becomes LC1D09**6**G7, and LC1D50AG7 becomes LC1D50A**6**G7).

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TeSys™ D Non-Reversing Contactors

LC1D09

LC1D093

LC1D40A

LC1D115

LRD22

LRD3

Table 18.22: TeSys D Contactors—3 or 4 Pole, Screw Terminal Connections

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Rating (A)	No. of Poles		Instantaneous Auxiliary Contacts		Catalog Number *[39]*
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1		N.O.	N.C.	N.O.	N.C.	
115 V	230 V	200 V	230 V	460 V	575 V								
1/3	1	2	2	5	7.5	9	20	25	3	0	1	1	LC1D09 *[40][41][42]*
—	—	—	—	—	—	—			4				LC1DT20 *[40]*
—	—	—	—	—	—	—			2	2			LC1D098 *[40]*
1/2	2	3	3	7.5	10	12	25	25	3	0	1	1	LC1D12 *[40][41][42]*
—	—	—	—	—	—	—			4				LC1DT25 *[40]*
—	—	—	—	—	—	—			2	2			LC1D128 *[40]*
1	3	5	5	10	15	18	32	32	3	0	1	1	LC1D18 *[40][41]*
—	—	—	—	—	—	—			4				LC1DT32 *[40]*
—	—	—	—	—	—	—			2	2			LC1D188 *[40]*
2	3	7.5	7.5	15	20	25	40	40	3	0	1	1	LC1D25 *[40][40]*
—	—	—	—	—	—	—			4				LC1DT40 *[40]*
—	—	—	—	—	—	—			2	2			LC1D258 *[40]*
2	5	10	10	20	25	32	50	50	3	0	1	1	LC1D32 *[40][41]*
2	5	10	10	20	25	38			3	0	1	1	LC1D38*[40][41]*
3	5	10	10	30	30	40	60	60	3	0	1	1	LC1D40A *[40]*
—	—	—	—	—	—	—			4		0	0	LC1DT60A*[40]*
3	7.5	15	15	40	40	50	80	70	3	0	1	1	LC1D50A *[40]*
5	10	20	20	40	50	65		80	3				LC1D65A *[40]*
—	—	—	—	—	—	—			4	0	0	0	LC1DT80A*[40]*
7.5	15	25	30	60	60	80	125	110	3	0	1	1	LC1D80
—	—	—	—	—	—	—			4		0	0	LC1D80004 *[43]*
—	—	—	—	—	—	—			2	2			LC1D80008 *[43]*
7.5	15	25	30	60	60	95			3	0	1	1	LC1D95
—	—	30	40	75	100	115	200	160	3	0	1	1	LC1D115
—	—	40	50	100	125	150			3				LC1D150
—	—	—	—	—	—	—			4		0	0	LC1D115004

Table 18.23: TeSys D Coil Voltage Codes*[44]*

Contactor	Hz	24 V	48 V	110 V	120 V	125 V	208 V	220 V	240 V	250 V	440 V	480 V	600 V
AC													
D09–D150	50/60	B7	E7	F7	G7	—	LE7	M7	U7	—	—	T7 *[45]*	X7 *[45]*
LC1D80–LC1D150	50	B5	E5	F5	—	—	—	M5 *[45]*	U5	—	—	—	—
	60	B6	E6	F6	G6	—	L6	M6	U6	—	—	T6	X6 *[45]*
DC													
D09-D38, DT20-D258 Low Consumption	—	BL	EL	FL	—	—	—	ML	—	UL	—	—	—
D09–D150	—	BD	ED	FD	—	GD	—	MD	—	UD	RD	—	—

[39] Complete the catalog number by adding the coil voltage code from Table 18.23 TeSys D Coil Voltage Codes, page 18-8 for example, LC1D09**G7**).

[40] For ring tongue versions of LC1D09–LC1D65A and LC1DT20–LC1DT80A, add **6** to the catalog number prior to adding the voltage code (for example, LC1D09G7 becomes LC1D09**6**G7 and LC1D50AG7 becomes LC1D50A**6**G7).

[41] For spring terminals versions of LC1D09–LC1D65A, add **3** to the catalog number prior to adding the voltage code (for example, LC1D12G7 becomes LC1D12**3**G7 and LC1D40AG7 becomes LC1D40A**3**G7. Note that 40–65 A spring terminals are only on the control terminations and not on power terminations).

[42] For slip-on connector versions of LC1D09 and LC1D12 only, add **9** to the catalog number prior to adding the voltage code (for example, LC1D09G7 becomes LC1D09**9**G7).

[43] For DC version of these devices, replace the **C** with a **P** (for example, L**C**1D80004•• becomes L**P**1D80004••). This applies only to 80 A, 4-pole devices.

[44] For additional voltage codes refer to the Control and Protection Components Catalog **MKTED210011EN**.

[45] Not available for LC1D80–LC1D150.

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TeSys™ D Overload Relays

Table 18.24: TeSys D Overload Relays—Ambient Compensated, Bimetallic, Direct Mounting

Current Setting Range (A)	For Direct Mounting to LC1D/LC2D...	Class 10 with Single-Phase Sensitivity	Class 10 without Single-Phase Sensitivity	Class 20 with Single-Phase Sensitivity	Class 20 without Single-Phase Sensitivity
0.10–0.16	D09–D38	LRD01	LR3D01	—	—
0.16–0.25		LRD02	LR3D02	—	—
0.25–0.40		LRD03	LR3D03	—	—
0.40–0.63		LRD04	LR3D04	LRD04L	LR3D04L
0.63–1		LRD05	LR3D05	LRD05L	LR3D05L
1–1.6		LRD06	LR3D06	LRD06L	LR3D06L
1.6–2.5		LRD07	LR3D07	LRD07L	LR3D07L
2.5–4		LRD08	LR3D08	LRD08L	LR3D08L
4–6		LRD10	LR3D10	LRD10L	LR3D10L
5.5–8		LRD12	LR3D12	LRD12L	LR3D12L
7–10		LRD14	LR3D14	LRD14L	LR3D14L
9–13	D12–D38	LRD16	LR3D16	LRD16L	LR3D21L
12–18	D18–D38	LRD21	LR3D21	LRD21L	LR3D21L
16–24		LRD22	LR3D22	—	—
17–24		—	—	LRD22L	LR3D22L
23–32	D25–D38	LRD32	LR3D32	LRD32L	LR3D32L
30–38	D32–D38	LRD35	LR3D35	—	—
9-13	D40A–D65A	LRD313	LR3D313	LRD313L	—
12-18	D40A–D65A	LRD318	LR3D318	LRD318L	—
17-25	D40A–D65A	LRD325	LR3D325	LRD325L	—
23-32	D40A–D65A	LRD332	LR3D332	LRD332L	—
30-40	D40A–D65A	LRD340	LR3D340	LRD340L	—
37-50	D40A–D65A	LRD350	LR3D350	LRD350L	—
48-65	D40A–D65A	LRD365	LR3D365	LRD365L	—
17-25	D40–D95	LRD3322	LR3D3322	LR2D3522	LR3D3522
23-32	D40–D95*[46]*	LRD3353	LR3D3353	LR2D3553	LR3D3553
30-40	D40–D95*[46]*	LRD3355	LR3D3355	LR2D3555	LR3D3555
37-50	D50–D95*[46]*	LRD3357	LR3D3357	LR2D3557	LR3D3557
48-65	D50–D95*[46]*	LRD3359	LR3D3359	LR2D3559	LR3D3559
55–70	D65–D95	LRD3361	LR3D3361	LR2D3561	LR3D3561
63–80	D65–D95	LRD3363	LR3D3363	LR2D3563	LR3D3563
80–104	D95	LRD3365	—	—	—
80–104	D115–D150	LRD4365	—	—	—
95–120	D115–D150	LRD4367	—	—	—
110–140	D150	LRD4369	—	—	—

Table 18.25: TeSys LR9D Electronic Overload Relays *New!*

Current Setting Range (A)	For Direct Mounting Beneath Contactor LC1D/LC2D	Class 5/10/20/30 Selectable
0.1–0.5	D09–D38	LR9D01
0.4–2	D09–D38	LR9D02
1.6–8	D09–D38	LR9D08
6.4–32	D09–D38	LR9D32
22–110	N/A (Separate Mounting Only)	LR9D110S

Table 18.26: TeSys D Overload Relays—Solid State

Current Setting Range (A)	For Direct Mounting Beneath Contactor LC1	Class 10	Class 20	Class 10/20 Selectable
60–100	D115–D150	LR9D5367	LR9D5567	LR9D67
90–150	D115–D150	LR9D5369	LR9D5569	LR9D69

TeSys D contactor accessories: TeSys™ D & F Auxiliary Contacts, Time Delay, Mechanical Latch, page 18-15
TeSys D overload relay accessories: TeSys D Overload Relay Accessories, page 18-22
TeSys D replacement coils: TeSys™ D AC Coils, page 18-43
Dimensions: TeSys™ D Contactors, AC and DC Coil, page 18-51 to TeSys™ D Thermal Overload Relay Dimensions, page 18-59
TeSys T: see TeSys™ T Motor Management System, page 16-101

E164862
CCN NLDX

LR43364
Class 3211 04

[46] Direct mount to old D2 style D40 to D65 (no Everlink terminations) and to D80 and D95 only.

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TeSys™ D Reversing Contactors

Each 3-pole device is prewired with line and load side power wiring for reversing applications. Each 4-pole device is prewired with load side power wiring.

Table 18.27: TeSys D Mechanically-Interlocked Reversing Contactors

Maximum Horsepower Ratings						Maximum Current (A)		Continuous Current Rating (A)	No. of N.O. Power Poles	Built In Auxiliary Contacts (per contactor)		Catalog Number *[47]*
Single-Phase		Three-Phase				Inductive AC3	Resistive AC1					
115 V	230 V	200 V	230 V	460 V	575 V					N.O.	N.C.	
1/3	1	2	2	5	7.5	9	20	25	3	1	1	LC2D09*[48]*
—	—	—	—	—	—	—			4	1	1	LC2DT20
1/2	2	3	3	7.5	10	12	25	25	3	1	1	LC2D12*[48]*
—	—	—	—	—	—	—			4	1	1	LC2DT25
1	3	5	5	10	15	18	32	32	3	1	1	LC2D18*[48]*
—	—	—	—	—	—	—			4	1	1	LC2DT32
2	3	7.5	7.5	15	20	25	40	40	3	1	1	LC2D25*[48]*
—	—	—	—	—	—	—			4	1	1	LC2DT40
2	5	10	10	20	25	32	50	50	3	1	1	LC2D32*[48]*
2	5	10	10	20	25	38			3	1	1	LC2D38*[48]*
3	5	10	10	30	30	40	60	60	3	1	1	LC2D40A
—	—	—	—	—	—	—			4	—	—	*[49]*
3	7.5	15	15	40	40	50	80	70	3	1	1	LC2D50A
5	10	20	20	40	50	65		80	3	1	1	LC2D65A
—	—	—	—	—	—	—			4	—	—	*[49]*
7.5	15	25	30	60	60	80	125	110	3	1	1	LC2D80
—	—	—	—	—	—	—			4	—	—	*[49]*
7.5	15	25	30	60	60	95			3	1	1	LC2D95
—	—	30	40	75	100	115	200	160	3	1	1	LC2D115*[50]*
—	—	—	—	—	—	—			4	—	—	LC2D115004 *[50]*
—	—	40	50	100	125	150			3	1	1	LC2D150*[50]*

LC2D25

E164862
CCN NLDX

LR43364
Class 3211 04

TeSys D contactor accessories: TeSys™ D & F Auxiliary Contacts, Time Delay, Mechanical Latch, page 18-15
TeSys D replacement coils: TeSys™ D AC Coils, page 18-43
TeSys D dimensions: TeSys™ D Contactors, AC and DC Coil, page 18-51 to TeSys™ D Thermal Overload Relay Dimensions, page 18-59

TeSys™ D Capacitor Contactors

LC1DFK

LC1DGK

LC1DTK

LC1DWK

Table 18.28: TeSys D Capacitor Contactors

Maximum Operational Power, kVAR			Instantaneous Auxiliary Contacts		Catalog Number *[51]*
Three-Phase			N.O.	N.C.	
230 V	460 V	575 V			
6	12.5	15	1	2	LC1DFK
8	16.7	20	1	2	LC1DGK
10	20	25	1	2	LC1DLK
12.5	25	30	1	2	LC1DMK
16.5	33.3	40	1	2	LC1DPK
20	40	50	1	2	LC1DTK
30	60	80	1	2	LC1DWK12

Table 18.29: Coil Voltage Codes for TeSys D Capacitor Contactor (50/60 Hz)

Voltage	24	48	110	120	220	230	240	380	400	415	440
Coil Code	B7	E7	F7	G7	M7	P7	U7	Q7	V7	N7	R7

[47] Includes mechanical interlock without electrical contacts. Installer to complete wiring for electronically interlocking contactor operating coils by using a N.C. auxiliary contact integrated in the contactor or optional LADN or LAD8N auxiliary contact block.
[48] For LC2D09–LC2D38, electrical interlock can be included by adding a **V** to the end of the catalog number (for example LC2D09B7**V**).
[49] For these items, order two non-reversing contactors and one mechanical interlock separately. See TeSys™ D Non-Reversing Contactors, page 18-8 for selection.
[50] Includes mechanical interlock (LA9D11502) with prewired electrical contacts for interlocking contactor operating coils.
[51] Complete the catalog number with the voltage code from Table 18.29 Coil Voltage Codes for TeSys D Capacitor Contactor (50/60 Hz), page 18-10 (for example, LC1DFK**G7**).

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TeSys™ F Catalog Number Interpretation

Table 18.30: TeSys F Contactors—Interpretation of the Catalog Number[52]

LC ____ F ____ ____ ____ ____

Full Voltage, Non-Reversing	1	
Full Voltage, Reversing	2	
TeSys F 2, 3, and 4 Pole Contactors 115–800 A		
Contactor AC-3 Full Load Amperes (FLA)		
115 A FLA		115
150 A FLA		150
185 A FLA		185
225 A FLA		225
265 A FLA		265
330 A FLA		330
400 A FLA		400
500 A FLA		500
630 A FLA		630
780 A FLA		780
800 A FLA		800
Number of Poles		
2 Poles (400 A, 500 A, and 630 A only)		2
3 Poles (all sizes)		Blank
4 Poles (all sizes except 800 A)		4
Termination Options—Purchase Lugs Separately		Blank

Coil Voltage (choose one, noting the contactor size it can be used on)

AC Coil Voltage	Coil Code	For use on:
24 V (50 Hz)	B5	LC1F115–F225
24 V (60 Hz)	B6	LC1F115–F225
24 V (40-400 Hz)	B7	LC1F225–F400
42 V (50 Hz)	D5	LC1F115–F225
48 V (50 Hz)	E5	LC1F115–F225
48 V (60 Hz)	E6	LC1F115–F225
48 V (40-400 Hz)	E7	LC1F115–F630
110 V (50 Hz)	F5	LC1F115–F225
110 V (60 Hz)	F6	LC1F115–F225
110 V	F7	LC1F1700, F2100
110 V (40-400 Hz)	F7	LC1F115–F780
115 V (50 Hz)	FE5	LC1F115–F225
115 V (40-400 Hz)	FE7	LC1F115–F780
120 V (60 Hz)	G6	LC1F115–F225
120 V (40-400 Hz)	G7	LC1F115–F400
120 V (40-400 Hz)	F7	LC1F500–F780, F170–F2100
127 V (60 Hz)	G6	LC1F115–F225
127 V (40-400 Hz)	G7	LC1F115–F780
200/208 V (60 Hz)	L6	LC1F115–F225
200/208 V (40-400 Hz)	L7	LC1F265–F780
208 V (40-400 Hz)	L7	LC1F115–F225
220 V (50 Hz)	M5	LC1F115–F225
220 V (60 Hz)	M6	LC1F115–F225
220 V (40-400 Hz)	M7	LC1F115–F780, F1700–F2100

AC Coil Voltage	Coil Code	For use on:
230 V (50 Hz)	P5	LC1F115–F225
230 V (40-400 Hz)	P7	LC1F115–F800, F1700–F2100
240 V (50 Hz)	U5	LC1F115–F225
240 V (60 Hz)	U6	LC1F115–F225
240 V (40-400 Hz)	U7	LC1F115–F780, F1700–F2100
277 V (50 Hz)	W5	LC1F115–F225
277 V (40-400 Hz)	W7	LC1F115–F780, F1700–F2100
380 V (50 Hz)	Q5	LC1F115–F225
380 V (60 Hz)	Q6	LC1F115–F225
380 V (40-400 Hz)	Q7	LC1F115–F780, F1700–F2100
400 V (50 Hz)	V5	LC1F115–F225
400 V (40-400 Hz)	V7	LC1F115–F800, F1700–F2100
415 V (50 Hz)	N5	LC1F115–F225
415 V (40-400 Hz)	N7	LC1F115–F780, F1700–F2100
440 V (50 Hz)	R5	LC1F115–F225
440 V (40-400 Hz)	R7	LC1F115–F780, F1700–F2100
460/480 V (60 Hz)	Q6	LC1F115–F225
480 V (40-400 Hz)	N7	LC1F780
500 V (50 Hz)	S5	LC1F115–F225
500 V (40-400 Hz)	S7	LC1F115–F780, F1700–F2100
600 V (40-400 Hz)	X7	LC1F500–F630
660 V (60 Hz)	Y6	LC1F115–F225

DC Coil Voltage	Coil Code	For use on:
24 V	BD	LC1F115–F400
48 V	ED	LC1F115–F630
110 V	FD	LC1F115–F780, LC1F1700–F2100
110 V	FW	LC1F800
125 V	GD	LC1F115–F780, LC1F1700–F2100
220 V	MD	LC1F265–F780
220/240 V	MW	LC1F800
250 V	UD	LC1F115–F780, LC1F17005–F2100
380/400 V	QW	LC1F800
440 V	RD	LC1F115–F780, LC1F1700–F2100

[52] Use this table **only** to interpret current catalog numbers. Some combinations are not available.

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TeSys™ F Non-Reversing Contactors

Table 18.31: TeSys F Contactors—2, 3, and 4 Pole

	Maximum Three-Phase Horsepower Ratings				Maximum Current (A)		Continuous Current Rating (A)	Number of Poles	Catalog Number [53]
	200 V	230 V	460 V	575 V	Inductive AC-3	Resistive AC-1			Panel Mount with Screws
LC1F330	30	40	75	100	115	200	175	3	LC1F115
								4	LC1F1154
	40	50	100	125	150	250	200	3	LC1F150
								4	LC1F1504
	50	60	125	150	185	275	200	3	LC1F185
								4	LC1F1854
	60	75	150	150	225	315	250	3	LC1F225
								4	LC1F2254
	60	75	150	200	265	350	285	3	LC1F265
								4	LC1F2654
	75	100	200	250	330	400	370	3	LC1F330
								4	LC1F3304
	100	125	250	300	400	500	420	2	LC1F4002
								3	LC1F400
								4	LC1F4004
LC1F1700, F2100	150	200	400	500	500	700	700	2	LC1F5002
								3	LC1F500
								4	LC1F5004
	250	300	600	800	630	1000	1000	2	LC1F6302
								3	LC1F630
								4	LC1F6304
	350	400	800	900	800	1000	1000	3	LC1F800
	—	450	900	900	780	1600	1350	3	LC1F780
								4	LC1F7804
	Current Rated					1400	1400	3	LC1F1400
						1700	1700	3	LC1F1700
						2100	2100	3	LC1F2100

Table 18.32: TeSys F Coil Voltage Codes [54]

Contactor	Hz	Coil Prefix	24 V	48 V	110 V	120 V	208 V	220 V	240 V	440 V	480 V
AC											
F115, F150, F185, and F225	50	LX1	B5	E5	F5	—	—	M5	U5	—	—
	60	LX1	B6	E6	F6	G6	L6	M6	U6	R6	Q5
	40–400	LX9	—	E7	F7	G7	L7	M7	U7	R7	S7
F265 and F330	40–400	LX1	B7	E7	F7	G7	L7	M7	U7	R7	S7
F400–F780	40–400	LX1	—	E7	F7	G7	L7	M7	U7	R7	S7
F1400–F2100	40–400	LX1	—	—	F7	G7	L7	M7	U7	R7	S7

Contactor	Coil Prefix	24 V	48 V	110 V	125 V	220 V	250 V	440 V
DC [55]								
F115–F330	LX4	BD	ED	FD	GD	MD	UD	RD
F400–F630	LX4	—	ED	FD	GD	MD	UD	RD
F780, F1400–F2100	LX4	—	—	FD	GD	MD	UD	RD

Table 18.33: Coil Voltage Codes for AC and DC Voltages for F800 (includes built-in surge suppressor)

Vac/Vdc	Hz	Coil Prefix	110 V	120 V	127 V	220 V	240 V	380 V	400 V	415 V
Code	40–400	LX4	FW	FW	FW	MW	MW	QW	QW	QW

TeSys™ F Overload Relays

Table 18.34: TeSys F 3-Phase Overload Relays—Solid State, Separate Mounting [56]

Current Setting Range A	For Direct Mounting to Contactor LC1●●●●	Class 10 Catalog Number	Class 20 Catalog Number	Class 10/20 Selectable Catalog Number
30–50	F115–F185	LR9F5357	LR9F5557	LR9F57
48–80	F115–F185	LR9F5363	LR9F5563	LR9F63
60–100	F115–F185	LR9F5367	LR9F5567	LR9F67
90–150	F115–F185	LR9F5369	LR9F5569	LR9F69
132–220	F185[57]–F400	LR9F5371	LR9F5571	LR9F71
200–330	F225–F500	LR9F7375	LR9F7575	LR9F75
300–500	F330–F500	LR9F7379	LR9F7579	LR9F79
380–630	F400–F630, F800	LR9F7381	LR9F7581	LR9F81

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TeSys F contactor accessories: TeSys™ D and F Accessories, page 18-16
TeSys F overload relay accessories: TeSys F Overload Relay Accessories, page 18-22
TeSys F replacement coils and parts: TeSys F Contact Kits, Arc Chambers, page 18-48, TeSys F AC Coils, page 18-44, and TeSys F DC Coils, page 18-47
TeSys F dimensions: TeSys F Contactors, Dimensions, page 18-53,TeSys™ F Overload Relay Dimensions, page 18-61

[53] Complete the catalog number with the coil voltage code from Table 18.32 TeSys F Coil Voltage Codes, page 18-12 and Table 18.33 Coil Voltage Codes for AC and DC Voltages for F800, page 18-12 (for example, LC1F115**G7**). All coils except F780 include 1 N.O. holding circuit interlock contact. The F780 uses 2 coils that must be wired in series.
[54] For additional voltage codes refer to the Control and Protection Components Catalog **MKTED210011EN**.
[55] DC coils for 3-pole contactors are fitted with built-in surge suppression as standard.
[56] When mounting overload relays LR9F5●57–LR9F5●71 and LR9F57–LR9F71 directly beneath the contactor, supporting the relays with a mounting plate is recommended. With overload relays LR9F7●75–LR9F7●81 and LR9F75–LR9F81, use of a support mounting plate is mandatory. Refer to TeSys F Overload Relay Accessories, page 18-22.
[57] Interconnection kit LA7F407 is required to mount an LR9F5●71 and LR9F71 to an LC1F185.

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LC1F265

TeSys™ F Reversing Contactors

Components are available for customer assembly of TeSys F reversing contactors. For example, the following components must be ordered to build a reversing contactor, 75 hp @ 460 V, with a 120 V / 60 Hz coil:

Table 18.35: Example of Components

Description	Quantity	Catalog Number
Contactors	2	LC1F115G6
Lugs (Suppressor Blocks, Lugs, page 18-21)	6	DZ2FF1
Auxiliary contacts	2	LADN11
Power connections	1	LA9FF976
Mechanical interlock	1	LA9FF970

Table 18.36: 3-Pole Contactors

Maximum Three-Phase Horsepower Ratings				Maximum Current (A)		Continuous Current Rating (A)	Holding Circuit Contact Built Into Coil		Catalog Number[58]
200 V	230 V	460 V	575 V	Inductive AC3	Resistive AC1		N.O.	N.C.	
30	40	75	100	115	200	175	1	0	LC1F115
40	50	100	125	150	250	200	1	0	LC1F150
50	60	125	150	185	275	200	1	0	LC1F185
60	75	150	150	225	315	250	1	0	LC1F225
60	75	150	200	265	350	285	1	0	LC1F265
75	100	200	250	330	400	370	1	0	LC1F330
100	125	250	300	400	500	420	1	0	LC1F400
150	200	400	500	500	700	700	1	0	LC1F500
250	300	600	800	630	1000	1000	1	0	LC1F630
350	400	800	900	800	1000	1000	0	0	LC1F800
—	450	900	900	780	1600	1350	0	0	LC1F780

Table 18.37: Auxiliary Contact (Electrical Interlocking)—2 must be purchased

For use with	Number of Contacts	Maximum Number of Blocks Per Contactor	Contact Arrangement		Catalog Number
			N.O.	N.C.	
LC1F to be ordered separately	1	1	1	—	LADN10[59]
			—	1	LADN01
	2	2	1	1	LADN11
			2	—	LADN20[59]
	4	2	2	2	LADN22
			1	3	LADN13
			4	—	LADN40[59]
			—	4	LADN04
			3	1	LADN31
			2	2	LADC22[60]

Table 18.38: Accessories—For the Assembly of 3-Pole Reversing Contactors (Horizontal Mounting)

With 2 Identical Contactors [61]	Set of Power Connections Catalog Number	Horizontal Mounting Mechanical Interlock Kit Catalog Number
LC1F115	LA9FF976	LA9FF970
LC1F150	LA9F15076	LA9FF970
LC1F185	LA9FG976	LA9FG970
LC1F225	LA9F22576	LA9FG970
LC1F265	LA9FH976	LA9FJ970
LC1F330	LA9FJ976	LA9FJ970
LC1F400	LA9FJ976	LA9FJ970
LC1F500	LA9FK976	LA9FJ970
LC1F630, F800	LA9FL976	LA9FL970

Table 18.39: Definite Purpose Ratings, 3-Phase, Breaking All Lines, 100,000 Cycles (Hermetic Refrigeration Compressor)

Device	FLA	LRA		
		240 V	480 V	600 V
LC1D09 (AC coil only)	9	54	45	36
LC1D12 (AC coil only)	12	72	60	48
LC1D18 (AC coil only)	18	108	90	72
LC1D25 (AC coil only)	25	150	125	100
LC1D32 (AC coil only)	32	192	160	128
LC1D40A	40	240	200	160
LC1D50A	50	300	250	200
LC1D65A	65	390	325	260
LC1D80	75	450	375	300
LC1D115	115	690	575	460
LC1D150	150	900	750	600

TeSys F contactor accessories: TeSys™ D and F Accessories, page 18-16
TeSys F overload relay accessories: TeSys F Overload Relay Accessories, page 18-22
TeSys F replacement coils and parts: TeSys F Contact Kits, Arc Chambers, page 18-48, TeSys F AC Coils, page 18-44, and TeSys F DC Coils, page 18-47
TeSys F dimensions: TeSys™ F Contactors, Dimensions, page 18-53

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[58] Complete the catalog number with the coil voltage code from TeSys F Coil Voltage Codes, page 18-12 and Coil Voltage Codes for AC and DC Voltages for F800, page 18-12 (for example, LC1F115**G7**). All coils except F780 include 1 N.O. holding circuit interlock contact. The F780 uses 2 coils that must be wired in series.
[59] Cannot be used for interlocking.
[60] Including 1 N.O. + 1 N.C. make-before-break overlapping contacts.
[61] For two contactors of different size, refer to pages Component parts, Vertical Mounting, page 18-20

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LA1KN22

LA2KT2U

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TeSys™ K Contactors

Table 18.40: Instantaneous Auxiliary Contact Blocks

Clip-on front mounting, 1 block per contactor and 2 blocks per pair of mechanically interlocked contactors			
Type of connection	Auxiliary Contacts		Catalog Number
	N.O.	N.C.	
Screw clamp	2	—	LA1KN20
	—	2	LA1KN02
	1	1	LA1KN11
	4	—	LA1KN40 *[1]*
	3	1	LA1KN31 *[1]*
	2	2	LA1KN22 *[1]*
	1	3	LA1KN13 *[1]*
	—	4	LA1KN04 *[1]*
Slip-on 1 x 0.250 in. or 2 x 0.110 in.	2	—	LA1KN207
	—	2	LA1KN027
	1	1	LA1KN117
	4	—	LA1KN407 *[1]*
	3	1	LA1KN317 *[1]*
	2	2	LA1KN227 *[1]*
	1	3	LA1KN137 *[1]*
	—	4	LA1KN047 *[1]*

Table 18.41: Electronic Time Delay Auxiliary Contact Blocks

Clip-on front mounting, 1 block per contactor and 2 blocks per pair of mechanically interlocked contactors				
Voltage (V)	Type	Timing Range (S)	Contacts	Catalog Number
24–48 Vac or Vdc	On-delay	1–30	SPDT	LA2KT2E
110–240 Vac	On-delay	1–30	SPDT	LA2KT2U

NOTE: Relay outputs, with single pole double throw, 240 Vac/Vdc, 2 A max.
Maximum switching capacity 250 VA / 150 W
Operating temperature: –10 to + 60°C (14 to 140°F)
Reset time: 1.5 s during time delay, 0.5 after time delay

Table 18.42: Suppressor Module with Incorporated LED Indicator

Clip-on front mounting			
Voltage range	Type	Sold in lots of	Catalog Number
12–24 Vac/Vdc	Varistor	5	LA4KE1B *[2]*
32–48 Vac/Vdc	Varistor	5	LA4KE1E *[2]*
50–129 Vac/Vdc	Varistor	5	LA4KE1FC *[2]*
130–250 Vac/Vdc	Varistor	5	LA4KE1UG *[2]*
12–24 Vdc	Diode + Zener	5	LA4KC1B *[3]*
32–48 Vdc	Diode + Zener	5	LA4KC1E *[3]*
220–250 Vac	RC	5	LA4KA1U *[4]*

Table 18.43: Paralleling Links

Description	Sold in lots of	Catalog Number
For 2 poles with screw-clamp terminals	4	LA9E01
For 4 poles with screw-clamp terminals	2	LA9E02

Table 18.44: Power Connectors

Description	Sold in lots of	Catalog Number
Set of 6 power connections for reversing contactors with screw-clamp terminals	100	LA9K0969
Set of 4 power connections for changeover contactors with screw-clamp terminals	100	LA9K0970

Table 18.45: Marking Strips

Description	Sold in lots of	Catalog Number
Clips onto front of the contactor	100	LA9D90

Table 18.46: Accessories for Overload Relays

Description	Type of Connection	Catalog Number
Terminal block for separate clip-on mounting of the overload relay onto 35 mm omega rail (AM1DP200)	Screw-clamp	LA7K0064

[1] Block of 4 contacts cannot be used with LP4K or LP5K contactors.
[2] Protection by limitation of the transient voltage to 2 Uc maximum. Maximum reduction of the transient voltage peaks. Slight time delay on drop-out (1.1–1.5 times normal).
[3] No overvoltage or oscillation frequency. Polarized component. Slight time delay on drop-out (1.1–1.5 times normal).
[4] Protection by limitation of the transient voltage to 3 Uc maximum and limitation of the oscillation frequency. Slight time delay on drop-out (1.2 times normal).

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Front Mounted
Auxiliary Blocks

TeSys™ D and F Auxiliary Contacts, Time Delay, Mechanical Latch

Table 18.47: Standard, Instantaneous Auxiliary Contact Blocks

Snap-On Mounting	Number of Contacts	Contact Arrangement N.O.	Contact Arrangement N.C.	Catalog Number *[5]*
To front of LC●DT20–D258 (4P), LC●D09–D150 *[5]* or **To right side of** LC●F	4 *[5]*	2	2	LADN22 *[6]*
		1	3	LADN13 *[6]*
		4	0	LADN40*[6]*
		0	4	LADN04 *[6]*
		3	1	LADN31 *[6]*
		2	2	LADC22 *[6]* *[7]*
	2	1	1	LADN11 *[6]*
		2	0	LADN20 *[6]*
		0	2	LADN02 *[6]*
To front of LC●D80–D150 or **To left side of** LC●F	1	1	0	LADN10 *[8]*
		0	1	LADN01 *[8]*
To side of LC●D09 to D150 only (not for use on TeSys F)	2	1	1	LAD8N11 *[9]*
		2	0	LAD8N20 *[9]*

Table 18.48: Instantaneous Blocks with Dust-Tight Auxiliary Contacts (IP54) NEMA 12

Snap-On Mounting	Standard Contacts N.O.	Standard Contacts N.C.	Dust-Tight Contacts N.O.	Dust-Tight Contacts N.C.	Catalog Number
To front of LP●D40–D80, LC●DT20–D258 (4P), LC●D09 to D95 or **To right side of** LC●F	—	—	2	—	LA1DX20
	2	—	2	—	LA1DZ40
	1	1	2	—	LA1DZ31
	—	—	2	—	LA1DY20 *[10]*

Table 18.49: Pneumatic Time Delay Contact Blocks

Snap-On Mounting	Time Delay Contacts N.O.	Time Delay Contacts N.C.	Type	Range of Time Delay	Catalog Number *[11]*
To front of LP●D40–D80, LC●DT20–D258 (4P), LC●D09 to D150 or **To right side of** LC●F	1	1	On energization (on delay)	0.1 to 3 s *[12]*	LADT0
				0.1 to 30 s	LADT2
				10 to 180 s	LADT4
				1 to 30 s *[13]*	LADS2
	1	1	On de-energization (off-delay)	0.1 to 3 s *[12]*	LADR0
				0.1 to 30 s	LADR2
				10 to 180 s	LADR4

Table 18.50: Mechanical Latch Blocks with Manual or Electrical Unlatch (TeSys D only)

Front snap-on mounting onto	Application	Catalog Number*[14]*
LC●D09 to D65A	For silent operation and energy conservation	LAD6K10*[15]*[16]
LC1D80 to D150, LP1D80	For silent operation and energy conservation	LA6DK20*[15]*

Table 18.51: Coil Voltage Codes for LA6DK Mechanical Latch Blocks

Volts	12	24	32/36	42/48	60/72	100	110/127	200/208	220/240	380/415	440/480	500/600
AC or DC	J	B	C	E	EN	K	F	L	M	Q	R	S

TeSys D contactors: TeSys™ D Non-Reversing Contactors, page 18-8 and TeSys™ D Reversing Contactors, page 18-10
TeSys D overload relay accessories: TeSys D Overload Relay Accessories, page 18-22
TeSys D replacement coils: TeSys™ D AC Coils, page 18-43
TeSys D dimensions: TeSys™ D Contactors, AC and DC Coil, page 18-51 to TeSys™ D Thermal Overload Relay Dimensions, page 18-59

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[5] For low consumption coils (LC1D09–D38 only), only one front-mounted two-contact block allowed. No side-mounted contact blocks allowed.
[6] For spring terminal versions of these blocks, add a **3** to the end of the catalog number (for example, LADN22**3**). For slip-on versions, add **9** to the end of the catalog number (for example, LADN22**9**).
[7] Including 1 N.O. + 1 N.C. make-before break overlapping contacts.
[8] This block cannot be added to the LC1D 09–D38 contactors; a maximum of 2 blocks can be mounted on the LC1D40A-LC1/LP1D80 contactors only.
[9] 1 block may be added to the left side of LC1D09–D38, AC coils only; only 1 block may be added to either side of the LC1D40A-D80 contactors, AC coils only. Cannot be installed on TeSys D contactors with DC coils.
[10] Device supplied with 4 ground terminal points.
[11] For spring terminal versions of these blocks, add a **3** to the end of the catalog number (for example, LADT2**3**).
[12] Scale range is expanded between 0.1 and 0.6 seconds on the dial for more accurate settings at the lower end of the range.
[13] Switching time between the opening of the N.C. contact and the closing of the N.O. contact: 40 ms ± 15 ms .
[14] To complete the catalog number, add the coil voltage code from Table 18.51 Coil Voltage Codes for LA6DK Mechanical Latch Blocks, page 18-15 (for example, LAD6K10F).
[15] Does not include internal coil clearing contact.
[16] Low consumption DC contactors (and relays) (code coil ●L) are not compatible with the LAD6K10● mechanical latching blocks.

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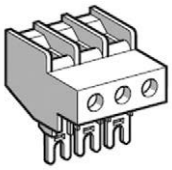
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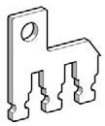
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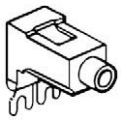
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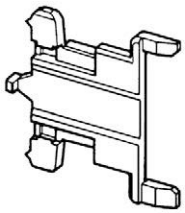
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TeSys™ D and F Accessories

Table 18.52: For Power Pole or Control Connection

Description			For use with contactors LC1/LP1	Sold in lots of	Catalog Number
Connectors for larger cable sizes	4 poles	#8 AWG (10 mm²)	DT20, DT25	1	LAD92560
	3 poles	#4 AWG (25 mm²)	D09–D38	1	LA9D3260
Everlink™ terminal block	3 poles		D40A–D65A	1	LAD96560
Links for the parallel connection of:	2 poles		D09–D38	10	LA9D2561
			D40A–D65A	1	LAD9P32
			D80, D95	2	LA9D80961
			F115	4	LA9FF602
			F150, F185	4	LA9FG602
			F225, F265, F330, F400	4	LA9FH602
			F500	4	LA9FK602
			F630, F800	4	LA9FL602
	3 poles (wye-delta shorting strap)		D09–D38	10	LAD9P3
			D40A-D65A	1	LAD9P33
			D80, D95	1	LA9D80962
			F115	1	LA9FF601
			F150, F185	1	LA9FG601
			F225, F265, F330, F400	1	LA9FH601
			F500	1	LA9FK601
			F630, F800	1	LA9FL601
	4 poles		DT20, DT25	2	LA9D1263
			D80, D95	2	LA9D80963
Second coil connection			LP1D80	10	LA9D09966
Control circuit take-off from main pole			D80, D95	10	LA9D8067
			D115, D150	10	LA9D11567
Spreaders for increasing pole pitch to 45 mm			D115, D150	3	GV7AC03
Replacement power terminal block			D115, D150	1	LA9D115603

Table 18.53: For Marking

Description	For use with contactors LC1/LP1	Sold in lots of	Catalog Number
Reference label holder snap-on 8 x 22 mm	4-pole contactors D80–D115	100	LA9D92
Reference label holder snap-on 8 x 18 mm 3 poles	D09-D65A, DT20-DT80A, LADN, LADT, LADR	100	LAD90
Sheet of 300 labels self adhesive 7 x 21 mm	For holder LA9D92	1	LA9D93

Table 18.54: For Mounting

Description	For use with contactors LC1/LP1	Sold in lots of	Catalog Number
Set of shims for mounting LAD8N and LA8DN	D80 to D95	1	LA9D511
Retrofit plate for replacement of LC1D40-D65 with LC1D40A-D65A	D40A-D65A	1	LAD7X3
35 mm DIN Rail – 2 meters long	LC1D09 to D80	10	AM1DP200

Table 18.55: Replacement Contacts

	For use with contactors		Catalog Number
Three-pole	LC1D115	3 poles	LA5D1158031
	LC1D150	3 poles	LA5D150803
Four-pole	LC1D115	4 poles	LA5D115804

Table 18.56: Arc Chambers

	For use with contactors		Catalog Number
Three-pole	LC1D115	3 poles	LA5D11550
	LC1D150	3 poles	LA5D15050
Four-pole	LC1D115	4 poles	LA5D115450

TeSys D contactors: TeSys™ D Non-Reversing Contactors, page 18-8 and TeSys™ D Reversing Contactors, page 18-10
TeSys D overload relay accessories: TeSys D Overload Relay Accessories, page 18-22
TeSys D contactor accessories: TeSys™ D & F Auxiliary Contacts, Time Delay, Mechanical Latch, page 18-15
TeSys D replacement coils: TeSys™ D AC Coils, page 18-43
TeSys D dimensions: TeSys™ D Contactors, AC and DC Coil, page 18-51 to TeSys™ D Thermal Overload Relay Dimensions, page 18-59
TeSys F contactors: TeSys™ F Non-Reversing Contactors, page 18-12 and TeSys™ F Reversing Contactors, page 18-13
TeSys F replacement coils and parts: TeSys F Contact Kits, Arc Chambers, page 18-48, TeSys F AC Coils, page 18-44, and TeSys F DC Coils, page 18-47

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LA4DA1U

RC and Varistor Coil Suppressors

RC Coil Suppressor

- Limitation of transient voltage to 300% of nominal voltage maximum.
- Oscillating frequency limited to 400 Hz maximum. Slight increase in drop-out time (1.2 to 2 times normal).

Table 18.57: Resistor/Capacitor Circuit (RC) for Reduction of Electrical Noise in AC Contactor Coils

Installed by	Mounting on	Operating Voltage 50/60 Hz	Catalog Number
Snapping into the cavity on the right side without tools[17]	LC●D09 to D38 (3P), LC1DT20 to DT40 (4P)	24–28 Vac	LAD4RCE
		50–127 Vac	LAD4RCG
		110–240 Vac	LAD4RCU
Snap-on mounting, and connection without tools to the contactor coil terminals	LC1D40A to 65A (3P), LC1DT60A to DT80A (4P)	24-48 Vac	LAD4RC3E
		50-127 Vac	LAD4RC3G
		110-240 Vac	LAD4RC3U
		380-415 Vac	LAD4RC3N
Screw connection to the contactor coil terminals	LC●D80 to D150 (3P), LC1D80 to D115 (4P)	24–48 Vac	LA4DA2E
		50–127 Vac	LA4DA2G
		110–240 Vac	LA4DA2U
		380–415 Vac	LA4DA2N

Varistor Coil Suppressor

- Limitation of transient voltage value to 200% of nominal voltage maximum.
- Maximum reduction of transient voltage peaks. Slight increase in drop-out time (1.1 to 1.5 times normal).

Table 18.58: Varistor (Peak Limiting) for Reduction of Electrical Noise in AC Contactor Coils

Installed by	Mounting on	Operating Voltage	Catalog Number
Snapping into the cavity on the right side without tools[17]	LC●D09 to D38 (3P), LC1DT20 to DT40 (4P)	24–48 Vac	LAD4VE
		50–127 Vac	LAD4VG
		110–250 Vac	LAD4VU
Snap-on mounting, and connection without tools to the contactor coil terminals	LC1D40A to D65A (3P), LC1DT60A to DT80A (4P)	24–48 Vac/Vdc	LAD4V3E
		50–127 Vac/Vdc	LAD4V3G
		110–250 Vac/Vdc	LAD4V3U
Screw connection to the contactor coil terminals	LC●D80 to D115 (3P) LC1D80 to D115 (4P)	24–48 Vac	LA4DE2E
		50–127 Vac	LA4DE2G
		110–250 Vac	LA4DE2U
Screw connection to the contactor coil terminals	LC●D80 to D95 (3P) LC1D80 (4P)	24–48 Vdc	LA4DE3E
		50–127 Vdc	LA4DE3G
		110–250 Vdc	LA4DE3U

Diode Coil Suppressor

LA4DC3U

- No overvoltage or oscillating frequency.
- Polarized component. Increased drop-out time (6–10 times normal).

Table 18.59: Diode for Reduction of Electrical Noise in DC Contactor Coils

Installed on the upper part by	Mounting on	Operating Voltage, DC	Catalog Number
Snap-on mounting and connection w/o tools to the contactor coil terminals	LC●D09 to D38 (3P), LC1DT20 to DT40 (4P)	24–250 Vdc	LAD4DDL
Clip-on front mounting	LC●D40A to D65A (3P), LC1DT60A to DT80A (4P)	24–250 Vdc	LAD4D3U
Screw connection of wire to the contactor coil terminals	LC●D80 to D95 (3P), LC1D80 (4P)	24–250 Vdc	LA4DC3U

[17] Installing the suppressor into the cavity makes the electrical connection. Overall width of the contactor remains the same.

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Bidirectional Diode Coil Suppressor

- Protection provided by limiting the transient voltage to 2 Uc max.
- Maximum reduction of transient voltage peaks

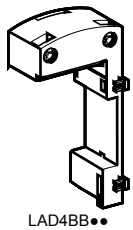
LAD4T3B

Table 18.60: Bidirectional Peak Limiting Diode

Installed by	Mounting on	Operating Voltage		Catalog Number
		Vac (50/60 Hz)	Vdc	
Snapping into the cavity on the right side of the contactor *[18]*	LC●D09 to D38 (3P)*[19]* LC1DT20 to DT40 (4P)	24	—	LAD4TB
		—	24	LAD4TBDL
		72	—	LAD4TS
		—	72	LAD4TSDL
		—	125	LAD4TGDL
		—	250	LAD4TUDL
		—	600	LAD4TXDL
Clip-on front mounting and connection without tools to the contactor coil terminals *[19]*	LC●D40A to D65A (3P), LC1DT60A to DT80A (4P)	12–24	12–24	LAD4T3B
		25–72	25–72	LAD4T3S
		73–125	73–125	LAD4T3G
		126–250	126–250	LAD4T3U
		251–440	251–440	LAD4T3R
Screw mounting *[20]*	LC●D80 to D95 (3P), LC1D80 (4P)	12–24	12–24	LA4DB2B
		25–72	25–72	LA4DB2S
		—	24	LA4DB3B
		—	72	LA4DB3S

Table 18.61: Cabling Accessories

Usage	Mounting on	Operating Voltage 50/60 Hz		Catalog Number
For adapting existing wiring to a new product or for use with top-mounting accessory.	LC1D09 to D38	Without coil suppression		LAD4BB
		With coil suppression (varistor)	24-48 Vac	LAD4BBVE
			50-127 Vac	LAD4BBVG
			110-250 Vac	LAD4BBVU
For adapting existing wiring to a new product or for use with top-mounting accessory	LC1D40A to D65A	Without coil suppression		LAD4BB3


LAD4BB●●

TeSys D contactors: TeSys™ D Non-Reversing Contactors, page 18-8 and TeSys™ D Reversing Contactors, page 18-10
TeSys D contactor accessories: TeSys™ D & F Auxiliary Contacts, Time Delay, Mechanical Latch, page 18-15
TeSys D overload relay accessories: TeSys D Overload Relay Accessories, page 18-22
TeSys D replacement coils: TeSys™ D AC Coils, page 18-43
TeSys D dimensions: TeSys™ D Contactors, AC and DC Coil, page 18-51 to TeSys™ D Thermal Overload Relay Dimensions, page 18-59

TeSys™ D Electronic Timers and Interface Modules

The following accessories require use of cabling accessories (LAD4BB●●) for proper mounting. See Bidirectional Diode Coil Suppressor, page 18-18 for illustration.

Table 18.62: Electronic Serial Timer Modules

Type	Operational Voltage *[21]*		Time Delay	Catalog Number
	24–250 Vac	100–250 Vac		
On-delay	LC1D09–D65A	LC1D80–D150	0.1–2 s	LA4DT0U
			1.5–30 s	LA4DT2U
			25–500 s	LA4DT4U

Table 18.63: Interface Modules

Interface Type*[22]*	Operational Voltage		Input Voltage	Catalog Number
	24–250 Vac	100–250 Vac		
Relay	LC1D09–D150	—	24 Vdc	LA4DFB
	LC1D09–D150	—	48 Vdc	LA4DFE
Relay Plus Manual Operation	LC1D09–D150	—	24 Vdc	LA4DLB
	LC1D09–D150	—	48 Vdc	LA4DLE
Solid State	LC1D09–D65A	LC1D80–D115	24 Vdc	LA4DWB

LA4DFE

Table 18.64: Automatic-Manual-Stop Control Modules

Operational Voltage		Catalog Number
24–100 Vac	100–250 Vac	
LC1D09–D150	—	LA4DMK

Table 18.65: TeSys Safety-Chain Identification System *New!*

Description	Compatibility	Package Qty	Catalog Number
Red retrofit contactor safety cover	LC1D09 to D65A, CAD32, CAD50	10	LAD9ET1S
	LC1D80	1	LAD9ET3S
	LC1D115 to D150	1	LAD9ET4S
Red auxiliary contact block, 2 N.O. + 2 N.C.	LC1D09 to D150, CAD32, CAD50	1	LADN22S
Red retrofit safety sticker	TeSys U	10	LU9ET1S

LAD9ET1S

LADN22S

LU9ET1S

[18] Installing the suppressor into the cavity makes the electrical connection. Overall width of the contactor remains the same.
[19] For LC●D09–LC●D65A with DC or low consumption DC coils, 3-pole contactors are fitted with built-in bidirectional diode suppression as standard.
[20] Mounting at the top of the contactor on coil terminals A1 and A2.
[21] For 24 V operation, the contactor must be fitted with a 21 V coil: coil voltage code Z5 for 50 Hz; Z6 for 60 Hz; and ZD for DC.
[22] Adapter required for D09–D65A, see Cabling Accessories, page 18-18.

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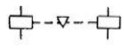
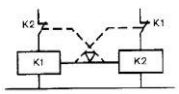
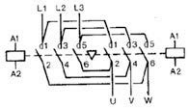
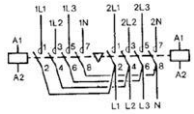
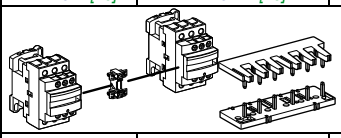
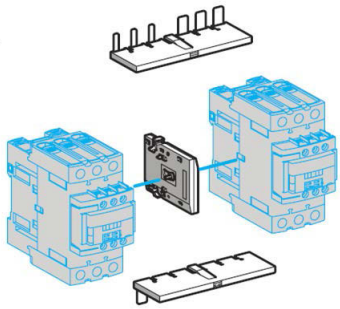
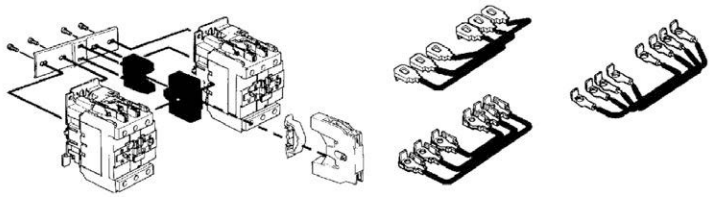
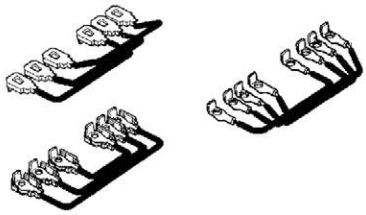
TeSys™ D Reversing Contactors

Table 18.66: Contactors

Reversing contactors comprising two identical, horizontally mounted contactors:	Mechanical interlock		Set of power connections	
	Without electrical interlock	With incorporated electrical interlock (2 N.C. contacts)	Reversing contactors for motor control	Four pole contactors
				
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
LC1D09, LC1D12, LC1D18, LC1D25, LC1D32, LC1D38	LAD9R1*[23]*	LAD9R1V*[23]*	Included with kit	—
LC1DT20, LC1DT25, LC1DT32, LC1DT40	LADT9R1*[23]*	LADT9R1V*[23]*	—	Included with kit
				
LC1D40A, D50A, D65A	LAD4CM	—	LA9D65A69	—
	LAD9R3 *[24]*	—	—	—
				
LC1D80 and D95 (AC coil)	LA9D50978	LA9D4002	LA9D8069	LA9D8070
LC1D80 and D95 (DC coil)	LA9D80978	LA9D8002	LA9D8069	LA9D8070
				
LC1D115 and LC1D150	Not Available	LA9D11502	LA9D11569	LA9D11570 (4P) (D115 only)
				

TeSys D contactors: TeSys™ D Non-Reversing Contactors, page 18-8 and TeSys™ D Reversing Contactors, page 18-10
TeSys D contactor accessories: TeSys™ D & F Auxiliary Contacts, Time Delay, Mechanical Latch, page 18-15
TeSys D replacement coils: TeSys™ D AC Coils, page 18-43
TeSys D dimensions: TeSys™ D Contactors, AC and DC Coil, page 18-51 to TeSys™ D Thermal Overload Relay Dimensions, page 18-59

[23] Kit including mechanical interlock and wiring.
[24] Kit combines both LAD4CM and LA9D65A69

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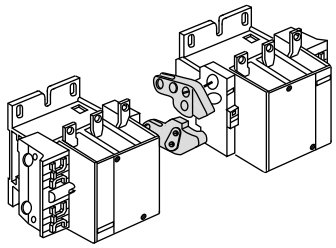
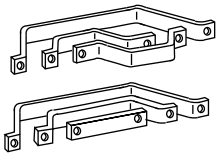
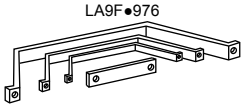


LA9F●970



LA9F●976



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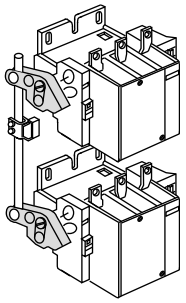
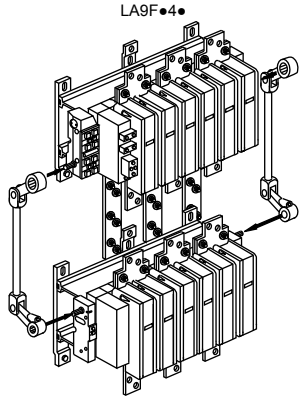
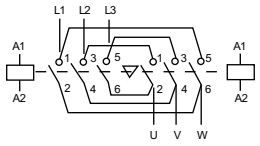


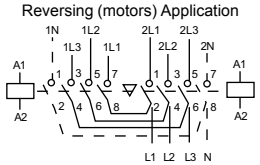
LA9F●4●



LA9FX970



Reversing (motors) Application



Transfer/Changeover Applications

TeSys™ F Component Parts and Vertical Mounting

Table 18.67: Component Parts for the Assembly of F-Line 3-pole Reversing Contactors

With 2 Identical Contactors	Set of Power Connections Cat. No.	Mechanical Interlock Kit Cat. No.
Horizontal Mounting		
LC1F115	LA9FF976	LA9FF970
LC1F150	LA9F15076	LA9FF970
LC1F185	LA9FG976	LA9FG970
LC1F225	LA9F22576	LA9FG970
LC1F265	LA9FH976	LA9FJ970
LC1F330	LA9FJ976	LA9FJ970
LC1F400	LA9FJ976	LA9FJ970
LC1F500	LA9FK976	LA9FJ970
LC1F630 or F800	LA9FL976	LA9FL970
Vertical Mounting		
LC1F115 or F150	*[25]*	LA9FF4F
LC1F185 or F225	*[25]*	LA9FG4G
LC1F265	*[25]*	LA9FH4H
LC1F330	*[25]*	LA9FJ4J
LC1F400	*[25]*	LA9FJ4J
LC1F500	*[25]*	LA9FK4K
LC1F630 or F800	*[25]*	LA9FL4L
LC1F780	*[26]*	LA9FX970 *[26]*

Table 18.68: Component Parts for the Assembly of TeSys F 3-pole or 4-pole Transfer Contactors

Mounting	Set of Power Connections		Mechanical Interlock Kit Cat. No.
	Three-Pole	Four-Pole	
Horizontal Mounting			
LC1F115/4	LA9FF982	LA9FF977	LA9FF970
LC1F150/4	LA9F15082	LA9F15077	LA9FF970
LC1F185/4	LA9FG982	LA9FG977	LA9FG970
LC1F225/4	LA9F22582	LA9F22577	LA9FG970
LC1F265/4	LA9FH982	LA9FH977	LA9FJ970
LC1F330/4	LA9FJ982	LA9FJ977	LA9FJ970
LC1F400/4	LA9FJ982	LA9FJ977	LA9FJ970
LC1F500/4	LA9FK982	LA9FK977	LA9FJ970
LC1F630/4	LA9FL982	LA9FL977	LA9FL970
Vertical Mounting			
LC1F115/4 or F150/4	*[25]*	*[25]*	LA9FF4F
LC1F185/4 or F225/4	*[25]*	*[25]*	LA9FG4G
LC1F265/4	*[25]*	*[25]*	LA9FH4H
LC1F330/4	*[25]*	*[25]*	LA9FJ4J
LC1F400/4	*[25]*	*[25]*	LA9FJ4J
LC1F500/4	*[25]*	*[25]*	LA9FK4K
LC1F630/4	*[25]*	*[25]*	LA9FL4L
LC1F780	*[26]*	—	LA9FX970 *[26]*
LC1F7804	—	*[27]*	LA9FX971 *[27]*

Table 18.69: Vertical Mounting of 2 Contactors of Different Ratings *[28]*

Upper Contactor	Lower Contactor *[29]*	Mechanical Interlock Kit Cat. No.
LC1F185/4 or F225/4	LC1F115/4 or F150/4	LA9FG4F
LC1F265/4 or F330/4	LC1F115/4 or F150/4	LA9FH4F
LC1F265/4 or F330/4	LC1F185/4 or F225/4	LA9FH4G
LC1F400/4	LC1F115/4 or F150/4	LA9FJ4F
	LC1F185/4 or F225/4	LA9FJ4G
	LC1F265/4 or F330/4	LA9FJ4H
LC1F500/4	LC1F115/4 or F150/4	LA9FK4F
	LC1F185/4 or F225/4	LA9FK4G
	LC1F265/4 or F330/4	LA9FK4H
	LC1F400/4	LA9FK4J
LC1F630/4 or F800	LC1F115/4 or F150/4	LA9FL4F
	LC1F185/4 or F225/4	LA9FL4G
	LC1F265/4 or F330/4	LA9FL4H
	LC1F400/4	LA9FL4J
	LC1F500/4	LA9FL4K

TeSys F contactors: TeSys™ F Non-Reversing Contactors, page 18-12 and TeSys™ F Reversing Contactors, page 18-13
TeSys F contactor accessories: TeSys™ D and F Accessories, page 18-16
TeSys F overload relay accessories: TeSys F Overload Relay Accessories, page 18-22
TeSys F replacement coils and parts: TeSys F Contact Kits, Arc Chambers, page 18-48, TeSys F AC Coils, page 18-44, and TeSys F DC Coils, page 18-47
TeSys F dimensions: TeSys™ F Contactors, Dimensions, page 18-53, TeSys™ F Overload Relay Dimensions, page 18-61

[25] Power connection to be assembled by the customer.
[26] Double mechanical interlock with 2 mechanical links and 3 power connection bars.
[27] Double mechanical interlock with 2 mechanical links and 4 power connection bars.
[28] With identical or different numbers of poles.
[29] Lower contactor must have equal or lesser current rating.

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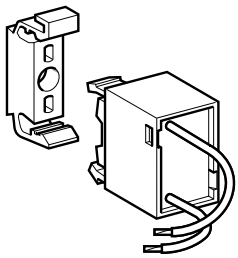


LA9D09981, LA9F980

TeSys™ F Contactors

Table 18.70: Suppressor Blocks

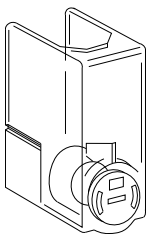
Operating limit: up to 220 V, 50/60 Hz coils		
Description	**For Use with coils**	**Catalog Number**
Suppressor block (clip-on mounting to coil)	LX1FF, FG, FH, F115, F150, F185, F225, F265, F330	LA9F980
	LX1FJ, FK, FL, FX, F400, F500, F630, F780, LX9FF, FG, FH, F115, F150, F185, F225, F265, F330	LA9D09980
Mounting bracket (for 35 mm DIN rail or panel mounting) for suppressor block		LA9D09981

Table 18.71: Lugs and Lug Kits *[30]*

Contactor Type LC1	Lug Kit Catalog Number Contactor Only	Cable Size AWG range	Overload Relay	Directly mounted to contactor	Lugs Required		Cable size AWG range	
				LC1•	Line side of contactor	Load side of overload	Line side of contactor	Load side of overload
F115	DZ2FF6	14 to 2/0	LR9F5•57 to F5•69, LR9F57 to F69	F115	3 each DZ2FF1	3 each DZ2FG1	14 to 2/0	6 to 3/0
F150, F185	DZ2FG6	6 to 3/0	LR9F5•57 to F5•71, LR9F57 to F71	F150 to F185	1 each DZ2FG6		6 to 3/0	
—	—	—	LR9F5•71, LR9F71	F225, F265	1 each DZ2FH6		6 to 300 MCM	
F225, F265, F330	DZ2FH6	6 to 300 MCM	LR9F7•75 to F7•79, LR9F75 to F79	F265 or F330	3 each DZ2FH1	—	6 to 300 MCM	4 to 500 MCM
F400	DZ2FJ6	4 to 500 MCM	LR9F7•75 to F7•81, LR9F75 to F81	F400	3 each DZ2FJ1	—	4 to 500 MCM	4 to 500 MCM
F500	DZ2FK6	2 x 2 to 600 MCM	LR9F7•75 to F7•81, LR9F75 to F81	F500	3 each DZ2FK1	—	2x2 to 600 MCM	4 to 500 MCM
F630, F800	DZ2FL6	3 x 2 to 600 MCM	LR9F7•81, LR9F81	F630	1 each DZ2FL1 DZ2FL2 DZ2FL3	1 each DZ2FR1	3x2 to 600 MCM	4 to 500 MCM
F780	DZ2FX6	4 x 1/0 to 750 MCM	—	—	—	—	—	—

Table 18.72: Lugs, 2- and 4-Pole *[31]*

Contactor Type LC1	Lug Kit Catalog Number	Qty. Required		AL/CU Cable Size
		2-Pole	4-Pole	
F115	DZ2FF1	4	8	14 to 2/0
F150, F185	DZ2FG1	4	8	6 to 3/0
F225, F265, F330	DZ2FH1	4	8	6 to 300 MCM
F400	DZ2FJ1	4	8	4 to 500 MCM
F500	DZ2FK1	4	8	2 X 2 to 600 MCM
F630	DZ2FL• *[32]*	*[32]*	*[32]*	3 X 2 to 600 MCM
F780	DZ2FX1	4	8	4 X 1/0 to 750 MCM



LA9F70•

These clear plastic protective shrouds are an effective means to meet international touch-safe requirements for power terminals. They are designed to be used with power cables that have been bolted to the terminal.

NOTE: The protection shrouds do not attach to contactors or overloads using **DZ2F** lug kits.

Table 18.73: Power Terminal Protection Shrouds

For Use With 2-, 3-, And 4-pole Contactors	Number of Shrouds Per Set	Catalog Number
LC1F115	6	LA9F701
LC1F150, F185	6	LA9F702
LC1F225, F265, F330, F400 and F4002, F500 and F5002	6	LA9F703
LC1F630, F6302 and F800	6	LA9F704
LC1F1154	8	LA9F706
LC1F1504 and F1854	8	LA9F707
LC1F2254, F2654, F3304, F4004, F5004	8	LA9F708
LC1F6304	8	LA9F709

For contactors LC1F115, LC1F150, and LC1F185, an available touch-safe terminal block may be used in place of lugs for power connections.

Table 18.74: Insulated Terminal Blocks

For contactor type LC1	For overload relay LR9	Maximum Cable Size	Catalog Number
F115, F150, F185	F5•57, F5•63, F5•67, F5•69, F57, F63, F67, F69	300 MCM	LA9F103

TeSys F contactor accessories: TeSys™ D and F Accessories, page 18-16
TeSys F overload relay accessories: TeSys F Overload Relay Accessories, page 18-22
TeSys F replacement coils and parts: TeSys F Contact Kits, Arc Chambers, page 18-48, F AC, page 18-44, and TeSys F DC Coils, page 18-47
TeSys F dimensions: TeSys™ F Contactors, Dimensions, page 18-53, TeSys™ F Overload Relay Dimensions, page 18-61

[30] Lug kits ending in the number **6** include 6 identical lugs. In some cases the LR9F overload relay mounted directly on the load side of an LC1F contactor will require a different size lug for your choice of contactor and overload. If the two sizes are different, order 3 of each size lug. Mounting hardware (screws, washers, and nuts) are provided with the contactors and overload relays, not with the lugs.

[31] Lugs for LC1F contactors and overload relays must be ordered separately. Each kit consists of one lug. Mounting hardware (screws, washers, nuts) are provided with the contactors, not the lugs.

[32] For 2-pole F630 contactors, order two DZ2FL1 (L1 and T2), and two DZ2FL3 (L2 and T1).
For 4-pole F6304, order two DZ2FL1 (L1 and T4), four DZ2FL2 (L2, T2, L3, T3) and two DZ2FL3 (L4 and T1).

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LA7D901

LA7D03

TeSys D Overload Relay Accessories

Table 18.75: Mounting Kits and Plates[1]

Description	For use with overload relays:	Cat. No.
Separate mounting kits for mounting to 35 mm DIN rail or for panel mounting with screws	LRD01–35 and LR3D01–35	LAD7B10
	LRD01–35 and LRD01–35 for ring tongue terminals	LAD7B106
	LRD04L—32L, LR3D04L–32L, and LR9D01–32	LAD7B205
	LRD3●●●, LR3D3●●●, LR2D35●●	LA7D3064
Mounting plates for screw mounting at 110 mm (4.3 in.) centers	LRD01–35, LR3D01–35, LR2D15●●	DX1AP25
	LRD3●●●, LR3D3●●, LR2D35●●	LA7D902

Table 18.76: Accessories

Description	For use with	Standard Packaging	Catalog Number
Prewiring kit allows direct connection of the N.C. contact of relay LRD01–D32 or LR3D01–D32 to the contactor	LC1D09 to D18	10	LAD7C1
	LC1D25 to D38	10	LAD7C2
Stop button locking device	All relays except LRD01–D32, LR3D01–D32 and LR9D	10	LA7D901
Remote stop/tripping or electrical reset[2]	LRD01-D32, LRD3, LR3D01-D32, LR3D3	1	LAD703[3]
	All relays except LRD01–D32, LR3D01–D31	1	LA7D03[3]
Reset by flexible cable 500 mm (19.6 in.)	LRD01-D32, LRD3, LR3D3	1	LAD7305

Table 18.77: Control Circuit Voltages for LA7D03 and LAD703

Volts	12	24	48	110	220/230	380/400	415/440
AC 50/60 Hz	J[4]	B	E	F	M	Q	N
DC	J	B	E	F	M	—	—

LA7F90●

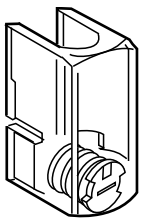
TeSys F Overload Relay Accessories

Table 18.78: Mounting Plate for Overload Relay

For use with relays	Catalog Number
LR9F5●57, F5●63, F5●67, F5●69, F5●71, F57, F63, F67, F69, and F71	LA7F901
LR9F7●75, F7●79, F5●81, F75, F79, and F81	LA7F902

These clear plastic protective shrouds are an effective means to meet international finger-safe requirements for power terminals. They are designed to be used with power cables that have been bolted to the terminal.

NOTE: Protection shrouds do not attach to contactors/overloads using DZ2F lug kits.



LA9F70●

Table 18.79: Power Terminal Protection Shrouds, Single-Pole

For use with relays	Catalog Number
LR9F5●57, F57	LA9F701
LR9F5●63, F5●67, F5●69, F63, F67, F69	LA9F702
LR9F5●71, F71	LA9F705
LR9F7●75, F7●79, F7●81, F75, F79, F81	LA9F703

Table 18.80: Power Terminal Protection Shrouds, 3-Pole

For use with relays	Catalog Number
LR9F5●57, F5●63, F5●67, F5●69, F57, F63, F67, F69	LA7F701
LR9F5●71, F71	LA7F702
LR9F7●75, F7●79, F7●81, F75, F79, F81	LA7F703

LA7F701

Table 18.81: Connection Accessories (for Mounting Overload Relays Beneath Reversing Contactors)[5]

Application		Set of 3 Busbars Catalog Number
For relays	For contactor	
LR9F5●57, F5●63, F5●67, F5●69, F69, F71	LC1F115	LA7F401
LR9F5●57, F5●63	LC1F150 and F185	LA7F402
LR9F5●71, F71	LC1F185	LA7F407
LR9F5●71, F71	LC1F225 and F265	LA7F403
LR9F7●75, F5●79, F75, F79	LC1F225 to F400	LA7F404
LR9F7●81, F81	LC1F400	LA7F404
LR9F7●75, F7●79, F7●81, F75, F79, F81	LC1F500	LA7F405
LR9F7●81, F81	LC1F630 and F800	LA7F406

Table 18.82: Marking Accessories

Description	Sold in units of:	Catalog Number
Marker holder, snap-in	100	LA7D903

Main overload selection: TeSys D AC and DC Contactors, page 18-7 and TeSys™ F AC and DC Contactors, page 18-11
TeSys D dimensions: TeSys™ D Open Starter Dimensions, page 18-57 and TeSys™ D Thermal Overload Relay Dimensions, page 18-59
TeSys F dimensions: TeSys™ F Contactors, Dimensions, page 18-53, TeSys™ F Overload Relay Dimensions, page 18-61
TeSys T: see TeSys™ T Motor Management System, page 16-101

[1] When using mounting plates, separate mounting kits are also required.
[3] Part number to be completed by adding coil voltage code, (for example, LAD703F).
[4] Not available for LRD01–D32, LR3D01–D32.
[5] Mounting plate required.

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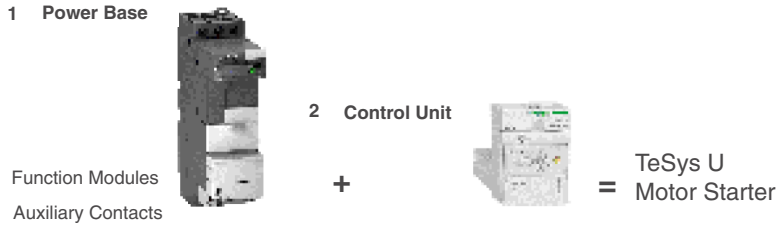
The TeSys U motor starter is integrated, making it simple to choose and install. It consists of a control unit snapped in a power base. TeSys U can be configured to fit specific applications as well. Optional accessories include a reverser, a current limiter, predictive maintenance options, and communication options.
For detailed information about TeSys U, visit our website.

TeSys™ U Motor Starter



Power Base LUB12

Power Base LUB120

Control Unit

Selecting TeSys U Motor Starters in Three Steps

Table 18.83: Step 1. Select Power Base (Only two different bases up to 32 A)

Control Connection	Max. Current (A)	Maximum Horsepower Ratings						Self-Protected Starter Base
		Three-Phase				Single-Phase		
		200 V	230 V	460 V	575 V	115 V	230 V	Catalog Number
With non-removable screw terminations	12	3	3	7.5	10	1.5	2	LUB12
	32	10	10	20	25	2	5	LUB32
Without screw terminations	12	3	3	7.5	10	1.5	2	LUB120*[1]*
	32	10	10	20	25	2	5	LUB320*[1]*

Table 18.84: Step 2. Select Control Unit *[2]*

Setting Range (A)	Standard 3-phase Class 10 trip *[3]*	Advanced 3-phase Class 10 trip *[3]*	Advanced single-phase Class 10 trip *[3]*	Advanced 3-phase Class 20 trip *[3]*
0.15–0.6	LUCAX6●●	LUCBX6●●	LUCCX6●●	LUCDX6●●
0.3–1.4	LUCA1X●●	LUCB1X●●	LUCC1X●●	LUCD1X●●
1.25–5.0	LUCA05●●	LUCB05●●	LUCC05●●	LUCD05●●
3–12	LUCA12●●	LUCB12●●	LUCC12●●	LUCD12●●
4.5–18	LUCA18●●	LUCB18●●	LUCC18●●	LUCD18●●
8–32	LUCA32●●	LUCB32●●	LUCC32●●	LUCD32●●

Table 18.85: Voltage Codes

Volts	24	48–72	110–240
DC	BL*[4]*	—	—
AC	B	—	—
DC or AC	—	ES*[5]*	FU

Table 18.86: Step 3. Select Auxiliary Contacts (optional)

	Terminals	Contact Indicates	Contact Normal Status	Contact State for Each Mode*[6]*						Catalog Number
				Off	Ready	Run	Short Circuit Trip	Overload Trip (Manual Reset)	Overload Trip (Remote/Auto Reset)*[7]*	
	Auxiliary Contact Blocks									
Auxiliary Contact	Screw	Ready condition	N.O.	O	I	I	O	O	I	LUA1C11
		Fault condition	N.C.	I	I	I	O	O	I	
	Screw	Ready condition	N.O.	O	I	I	O	O	I	LUA1C20
		Fault condition	N.O.	O	O	O	I	I	O	
	Auxiliary Contact Function Modules									
	Screw	Pole state	2 N.O.	O	O	I	O	O		LUFN20
	Screw	Pole state	1 N.O. and 1 N.C.	O | I	O | I	I | O	O | I	O | I		LUFN11
	Screw	Pole state	2 N.C.	1	I	O	I	I		LUFN02

Table 18.87: Accessories

Accessory	Quick Description	For details & selection, see:
Current limiter	Increases the breaking capacity to 130 kA @ 460 V and to 65 kA @ 575 V	Line Phase Barrier, Reverser, page 18-25
Reverser	Stacked or side mounted (LU6MB0●●● only)	Line Phase Barrier, Reverser, page 18-25
Line phase barrier	Required for use as a self-protected combination starter (UL 508 Type E)	Line Phase Barrier, Reverser, page 18-25
Multifunction control unit	Has functions for monitoring and predictive maintenance	Line Phase Barrier, Reverser, page 18-25
Function modules	Fault differentiation, thermal overload, motor load indication	Line Phase Barrier, Reverser, page 18-25
Communication modules	Integrates into existing networks, major portocols are available	Communication Modules and Control Circuit Accessories, page 18-26
Soft starter + TeSys U	Use Altistart U01soft starter with TeSys U	Altistart Drive and TeSys U Motor Starter, page 18-42
Powerbus	Use TeSys U with a prewired system	Communication Modules and Control Circuit Accessories, page 18-26
Configuration and connection accessories	SoMove software, bus bar, external handle	GV2 Cabling Accessories—Bus Bars, page 18-26

E164862
CCN NLDX

LR43364
Class 3211 04

Accessories: Power Base and Plug-in Accessories, page 18-24 to Powerbus, page 18-26
Dimensions: TeSys U Starter Dimensions, page 18-64
Overload Relays: TeSys™ K Overload Relays, page 18-3
Accessories: Aux Contact Blocks, page 18-14
Dimensions: TeSys K Contactor Dimensions, page 18-63

[1] For use with reversing modules or communication modules with prewired connector
[2] The control unit contains solid-state overload relay and control power source for TeSys U. For more details on the different control units, their functions, and placement on the power base, see Power Base and Plug-in Accessories, page 18-24
[3] Complete the catalog number by adding appropriate code from Table 18.85 Voltage Codes, page 18-23 (for example, LUCAX6FU).
[4] DC voltage with range of 0.90 to 1.10 of nominal.
[5] 48–72 Vdc; 48 Vac
[6] I indicates closed contact; O indicates open contact
[7] Requires multifunction or advanced control unit plus fault differentiation module LUFDA10.

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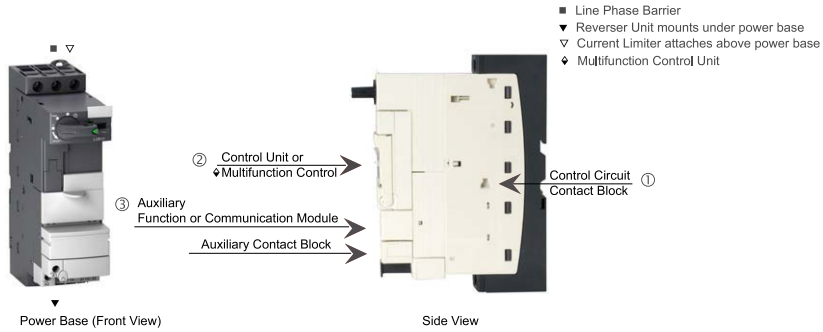
Control Units and Functions

Table 18.88: Control Units and Functions

	Standard		Advanced		Multifunction
Reference	**LUCA**	**LUCB**	**LUCC**	**LUCD**	**LUCM**
Protection type					
Class 10	■	■			■
Class 20				■	■
Class 5–30					■
Single Phase: LUCC Class 10 only			■		■
Protection functions					
Short circuit	■	■	■	■	■
Over current	■	■	■	■	■
Thermal overload	■	■	■	■	■
Phase loss	■	■		■	■
Phase imbalance	■	■		■	■
Ground fault	■	■	■	■	■
Underload, long start, jam					■
Control functions					
Manual reset	■				
Automatic or local/remote reset					■
Fault differentiation					■
Thermal alarm					■
Motor load display					■
Fault history					■
Alarm threshold adjustment					■
Tripping test					■
	■	= built-in the control unit			
		= works with the related function modules (see Line Phase Barrier, Reverser , page 18-25)			

Power Base and Plug-in Accessories

See below where to install accessories on the power base. Only one accessory can be installed in each location.



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Line Phase Barrier

Reverser Unit Assembled under the Power Base

TeSys™ U Simple Motor Starter

Table 18.89: Line Phase Barrier (optional) *[8]*

Description	Cat. No.
Incoming line phase barrier to allow the TeSys U to be used as a self-protected combination starter according to UL508 Type E	LU9SP0

Table 18.90: Reverser

Control Connection	Max. Current (A)	Maximum Horsepower Ratings						Self-Protected Starter Base Catalog Number
		Three-Phase				Single-Phase		
		200 V	230 V	460 V	575 V	115 V	230 V	
With screw terminations	12	3	3	7.5	10	1.5	2	LU2B12*[9]*
	32	10	10	20	25	2	5	LU2B32*[9]*

Table 18.91: Select Control Unit Options*[10][11]*

Setting Range (A)	Standard Three-Phase Class 10 trip *[12]*	Advanced Three-Phase Class 10 trip *[12]*	Advanced Single-Phase Class 10 trip *[12]*	Advanced Three-Phase Class 20 trip *[12]*
0.15–0.6	LUCAX6●●	LUCBX6●●	LUCCX6●●	LUCDX6●●
0.3–1.4	LUCA1X●●	LUCB1X●●	LUCC1X●●	LUCD1X●●
1.25–5.0	LUCA05●●	LUCB05●●	LUCC05●●	LUCD05●●
3–12	LUCA12●●	LUCB12●●	LUCC12●●	LUCD12●●
4.5–18	LUCA18●●	LUCB18●●	LUCC18●●	LUCD18●●
8–32	LUCA32●●	LUCB32●●	LUCC32●●	LUCD32●●

Table 18.92: Voltage Codes

Volts	24	48–72	110–240
DC	BL*[13][14]*	—	—
AC	B	—	—
DC or AC	—	ES*[15]*	FU

Table 18.93: Reversing Modules for Field Addition

Mounting	Catalog No.	Wiring Adapter	
Beneath	LU2MB0	LU9MR1C	**Note:** For LU2MB0 and LU6MB0, voltage code required; must match control unit.
Beside	LU6MB0	LU9MR1	

Table 18.94: Current Limiter *[16][17]*

Accessory	Application	Technical Data	Mounting	Cat. No.
Current limiter/isolator	Additional current limiting aspects for the starter	130 kA at 460 V 65 kA at 575 V	Direct mounting to LUB● and LU2B●	LUALB1
Limiter cartridge	Replacement cartridge for LUALB1	130 kA at 460 V 65 kA at 575 V	—	LUALF1

Table 18.95: Control Unit Multifunction *[16][18]*

Setting Range (A)	Multifunction programmable
0.15–0.6	LUCMX6BL
0.3–1.4	LUCM1XBL
1.25–5.0	LUCM05BL
3–12	LUCM12BL
4.5–18	LUCM18BL
8–32	LUCM32BL

Table 18.96: Function Modules *[16][19]*

Module	Description	For use with:	Operation Requirements	Catalog Number
Fault differentiation with manual reset (thermal overload)	Provides indication between an overload trip and a short circuit trip.	Advanced control units only	24–250 Vac or Vdc (power from control unit)	LUFDH11
Fault differentiation with auto reset				LUFDA10
Thermal overload pre-alarm	Signals when the motor current reaches 1.05 of the full load setting on the control unit.	Advanced control units only	24–250 Vac or Vdc (power from control unit)	LUFW10
Motor load indication	Provides a signal proportional to the average currents in the three phases divided by the full load current setting of the control unit. The output corresponds to a load status of 0–2 times the full load setting of the control unit.	Advanced or multi-function control units	4–20 mA (requires separate 24 Vdc power supply)	LUFV2
Parallel wiring	Provides a convenient way to reduce control wiring and allow for connecting starters to a communications network by providing 24 Vdc for the starters.	Advanced or multi-function control units (24 Vdc only) and LU9BN11C or LU9MRC prewired connector	LU9G02 splitter box and PLC network	LUFC00

Control Unit Multifunction

Alarm Differentiation

Parallel Wiring

Motor Load Indicator

[8] See Power Base and Plug-in Accessories, page 18-24 for placement on the power base.
[9] Voltage code required.
[10] The control unit contains solid-state overload relay and control power source for TeSys U. For more details on the different control units, their functions, and placement on the power base see Power Base and Plug-in Accessories, page 18-24.
[11] Control units for 4.5–18 and 8–32 can be used **only** with 32 A rated power bases (LUB32, LUB320, and LU2B32).
[12] Complete the catalog number by adding the appropriate code from Table 18.92 Voltage Codes, page 18-25 (for example, LUCAX6FU).
[13] DC voltage with range of 0.90 to 1.10 of nominal.
[14] Voltage code to use for a power base with a communication module.
[15] 48–72 Vdc; 48 Vac
[16] See Power Base and Plug-in Accessories, page 18-24 for placement on the power base.
[17] Increases the breaking capacity of the motor starter.
[18] Offers motor management system capabilities. For more details see the LUCM on Communication Modules and Control Circuit Accessories, page 18-26
[19] Offers customization for specific application requirements.

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AS-Interface

Modbus

DeviceNet

Profibus

CANopen

Communication Modules and Control Circuit Accessories

Table 18.97: Communication Modules *[20][21]*

Module	Description	For use with:	Operation Requirements	Catalog Number
AS-Interface Communication	Allows the TeSys U starter to be connected directly to the network using AS-Interface protocols.	Advanced or multi-function control units (24 Vdc only) and LU9BN11C or LU9MRC prewired connector	Requires separate 24 Vdc power supply and AS-Interface network	ASILUFC5
AS-Interface V2 Communication	Allows the TeSys U starter to be connected directly to the network using AS-Interface V2 protocols.	Advanced or multi-function control units (24 Vdc only) and LU9BN11C or LU9MRC prewired connector	Requires separate 24 Vdc power supply and AS-Interface V2 network	ASILUFC51
Modbus™ Communication Protocol	Allows the TeSys U starter to be connected directly to the network using Modbus protocols.	Advanced or multi-function control units (24 Vdc only) and LU9BN11C or LU9MRC prewired connector	Requires separate 24 Vdc power supply	LULC033
Advantys™ STB Communication	Allows the TeSys U starter to be connected to the network using the Advantsys STB protocol	Advanced or multi-function control units (24 Vdc only) and LU9BN11L or LU9MRL prewired connector	Requires separate 24 Vdc power supply	LULC15
CANopen Communication	Allows the TeSys U starter to be connected to the network using the CANopen protocol	Advanced or multi-function control units (24 Vdc only) and LU9BN11L or LU9MRL prewired connector	Requires separate 24 Vdc power supply	LULC08
Beckoff Communication	Allows the TeSys Ustarter to be connected to the network using the Beckoff protocol	Advanced or multi-function control units (24 Vdc only) and LU9BN11L or LU9MRL prewired connector	Requires separate 24 Vdc power supply	LULC14
Profibus Communication	Allows the TeSys U starter to be connected to the network using the Profibus protocol	Advanced or multi-function control units (24 Vdc only) and LU9BN11L or LU9MRL prewired connector	Requires separate 24 Vdc power supply	LULC07
DeviceNet™ Communication	Allows the TeSys U starter to be connected to the network using the Device Net protocol	Advanced or multi-function control units (24 Vdc only) and LU9BN11L or LU9MRL prewired connector	Requires separate 24 Vdc power supply	LULC09

Table 18.98: Control Circuit Accessories *[20]*

Accessory	Application	Technical Data	Mounting		Catalog Number
Control circuit contact block	Switches control circuit power via LUB● handle (NEC430-74 compliance)	5 A at 600 Vac 5 A at 250 Vdc	Side mounting to LUB● and LU2B● only		LUA8E20
Through-the-door operating mechanism	Use to enclose TeSys LUB● only.	NEMA 1, 12, 3R, 4, 4X Black without trip indication	Kit		LU9APN43
		NEMA 1, 12, 3R, 4, 4X Red/Yellow without trip indication	Kit		LU9APN44
Control circuit filters	Use with electronic or triac output controllers	Up to 150 Vac max.	Directly to coil terminals	Non-reversing	LUA4F11
				Reversing	LUA4F12
Pre-wire connector	Central control when using communication modules	See Table 18.97 Communication Modules, page 18-26 for usage.	Lower power terminals to communication module.	Non-reversing	LU9BN11C
					LU9BN11L
				Reversing	LU9MRL

Power Bus Bars

Table 18.99: TeSys U Cabling Accessories—Bus Bars

Description	Application	Pitch	Standard Pack	Catalog Number
3-Pole, 63 A Bus Bar	For feeding 2 TeSys U controllers	45	1	GV2G245
		54	1	GV2G254
		72	1	GV2G272
	For feeding 3 TeSys U controllers	45	1	GV2G345
		54	1	GV2G354
	For feeding 4 TeSys U controllers	45	1	GV2G445
		54	1	GV2G454
		72	1	GV2G472
	For feeding 5 TeSys U controllers	54	1	GV2G554

Additional accessories and components are available, including:

- Mounting accessories
- Gateways
- Cabling accessories
- Magelis™ remote display unit

[20] See Power Base and Plug-in Accessories, page 18-24 for placement on the power base.
[21] Communication capabilities can be integrated into existing automation architecture via a variety of protocols.

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1. Choose a base configuration

Table 18.100: Base Configurations New!

Ratings				Type 1/12/3R enclosure		Type 4/4X enclosure	
Motor Voltage (V)	Max. HP		Max. Current (A)	Non-reversing starter	Reversing starter	Non-reversing starter	Reversing starter
	Single phase	Three-phase		Base Configuration Number	Base Configuration Number	Base Configuration Number	Base Configuration Number
115	1.5		12	LE1U16	LE2U16	LE1U19	LE2U19
230	2						
200		3					
230		3					
460		7.5					
575		10					
115	2		32	LE1U36	LE2U36	LE1U39	LE2U39
230	5						
200		10					
230		10					
460		20					
575		25					

Type 1/12/3R enclosure

Type 4/4X enclosure

2. Choose Thermal Overload Relay (Plug-in Control Unit)

The thermal overload relay is a control unit that plugs into the TeSys U starter. No tool is needed to install or remove the control unit.

If you do not wish to select the thermal overload relay at this time, select Thermal Overload Relay Type codes N1 or N3 in function of the motor configuration (single phase or 3–phase) in Thermal Overload Protection Types, page 18-28. A thermal overload relay can be selected and ordered later on (independently) before installation.

In order to select a thermal overload relay, you must follow the next 2 steps. First, select the thermal overload protection type code in Thermal Overload Protection Types, page 18-28. Secondly, select the full load amperage code in Full Load Amperage Code, page 18-28.

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2.1 Choose the thermal overload protection type

Table 18.101: Thermal Overload Protection Types

	Advanced Control Unit			Multifunction Control Unit	No Control Unit (Ordered later on independently)	
					Single Phase	3-Phase
Thermal Overload Protection Type Code	**A ▲**	**B ▲**	**C ▲**	**D ▲**	**N1**	**N3**
Protection Type						
Single phase, Class 10	■					
3-phase, Class 10		■				
3-phase, Class 20			■			
3-phase, Selectable Class 5–30				■		
Protection Functions						
Short circuit	■	■	■	■		
Over current	■	■	■	■		
Thermal overload	■	■	■	■		
Phase loss		■	■	■		
Phase imbalance		■	■	■		
Ground fault	■	■	■	■		
Underload, long start, jam	♦	♦	♦	■		
Control Functions						
Automatic or local/remote reset	♦	♦	♦	■		
Fault differentiation	♦	♦	♦	■		
Thermal alarm	♦	♦	♦	■		
Motor load display	♦	♦	♦	■		
Fault history				■		
Alarm threshold adjustment				■		
Tripping test	■	■	■	■		

▲ Complete the Thermal Overload Relay Selection by adding the full load amperage code after the thermal overload protection type code.
■ Built-in Control Unit.
♦ Available when combined with appropriate Function module.

2.2 Choose the Motor Full Load Amperage

Table 18.102: Full Load Amperage Code

Full Load Amperage Setting Range (A)	Full Load Amperage Code
0.15–0.6	A
0.3–1.4	B
1.25–5.0	C
3–12	D
4.5–18	E
8–32	F

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3. Choose the Control Power Source

Table 18.103: Control Power Source Code

Control Circuit Source	System Type	Motor Voltage		Control Voltage		Control Power Source Code
		Voltage	Voltage Type	Voltage	Voltage Type	
Common Control	Single Phase	120	AC	120	AC	G7
		240	AC	240	AC	U7
	Three-Phase	208	AC	208	AC	LE7
		240	AC	240	AC	U7
Separate Control	Single Phase	120	AC	24	AC	B7 *[22]*
		120	AC	24	DC	BD *[22]*
		120	AC	120	AC	G7 *[22]*
		240	AC	24	AC	B7 *[22]*
		240	AC	24	DC	BD *[22]*
		240	AC	120	AC	G7 *[22]*
	Three-Phase	208	AC	24	AC	B7 *[22]*
		208	AC	24	DC	BD *[22]*
		208	AC	120	AC	G7 *[22]*
		240	AC	24	AC	B7 *[22]*
		240	AC	24	DC	BD *[22]*
		240	AC	120	AC	G7 *[22]*
		480	AC	24	AC	B7 *[22]*
		480	AC	24	DC	BD *[22]*
		480	AC	120	AC	G7 *[22]*
		600	AC	24	AC	B7 *[23]*
		600	AC	24	DC	BD *[23]*
		600	AC	120	AC	G7 *[23]*
Factory Installed Control Power Transformer *[24]*	Single Phase	120	AC	24	AC	V89
		240	AC	120	AC	V80
		240	AC	24	AC	V82
	Three-Phase	208	AC	24	AC	V90
		208	AC	120	AC	V84
		240	AC	24	AC	V82
		240	AC	120	AC	V80
		480	AC	24	AC	V83
		480	AC	120	AC	V81
		600	AC	24	AC	V91
		600	AC	120	AC	V86
Factory Installed Power Supply *[25]*	Single Phase	120	AC	24	DC	BD1
		240	AC	24	DC	BD2
	Three-Phase	208	AC	24	DC	BD2
		240	AC	24	DC	BD2
		480	AC	24	DC	BD2
		600	AC	24	DC	BD6

4. Choose Communication Type

If you do not need communication capabilities, select communication code N.

If a Communication protocol is selected, Control Voltage must be 24 Vdc (Control Power Source Codes BD, BD1, BD2 or BD6 only. Refer to Control Power Source Code, page 18-29).

If additional I/O is needed with communication, select communication code N in Table 18.104 Communication Code, page 18-29 and choose between Forms W10, W11, W12, W13 and W14 from Distributed 6 Input/6 Output Modicon STB with Communication Forms, page 18-31.

Table 18.104: Communication Code

Communication Protocol	Communication Code
Modbus	M
Modbus TCP/IP	E
CANopen	C
DeviceNet	D
Beckoff	B
Profibus	P
Advantys STB	A
AS-interface	J
AS-interface V2	K
No Communication	N

5. Choose Factory Modifications

When choosing Factory modifications, the Form code must be added at the end of the catalog number. If several forms are selected, they must be arranged in alphabetical order. There are two types of Forms available: abbreviated forms and standard forms.

[22] Form S must be added at the end of the catalog number.
[23] Form S6 must be added at the end of the catalog number. Current limiter is provided and factory installed.
[24] Two fuses in primary and one fuse in secondary provided as standard.
[25] Fuse holder with 2 fuses provided as standard.

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5.1 Abbreviated Forms

Abbreviated forms are defined combinations of the most commonly ordered standard forms and are part of the profiled configurations with short lead time. For example, abbreviated form CP1 is a combination of standard forms C and P51.

Abbreviated forms cannot be mixed with other standard forms, with the exceptions of forms S and S6. If your combination of forms is not available as an abbreviated form, use only standard forms and arrange them in alphabetical order. For example, LE1U16BDG7NCP1S is a valid catalog number with the abbreviated form CP1. If you want to add standard Form P68, the valid catalog number becomes LE1U16BDG7NCP51P68S. LE1U16BDG7NCP1P68S is invalid because abbreviated form CP1 cannot be used with standard form P68.

Table 18.105: Abbreviated Forms

Factory Modifications	Form
Hand/Off/Auto Selector Switch + Red ON LED Standard Pilot Light	CP1
Hand/Off/Auto Selector Switch + Green ON LED Standard Pilot Light	CP2
Hand/Off/Auto Selector Switch + Red ON LED Standard Pilot Light + Green OFF LED Standard Pilot Light	C12
Hand/Off/Auto Selector Switch + Green ON LED Standard Pilot Light + Red OFF LED Standard Pilot Light	C21
Start/Stop Push Buttons + Red ON LED Standard Pilot Light	AP1
Start/Stop Push Buttons + Green ON LED Standard Pilot Light	AP2
Start/Stop Push Buttons + Red ON LED Standard Pilot Light + Green OFF LED Standard Pilot Light	A12
Start/Stop Push Buttons + Green ON LED Standard Pilot Light + Red OFF LED Standard Pilot Light	A21
ON/OFF Selector Switch + Red ON LED Standard Pilot Light	C61
ON/OFF Selector Switch + Green ON LED Standard Pilot Light	C62
ON/OFF Selector Switch + Red ON LED Standard Pilot Light + Green OFF LED Standard Pilot Light	C66
ON/OFF Selector Switch + Green ON LED Standard Pilot Light + Red OFF LED Standard Pilot Light	C67
Red ON LED Standard Pilot Light + Green OFF LED Standard Pilot Light	P12
Green ON LED Standard Pilot Light + Red OFF LED Standard Pilot Light	P21

5.2 Standard Forms

Table 18.106: Push Button Forms

Factory Modifications	Form
Start/Stop	A
Forward/Reverse/Stop	A1
ON/OFF	A3
Miscellaneous	A11
Stop	A13
Start Push Button + Stop Mushroom Head	A22
Emergency Stop Mushroom Head	A31
Turn-To-Release Emergency Stop Mushroom Head	A32

Table 18.107: Selector Switch Forms

Factory Modifications	Form
Hand/Off/Auto	C
Start/Stop	C1
ON/Auto	C2
ON/OFF	C6
Hand/Auto	C8
Forward/OFF/Reverse	C14
Forward/Reverse	C20
Three position	C34
Two position	C35
Keyed Hand/Off/Auto	C36
Keyed Start/Stop	C37
Keyed ON/Auto	C38
Keyed ON/OFF	C39
Keyed Forward/Off/Reverse	C43
Keyed Forward/Reverse	C47

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Self-Protected Combination Starters

Table 18.108: 22 mm Standard LED Pilot Light Forms

Factory Modifications	Form
Red ON	P51
Green OFF	P52
White — Not Factory wired	P54
Blue — Not Factory wired	P56
Amber Overload Trip	P68
Yellow SSC Trip	P69
Red OFF	P91
Green ON	P92
Green Forward/Reverse	P95
Red Forward/Reverse	P96

Table 18.109: 22 mm Push-to-Test LED Pilot Light Forms

Factory Modifications	Form
Red ON	P42
Red OFF	P43
Green ON	P45
Green OFF	P46
Blue — Not Factory wired	P66
White — Not Factory wired	P67
Green Forward/Reverse	P79
Red Forward/Reverse	P80
Amber Overload Trip	P88
Yellow SSC Trip	P89

Table 18.110: Separate Control Forms

Factory Modifications	Form
Separate Control for starters with line voltage less or equal to 480 V	S
Separate Control for starters with line voltage equal to 600 V — Current Limiter is factory installed.	S6

Table 18.111: Additional Capacity Forms

Factory Modifications	Form
50 VA additional capacity	T10
100 VA additional capacity	T11

NOTE: Fuses are provided. Two fuses in primary and one fuse in secondary.

Table 18.112: Auxiliary Contact Forms

Factory Modifications	Form
2 N.O.	U8
1 N.O. and 1 N.C.	U9
2 N.C.	U10
1 N.C. fault signaling contact and 1 N.O. contact indicating starter is in "ready" state	U6
1 N.O. fault signaling contact and 1 N.O. contact indicating starter is in "ready" state	U7

Table 18.113: Auxiliary Relay Forms

Factory Modifications	Form
4 poles screw clamp Control Relay — 4 N.O.	R1740
4 poles screw clamp Control Relay — 3 N.O. and 1 N.C.	R1731
4 poles screw clamp Control Relay — 2 N.O. and 2 N.C.	R1722
Programmable Timer Relay	K1070

Table 18.114: Enclosure Forms

Factory Modifications	Form
Oversized enclosure — Only available for Type 1/12/3R	G28
Plain Blank Door — No covered pre-stamped holes	G30

Table 18.115: Miscellaneous Forms

Factory Modifications	Form
Nameplate — 2"x1/2" screwed	A241
Nameplate — 3"x1" screwed	A242
Unwired Terminal Block	G50*[26]*
Wired Terminal Block	G56*[26][27]*
Wire Markers	G105
Padlock Attachment	G122
Transient Suppressor	U11
Black IP65 through the Door Rotary Disconnect Handle	G40
Special Factory Orders	SPL
Customer Control Wiring	Y217
Solid Neutral Terminal Block	N

Table 18.116: Increase Short Circuit Current Rating Forms

Factory Modifications	Form
130 kA @480 V — Current Limiter factory installed	Y1261

[26] Add number of terminal block points required. Number must be in increments of 5.
[27] Wiring diagram must be provided by customer.

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Table 18.117: Soft Starter Forms *[28]*

Factory Modifications	Form
Motor FLA < 6A	H1
6 < Motor FLA < 9A	H2
9 < Motor FLA < 12A	H3
12 < Motor FLA < 22A	H4
22 < Motor FLA < 32A	H5

Table 18.118: Distributed 6 Input/6 Output Modicon STB with Communication Forms *[29]*

Factory Modifications	Form
DeviceNet Bus	W10
Modbus TCP Bus	W11
Ethernet IP Bus	W12
CANOpen Bus	W13
Profibus Bus	W14

Table 18.119: Starter Status Indication Forms

Factory Modifications	Form
Fault Differentiation Module — Manual Reset	U1
Fault Differentiation Module — Automatic or remote reset	U2
Thermal Overload Alarm Module	U3
Motor Load Indication Module	U4

TeSys H™ Ultra Compact Starters

TeSys H ultra compact motor starters are extremely compact motor starters for asynchronous motors (AC53a utilization category) and resistive loads (AC51 utilization category). With up to 75% space savings, the 22.5 mm wide starter maintains that width even for a reversing starter! An available safety version features embedded Safe Torque Off and is SIL3 according to IEC 61508-1 and Ple according to ISO 13849-1. TeSys H is ideal for industries such as food and beverage, logistics, and durable goods.

TeSys H™ Ultra Compact Starter

TeSys H Ultra Compact Safety Starter

Table 18.120: TeSys H Ultra Compact Motor Starters

Non-Reversing					
Maximum HP Ratings			Current Setting Range (A)		CatalogNumber *[30][31]*
200 V	230 V	460 V	Inductive AC53a	Resistive AC51	
1/2	1/2	1	0.18 -2.4	0.18-2.4	LZ1H2X4
1	1.5	3	1.5-6.5	1.5-9.0	LZ1H6X5
Reversing					
Maximum HP Ratings			Current Setting Range (A)		Catalog Number *[30][31]*
200 V	230 V	460 V	Inductive AC53a	Resistive AC51	
1/2	1/2	1	0.18 -2.4	-	LZ2H2X4
1	1.5	3	1.5-6.5	-	LZ2H6X5

Table 18.121: TeSys H Ultra Compact Safety Motor Starters (SIL3)

Non-Reversing					
Maximum HP Ratings			Current Setting Range (A)		Catalog Number *[30][31]*
200 V	230 V	460 V	Inductive AC53a	Resistive AC51	
1/2	1/2	1	0.18 -2.4	0.18-2.4	LZ7H2X4
1	1.5	3	1.5-6.5	1.5-9.0	LZ7H6X5
Reversing					
Maximum HP Ratings			Current Setting Range (A)		Catalog Number *[30][31]*
200 V	230 V	460 V	Inductive AC53a	Resistive AC51	
1/2	1/2	1	0.18 -2.4	-	LZ8H2X4
1	1.5	3	1.5-6.5	-	LZ8H6X5

Table 18.122: TeSys H Voltage Codes

24 Vdc	110-230 Vac (50/60Hz)
BD	FU

[28] Motor Voltage must be equal to or less than 480 Vac and Control Voltage must be 24 Vdc (Control Power Source Codes BD, BD1, or BD2 only). Refer to Control Power Source Code, page 18-29.
[29] Distributed I/O Modicon STB is factory wired.
[30] Complete the catalog number by adding the voltage code from TeSys H Voltage Codes, page 18-32. For example, LZ1H2X4 becomes LZ1H2X4BD.
[31] For spring terminals, add 3 to the catalog number prior to adding the voltage code. For example, LZ1H2X4BD becomes LZ1H2X4**3**BD.

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GV2ME

TeSys™ GV Family

The TeSys GV family of products are 3-pole, horsepower rated, UL 508 listed manual starters. They include a manual disconnect, class 10 ambient-compensated thermal overload relay, and instantaneous, magnetic trip mechanism in one compact unit.

Any GV manual starter can be used alone for local manual control of a motor with individual full-load currents up to 220 A. The GV products may also be used in group motor installations in accordance with National Electric Code article 430-53. Group motor installations give you greater panel density for smaller size and require fewer parts and less wiring for installation when compared to conventional panel designs.

The GV2P and GV3P products also have an additional UL508 Type E rating as a stand-alone, self-protected manual combination starter. The UL508 Type E rating requires the addition of line side insulating barrier GV2GH7 for the GV2P or a GV3G66 line side insulating barrier and a GVAM11 short circuit signaling contact for the GV3P. The GV2P and GV3P self-protected manual combination starters may also be combined with specific size contactors from the LC1D product family for a UL508 Type F combination starter construction. These products have a UL-listed short circuit current rating from 10–100 kA depending on application size and voltage. Refer to the Motor Control Solutions for the North American Market data bulletin (8536DB0901) for more information.

Table 18.123: GV2, GV3

	Thermal Setting (A)	Maximum Horsepower Ratings								Group Motor Applications	GV2ME push button *[32]*	GV2/3P rotary handle
		Single-Phase			Three-Phase							
		115 V	200 V	230 V	115 V	200 V	230 V	460 V	575 V	Max. Fuse or Circuit Breaker	Catalog Number	Catalog Number
GV2P	0.10–0.16	—	—	—	—	—	—	—	—	450 A	GV2ME01	GV2P01
	0.16–0.25	—	—	—	—	—	—	—	—	450 A	GV2ME02	GV2P02
	0.25–0.40	—	—	—	—	—	—	—	—	450 A	GV2ME03	GV2P03
	0.40–0.63	—	—	—	—	—	—	—	—	450 A	GV2ME04	GV2P04
	0.63–1	—	—	—	—	—	—	—	1/2	450 A	GV2ME05	GV2P05
	1–1.6	—	—	1/10	—	—	—	3/4	3/4	450 A	GV2ME06	GV2P06
	1.6–2.5	—	1/6	1/6	—	1/2	1/2	1	1.5	450 A	GV2ME07	GV2P07
	2.5–4	1/8	1/4	1/3	—	3/4	3/4	2	3	450 A	GV2ME08	GV2P08
	4–6.3	1/4	1/2	1/2	3/4	1	1.5	3	5	450 A	GV2ME10	GV2P10
	6–10	1/2	1	1.5	1	2	3	5	7.5	450 A	GV2ME14	GV2P14
	9–14	3/4	2	2	2	3	3	10	10	450 A	GV2ME16	GV2P16
	13–18	1	2	3	2	5	5	10	15	450 A	GV2ME20	GV2P20
	17–23	1.5	3	3	3	5	7.5	15	20	450 A	GV2ME21	GV2P21
	20–25	2	—	—	—	7.5	7.5	15	20	450 A	GV2ME22	GV2P22
	24–32	2	5	5	5	7.5	10	20	25	450 A	GV2ME32	GV2P32
GV3P	9–13	1/2	—	1.5	—	3	3	7.5	10	—	—	GV3P13
	12–18	3/4	—	2	—	3	5	7.5	10	—	—	GV3P18
	17–25	1.5	—	3	—	5	7.5	15	20	—	—	GV3P25
	23–32	2	—	3	—	7.5	7.5	20	25	—	—	GV3P32
	30–40	3	—	5	—	10	10	25	30	—	—	GV3P40
	37–50	3	—	7.5	—	10	10	30	40	—	—	GV3P50
	48–65	3	—	10	—	15	15	40	50	—	—	GV3P65

GV7RE20

Table 18.124: GV7

Thermal Setting (A)	Maximum Three-Phase Horsepower Ratings				Toggle Operator	
					Standard Interrupt	High Interrupt
	200 V	230 V	460 V	575 V	Catalog No.	Catalog No.
12–20	—	5	10	15	GV7RE20	GV7RS20
15–25	—	7.5	15	20	GV7RE25	GV7RS25
25–40	—	10	30	30	GV7RE40	GV7RS40
30–50	—	15	30	40	GV7RE50	GV7RS50
48–80	—	30	60	75	GV7RE80	GV7RS80
60–100	—	30	75	100	GV7RE100	GV7RS100
90–150	—	50	100	150	GV7RE150	GV7RS150
132–220	—	75	150	200	GV7RE220	GV7RS220

Accessories: TeSys™ GV2, GV3, GV7 Manual Starters and Protectors, page 18-37
Dimensions: TeSys Manual Starters and Protectors, page 18-66 and TeSys GV7 Manual Starters and Protectors, page 18-69

[32] For spring terminals add **3** to the catalog number (for example, GV2ME01**3**). GV2ME32 is not available with spring terminals. For ring terminals, add **6**.

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Motor Protector Circuit Breakers

Listed to UL 60947-4-1, these manual starters provide built-in thermal and magnetic protection.

Table 18.125: PowerPact™ Electronic Motor Protector Circuit Breakers (Manual Starters) New!

Electronic Trip Unit Type	Frame	Sensor Rating	Trip Unit	Full Load Ampere Rating (FLA)	Isd (x FLA)	G Interrupting	J Interrupting	L Interrupting	R Interrupting
						Cat. No.	Cat. No.	Cat. No.	Cat. No.
Standard[33]	H-Frame	30	2.2 M	14-25	5-13 x FLA	HGL36030M38X	HJL36030M38X	HLL36030M38X	HRL36030M38X
		50		14-42	5-13 x FLA	HGL36050M38X	HJL36050M38X	HLL36050M38X	HRL36050M38X
		100		30-80	5-13 x FLA	HGL36100M38X	HJL36100M38X	HLL36100M38X	HRL36100M38X
		150		58-130	5-13 x FLA	HGL36150M38X	HJL36150M38X	HLL36150M38X	HRL36150M38X
	J-Frame	250		114-217	5-13 x FLA	JGL36250M38X	JJL36250M38X	JLL36250M38X	JRL36250M38X
	L-Frame	400	2.3 M	190-348	5-13 x FLA	LGL36400M38X	LJL36400M38X	LLL36400M38X	LRL36400M38X
		600		312-520	5-13 x FLA	LGL36600M38X	LJL36600M38X	LLL36600M38X	LRL36600M38X

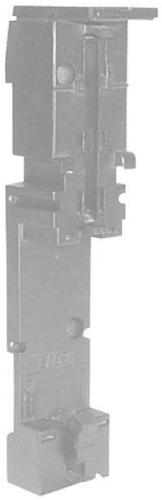
E164862
CCN NLDX

LR43364
Class 3211 04

TeSys™ GV2 Accessories and Enclosures

GV2GH7

LAD31



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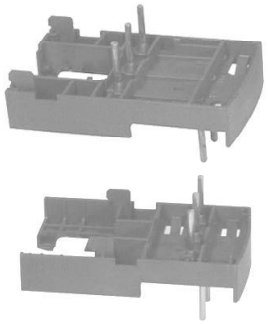

GV2AF3/G2AF4

Table 18.126: GV2 Mounting Accessories

Description	Application	Standard Pack [34]	Catalog Number
Common mounting plate	For GV2 plus any 3-pole LC1D09 thru LC1D25 contactor (supplied with GV1G02 connector)	1	GK2AF01
Adapter plate	For screw mounting of GV2M	10	GV2AF02
Combination block	Interconnect for GV2 plus any 3-pole LC1K or LP1K contactor	10	GV2AF01
	Interconnect GV2 and LC1D09 thru D32	10	GV2AF3
	Interconnect GV2 and LC1D09 thru D32 mounted on LAD31	10	GV2AF4
7.5 mm compensation plate	To allow mounting of GV2M and GV2P on a common bus bar	10	GV1F03
Mounting plate	For mounting GV2ME or GV2P and contactor LC1D09 thru D32	10	LAD31
		10	LAD311

Table 18.127: GV2 Cabling Accessories—Bus Bars

Description	Application	Pitch	Standard Pack [34]	Catalog Number
3-Pole, 63 A Bus Bar	For feeding 2 GV2 starters	45	1	GV2G245
		54	1	GV2G254
		72	1	GV2G272
	For feeding 3 GV2 starters	45	1	GV2G345
		54	1	GV2G354
	For feeding 4 GV2 starters	45	1	GV2G445
		54	1	GV2G454
		72	1	GV2G472
	For feeding 5 GV2 starters	54	1	GV2G554

Table 18.128: GV2 Other Cabling Accessories

Description	Application	Standard Pack [34]	Catalog Number
Terminal blocks	Top feed for use with bus bars	1	GV1G09
	Bottom feed, to be used with bus bars; can be fitted with GV1L3 current limiter	1	GV2G05
Protective end cover	To cover unused bus bar outlets	5	GV1G10
3-pole flexible connector	For connecting a GV2 to an LC1D09 thru D25 contactor	10	GV1G02
Incoming line spacer	For GV2P when used in UL 508 Type E applications[35]	1	GV2GH7

Table 18.129: GV2 Other Accessories

Description	Application	Standard Pack [34]	Catalog Number
Visible isolation block—GV2P	Front mounting, 3-pole visible isolation on incoming side of GV2P	1	GV2AK00
Current limiter—GV2	Increases interrupt capacity when attached to GV2ME or GV2P	1	GV1L3
Through-the-door operating mechanism kits	NEMA 1, 12, Black with trip indication, for use with GV2P	1	GV2APN01
	NEMA 1, 12, Red/Yellow with trip indication, for use with GV2P	1	GV2APN02
	NEMA 3R, 4, 4X, Red/Yellow without trip indication, for use with GV2P	1	GV2APN04
Angle bracket	Operating mechanism support shaft for deep enclosures (≥ 250 mm), for use with GV2P	1	GVAPK11
Mounting bracket	Mounting bracket for installing GV2P operating mechanism	1	GVAPH02
Operating mechanism short shaft	One-piece short shaft for installing operating mechanisms in shallow enclosures, for use with GV2P, GV3P and TeSys U	1	GVAPA2
SoLink non-reversing communications link	Connection module for directly mounted GV2 and TeSys D contactor to PLC	5	LAD5C11
SoLink reversing communications link	Connection module for directly mounted GV2 and reversing TeSys D contactor to PLC	3	LAD5C12
Laser tool	Laser tool for installing through-the-door kits	1	GVAPL01

[33] The standard trip unit offers Class 5, 10, and 20 and phase unbalance or phase loss protection.
[34] Orders must specify multiples of quantities listed.
[35] Cannot be used with front-mounted auxiliary contact block.

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Table 18.130: GV2 Enclosures

Description	Listing	Mounting	Enclosure Rating	Max. Side Mounting Aux. Contacts		Catalog Number
				Left Side	Right Side	
Enclosures for GV2ME with or without accessories	CSA Listed. Not UL Listed.	Surface mounting	NEMA 1, IP41	1	1	GV2MC01
			NEMA 12/4, IP55	1	1	GV2MC02
		Flush mounting	NEMA 1, IP41	1	1	GV2MP01
			NEMA 12/4, IP55	1	1	GV2MP02
		Flush mounting, front face reduced	NEMA 1, IP41	0	1	GV2MP03
			NEMA 12/4, IP55	0	1	GV2MP04

Table 18.131: GV2 Enclosures Accessories

Description	Type		Standard Pack*[36]*	Catalog Number
Padlocking device for GV2M (when padlocked, starter is automatically in Off position)	—		1	GV2V01
Mushroom head stop push button (40 mm, red)*[37]*	Spring return		1	GV2K011
	Latching	Key release (Ronis key no. 455)	1	GV2K021
		Turn to Release	1	GV2K031
	Latching / Padlockable Turn to Release		1	GV2K04
Sealing kit	For enclosures GV2MC01 and GV2MP01		10	GV2E01
Pilot Light (neon)	110 V	Green	10	GV2SN13
	110 V	Red	10	GV2SN14
	110 V	Orange	10	GV2SN15
	110 V	White	10	GV2SN17
	220/240 V	Green	10	GV2SN23
	220/240 V	Red	10	GV2SN24
	220/240 V	Orange	10	GV2SN25
	220/240 V	White	10	GV2SN27
	380/440 V	Green	10	GV2SN33
	380/440 V	Red	10	GV2SN34
	380/440 V	Orange	10	GV2SN35
	380/440 V	White	10	GV2SN37

[36] Orders must specify multiples of quantities listed.
[37] Supplied with IP55 sealing kit.

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Voltage Trips

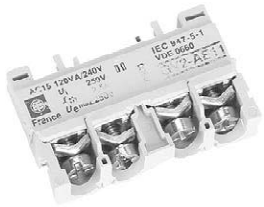
GVAU116

Table 18.132: Voltage Trips

Only one trip or fault signaling contact can be installed per GV2/GV3 device.				
Description	**Characteristics**	**Voltage**	**Frequency**	**Cat. No.** *[38]*
Voltage trips GV2 or GV3P	Undervoltage or Shunt trip (external mounting, 1 block right side only)	24 V	50 Hz	GVA●025
			60 Hz	GVA●026
		48 V	50 Hz	GVA●055
			60 Hz	GVA●056
		100–110 V	50/60 Hz	GVA●107
		110–115 V	50 Hz	GVA●115
			60 Hz	GVA●116
		120–127 V	50 Hz	GVA●125
		127 V	60 Hz	GVA●115
		200 V	50 Hz	GVA●207
		200–220 V	60 Hz	GVA●207
		220–240 V	50 Hz	GVA●225
			60 Hz	GVA●226
		380–400 V	50 Hz	GVA●385
			60 Hz	GVA●386
		415–440 V	50 Hz	GVA●415
		415 V	60 Hz	GVA●416
		440 V	60 Hz	GVA●385
		480 V	60 Hz	GVA●415
		500 V	50 Hz	GVA●505
		600 V	60 Hz	

Table 18.133: Voltage Trips–Technical Data (GV2AU, GV2AS)

Rated Voltage—660 Vac					
Model	**Inrush**	**Sealed**	**Pick-Up Voltage**	**Drop-Out Voltage**	**Operating Time** *[39]*
GVAU	12 VA / 8 W	3.5 VA / 1.1 W	0.8—1.1	0.35—0.7	10—15 ms
GVAS	14 VA / 10.5 W	5 VA / 1.6 W	0.7—1.1	0.2—0.75	10—15 ms



GVAE11

Table 18.134: Auxiliary Contact Blocks *[40]*

Description	Mounting Location	Max. No. of Blocks	Contact Type	Sold in lots of	Cat. No.
Instantaneous auxiliary contacts GV2 or GV3P	Front *[41][42]*	1	N.O. or N.C. *[43]*	1	GVAE1
			N.O. + N.C.	10	GVAE11 *[44]*
			N.O. + N.O.	1	GVAE20 *[44]*
	Left Hand Side	2	N.O. + N.C.	1	GVAN11 *[44]*
			N.O. + N.O.	1	GVAN20 *[44]*
Fault signaling contact + instantaneous auxiliary contact GV2 or GV3P	Left Hand Side *[45]*	1	N.O. (fault) + N.O.	1	GVAD1010
			N.O. (fault) + N.C.	1	GVAD1001
			N.C. (fault) + N.O.	1	GVAD0110
			N.C. (fault) + N.C.	1	GVAD0101
Short circuit signaling contact GV2 or GV3P	Left Hand Side	1	SPDT	1	GVAM11

GVAD0101

GVAN11

Table 18.135: GV3P Accessories

Accessory	Application / Use With	Standard Pack	Cat. No.
Through-the-door operating mechanism kits	NEMA 1, 12, Black with trip indication, for use with GV3P	1	GV3APN01
	NEMA 1, 12, Red/Yellow, with trip indication, for use with GV3P	1	GV3APN02
	NEMA 3R, 4, 4X Red/Yellow without trip indication, for use with GV3P	1	GV3APN04
Angle bracket	Operating mechanism support shaft for deep enclosures (≥ 300 mm), for use with GV3P	1	GVAPK12
Mounting bracket	Mounting bracket for installing GV3P operating mechanism	1	GVAPH03
3-pole, 115 A busbar	For feeding 2 GV3P starters, 64 mm pitch	1	GV3G264
	For feeding 3 GV3P starters, 64 mm pitch	1	GV3G364
Incoming line spacer	Line spacer for GV3P when used in UL 508 Type E applications. One spacer required on line side.	1	GV3G66
IP 20 cover	IP20 protective cover for ring tongue versions of GV3P and 3-pole TeSys D Everlink contactors. Two covers required for line and load side.	1	LAD96570
Padlocking device	For use with up to 4 padlocks (not supplied). Ø 6 mm shank maximum	1	GV2V03
Operating mechanism short shaft	One-piece short shaft for installing operating mechanisms in shallow enclosures, for use with GV2P, GV3P and TeSys U	1	GVAPA2
SoLink non-reversing communications link	Connection module for directly mounted GV3 and TeSys D contactor to PLC	5	LAD5C31
SoLink reversing communications link	Connection module for directly mounted GV3 and reversing TeSys D contactor to PLC	3	LAD5C32
Laser tool	Laser tool for installing through-the-door kits	1	GVAPL01
S-shaped busbar	For connecting GV3P starters and LC1D40A-65A contactors side by side without intrawiring	1	GV3S

[38] To order an undervoltage trip: replace the bullet (●) with a **U** (for example, GVA**U**025).
To order a shunt trip: replace the bullet (●) with an **S** (for example, **GVAS025**).
[39] From the loss of voltage at the trip terminals to the opening of the starter contacts.
[40] One trip or one fault signaling can be fitted per GV3.
[41] Cannot be used with **GV2GH7** insulator.
[42] Mounting of a **GVAE** contact block or a **GV2AK00** visible isolation block on **GV2P**.
[43] Choice of N.C. or N.O. contact operation, depending on which way the reversible block is mounted.
[44] For spring terminals, add **3** to the catalog number (for example, **GVAE113**).
[45] The **GVAD** is always mounted next to the starter.

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GV7AE11

GV7AD111

GV7AS055

GV7AC01

GV7RE20

GV7AC021

GV7V01

GV7AP03

GVAPB54

GVAPR54

TeSys™ GV2, GV3, GV7 Manual Starters and Protectors

Table 18.136: GV7 Auxiliary Contact Blocks (auxiliary contact functions depends on location inside the device)

Description	Mounting Location	Max. No. of Blocks	Contact Type	Catalog Number
Standard				
Instantaneous	Inside Device	2 per device	N.O. + N.C.	GV7AE11
Trip Indication		1 per device	N.O. + N.C.	
Fault Indication		1 per device	N.O. + N.C.	
Low Level				
Instantaneous	Inside Device	2 per device	N.O. + N.C.	GV7AB11
Trip Indication		1 per device	N.O. + N.C.	
Fault Indication		1 per device	N.O. + N.C.	

Table 18.137: GV7 Voltage Trips

Description	Mounting Location	Max. No. of Blocks	Voltage		Catalog Number
Undervoltage Trip	Inside Device	1 per device	48 Vac	50 Hz	GV7AU055
			110–130 Vac	50/60 Hz	GV7AU107
			200–240 Vac	50/60 Hz	GV7AU207
			380–440/480 Vac	50/60 Hz	GV7AU387
			525 Vac	50 Hz	GV7AU525
Shunt Trip	Inside Device	1 per device	48 Vac	50 Hz	GV7AS055
			110–130 Vac	50/60 Hz	GV7AS107
			200–240 Vac	50/60 Hz	GV7AS207
			380–440/480 Vac	50/60 Hz	GV7AS387
			525 Vac	50 Hz	GV7AS525
Fault Indication	Inside Device	1 per device	24–130	_	GV7AD111
			110–415	_	GV7AD112

Table 18.138: GV7 Wiring Accessories

Description	Application	Catalog Number
Box Lugs	Sold in lots of 3 for GV7R●20–150*[46]*	GV7AC021
	Sold in lots of 3 for GV7R●220*[46]*	GV7AC022
Phase Barriers, Bus Bars & Shrouds		
Terminal Extension Kit	Increases center distance between phases to 45 mm	GV7AC03
Terminal Shroud Kit	Covers terminal connections for touch safe protection	GV7AC01
Phase Barriers	Provides maximum phase separation at connection points	GV7AC04
Insulating Barriers	Provides insulation between connectors and backplate	GV7AC05
Busbars and Covers	Connect to LC1F115–185 contactor	GV7AC06
	Connect to LC1F225–265 contactor	GV7AC07
Operating Handles and Accessories		
Black rotary operating handle with black legend plate (mounts directly on device)		GV7AP03
Red rotary operating handle with yellow legend plate (mounts directly on device)		GV7AP04
Conversion accessory to mount the device directly on panel door		GV7AP05
Black rotary operating handle with black legend plate and extension kit (185–600 mm)		GV7AP01
Red rotary operating handle with yellow legend plate and extension kit (185–600 mm)		GV7AP02
Padlocking device for toggle handle (max. 38 mm padlocks)		GV7V01

Table 18.139: Operating Handles

Accessory	Description	Catalog Number
Operating Handle (Qty: 1)	NEMA 1/12 Black handle with trip indication	GVAPB54
	NEMA 1/12 Red/Yellow handle with trip indication	GVAPR54
	NEMA 3R/4/4X Black handle without trip indication	GVAPB65
	NEMA 3R/4/4X Red/Yellow handle without trip indication	GVAPR65

Dimensions: TeSys GV2 and GV3 Manual Starter and Protector Dimensions, page 18-66 and TeSys GV7 Manual Starter and Protector Dimensions, page 18-69

[46] Wire size: GV7AC021 = 14 to 3/0 AWG; GV7AC022 = 14 AWG to 350 kcmil.

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Enclosed TeSys™ D Starters

TeSys D enclosed full-voltage starters are available in Type 1 and Type 12/3R enclosures. The enclosed TeSys D offer accepts standard TeSys D accessories and all Insta-Kits™ control units and control power transformer kits. Standard capacity control power transformers with built-in fuse block can be installed in the standard enclosure. For extra capacity, please refer to your local distributor or Schneider Electric sales office.

Table 18.140: Enclosed Full Voltage Non-Reversing Starters

Max. Horsepower Ratings						Auxiliary Contacts On Each Contactor		Current Rating of Contactor	Catalog Number	Catalog Number
Single-Phase		Three-Phase								
115 V	230 V	200 V	230 V	460 V	575 V	N.O.	N.C.		Type 1	Type 12/3R
1/3	1	2	2	5	7.5	1	1	9	LE1D093A62•••••	LE1D093A72•••••
1/2	2	3	3	7.5	10	1	1	12	LE1D123A62•••••	LE1D123A72•••••
1	3	5	5	10	15	1	1	18	LE1D183A62•••••	LE1D183A72•••••
2	3	5	7.5	15	20	1	1	25	LE1D253A62•••••	LE1D253A72•••••
2	5	7.5	10	20	25	1	1	32	LE1D323A62•••••	LE1D323A72•••••
3	5	10	10	30	30	1	1	40	LE1D403A62•••••	LE1D403A72•••••
3	7.5	12	15	40	40	1	1	50	LE1D503A62•••••	LE1D503A72•••••
5	10	20	20	40	50	1	1	65	LE1D653A62•••••	LE1D653A72•••••
7.5	15	30	30	60	60	1	1	80	LE1D803A62•••••	LE1D803A72•••••

Table 18.141: Enclosed Full Voltage Reversing Starters

Max. Horsepower Ratings						Auxiliary Contacts On Each Contactor		Current Rating of Contactor	Catalog Number	Catalog Number
Single-Phase		Three-Phase								
115 V	230 V	200 V	230 V	460 V	575 V	N.O.	N.C.		Type 1	Type 12/3R
1/3	1	2	2	5	7.5	1	1	9	LE2D093A62•••••	LE2D093A72•••••
1/2	2	3	3	7.5	10	1	1	12	LE2D123A62•••••	LE2D123A72•••••
1	3	5	5	10	15	1	1	18	LE2D183A62•••••	LE2D183A72•••••
2	3	5	7.5	15	20	1	1	25	LE2D253A62•••••	LE2D253A72•••••
2	5	7.5	10	20	25	1	1	32	LE2D323A62•••••	LE2D323A72•••••
3	5	10	10	30	30	1	1	40	LE2D403A62•••••	LE2D403A72•••••
3	7.5	12	15	40	40	1	1	50	LE2D503A62•••••	LE2D503A72•••••
5	10	20	20	40	50	1	1	65	LE2D653A62•••••	LE2D653A72•••••
7.5	15	30	30	60	60	1	1	80	LE2D803A62•••••	LE2D803A72•••••

Table 18.142: Overload Relay Range (Select code from below) *[47]*

Code	Range	For use on Contactors
01	0.1–0.16	D09–D32 *[48]*
02	0.16–0.25	D09–D32 *[48]*
03	0.25–0.40	D09–D32 *[48]*
04	0.40–0.63	D09–D32 *[48]*
05	0.63–1.0	D09–D32 *[48]*
06	1.0–1.6	D09–D32 *[48]*
07	1.6–2.5	D09–D32 *[48]*
08	2.5–4	D09–D32
10	4–6	D09–D32
12	5.5–8	D09–D32
13	9–13	D40, D50, D65
14	7–10	D09–D32
16	9–13	D12–D32
18	12–18	D40, D50, D65
21	12–18	D18–D32
22	16–24	D25–D32 *[48]*
	17–25	D25–D32 *[49]*
	17–25	D80
25	17–25	D40, D50, D65
30	23-28	D25–D32 *[48]*
32	23–32	D25–D32
32	23–32	D40, D50, D65
40	30–40	D40, D50, D65
50	37–50	D40, D50, D65
53	30–38	D80
55	30–40	D80
57	37–50	D80
59	48–65	D80
61	55–70	D65–D80
63	63–80	D65–D80
65	48–65	D40, D50, D65

Table 18.143: Catalog Number Nomenclature

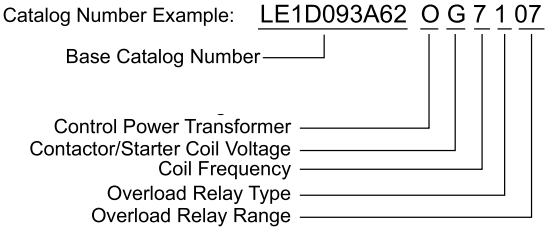

Table 18.144: Control Power Transformer

Select letter for primary voltage of CPT:

Voltage	No Transformer used	208	240	480	600
Code	O *[50]*	L	M	T	X

NOTE: If control transformer is used, the only options available are 24 or 120 V as the secondary of the transformer. Also, DC voltages are not available when control power transformer is used.

Table 18.145: Contactor/Starter Coil Voltage

Select coil voltage from table:

Voltage	24	120	208	240	480	600
AC	B	G	L	U	T	X
DC	B	—	—	—	—	—

Coil Frequency

Select:

7 = dual frequency coils (50/60 Hz)
6 = 60 Hz.
D=DC

NOTE: For 9 to 65 A contactors, only dual frequency coils are available; 80 A contactors, the 24–240 V coils are dual frequency only (50/60 Hz). The 480–600 V coils are 60 Hz. only. See catalog MKTED210011EN for other restrictions.

Overload relay type

Select:

0 = No overload relay
1 = Class 10 Trip
2 = Class 20 Trip

TeSys D dimensions: TeSys D Combination Starter Dimensions, page 18-62

[47] If no overload relay is required, leave this portion of the catalog blank.
[48] Available for Class 10 only.
[49] Available for Class 20 only.
[50] Letter O, not zero.

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TeSys™ D Enclosed Fusible, Circuit Breaker and Non-Fusible

IEC combination starters combine the requirements of motor overload and short circuit protection in one convenient compact package. All devices provide Type 2 Coordination through 30 hp at 460 V. Devices are available in Type 1 and Type 12/3R enclosures. The IEC combination starter line accepts standard TeSys D accessories and all Insta-Kits™ pilot devices and control power transformer kits. Standard capacity control power transformers with built-in fuse block can be installed in the standard enclosure. For extra capacity, please refer to your local distributor or nearest Square D/Schneider Electric sales office.

NOTE: Use tables and notes from Enclosed FVRS, Overload Relays, page 18-38 to complete the catalog numbers.

Table 18.146: Enclosed Full Voltage Non-Reversing Fusible Combination Starters

Maximum Three-Phase Horsepower Ratings				Fuse Clip Rating		Auxiliary Contacts		Current Rating of Contactor	Catalog Number	Catalog Number
200 V	230 V	460 V	575 V	Amperes	UL Class	N.O.	N.C.		Type 1	Type 12/3R
2	2	5	7.5	30 A	CC	1	1	9	LE1D096B62●●●●●	LE1D096B72●●●●●
3	3	7.5	10	30 A	CC	1	1	12	LE1D126B62●●●●●	LE1D126B72●●●●●
5	5	10	15	30 A	J	1	1	18	LE1D186B62●●●●●	LE1D186B72●●●●●
5	7.5	15	20	30 A	J	1	1	25	LE1D256B62●●●●●	LE1D256B72●●●●●
7.5	10	20	25	60 A	J	1	1	32	LE1D326C62●●●●●	LE1D326C72●●●●●
10	10	30	30	60 A	J	1	1	40	LE1D406C62●●●●●	LE1D406C72●●●●●

Table 18.147: Enclosed Full Voltage Reversing Fusible Combination Starters

Maximum Three-Phase Horsepower Ratings				Fuse Clip Rating		Aux. Contacts Each Contactor		Current Rating of Contactor	Catalog Number	Catalog Number
200 V	230 V	460 V	575 V	Amperes	UL Class	N.O.	N.C.		Type 1	Type 12/3R
2	2	5	7.5	30 A	CC	1	1	9	LE2D096B62●●●●●	LE2D096B72●●●●●
3	3	7.5	10	30 A	CC	1	1	12	LE2D126B62●●●●●	LE2D126B72●●●●●
5	5	10	15	30 A	J	1	1	18	LE2D186B62●●●●●	LE2D186B72●●●●●
5	7.5	15	20	30 A	J	1	1	25	LE2D256B62●●●●●	LE2D256B72●●●●●
7.5	10	20	25	60 A	J	1	1	32	LE2D326C62●●●●●	LE2D326C72●●●●●
10	10	30	30	60 A	J	1	1	40	LE2D406C62●●●●●	LE2D406C72●●●●●

Table 18.148: Enclosed Full Voltage Non-Reversing Circuit Breaker Combination Starters

Maximum Three-Phase Horsepower Ratings				Auxiliary Contacts		Circuit Breaker Maximum Current Rating	Current Rating of Contactor	Catalog Number	Catalog Number
200 V	230 V	460 V	575 V	N.O.	N.C.			Type 1	Type 12/3R
2	2	5	7.5	1	1	15 A	9	LE1D097D62●●●●●	LE1D097D72●●●●●
3	3	7.5	10	1	1	15 A	12	LE1D127D62●●●●●	LE1D127D72●●●●●
5	5	10	15	1	1	30 A	18	LE1D187E62●●●●●	LE1D187E7●●●●●
5	7.5	15	20	1	1	30 A	25	LE1D257E62●●●●●	LE1D257E72●●●●●
7.5	10	20	25	1	1	50 A	32	LE1D327F62●●●●●	LE1D327F72●●●●●
10	10	30	30	1	1	50 A	40	LE1D407F62●●●●●	LE1D407F72●●●●●

Table 18.149: Enclosed Full Voltage Reversing Circuit Breaker Combination Starters

Maximum Three-Phase Horsepower Ratings				Auxiliary Contacts Each Contactor		Circuit Breaker Maximum Current Rating	Current Rating of Contactor	Catalog Number	Catalog Number
200 V	230 V	460 V	575 V	N.O.	N.C.			Type 1	Type 12/3R
2	2	5	7.5	1	1	15 A	9	LE2D097D62●●●●●	LE2D097D72●●●●●
3	3	7.5	10	1	1	15 A	12	LE2D127D62●●●●●	LE2D127D72●●●●●
5	5	10	15	1	1	30 A	18	LE2D187E62●●●●●	LE2D187E72●●●●●
5	7.5	15	20	1	1	30 A	25	LE2D257E62●●●●●	LE2D257E72●●●●●
7.5	10	20	25	1	1	50 A	32	LE2D327F62●●●●●	LE2D327F72●●●●●
10	10	30	30	1	1	50 A	40	LE2D407F62●●●●●	LE2D407F72●●●●●

Table 18.150: Enclosed Full Voltage Non-Reversing Non-Fused Combination Starters

Maximum Three-Phase Horsepower Ratings				Auxiliary Contacts		Current Rating of Contactor	Catalog Number	Catalog Number
200 V	230 V	460 V	575 V	N.O.	N.C.		Type 1	Type 12/3R
2	2	5	7.5	1	1	9	LE1D096A62●●●●●	LE1D096A72●●●●●
3	3	7.5	10	1	1	12	LE1D126A62●●●●●	LE1D126A72●●●●●
5	5	10	15	1	1	18	LE1D186A62●●●●●	LE1D186A72●●●●●
5	7.5	15	20	1	1	25	LE1D256A62●●●●●	LE1D256A72●●●●●
7.5	10	20	25	1	1	32	LE1D326A62●●●●●	LE1D326A72●●●●●
10	10	30	30	1	1	40	LE1D406A62●●●●●	LE1D406A72●●●●●

Table 18.151: Enclosed Full Voltage Reversing Non-Fused Combination Starters

Maximum Three-Phase Horsepower Ratings				Aux. Contacts Each Contactor		Current Rating of Contactor	Catalog Number	Catalog Number
200 V	230 V	460 V	575 V	N.O.	N.C.		Type 1	Type 12/3R
2	2	5	7.5	1	1	9	LE2D096A62●●●●●	LE2D096A72●●●●●
3	3	7.5	10	1	1	12	LE2D126A62●●●●●	LE2D126A72●●●●●
5	5	10	15	1	1	18	LE2D186A62●●●●●	LE2D186A72●●●●●
5	7.5	15	20	1	1	25	LE2D256A62●●●●●	LE2D256A72●●●●●
7.5	10	20	25	1	1	32	LE2D326A62●●●●●	LE2D326A72●●●●●
10	10	30	30	1	1	40	LE2D406A62●●●●●	LE2D406A72●●●●●

TeSys D dimensions: TeSys D Combination Starter Dimensions, page 18-62

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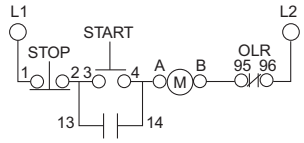
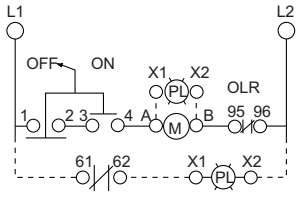
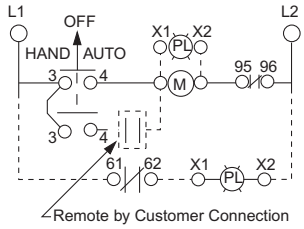
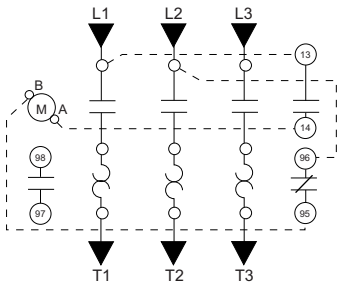


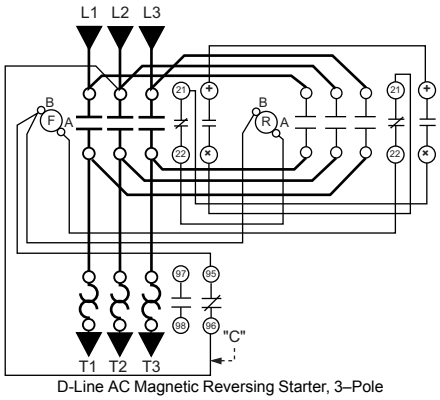




From top to bottom: Start/Stop, On-Off Selector Switch, HOA Selector Switch



D-Line AC Magnetic Starter, 2–3 Poll



D-Line AC Magnetic Reversing Starter, 3–Pole

Factory Modifications and Insta-Kits™ Selection

Add the factory modification code to the end of the catalog number created from Enclosed TeSys™ D Starters and Combination Starters, page 18-38. With the use of Insta-Kits™, only one operator scheme is allowed. Only the combinations of operators and pilot lights shown below can be ordered.

Pilot lights will be at the coil voltage indicated in the catalog number for the starter.

Table 18.152: Factory Modifications

Description	Factory Modification Code*[51]*	Insta-Kits (for field installation)
Control Units Only		
For-Rev-Stop Push Button	A06L	LA9CA06LT
Start/Stop Push Button	A06G	LA9CA06GT
I/O (Start/Stop) Push Button	N/A	N/A
I/O Push Button (double touch)	A06I	LA9CA06IO
Emergency Stop	N/A	N/A
Hand-Off-Auto Selector Switch	A06E	LA9CA06ET
On/Off Selector Switch	A06D	LA9CA06DT
Start/Mushroom Head Stop Push Button	A06X	LA9CA06XT
Pilot Lights only		
LED Pilot light, 24, 120 or 240 V	A16S	LA9CA16ST*[52]*
Green-Red Pilot Light, Direct Supply, 24 or 120 V *[53]*	A06S	LA9CA06ST*[52]*
Green-Red Transformer Pilot Light, 120, 208/240, 480 or 600 V *[53]*	A06F	LA9CA06FT*[52]*
Available Combination of Control Units and Pilot Lights		
Hand-Off-Auto Selector Switch w/24, 120, or 240 V LED Pilot Light	A16U	LA9CA16UT*[52]*
Start/Stop Push Button w/ 24, 120 or 240 V LED Pilot Light	A16V	LA9CA16VT*[52]*
On/Off Selector w/ 24, 120 or 240 V LED Pilot Light	A16W	LA9CA16WT*[52]*
Start/Stop Push Button w/ Green-Red Transformer Pilot Light	A06N	LA9CA06NT*[52]*
Start/Stop Push Button w/Green-Red Pilot Light	A06V	LA9CA06VT
Hand-Off-Auto Selector Switch w/Green-Red Pilot Light	A06U	LA9CA06UT
Hand-Off-Auto Selector Switch w/Green-Red Transformer Pilot Light	A06J	LA9CA06JT*[52]*
On/Off Selector w/Green-Red Pilot Light	A06W	LA9CA06WT
On/Off Selector w/Green-Red Transformer Pilot Light	A06H	LA9CA06HT*[52]*
Control Power Transformer		
Standard VA, 2 Fuses in Primary, 1 Fuse in Secondary	A206P	*[54]*
50 VA extra, 2 Fuses in Primary, 1 Fuse in Secondary	A207P	*[54]*
100 VA extra, 2 Fuses in Primary, 1 Fuse in Secondary	A208P	*[54]*

Table 18.153: Insta-Kits™ Selection

Total VA	Insta-Kits™ Catalog Number
50	LA9TFD32*[52]*
100	LA9TFD80*[52]*
150	LA9TFD15*[52]*

Table 18.154: Voltage Codes for Pilot Lights

Voltage (Vac)	24	120	208/240	480	600
Code	B	G	M	T	X

Table 18.155: Voltage Codes for Control Power Transformers

Primary Voltage	120	208	240	480	600	208	240	480	600
Secondary Voltage	24					120			
Code	E	D	C	B	A	L	M	T	X

[51] Add these forms to the catalog number selected from Overload Relay Range, page 18-38. The numbers as shown are for use in NEMA 1 Enclosures. For uses in NEMA 12/3R change the 6 to a 7 (ex. A06U becomes A07U). Price remains the same. The change DOES NOT apply to control power transformer forms.

[52] Complete the part number for the Insta-Kits™ by selecting the voltage code from Table 18.153 Insta-Kits™ Selection, page 18-40.

[53] Pilot lights are wired such that the light is on when the contactor is energized. For non-LED type pilot lights, a green lens is installed on the unit when shipped. A red lens is included for use as applicable.

[54] Select Insta-Kits™ from Table 18.153 Insta-Kits™ Selection, page 18-40.

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LS1D30

TeSys™ LS1 Fuse Holders

- 45 mm wide (same dimensions as GV2ME)
- Available with screw clamp and spring type terminals
- Mounts directly to LC1D09–D38 contactors (with use of GV2AF3 or GV2AF4)
- Meets application needs for fusible starter
- Uses GV2AE instantaneous contact blocks to open control circuits
- DIN rail mounted

Table 18.156: TeSys LS1 Fuse Holders

Description	Fuse Type	Dimensions		Use In	Catalog Number
		in.	mm		
Spring terminals, 3-pole	CC, KTK-R	0.41 x 1.5	10.3 x 38	US Markets	LS1D303
Screw clamp terminals, 3-pole	CC, KTK-R	0.41 x 1.5	10.3 x 38	US Markets	LS1D30
Spring terminals, 3-pole	aM, gG	0.39 x 1.5	10 x 38	European Markets	LS1D323
Screw clamp terminals, 3-pole	aM, gG	0.39 x 1.5	10 x 38	European Markets	LS1D32
Auxiliary main pole adder	aM, gG	0.39 x 1.5	10 x 38	European Markets	LA8D324*[55]*

Table 18.157: Specifications

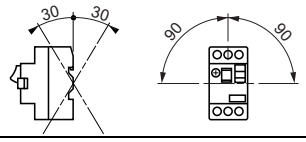
Type	LS1D30, LS1D303	LS1D32, LS1D323, LS1DT32
Max. voltage	600 V 3 Phase	
Max. current	30 A	
Conforming to standards	IEC 60947-1, 60947-2, 60947-4-1, EN60204, BS4841, UL 508, CSA 222.2 No. 14, NFC 63-650, 63-120, 79-130, VDE 0113, 0660	
Product approvals	UL, CSA	BV
Protective treatment	"TH"	
Ambient air temperature—operation	-58 to 158º F (-50 to +70º C)	
Wiring	Number of conductors and cross sectional area (c.s.a.)	
Solid cable	2 x 16–8 AWG (1–6 mm²)	
Flexible cable without cable end	2 x 14–8 AWG (1–6 mm²)	
Flexible cable with cable end	2 x 16–10 AWG (1–4 mm²)	
Resistance to mechanical impact conforming to IEC 60947-1 §7-1-6	0.5 J	
Tightening torque	15 in-lb (1.7 N•m)	
Sensitivity to phase failure	No	
Operating Positions		
Rated voltage	600 V	

Table 18.158: Environmental Specifications and Approvals

Shock resistance	30 g (conforming to IEC 600 68-2-27)
Vibration resistance	5 g (5 to 150 Hz) (IEC 600 68-2-26)
Ambient temperature	–40 to 176 °F (–40 to +80 °C) for storage –4 to 140 °F (–20 to +60 °C) open operation –4 to 104 °F (–20 to +40 °C) enclosed operation
Maximum operating rate	25 operations per hour
Operating current of magnetic trip	Approximately 13 times the maximum thermal trip (non-adjustable setting)

E164862
CCN NLDX

LR43364
Class 3211 04

[55] Can be mounted on left-hand or right-hand side of the 3-pole LS1D32 block.

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Altistart Drive and TeSys U Motor Starter

Table 18.159: Soft Start / Soft Stop Unit for 0.75 to 15 kW Motors (can be combined with the TeSys U starter)

Motor		Starter	
Motor Power[1]		Nominal Current	Catalog Number
230 V	460 V		
HP	HP	A	
3-phase supply voltage: 200 to 480 V 50/60 Hz			
1	2	6	ATSU01N206LT
1.5	3		
2	5	9	ATSU01N209LT
3	7.5	12	ATSU01N212LT
5	10	22	ATSU01N222LT
7.5	15		
10	20	32	ATSU01N232LT

ATSU01●●

Table 18.160: Accessories

Description	Used for Starter	Catalog Number
Power connector between ATSU 01N2●●LT and TeSys U	ATSU01N2●●T	VW3G4104

Table 18.161: TeSys U Starter and Soft Start Unit Combinations

Motor Power		Soft Starter	TeSys U	
Voltage			Power Base	Control Unit [2]
200 V	460 V			
HP	HP			
1	2	ATSU01N206LT	LUB 12	LUC●05BL
1.5	3	ATSU01N206LT		LUC●12BL
2	5	ATSU01N209LT		LUC●12BL
3	—	ATSU01N212LT		LUC●12BL
—	7.5	ATSU01N212LT		LUC ●18BL
5	10	ATSU01N222LT		LUC●18BL
7.5	15	ATSU01N222LT	LUB 32	LUC●32BL
10	20	ATSU01N232LT		LUC●32BL

E164862
CCN NLDX

LR43364
Class 3211 04

[1] Standard motor power ratings, HP power ratings indicated according to standard UL 508.
[2] Depending on the configuration of the chosen TeSys U starter, replace the ● with **A** for standard, **B** for advanced, and **M** for multifunction. See Selecting TeSys U Motor Starters in Three Steps, page 18-23 for a complete list of available control units. Control voltage must be 24 Vdc.

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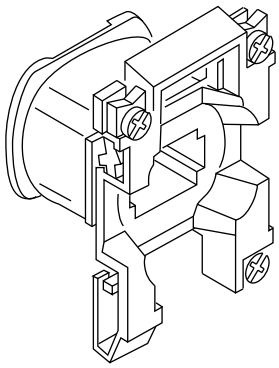

LX1D2

TeSys™ D AC Coils

Table 18.162: For LC1D09–D38, LC1DT20–DT40 Contactors and CAD Relays

Rated Nominal Voltage	Catalog Number 50/60 Hz
12	LXD1J7
21*[1]*	LXD1Z7
24	LXD1B7
32	LXD1C7
36	LXD1CC7
42	LXD1D7
48	LXD1E7
60	LXD1EE7
100	LXD1K7
110	LXD1F7
115	LXD1FE7
120	LXD1G7
127	LXD1FC7
200	LXD1L7
208	LXD1LE7
220/230	LXD1M7
230	LXD1P7
230/240	LXD1U7
277	LXD1W7
380/400	LXD1Q7
400	LXD1V7
415	LXD1N7
440	LXD1R7
480	LXD1T7
575	LXD1SC7
600	LXD1X7
Specifications	50/60 Hz
Average consumption - Inrush (inductance 0.75) - Sealed (inductance 0.3)	 70 VA 7 VA
Operating range@ 60º C	80–110% of nominal @ 50 Hz, 85–110% of nominal @ 60 Hz

[1] Voltage for special coils fitted in contactors with serial timer modules, with 24 V supply.

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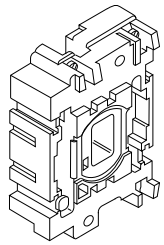
TeSys™ D AC Coils



LX1D6

Table 18.163: For Old D2 Style LC1D40, D50, D65, D80, and D95; For TeSys D LC1D40A, D50A, D65A, DT60A, and DT80A; For TeSys D LC1D115 and D150

For Old D2 Style LC1D40, D50, D65, D80, D95			
Rated Nominal Voltage V	Catalog Number 50 Hz	Catalog Number 60 Hz	Catalog Number 50/60 Hz
24	LX1D6B5	LX1D6B6	LX1D6B7
32	LX1D6C5	—	—
42	LX1D6D5	—	LX1D6D7
48	LX1D6E5	LX1D6E6	LX1D6E7
110	LX1D6F5	LX1D6F6	LX1D6F7
120	—	LX1D6G6	LX1D6G7
127	LX1D6G5	—	—
208	—	LX1D6L6	LX1D6LE7
220	LX1D6M5	LX1D6M6	LX1D6M7
230	LX1D6P5	—	LX1D6P7
240	LX1D6U5	LX1D6U6	LX1D6U7
256	LX1D6W5	—	—
277	—	LX1D6W6	—
380	LX1D6Q5	LX1D6Q6	LX1D6Q7
400	LX1D6V5	—	LX1D6V7
415	LX1D6N5	—	LX1D6N7
440	LX1D6R5	LX1D6R6	LX1D6R7
480	—	LX1D6T6	—
500	LX1D6S5	—	—
575	—	LX1D6S6	—
600	—	LX1D6X6	—
660	LX1D6Y5	—	—

For old style and new TeSys style contactors where the catalog number may or may not include the auxiliary contact arrangement.

For TeSys D LC1D40A, D50A, D65A, DT60A, DT80A			
Rated Nominal Voltage V	Catalog Number 50 Hz	Catalog Number 60 Hz	Catalog Number 50/60 Hz
12	LXD3J5	—	—
24	—	—	LXD3B7
32	—	—	LXD3C7
42	—	—	LXD3D7
48	—	—	LXD3E7
100	—	—	LXD3K7
110	—	—	LXD3F7
115	—	—	LXD3FE7
120	—	—	LXD3G7
127	—	—	LXD3FC7
200	—	—	LXD3L7
208	—	—	LXD3LE7
220	—	—	LXD3M7
230	—	—	LXD3P7
240	—	—	LXD3U7
277	—	—	LXD3W7
380	—	—	LXD3Q7
400	—	—	LXD3V7
415	—	—	LXD3N7
440	—	—	LXD3R7
480	—	—	LXD3T7
500	—	—	LXD3S7
575	—	—	LXD3SC7
600	—	—	LXD3X7
660	—	—	LXD3YC7
690	—	—	LXD3Y7

For TeSys D LC1D115, D150			
Rated Nominal Voltage V	Catalog Number 50 Hz	Catalog Number 60 Hz	Catalog Number 50/60 Hz
24	LX1D8B5	LX1D8B6	LX1D8B7
32	LX1D8C5	—	LX1D8C7
42	LX1D8D5	—	LX1D8D7
48	LX1D8E5	LX1D8E6	LX1D8E7
110	LX1D8F5	LX1D8F6	LX1D8F7
115	LX1D8FE5	—	LX1D8FE7
120	—	LX1D8G6	LX1D8G7
127	LX1D8FC5	—	LX1D8FC7
208	—	LX1D8L6	LX1D8L7
220/230	LX1D8M5	LX1D8M6	LX1D8M7
230	LX1D8P5	—	LX1D8P7
240	LX1D8U5	LX1D8U6	LX1D8U7
277	—	LX1D8W6	LX1D8W7
380/400	LX1D8Q5	LX1D8Q6	LX1D8Q7
400	LX1D8V5	—	LX1D8V7
415	LX1D8N5	—	LX1D8N7
440	LX1D8R5	LX1D8R6	LX1D8R7
480	—	LX1D8T6	LX1D8T7
500	LX1D8S5	—	LX1D8S6

For old style and new TeSys style contactors where the catalog number may or may not include the auxiliary contact arrangement.

Specification	50 Hz	60 Hz	50/60 Hz
Average consumption:-inrush (inductance 0.75) -sealed (inductance 0.3)	200 VA 20 VA	220 VA 22 VA	245 VA 26 VA
Operating range at θ ≤ 55ºC / 131ºF	80–110% of nominal voltage		85–110% of nominal voltage

Specification	50 Hz	60 Hz	50/60 Hz
Average consumption: -inrush (inductance 0.3) -sealed (inductance 0.3)	160 VA 7.0 VA	140 VA 7.5 VA	140 VA (Inductance: 0.9) 7.5 VA (Inductance: 0.9)
Operating range at θ ≤ 55 °C / 131 °F	85–110% of nominal voltage		80–115% of nominal voltage

Specification	50 Hz	60 Hz	50/60 Hz
Average consumption: -inrush (inductance 0.8) -sealed (inductance 0.3)	300 VA 22 VA	300 VA 22 VA	350 VA (Inductance: 0.9) 18 VA (Inductance: 0.9)
Operating range at θ ≤ 55 °C / 131 °F	85–110% of nominal voltage		80–115% of nominal voltage

Table 18.164: TeSys™ F AC Coils (For LC1F115, F150, F185, F225, F265, F330, F400, F500, F630, F780, and F800)

Device Type	Hz	Catalog Number	Catalog Number Suffix[2]												
			24 V	48 V	110 V	120 V	208 V	220 V	240 V	277 V	380 V	415 V	440 V	480 V	600 V
F115–F150	50	LX1FF●	024	048	110	127	200	220	240	264	380	415	415	500	600
	60	LX1FF●	020	040	092	095	162	184	187	220	316	340	360	380	475
	40–400	LX9FF●[3]	—	048	110	127	200	220	220	260	380	415	415	500	—
F185, F225	50	LX1FG●	024	048	110	127	200	220	240	264	380	415	415	450	600
	60	LX1FG●	020	040	092	095	162	184	187	220	316	340	360	380	475
	40–400	LX9FG●[3]	—	048	110	127	200	220	220	260	380	415	415	500	—
F265–F330	40–400	LX1FH●	0242	0482	1102	1272	2002	2202	2402	2772	3802	3802	4402	5002	6002
	40–400	LX9FH●[3]	—	0482	1102	1272	2002	2202	2402	2772	3802	3802	. . .	5002	—
F400	40–400	LX1FJ●	—	048	110	110	200	220	240	280	380	415	415	415	600
	40–400	LX9FJ● [3]	910	917	925	925	930	931	932	932	936	936	937	937	—[4]
F500	40–400	LX1FK●	—	048	110	110	200	220	240	280	380	415	415	415	600
	40–400	LX9FK●[3]	910	917	925	925	930	931	932	932	936	936	937	937	—[4]
F630	40–400	LX1FL●	—	048	110	110	200	220	240	260	380	415	415	415	600
	40–400	LX9FL● [3]	910	917	924	925	930	930	931	932	935	936	936	937	—[4]
F780[5]	40–400	LX1FX●	—	—	110	110	200	220	220	280	380	415	415	415	—
F800	50/60	LX4F8●[3]	—	—	FW	FW	—	MW	MW	—	QW	QW	QW	—	—
F1400–F2100	40–400	LX1FK●[3]	—	—	065	070	—	110	127	140	200	220	220	—	—

[2] Complete the catalog number by adding the suffix (for example, LX1FF024).
[3] Also requires rectifier DR5TE4U for 110–240 V coils, DR5TE4S for 380–440 V coils.
[4] The 600 V coils for the F400, F500 and F630 do not include an auxiliary contact for holding circuits. If required, select appropriate contacts from Blocks, page 18-15.
[5] LC1F780 contactors operate with 2 coils as a set. The LX1FX● part number includes both coils.

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Application Note on Contactor Drop-out Times

Contactors using LX1, FH, FJ, FK, FL, and FX coils have longer drop-out times. For critical applications such as emergency stop functions:

- Select a fast drop-out coil (LX9), or
- Use a maintained contact Stop button, or
- Use an interposing relay.

Table 18.165: Rectifier Table

Coil	Rectifier Catalog Number
LX9F●910	DR5TF4V
LX9F●917	
LX4F8FW	
LX4F8MW	
LX9F●925	DR5TE4U
LX9F●926	
LX9F●931	
LX9F●936	DR5TE4S
LX9F●937	
LX9F●938	
LX4F8QW	

Table 18.166: AC and DC Coil Part Numbers for LC1F1400 to F2100 *[6]*

Control Circuit Voltage of Contactor	Voltage Code	Spare Coil Part Number	Quantity
AC Coils			
110 V	F7	LX1FK065	2
120 V	G7	LX1FK070	2
220 V	M7	LX1FK110	2
230 V	P7	LX1FK110	2
240 V	U7	LX1FK127	2
277 V	W7	LX1FK140	2
380 V	Q7	LX1FK200	2
400 V	V7	LX1FK200	2
415 V	N7	LX1FK220	2
440 V	R7	LX1FK220	2
500 V	S7	LX1FK240	2
DC Coils			
110 V	FD	LX4FK055	2
125 V	GD	LX4FK065	2
220 V	MD	LX4FK110	2
250 V	UD	LX4FK125	2
440 V	RD	LX4FK220	2

TeSys D contactors: TeSys™ D Non-Reversing Contactors, page 18-8 and TeSys™ D Reversing Contactors, page 18-10
TeSys F contactors: TeSys™ F Non-Reversing Contactors, page 18-12 and TeSys™ F Reversing Contactors, page 18-13
TeSys D overload relay accessories: TeSys D Overload Relay Accessories, page 18-22
TeSys D replacement coils: TeSys™ D AC Coils, page 18-43
Dimensions: TeSys™ D Contactors, AC and DC Coil, page 18-51 to TeSys™ D Thermal Overload Relay Dimensions, page 18-59

[6] These coils are standard parts included when a voltage code is added to the contactor part number LC1F1700 or LC1F2100.

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TeSys™ D DC Coils

NOTE: DC coils for new TeSys D contactors LC●D09-D38, LC1DT20-DT40, LC●D40A-65A, LC1DT60A-80A, and LC●D80-D95 are not replaceable.

Table 18.167: For Old D2 LP1D80 and LC1D80 *[7]*

Rated Nominal Voltage V	Catalog Number	Catalog Number Wide Range *[8]*
12	LX4D7JD	LX4D7JW
24	LX4D7BD	LX4D7BW
36	LX4D7CD	LX4D7CW
48	LX4D7ED	LX4D7EW
60	LX4D7ND	—
72	LX4D7SD	LX4D7SW
110	LX4D7FD	LX4D7FW
125	LX4D7GD	—
220	LX4D7MD	LX4D7MW
250	LX4D7UD	—
440	LX4D7RD	—
600	LX4D7XD	—

Specifications		
Average consumption	22 W	23 W
Operating range at θ < 55 °C / 131 °F	80–110% nominal voltage	70–120% nominal voltage

Table 18.168: For TeSys D LC1D115, 150

Rated Nominal Voltage V	Catalog Number
24	LX4D8BD
48	LX4D8ED
60	LX4D8ND
72	LX4D8SD
110	LX4D8FD
125	LX4D8GD
220	LX4D8MD
250	LX4D8UD
440	LX4D8RD

Average Consumption	Inrush 365 W, Sealed 5 W
Operating range at θ < 55 °C / 131 °F	70%–120% of nominal voltage

TeSys D contactors: TeSys™ D Non-Reversing Contactors, page 18-8 and TeSys™ D Reversing Contactors, page 18-10
TeSys D overload relay accessories: TeSys D Overload Relay Accessories, page 18-22
TeSys D replacement coils: TeSys™ D AC Coils, page 18-44
TeSys D dimensions: TeSys™ D Contactors, AC and DC Coil, page 18-51 to TeSys™ D Thermal Overload Relay Dimensions, page 18-59

[7] For old style contactors where the catalog number includes the auxiliary contact arrangement (for example, LP1D8010). The new style TeSys DC controlled contactors (for example, LC1D80BD) do not have replaceable coils.

[8] Wide range coils cannot be used with contactors using both front- and side-mounting auxiliaries.

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TeSys F DC Coils

LX4 coils are the standard coils when a voltage code is added to the part number. The LX9 coils may be ordered separately for special applications. LX9 coils do not include a built-in normally open holding circuit contact; a separate auxiliary contact block with an N.O. contact should be added to the contactor. Both the LX4 and LX9 coils can be used on previous TeSys F devices.

Table 18.169: LX4 Coils for LC1F115, F150, F185, F225, F265, F400, F500, F630, F780, F800

Device Type	Catalog Number	● Catalog Number Suffix									
		24 V	36V	48 V	60 V	72 V	110 V	125 V	220 V	250 V	440 V
F115, F150	LX4FF●	024	035	048	060	070	110	125	220	250	440
F185, F225	LX4FG●	024	035	048	060	070	110	125	220	250	440
F265, F330	LX4FH●	024	035	048	060	070	110	125	220	250	440
F400	LX4FJ●	—	—	048	060	070	110	125	220	250	440
	LX9FJ●*[9]*	—	—	918	—	—	926	927	932	—	938
F500	LX4FK●	—	—	048	060	070	110	125	220	250	440
	LX9FK●*[9]*	—	—	918	—	—	926	927	932	—	938
F630	LX4FL●	—	—	048	060	070	110	125	220	250	440
	LX9FK●*[9]*	—	—	918	—	—	926	927	932	—	938
F780	LX4FX●*[10]*	—	—	—	—	—	110	125	220	250	440
F800	LX4F8●*[11]*	—	—	—	—	—	FW	FW	MW	—	QW
F1400, F1700, and F2100	LX4FK●*[11]*	—	—	—	—	—	055	065	110	125	220

Table 18.170: LX9 Coils and Resistors

Coil	Resistor Catalog Number	Qty. Required	Coil	Resistor Catalog Number	Qty. Required	Coil	Resistor Catalog Number	Qty. Required
LX9FJ918	DR2SC0047	1	LX9FK918	DR2SC0039	1	LX9FL918	DR2SC0047	2
LX9FJ926	DR2SC0030	1	LX9FK926	DR2SC0220	1	LX9FL925	DR2SC0270	2
LX9FJ927	DR2SC0390	1	LX9FK927	DR2SC0330	1	LX9FL926	DR2SC0330	2
LX9FJ932	DR2SC1200	1	LX9FK932	DR2SC1000	1	LX9FL931	DR2SC1000	2
LX9FJ938	DR2SC4700	1	LX9FK938	DR2SC3300	1	LX9FL937	DR2SC3900	2

TeSys F contactors: TeSys™ F Non-Reversing Contactors, page 18-12 and TeSys™ F Reversing Contactors, page 18-13
TeSys F overload relay accessories: TeSys F Overload Relay Accessories, page 18-22
TeSys F replacement coils and parts: TeSys F Contact Kits, Arc Chambers, page 18-48, TeSys F AC Coils, page 18-44
TeSys F dimensions: TeSys F dimensions: TeSys™ F Contactors, Dimensions, page 18-53, TeSys™ F Overload Relay Dimensions, page 18-61

[9] Coil circuit requires a separately mounted resistor. See Table 18.170 LX9 Coils and Resistors, page 18-47.
[10] LC1F780 contactors operate on 2 coils as a set. The LX4FX part number includes both coils.
[11] Also requires rectifier DR5TE4U,

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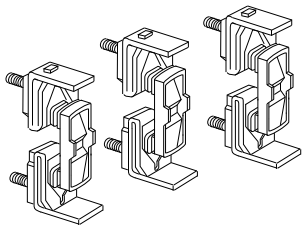
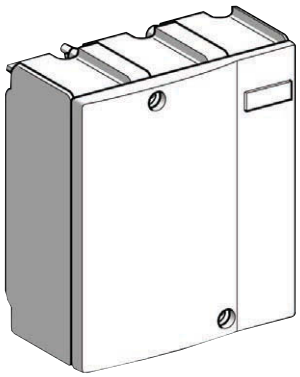


LA5FG431



LA5F11550

TeSys™ F Contact Kits, Arc Chambers

Table 18.171: Replacement Contact Sets[12]

	For use on contactors	Number of Poles	Catalog Number
Two-pole	LC1F4002	2 poles	LA5F400802
	LC1F5002	2 poles	LA5F500802
	LC1F6302	2 poles	LA5F630802
Three-pole	LC1F115, F150	3 poles	LA5FF431
	LC1F185, F225	3 poles	LA5FG431
	LC1F265	3 poles	LA5FH431
	LC1F330, F400	3 poles	LA5F400803
	LC1F500	3 poles	LA5F500803
	LC1F630	3 poles	LA5F630803
	LC1F780	1 pole	LA5F780801 [13]
	LC1F800	3 poles	LA5F800803
Four-pole	LC1F1504, F1154	4 poles	LA5FF441
	LC1F1854, F2254	4 poles	LA5FG441
	LC1F2654	4 poles	LA5FH441
	LC1F3304, F4004	4 poles	LA5F400804
	LC1F5004	4 poles	LA5F500804
	LC1F6304	4 poles	LA5F630804
	LC1F7804	1 pole	LA5F780801 [13]

Table 18.172: Arc Chambers

	For use on contactors	Number of Poles	Catalog Number
Two-pole	LC1F4002	2 poles	LA5F400250
	LC1F5002	2 poles	LA5F500250
	LC1F6302	2 poles	LA5F630250
Three-pole	LC1F115	3 poles	LA5F11550
	LC1F150	3 poles	LA5F15050
	LC1F185	3 poles	LA5F18550
	LC1F225	3 poles	LA5F22550
	LC1F265	3 poles	LA5F26550
	LC1F330	3 poles	LA5F33050
	LC1F400	3 poles	LA5F40050
	LC1F500	3 poles	LA5F50050
	LC1F630	3 poles	LA5F63050
	LC1F780	1 pole	LA5F780150 [13]
	LC1F800	3 poles	LA5F80050
	LC1F1400	6 poles	LA5F140050
	LC1F1700	6 poles	LA5F170050
	LC1F2100	6 poles	LA5F210050
Four-pole	LC1F1154	4 poles	LA5F115450
	LC1F1504	4 poles	LA5F150450
	LC1F1854	4 poles	LA5F185450
	LC1F2254	4 poles	LA5F225450
	LC1F2654	4 poles	LA5F265450
	LC1F3304	4 poles	LA5F330450
	LC1F4004	4 poles	LA5F400450 [14]
	LC1F5004	4 poles	LA5F500450 [14]
	LC1F6304	4 poles	LA5F630450 [15]
	LC1F7804	1 pole	LA5F780150 [13]

TeSys F contactors: TeSys™ F Non-Reversing Contactors, page 18-12 and TeSys™ F Reversing Contactors, page 18-13
TeSys F overload relay accessories: TeSys F Overload Relay Accessories, page 18-22
TeSys F replacement coils and parts: F AC, page 18-44, and TeSys F DC Coils, page 18-47
TeSys F dimensions: TeSys™ F Contactors, Dimensions, page 18-53, TeSys™ F Overload Relay Dimensions, page 18-61

[12] Supplied per pole are: 2 fixed contacts, 1 moving contact, 2 deflectors, 1 backplate, mounting screws and washers.
[13] Two identical components per pole are supplied.
[14] Two 2-pole arc chambers.
[15] Single-pole arc chambers.

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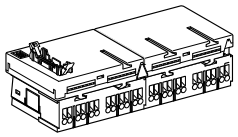
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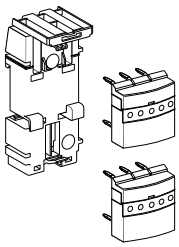
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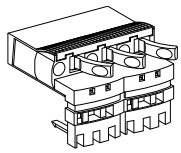
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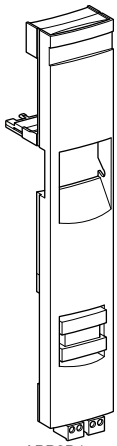
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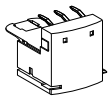
LAD33

Splitter Boxes, Power Connections and Accessories

Table 18.173: Splitter Boxes[1]

Description	Type of Control-Command Connection on Control System Side	No. of I/O per Starter	No. of Starters per Unit	Catalog Number
50 A power splitter box	—	—	2	LAD322
			4	LAD324
50 A power and control splitter box	1 x HE10 8I/8O	1I/1O	4	APP2R4H1
	1 x HE10 16I and 1 x HE10 8O	2I/1O	4	APP2R4H2
	via module APP1C●●● [2]	—	2	APP2R2E
			4	APP2R4E
	AS-Interface	2I/1O	2	APP2R2AS
		1I/1O	4	APP2R4AS

Table 18.174: Power Connection Components for One Starter

Description	Kit Consists Of:	Catalog Number
Assembly and power connection kit	One LAD31 plate for GV2ME and two LAD34 power connection modules	LAD351
Reversing kit [3]	One set of bus bars and one mechanical interlock	LAD32

Table 18.175: Power Connection Accessories for One Starter

Description	Max. Connection Cross-Section	Use	Catalog Number
Upstream terminal block (50 A max)	16 mm^2 (6 AWG)	Power supply for one or two power splitter boxes	LAD3B
Downstream terminal block (50 A max)	6 mm^2 (10 AWG)	Connection of motor cables	LAD331

Table 18.176: Control Connection Module for One Starter

Description	D-Line Coil Voltage	Type of Coil Control Relay	Type of Starter	Catalog Number
Control connection module (integrating contact block GVAE20)	12–240 Vac or 24–125 Vdc	Electromechanical [4]	Non-reversing	APP2D1
			Reversing	APP2D2
	24–48 Vdc	Without relay [5]	Non-reversing	APP2D1D
			Reversing	APP2D2D

Table 18.177: Spare or Replacement Parts

Description	Type of Control-Command Connection on Control System Side	No. of I/O per Starter	No. of Starters	Sold in Lots of	Catalog Number
Plate for mounting a GV2ME manual starter	—	—	1	10	LAD311
Power connection module	—	—	1	10	LAD341
Control-command splitter box (single, for mounting on a power splitter box)	1 x HE10 8I/8O	1I/1O	4	1	APP2R4H3
	1 x HE10 16I and 1 x HE10 8O	2I/1O	4	1	APP2R4H4
	Per module APP1C●●● [2]	—	2	1	APP2R2C
			4	1	APP2R4C
	AS-Interface	2I/1O	2	1	APP2R2A
		1I/1O	4	1	APP2R4A
Replacement electromechanical relay (for control connection module)		—	1	10	APP2ER

[1] A total of up to eight starters is permissible after extensions. Use multiple quantities of the same catalog number to create the desired line-up.
[2] Connection to an APP1C••• module via APP2CX adapter (LAD35).
[3] To create a TeSys D reverser, use two LC1D contactors, one assembly and power connection kit, and one reversing kit.
[4] Relay supplied mounted on the front panel of the control connection.
[5] The use of TeSys D low consumption contactors is recommended.

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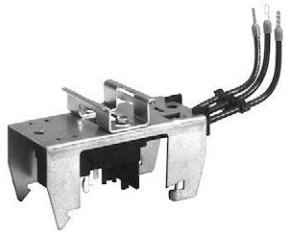
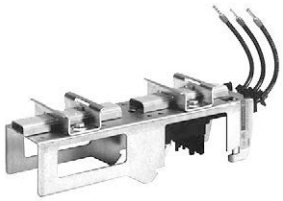
TeSys™ AK5 Panel Busbar System

The AK5 pre-fabricated bus bar system provides a quick and easy method of mounting control devices. All components are finger safe, UL Listed, CSA approved and CE marked. Although the AK5 system can be screw mounted onto any type of support, it **must be mounted** on the AM1DL201 DIN rail when component mounting plates incorporating a tap-off are used. When using tap-offs, the nominal operating current of the bus bar (160 A @ 35°) must not be exceeded. Approvals include IEC 439, UL, CSA, DNV and LROS.

AK5JB143



AK5PA231



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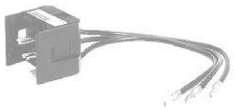

AK5PC33

AM1DL201

Table 18.178: 160 A, 3-Phase Busbar System

Maximum number of mounting plates						Length		Catalog Number
Tap-off		Standard Width Plate		Extension Plate				
1.42 in.	36 mm	2.13 in.	54 mm	2.80 in.	71 mm	in.	mm	
6		4		2		13.39	344	AK5JB143
9		6		3		17.64	452	AK5JB144
12		8		4		21.85	560	AK5JB145
15		10		5		26.05	668	AK5JB146
24		16		8		38.69	992	AK5JB149
27		18		9		42.90	1100	AK5JB1410

Table 18.179: Mounting Plate Tap-off (plugs into busbar mounted on AM1DL201 DIN rail)

Width		Thermal Current Amperes	Application		Catalog Number
in.	mm				
2.13	54	25 A	GV2 with	LUS or LUB 12 and 32	AK5PA231
2.13	54	25 A		contactor	AK5PA232
4.25	108	25 A		reversing contactor	AK5PA232S

Table 18.180: Bus Tap-off (plugs into busbar for wiring to a separately mounted device)

Width		Thermal Current (A)	Length of Leads		Catalog Number
in.	mm		in.	mm	
1.42	36	32 A	9.84	250	AK5PC33
1.42	36	32 A	39.37	1000	AK5PC33L

Table 18.181: Extension Plates

Used to mount wider components. Bolt to standard mounting plates (after DIN rails are removed).

Width		Application	Catalog Number
in.	mm		
2.80	71	GV & Reversing contactor	AK5PE27

Table 18.182: Mounting Rail (must be used for mounting plates with tap-offs)

Description	Depth	Length	Catalog Number
	mm	mm	
75 mm Omega Rail	15	2000	AM1DL201

File E161251
CCN NMTR

File LR 89150
Class 6228-01

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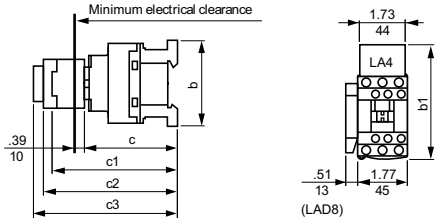
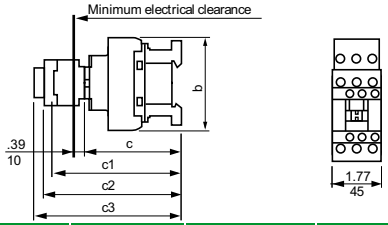
TeSys™ D Contactors, AC and DC Coil

Table 18.183: TeSys D 9 to 38 A Contactors, AC and DC Coils

LC1D09 to D18



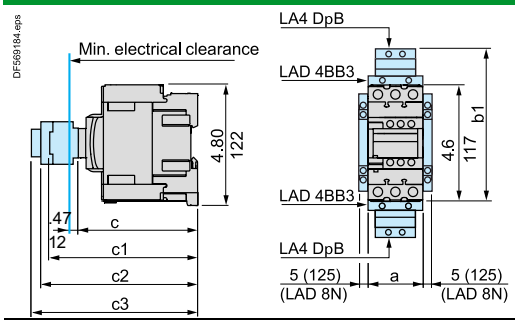
LC1D25 to D38 (3-pole) and LC1DT20 to DT40 (4–pole)



	TeSys D contactors: LC1D	D09 to D18 Inches (mm)	D093 to D123 Inches (mm)	D099 to D129 Inches (mm)	D25 to D38 Inches (mm)	D183 to D323 Inches (mm)	D098, D128, DT20, DT25 Inches (mm)	DT203, DT253 Inches (mm)	DT32, DT40 Inches (mm)	D188, D258, DT323, DT403 Inches (mm)
b	AC coil, without add-on accessories	3.03 (77)	3.89 (99)	3.14 (80)	3.36 (85)	3.89 (99)	3.34 (85)	3.89 (99)	3.58 (91)	4.13 (105)
	DC coil	3.03 (77)	3.89 (99)	3.14 (80)	3.36 (85)	3.89 (99)	3.34 (85)	3.89 (99)	3.58 (91)	4.13 (105)
b1	AC coil, with LAD4BB	3.70 (94)	4.21 (107)	3.75 (95.5)	3.85 (98)	4.21 (107)	3.85 (98)	—	—	—
	AC coil, with LA4D*2	4.33 (110) *[1]*	4.84 (123) *[1]*	4.30 (111.5) *[1]*	4.48 (114) *[1]*	4.84 (123) *[1]*	4.48 (114)	—	—	—
	AC coil, with LA4DF, DT	4.68 (119) *[1]*	5.19 (132) *[1]*	4.76 (120.5) *[1]*	4.84 (123) *[1]*	5.19 (132) *[1]*	5.02 (129)	—	—	—
	AC coil, with LA4DR, DW, DL	4.96 (126) *[1]*	5.67 (139) *[1]*	5.0 (127.5) *[1]*	5.11 (130) *[1]*	5.47 (139) *[1]*	7.48 (190)	—	—	—
c	AC coil, without cover or add-on blocks	3.30 (84)	3.30 (84)	3.30 (84)	3.54 (90)	3.54 (90)	3.54 (90)	3.54 (90)	3.85 (98)	3.85 (98)
	AC coil, with cover, without add-on blocks	3.38 (86)	3.38 (86)	3.38 (86)	3.62 (92)	3.62 (92)	3.62 (92)	3.62 (92)	3.93 (100)	3.93 (100)
	DC coil, without cover or add-on blocks	3.66 (93)	3.66 (93)	3.66 (93)	3.89 (99)	3.89 (99)	—	—	—	—
	DC coil, with cover, without add-on blocks	3.76 (95)	3.76 (95)	3.76 (95)	3.97 (101)	3.97 (101)	3.90 (99)	3.90 (99)	4.21 (107)	4.21 (107)
c1	AC coil, with LADN or C (two or four contacts)	4.60 (117)	4.60 (117)	4.60 (117)	4.84 (123)	4.84 (123)	4.84 (123)	4.84 (123)	5.15 (131)	5.15 (131)
	DC coil, with LADN or C (two or four contacts)	4.96 (126)	4.96 (126)	4.96 (126)	5.19 (132)	5.19 (132)	4.84 (123)	4.84 (123)	5.15 (131)	5.15 (131)
c2	AC coil, with LAD6K10	5.07 (129)	5.07 (129)	5.07 (129)	5.31 (135)	5.31 (135)	5.31 (135)	5.31 (135)	5.62 (143)	5.62 (143)
	DC coil, with LAD6K10	5.43 (138)	5.43 (138)	5.43 (138)	5.66 (144)	5.66 (144)	5.31 (135)	5.31 (135)	5.62 (143)	5.62 (143)
c3	AC coil, with LADT, R, S	5.39 (137)	5.39 (137)	5.39 (137)	5.62 (143)	5.62 (143)	5.62 (143)	5.62 (143)	5.94 (151)	5.94 (151)
	AC coil, with LADT, R, S and sealing cover	5.55 (141)	5.55 (141)	5.55 (141)	5.78 (147)	5.78 (147)	5.78 (147)	5.78 (147)	6.10 (155)	6.10 (155)
	DC coil with LADT, R, S	5.76 (146)	5.76 (146)	5.76 (146)	5.98 (152)	5.98 (152)	5.62 (143)	5.62 (143)	5.94 (151)	5.94 (151)
	DC coil with LADT, R, S and sealing cover	5.90 (150)	5.76 (146)	5.76 (146)	6.14 (156)	6.14 (156)	5.78 (147)	5.78 (147)	6.10 (155)	6.10 (155)

Table 18.184: TeSys D 40 A to 65 A, AC and DC coil

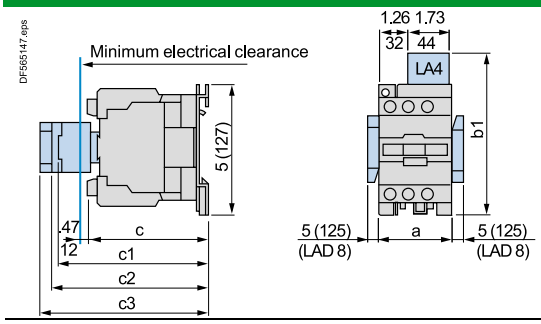
LC1 D40A–D65A (3P), LC1 DT60A–DT80A (4P) AC OR DC



	LC1	D40A–D65A in. (mm)	DT60A–DT80A in. (mm)
a		2.17 (55)	2.76 (70)
b1	with LA4 D●2	—	—
	with LA4 DB3 or LAD 4BB3	5.35 (136)	—
	with LA4 DF, DT	6.18 (157)	—
	with LA4 DM, DW, DL	6.54 (166)	—
c	without cover or add-on blocks	4.65 (118)	4.65 (118)
	with cover, without add-on blocks	4.72 (120)	4.72 (120)
c1	with LADN (1 contact)	—	—
	with LADN or C (2 or 4 contacts)	5.91 (150)	5.91 (150)
c2	with LAD 6K10 or LA6 DK	6.42 (163)	6.42 (163)
c3	with LADT, R, S	6.73 (171)	6.73 (171)
	with LADT, R, S and sealing cover	6.89 (175)	6.89 (175)

Table 18.185: TeSys D80 and D95 AC Coil

LC1D80 and D95 (3P), LP1 D80004 and D80008 (4P)



	LC1	D80 in. (mm)	D95 in. (mm)	D80004 in. (mm)	D80008 in. (mm)
a		3.35 (85)	3.35 (85)	3.78 (96)	3.78 (96)
b1	with LA4 D●2	5.31 (135)	5.31 (135)	5.31 (135)	5.31 (135)
	with LA4 DB3 or LAD 4BB3	5.31 (135)	—	—	—
	with LA4 DF, DT	5.59 (142)	5.59 (142)	5.59 (142)	5.59 (142)
	with LA4 DM, DW, DL	5.90 (150)	5.90 (150)	5.90 (150)	5.90 (150)
c	without cover or add-on blocks	4.92 (125)	4.92 (125)	4.92 (125)	5.51 (140)
	with cover, without add-on blocks	5.12 (130)	5.12 (130)	—	—
c1	with LADN (1 contact)	5.90 (150)	5.90 (150)	5.90 (150)	5.90 (150)
	with LADN or C (2 or 4 contacts)	6.22 (158)	6.22 (158)	6.22 (158)	6.22 (158)
c2	with LAD 6K10 or LA6 DK	6.69 (170)	6.69 (170)	6.69 (170)	6.69 (170)
c3	with LADT, R, S	7 (178)	7 (178)	7 (178)	7 (178)
	with LADT, R, S and sealing cover	7.16 (182)	7.16 (182)	7.16 (182)	7.16 (182)

[1] Including LAD4BB

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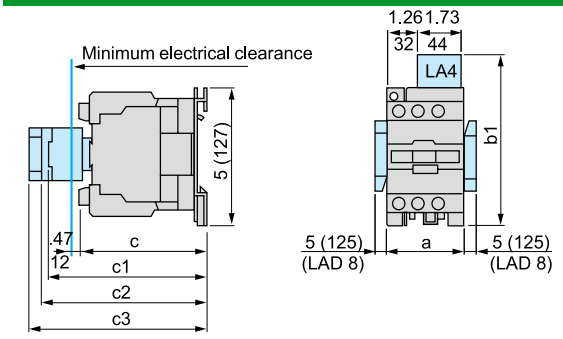
TeSys™ D Contactors, DC Coil

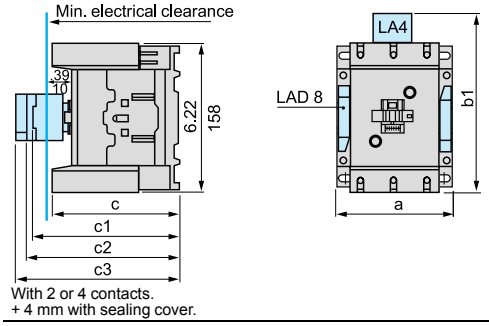
Table 18.186: DC Coil

LC1D80, D95 (3P), LP1D80004, D80008 (4P)



LC1		D80 and D95 in. (mm)	D80004 in. (mm)	D80008 in. (mm)
a		3.35 (85)	3.78 (96)	3.78 (96)
b1	with LAD 4BB3	—	—	—
	with LA4 DF, DT	—	—	—
c	without cover or add-on blocks	7.13 (181)	7.13 (181)	7.72 (196)
	with cover, without add-on blocks	7.32 (186)	—	—
c1	with LAD N (1 contact)	8.03 (204)	8.03 (204)	8.03 (204)
	with LAD N or C (2 or 4 contacts)	8.27 (210)	8.27 (210)	8.27 (210)
c2	with LA6 DK10	8.70 (221)	8.70 (221)	8.70 (221)
c3	with LAD T, R, S	9.01 (229)	9.01 (229)	9.01 (229)
	with LAD T, R, S and sealing cover	9.17 (233)	9.17 (233)	9.17 (233)

LC1D115, D150 (3P), LC1D115004 (4P), AC and DC Coils
Panel mounted with 1/4" screws



With 2 or 4 contacts.
+ 4 mm with sealing cover.

LC1		D115, D150 in. (mm)	D115004 in. (mm)	D1150046 in. (mm)
a		(120)	(150)	(155)
b1	with LA4DA2	(174)	(174)	(174)
	with LA4DF, DT	(185)	(185)	(185)
	with LA4DM, DL	(188)	(188)	(188)
	with LA4DW	(132)	(132)	(115)
c	without cover or add-on blocks	(136)	—	—
	with cover, without add-on blocks	(136)	—	—
c1	with LAD N or C (2 or 4 contacts)	(150)	(150)	(150)
c2	with LA6DK20	(155)	(155)	(155)
c3	with LAD T, R, S	(168)	(168)	(168)
	with LADT, R, S and sealing cover	(172)	(172)	(172)

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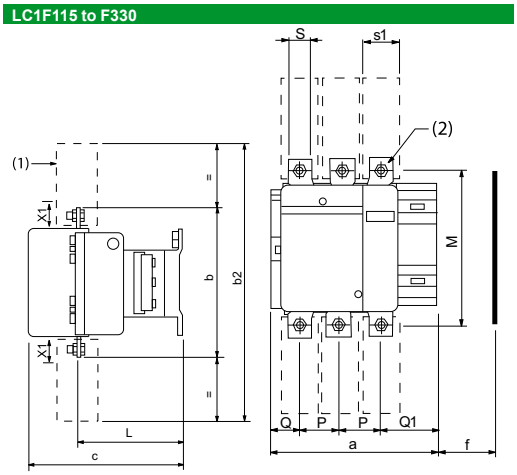
TeSys™ F Contactors, Dimensions

All dimensions shown in mm.
To convert to inches, divide by 25.4.

LC1F115 to F330



(1) Protective cover Type LA9F70•

(2) Optimal terminal shroud

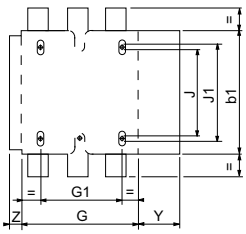


Table 18.187: LC1F115–F330 Dimensions

LC1	F115		F150		F185		F225		F265		F330	
	3-Pole	4-Pole	3-Pole	4-Pole	3-Pole	4-Pole	3-Pole	4-Pole	3-Pole	4-Pole	3-Pole	4-Pole
a	163.5	200.5	163.5	200.5	168.5	208.5	168.5	208.5	201.5	243.5	213	261
b	162	162	170	170	174	174	197	197	203	203	206	206
b1	137	137	137	137	137	137	137	137	145	145	145	145
b2	265	265	301	301	305	305	364	364	370	370	375	375
c	165 *[2]*	165*[2]*	165*[2]*	165 *[2]*	176	176	181	181	207	207	219	219
f	131	131	131	131	130	130	130	130	147	147	147	147
G	106	143	106	143	111	151	111	151	142	190	154.5	202.5
G1	80	80	80	80	80	80	80	80	96	96	96	96
J	106	106	106	106	106	106	106	106	106	106	106	106
J1	120	120	120	120	120	120	120	120	120	120	120	120
L	107	107	107	107	113.5	113.5	113.5	113.5	141	141	145	145
M	147	147	150	150	154	154	172	172	178	178	181	181
P	37	37	40	40	40	40	48	48	48	48	48	48
Q	29.5	29.5	26.5	26	29	29	21	17	39	34	43	43
Q1	60	60	57.5	55.5	59.5	59.5	51.5	47.5	66.5	66.5	74	74
S	15	15	20	20	20	20	25	25	25	25	25	25
S1	27	27	34	34	34	34	44.5	44.5	38	38	44.5	44.5
Y	44	44	44	44	44	44	44	44	38	38	38	38
Z	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	21.5	21.5	20.5	20.5

f = minimum distance required for coil removal.

Table 18.188: LC1F115–F330 Voltage

	200 to 500 V	600 to 1000 V
LC1F115, F150	10	15
LC1F185	10	15
LC1F225, F265	10	15
LC1F330	10	15

X1: Minimum clearance according to the operational voltage and the breaking capacity.

LC1F400 to F500

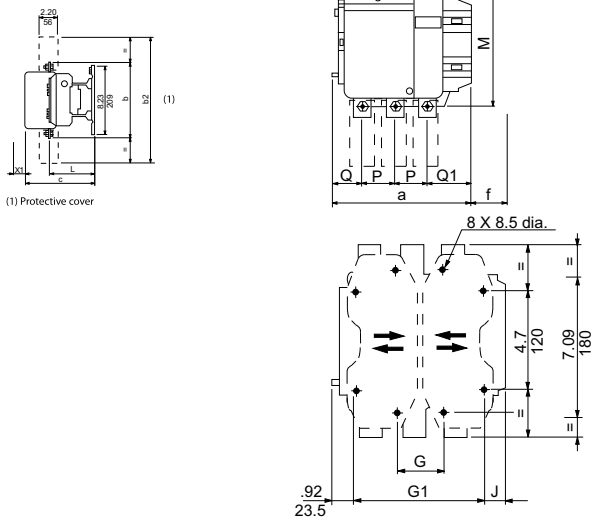


Table 18.189: LC1F400–F500 Dimensions

LC1	F400			F500		
	2-Pole	3-Pole	4-Pole	2-Pole	3-Pole	4-Pole
a	213	213	261	233	233	288
b	206	206	206	238	238	238
b2	375	375	375	400	400	400
c	213	213	213	226	226	226
f	119	119	119	141	141	141
G*[3]*	80	80	80	80	80	140
G min.	66	66	66	66	66	66
G max.	102	102	150	120	120	175
G1*[3]*	170	170	170	170	170	230
G1 min.	156	156	156	156	156	156
G1 max.	192	192	240	210	210	265
J	19.5	19.5	67.5	39.5	39.5	34.5
L	145	145	145	146	146	146
M	181	181	181	208	208	208
P	48	48	48	55	55	55
Q	69	43	43	76	46	46
Q1	96	74	74	102	77	77
S	25	25	25	30	30	30

f = Minimum distance required for coil removal.

Table 18.190: LC1F400–F500 Voltage

	200 to 500 V	600 to 1000 V
LC1F400	15	20
LC1F500	15	20

X1: Minimum clearance according to the operational voltage and the breaking capacity.

[2] +6 mm with time delay block (for F115 and F150).
[3] Supplied

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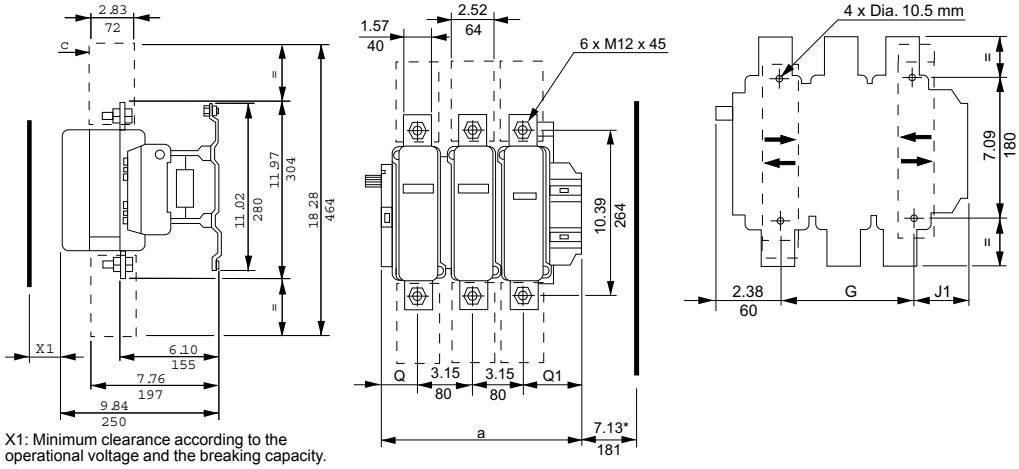
Table 18.191: LC1F Dimensions

LC1F630 and LC1F800

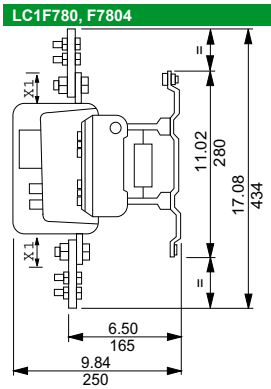


X1: Minimum clearance according to the operational voltage and the breaking capacity.

	LC1F630	a		G supplied		G min.		G max.		J1		Q		Q1	
* = minimum distance required for coil removal. ♦ Protective terminal cover.	2 P	12.17	309	7.09	180	3.94	100	7.68	195	2.70	68.5	4.02	102	5.00	127
	3 P	12.17	309	7.09	180	3.94	100	7.68	195	2.70	68.5	2.36	60	3.50	89
	4 P	15.31	389	9.45	240	5.91	150	10.83	275	2.70	68.5	2.36	60	3.50	89

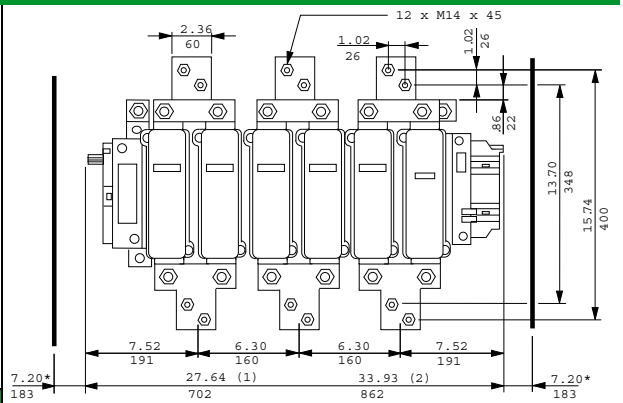
Voltage (V)	200 to 500 V	690 to 1000 V	200 to 690 V	1000 V
F630	20	30	—	—
F800	—	—	10	20

LC1F780, F7804



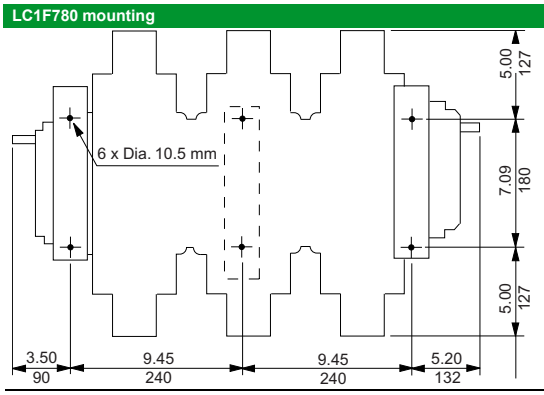
X1: Minimum clearance according to the operational voltage and the breaking capacity.

Voltage (V)	200 to 500 V	690 to 1000 V
X1 in mm	30	35

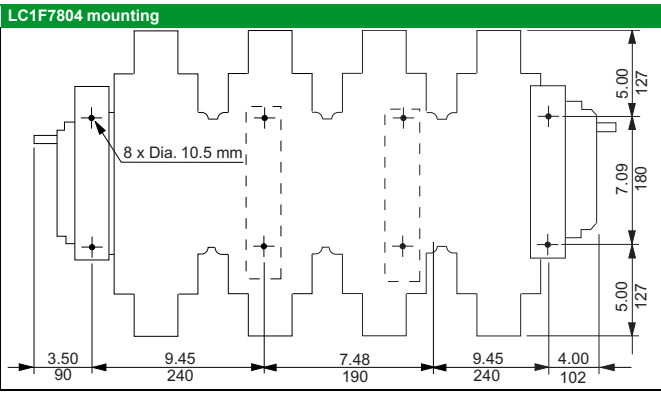


1) Overall length (3 poles).
2) Overall length (4 poles).
* Minimum distance required for coil removal.

LC1F780 mounting



LC1F7804 mounting



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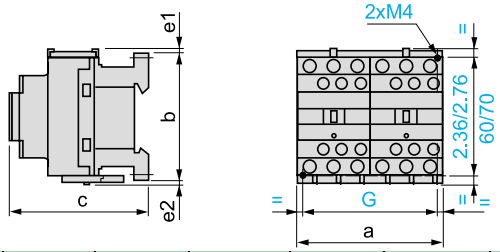
TeSys™ D Reversing Contactor Dimensions

Table 18.192: Reversing Contactor Dimensions

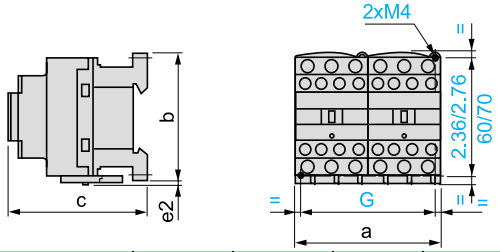
LC2D09–D38
2 x LC1D09 to D38



LC2 or 2 x LC1	a	b	c [4]	e1	e2	G
	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
D09 to D18 (AC Coil)	3.54 (90)	3.03 (77)	3.38 (86)	0.16 (4)	0.06 (1.5)	3.14 (80)
D093 to D123 (AC Coil)	3.54 (90)	3.9 (99)	3.38 (86)	—	—	3.14 (80)
D09 to D18 (DC Coil)	3.54 (90)	3.03 (77)	3.74 (95)	0.16 (4)	0.06 (1.5)	3.14 (80)
D093 to D123 (DC Coil)	3.54 (90)	3.9 (99)	3.74 (95)	—	—	3.14 (80)
D25 to D38 (AC Coil)	3.54 (90)	3.34 (85)	3.62 (92)	0.35 (9)	0.20 (5)	3.14 (80)
D183 to D383 (AC Coil)	3.54 (90)	3.9 (99)	3.62 (92)	—	—	3.14 (80)
D25 and D32 (DC Coil)	3.54 (90)	3.34 (85)	3.98 (101)	0.35 (9)	0.20 (5)	3.14 (80)
D183 to D383 (DC Coil)	3.54 (90)	3.9 (99)	3.98 (101)	—	—	3.14 (80)

e1 and e2: includes cabling

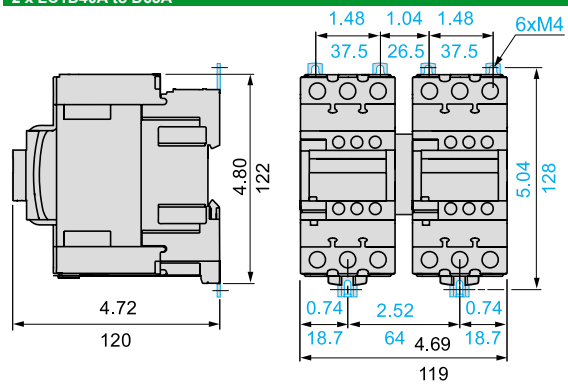
LC2DT20 to DT40
2 x LC1 DT20 to DT40



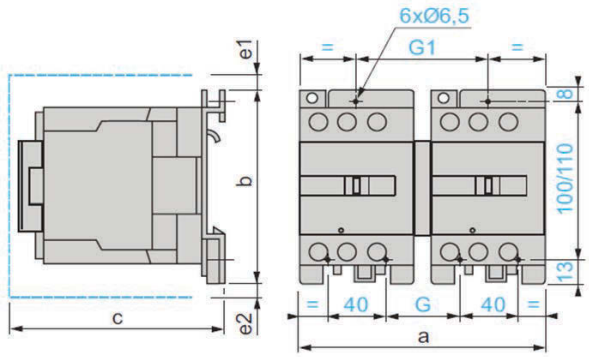
LC2 or 2 x LC1	a	b	c	G
	in. (mm)	in. (mm)	in. (mm)	in. (mm)
DT20 and DT25 (AC Coil)	3.54 (90)	3.34 (85)	3.62 (92)	3.14 (80)
DT32 and DT40 (AC Coil)	3.54 (90)	3.58 (91)	3.9 (99)	3.14 (80)
DT20 and DT25 (DC Coil)	3.54 (90)	3.34 (85)	4 (102)	3.14 (80)
DT32 and DT40 (DC Coil)	3.54 (90)	3.58 (91)	4.29 (109)	3.14 (80)

c, e: includes cabling

LC2D40A to D65A
2 x LC1D40A to D65A



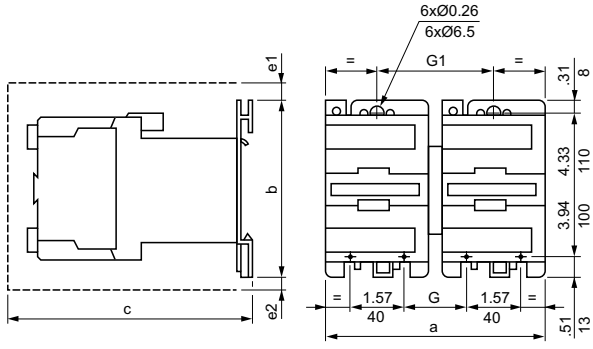
LC2D80 and D95
2 x LC1D80 and D95 (AC Coil)



LC2 or 2 x LC1	a	b	c	e1	e2	G	G1
	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
D80 and D95	7.17 (182)	5 (127)	6.22 (158)	0.51 (13)	—	2.24 (57)	3.78 (96)
D80004	8.15 (207)	5 (127)	6.22 (158)	—	0.79 (20)	2.8 (71)	4.37 (111)

c, e1, and e2: includes cabling

2 x LC1D80 and D95 (DC Coil)



2 x LC1	a	b	c	e1	e2	G	G1
	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
D80 and D95	8.15 (207)	5.0 (127)	8.46 (215)	0.51 (13)	0.79 (20)	3.78 (96)	4.37 (111)

c, e1 and e2: includes cabling.

[4] With safety cover, without add-on block.

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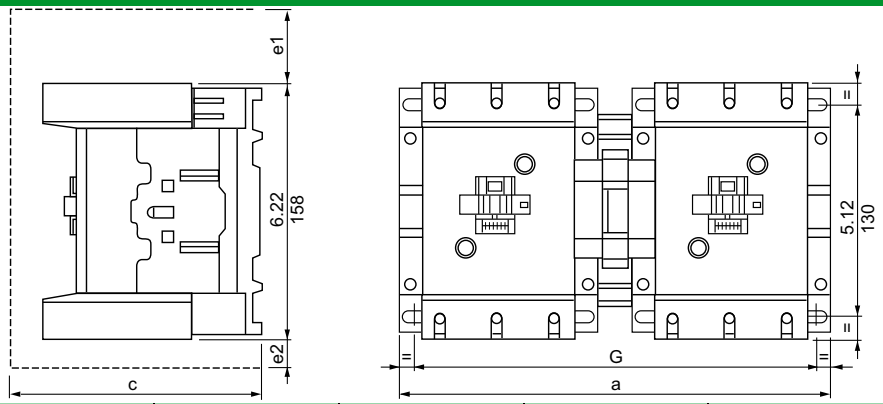
LC2D115 and D150
2 x LC1D115 and D150



LC2 or 2 x LC1	a in. (mm)	c in. (mm)	e1 in. (mm)	e2 in. (mm)	G in. (mm)
D115, D150	10.47 (266)	5.83 (148)	2.2 (56)	0.71 (18)	9.53/10.08 (242/256)
D115004	13.15 (334)	5.83 (148)	—	2.36 (60)	12.2/12.76 (310/324)

c, e1 and e2 includes cabling

NOTE: For dimensions of TeSys F reversing contactors, please refer to catalog MKTED210011EN.

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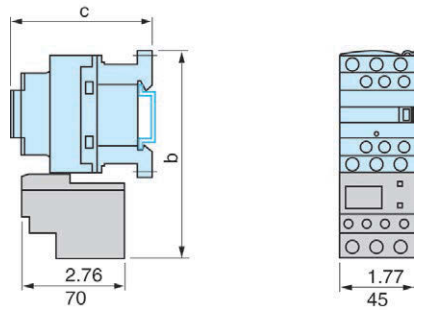
TeSys™ D Open Starter Dimensions

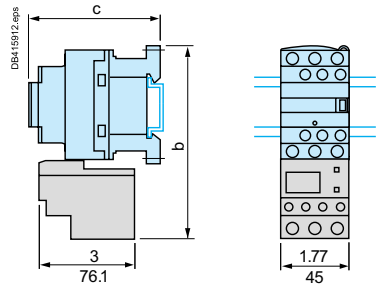
Table 18.193: TeSys D Thermal Overload Relay Dimensions, in. (mm)

LRD01-35
Direct mounting beneath contactors with screw clamp connections



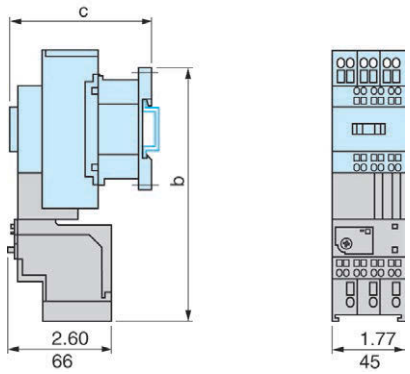
LC1•	D09–D18	D25–D38
b	4.84 (123)	5.39 (137)
c	See TeSys™ D Contactors, AC and DC Coil, page 18-51	

LRD04L-32L
Direct mounting beneath contactors with screw clamp connections



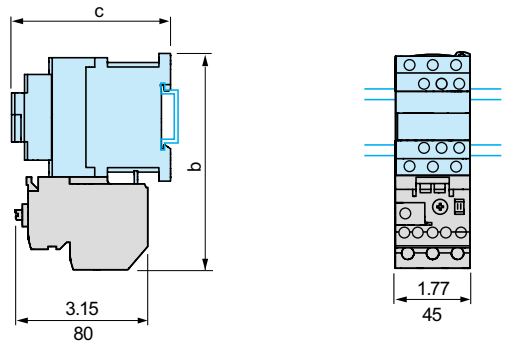
LC1•	D09–D18	D25–D38
b	4.84 (123)	5.39 (137)
c	See TeSys™ D Contactors, AC and DC Coil, page 18-51	

LRD013-223
Direct mounting beneath contactors with spring terminal connections



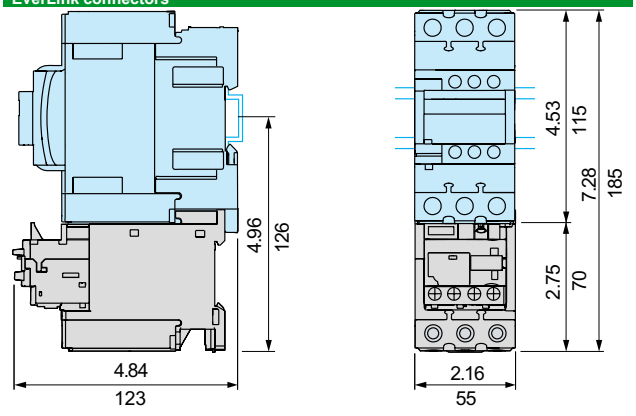
LC1•	D093–383
b	6.61 (168)
c	See TeSys™ D Contactors, AC and DC Coil, page 18-51

LR9D01, 02, 08, and 32

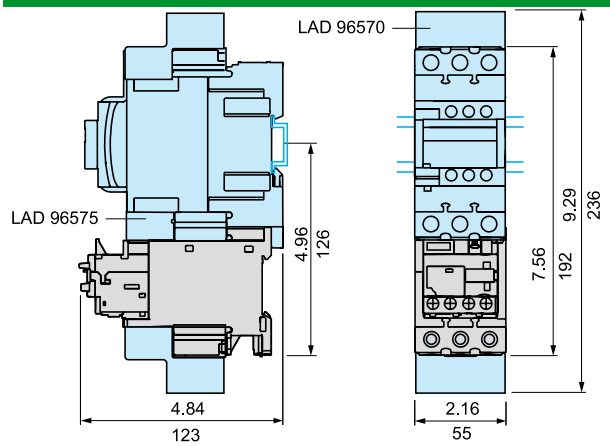


LC1•	D09–D18	D25–D38
b	5.12 (130)	5.51 (140)
c	See TeSys™ D Contactors, AC and DC Coil, page 18-51	See TeSys™ D Contactors, AC and DC Coil, page 18-51

LRD313–365
Direct mounting beneath LC1D40A to D65A with screw clamp connectionsor EverLink connectors



LRD3136–3656
Direct mounting beneath contactors LC1D40A6 to D65A6 with lugs



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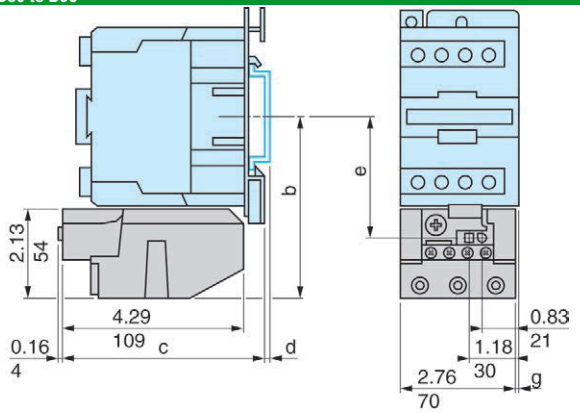
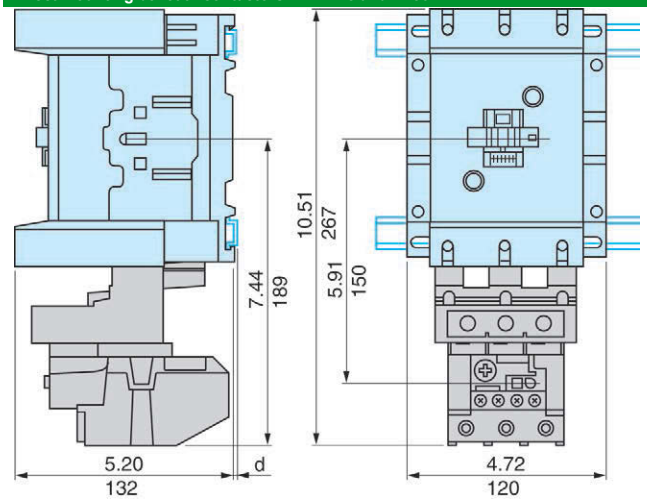
LRD33●●●
Direct mounting beneath contactors LC1D80 to D95



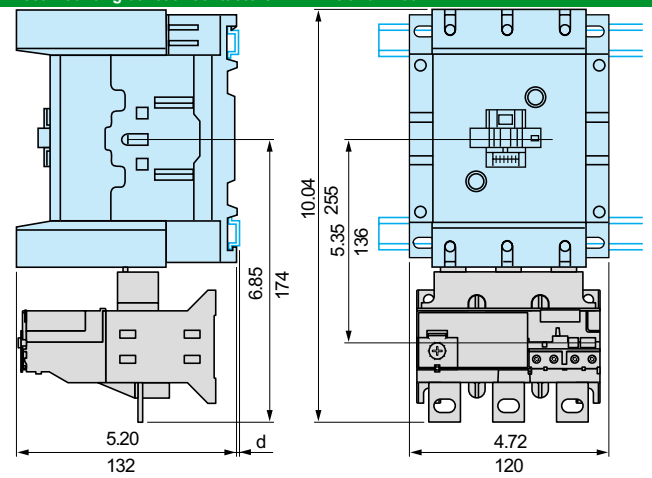
AM1●	DL201			DL200	
d	0.28 (7)			0.67 (17)	
	b	c	e	g (3P)	g (4P)
AC Control Circuit					
LC1D80	4.55 (115.5)	4.88 (124)	3.03 (76.9)	0.37 (9.5)	0.87 (22)
LC1D95	4.55 (115.5)	4.88 (124)	3.03 (76.9)	0.37 (9.5)	—
DC Control Circuit					
LP1D80	4.55 (115.5)	7.06 (179.4)	3.03 (76.9)	0.37 (9.5)	0.87 (22)

LRD4●●●*[5]*
Direct mounting beneath contactors LC1D115 and D150



AM1	DL200 and DR200	DE200 and ED●●●
d	0.10 (2.5)	0.41 (10.5)

LR9D5●●● and LR9D6●*[5]*
Direct mounting beneath contactors LC1D115 and D150



AM1	DP200 and DR200	DE200 and ED●●●
d	0.10 (2.5)	0.41 (10.5)

[5] For additional specifications and selection information, see catalog MKTED210011EN

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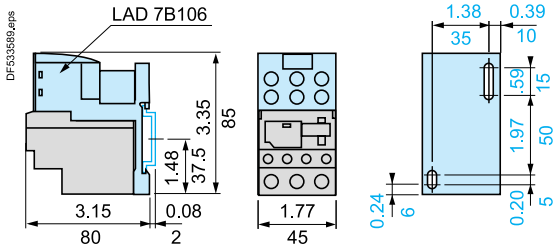
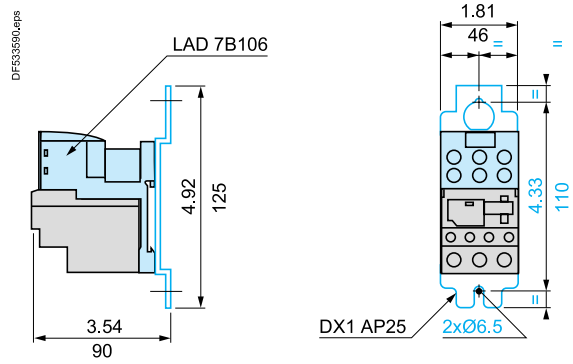
TeSys™ D Thermal Overload Relay Dimensions

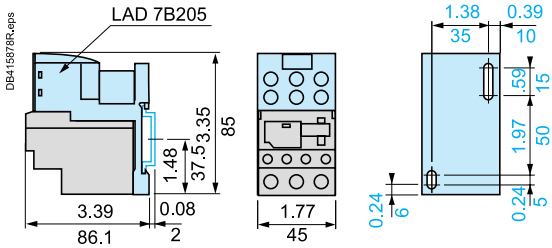
LRD01–35
Independent mounting on 1.97 in. (50 mm) centers or on rail AM1DP200 or DE200



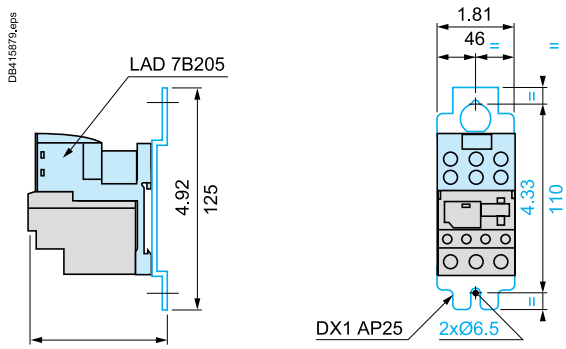
Independent mounting on 4.33 in. (110 mm) centers



LRD04L–32L
Independent mounting on 1.97 in. (50 mm) centers or on rail AM1DP200 or DE200



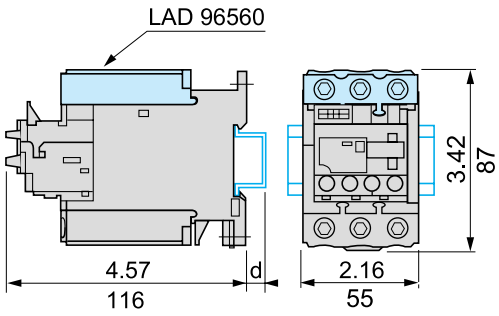
Independent mounting on 4.33 in. (110 mm) centers



AM1	DP200	DE200
d	0.08 (2)	0.37 (9.5)

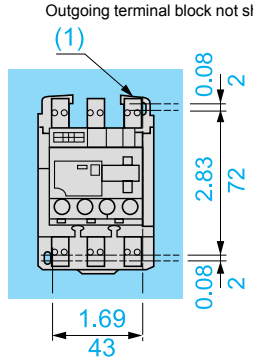
LRD313–365
Mounting on rail AM1D•200 or ED200

With terminal block LAD96560



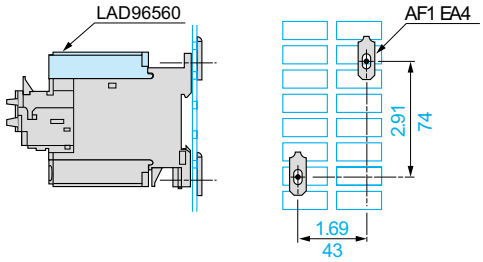
Panel mounting

Outgoing terminal block not shown



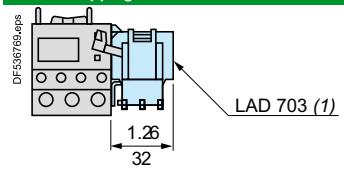
(1) 2 elongated holes Ø 4.2 x 6.

Mounted on plate AM1P



AM1	DP200	DE200	ED200
d	0.08 (2)	0.37 (9.5)	0.37 (9.5)

LRD01–35 and LRD313–365
Remote tripping or electrical reset



(1) Can only be mounted on RH side of relay

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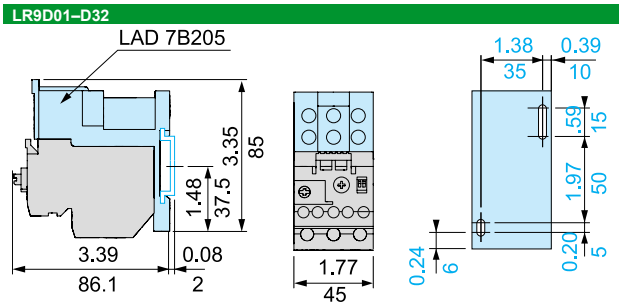
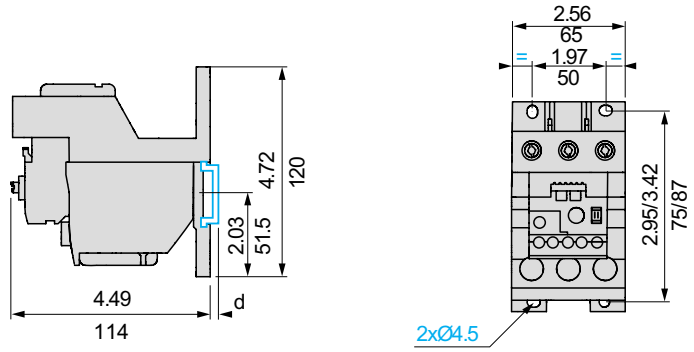
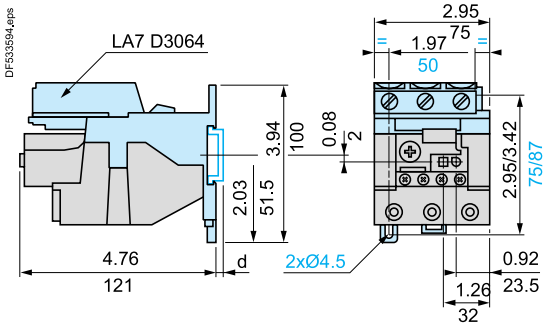
LR9D01–D32



LR9D110S

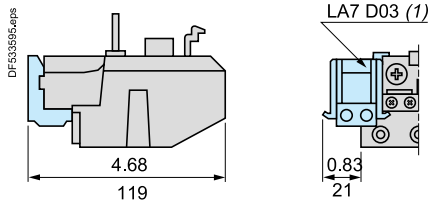


LRD3●●● and LR2D35●●
Independent mounting on 1.97 in. (50 mm) centers or on rail AM1DP200 or DE200



AM1	DP200	DE200
d	0.08 (2)	0.37 (9.5)

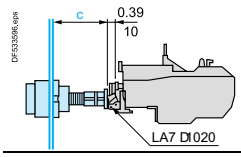
LRD3●●●, LR2D35●●, and LR9D5
Remote tripping or electrical reset



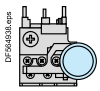
(1) Can be mounted on RH or LH side of relay LRD3●●●, LR2D35●●, or LR9D

LRD3●●●
Adapter for door-mounted operator

LA7 D1020



Stop

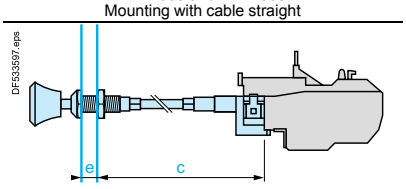


Reset

c: adjustable from 0.67 to 4.72 (17 to 120)

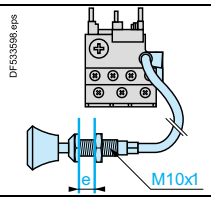
LRD, LRD313–365, LRD04–32L, LR9D5, and LR9D6
"Reset" by flexible cable

LA7D305 and LAD7305
Mounting with cable straight



e: up to 1.18 (20)
c: up to 21.65 (550)

Mounting with cable bent



e: up to 1.18 (20)

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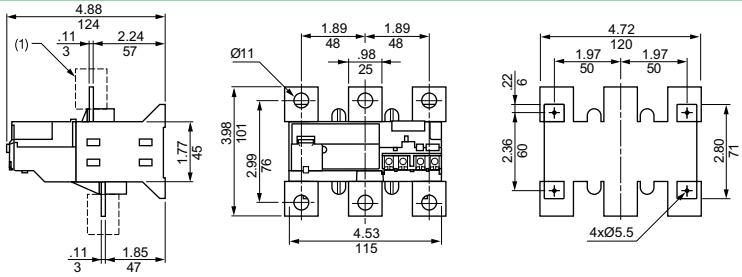
TeSys™ F Overload Relay Dimensions

All dimensions shown in mm.
To convert to inches, divide by 25.4.

Table 18.194: TeSys F Overload Relay Dimensions

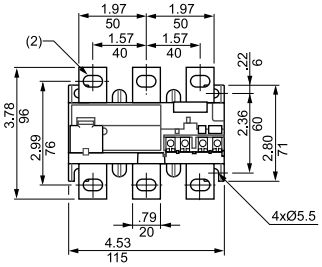
LR9F5•71, F71

Common side view



1) Terminal shroud LA9F70•

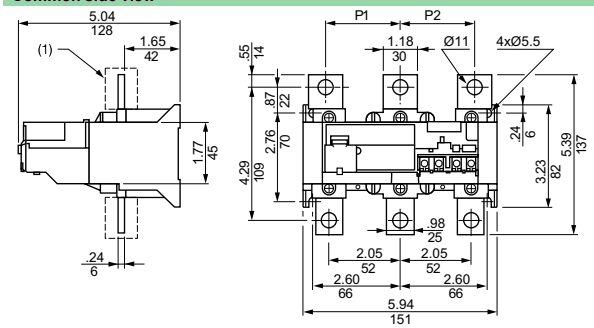
LR9F5•57, F5•63, F5•67, F5•69, F57, F63, F67, F69



2) 6.5 x 13.5 for LR9F5•57 and F57.
8.5 x 13.5 for LR9F5•63, F5•67, F5•69, F63, F67, F69.

LR9F7•75, F7•79, F7•81, F75, F79, F81

Common side view

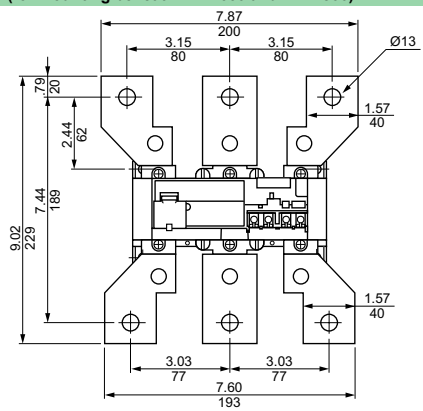


(1) Terminal shroud LA9-F70•

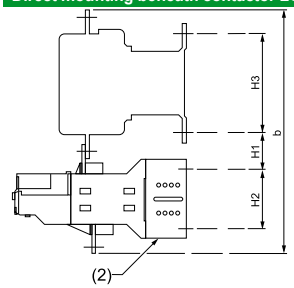
	P1	P2
LR9F7•75, F75	48	48
LR9F7•79, F7•81, F79, F81	55	55

LR9F7•81, F81

(for mounting beneath LC1F630 and LC1F800)

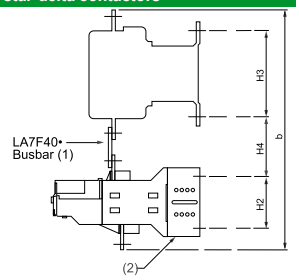


Direct mounting beneath contactor LC1F



(2) Relay mounting plate, see Mounting Plate for Overload Relay, page 18-22.

Direct mounting beneath reversing contactors or star-delta contactors



(1) Connection accessories, see Connection Accessories, page 18-22.
(2) Relay mounting plate, see Mounting Plate for Overload Relay, page 18-22.

LC1 contactors	With LR9 relays	b	H1	H2	H3	LC1 contactors	With LR9 relays	b	H4	H2	H3
F115	F5•57, F5•63, F5•67, F5•69, F57, F63, F67, F69	240	30	76	120	F115	F5•57, F5•63, F5•67, F5•69, F57, F63, F67, F69	279	60	76	120
F150	F5•57, F5•63, F5•67, F5•69, F57, F63, F67, F69	246	30	76	120	F150	F5•57, F5•63, F5•67, F5•69, F57, F63, F67, F69	283	60	76	120
F185	F5•57, F5•63, F5•67, F5•69, F57, F63, F67, F69	250	30	76	120	F185	F5•57, F5•63, F5•67, F5•69, F57, F63, F67, F69	285	60	76	120
F225	F5•71, F71	273	40	76	120	F225	F5•71, F71	319	80	76	120
	F7•75, F7•79, F75, F79	308	50	108.8	120		F7•75, F7•79, F75, F79	360	100	108.8	120
F265	F5•71, F71	279	40	76	120	F265	F5•71, F71	332	90	76	120
	F7•75, F7•79, F75, F79	314	60	108.8	120		F7•75, F7•79, F75, F79	363	100	108.8	120
F330	F7•75, F7•79, F75, F79	317	60	108.8	120	F330	F7•75, F7•79, F75, F79	364	100	108.8	120
F400	F7•75, F7•79, F7•81, F75, F79, F81	317	60	108.8	180	F400	F7•75, F7•79, F7•81, F75, F79, F81	364	100	108.8	180
F500	F7•75, F7•79, F7•81, F75, F79, F81	346	70	108.8	180	F500	F7•75, F7•79, F7•81, F75, F79, F81	390	110	108.8	180
F630, F800	F7•81, F81	510	110	108.8	180	F630, F800	F7•81, F81	509	120	108.8	180

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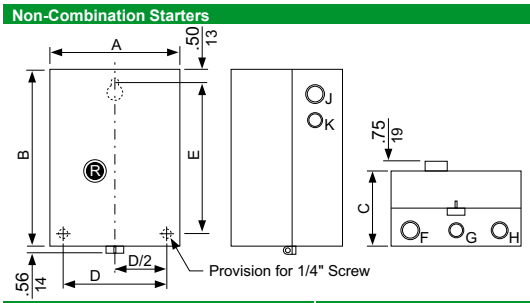
TeSys™ D Combination Starter Dimensions

Table 18.195: Non-Combination Starter Dimensions *[6]*

Non-Combination Starters

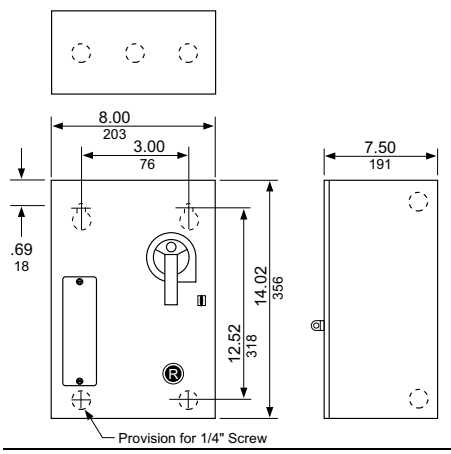


		Type 1										Type 12/3R	
Non-Reversing	Reversing	A	B	C	D	E	F	G	H	J	K	D	E
D09-32	—	6.77	10.04	6.25	5.38	9.00	1–1.25	0.5–0.75	—	1–0.25	0.5–0.75	5.38	11.37
D40-65	D09-32	8.66	10.83	7.21	7.25	9.75	1.25–1.5	0.5–0.75	1–1.25	1–0.25	0.5–0.75	5.38	12.15
D80	D40-80	10.63	13.98	7.21	9.22	12.94	1.25–1.5	0.5–0.75	1–1.25	1–1.25	0.5–0.75	5.38	15.30

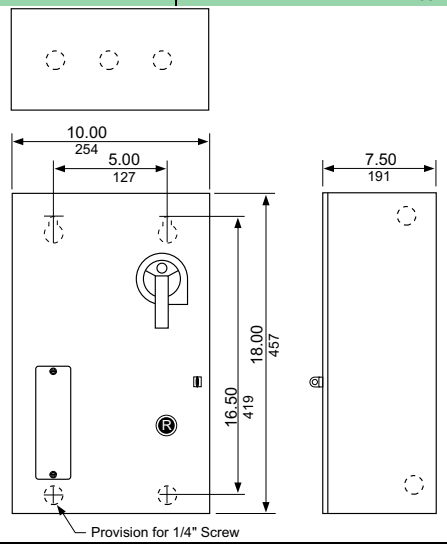
Table 18.196: TeSys D Combination Starter Dimensions, Reversing and Non-Reversing

NEMA 1

D09–25 (FVNR)

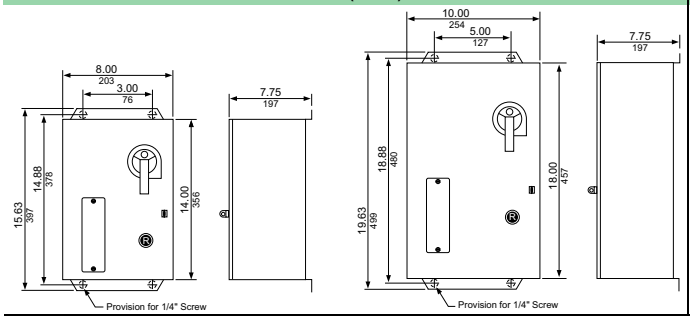


D09–40 (FVR); D32-40 (FVNR)

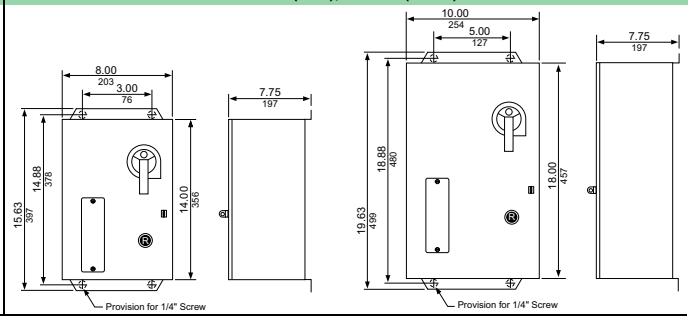


NEMA 12/3R

D09–25 (FVNR)



D09–40 (FVR); D32–40 (FVNR)



[6] **All dimensions in inches.**

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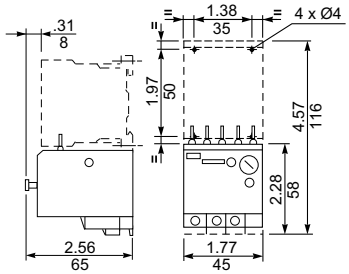
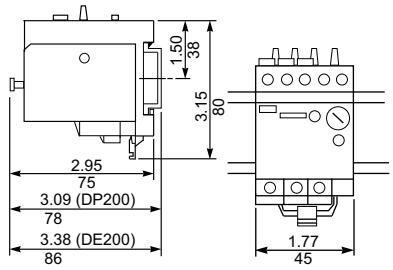
TeSys™ K Contactor Dimensions

Table 18.197: TeSys K Contactor Dimensions

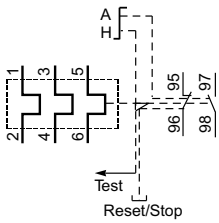
LR2K
Direct mounting under the contactor



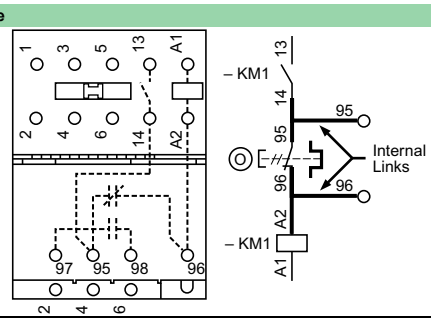
Separate mounting with LA7-K0064 terminal block on 35 mm rail (AM1DP200 or AM1DE200)



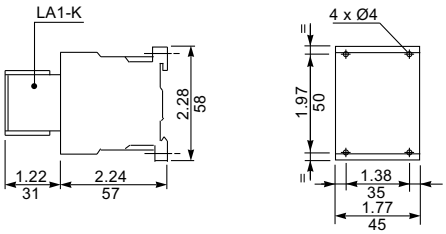
Three-phase



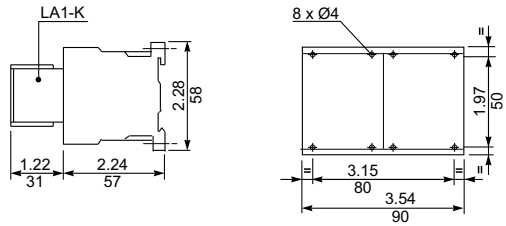
Wiring Scheme



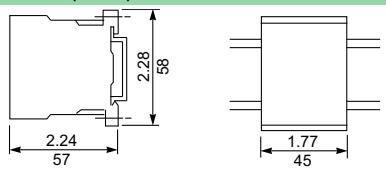
LC1, LP1, LP4K
Mini-contactors
On baseplate



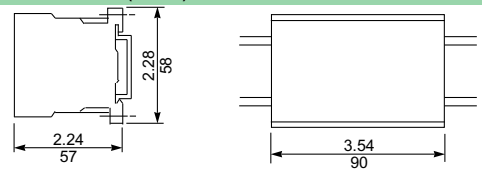
LC2, LC8, LP2, LP5K
Reversing mini-contactors
On baseplate



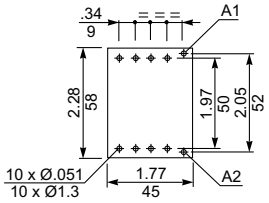
On AM1DP200 or DE200 rail (35 mm)



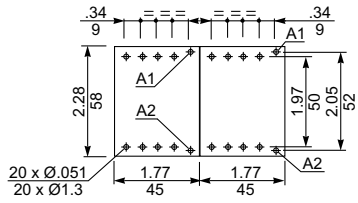
On AM1DP200 or DE200 rail (35 mm)



On printed circuit board

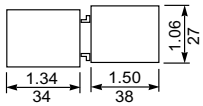


On printed circuit board for reversing contactors or 2 mini-contactors side-by-side

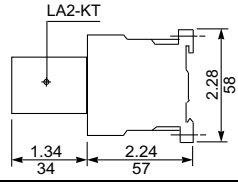


LA2KT

Electronic time delay contact blocks



On mini-contactors or reversing mini-contactors



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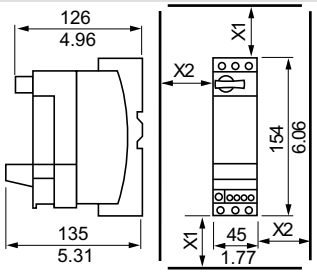
TeSys™ U Starter Dimensions

Table 18.198: TeSys U Starter Dimensions

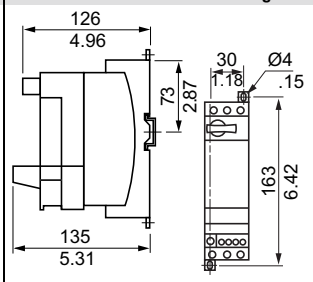
Starter Controllers

Non-Reversing [7]

Rail Mounting

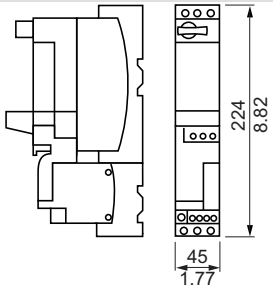


Screw Mounting

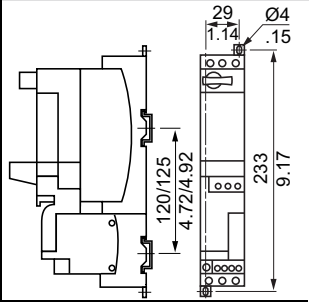


Reversing

Rail Mounting

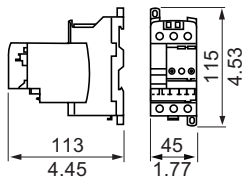


Screw Mounting

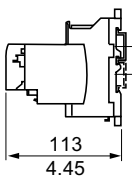


NOTE: Minimum electrical clearance:
X1: 35 mm for Ue = 440 V; and 70 mm for Ue = 500 and 690 V
X2: 0

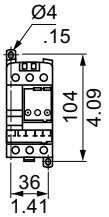
Reversing Block for Mounting Separately from Power Base



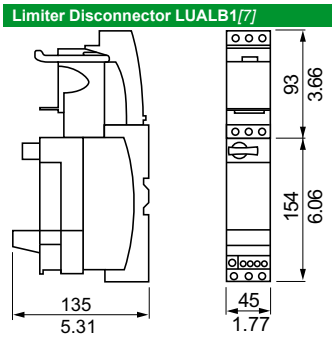
Rail Mounting



Screw Mounting

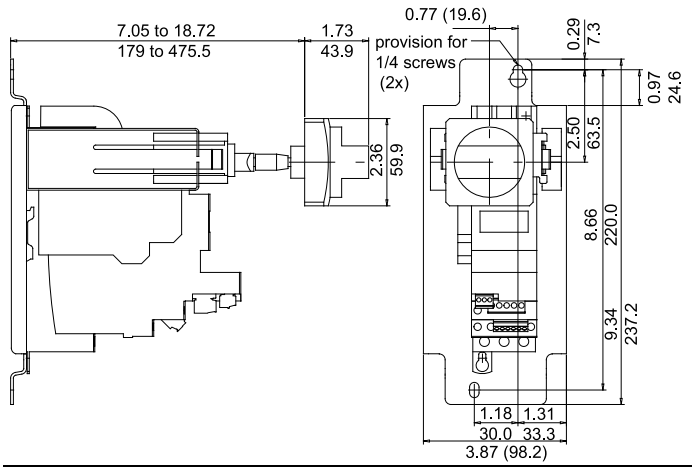


Limiter Disconnector LUALB1 [7]



Door interlock Mechanisms

LU9APN43 and LU9APN44



[7] Maximum depth (with Modbus™ communication module)

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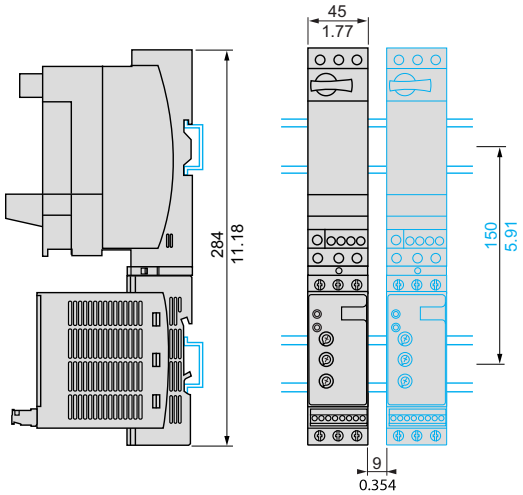
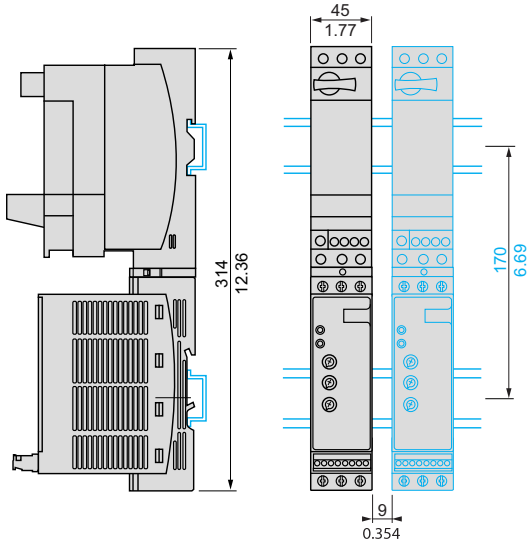
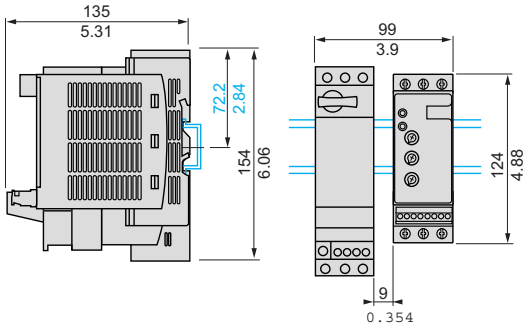
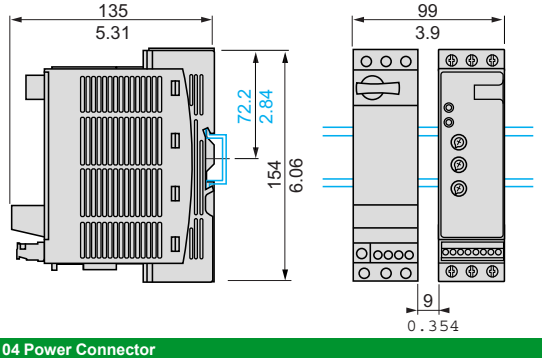
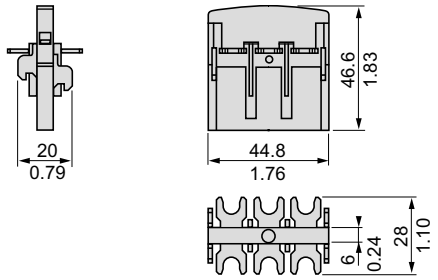
Altistart U01 and TeSys U Soft Starters, Mounting

Table 18.199: Altistart U01 and TeSys U Soft Starters

TeSys U Combination (non-reversing power base) and ATSU01N212LT	TeSys U Combination (non-reversing power base) and ATSU01N222LT to ATSU01N232LT
Mounting on (35 mm) rail with VW3 G4104 connector	Mounting on (35 mm) rail with VW3G4104 connector
	
TeSys U Combination (non-reversing or reversing power base) and ATSU01N2206LT to ATSU01N212LT	**TeSys U Combination (non-reversing or reversing power base) and ATSU01N222LT to ATSU01N232LT**
Side-by-side mounting	**Side-by-side mounting**
	

VW3G4104 Power Connector



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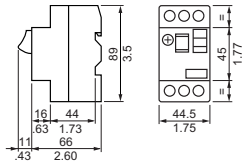
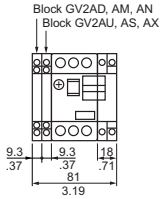
TeSys GV2 and GV3 Manual Starter and Protector Dimensions

Table 18.200: TeSys GV2 and GV3 Manual Starter and Protector Dimensions

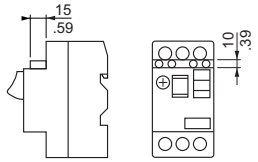
GV2M



GV2AD, AM, AN, AU, AS, AX

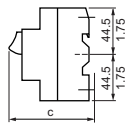


GV2AE

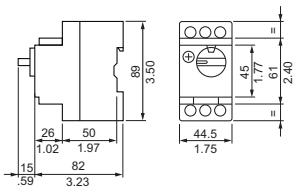


Mounting of GV2M

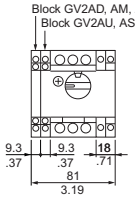
On 35 mm ⊔ rail
C = 78.5 mm (3.09") on AM1DP200 (35 x 7.5 mm)
C = 86 mm (3.39") on AM1DE200, ED200 (35 x 15 mm)



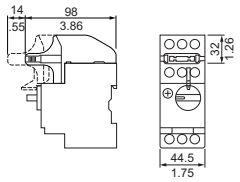
GV2P



GV2AD, AM, AN, AU, AS, AX

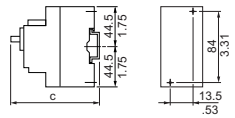


GV2AK00



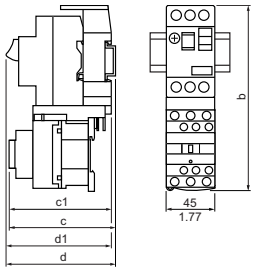
Mounting of GV2P

On 35 mm ⊔ rail
C = 98.5 mm (3.88") on AM1DP200
(35 x 7.5 mm)
C = 106 mm (4.17") on AM1DE200, ED200
(35 x 15 mm)

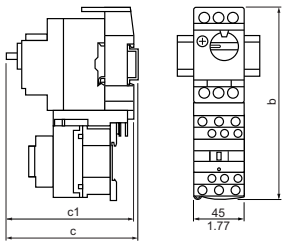


GV2AF4 + LAD31

Combination GV2ME + TeSys D range contactor

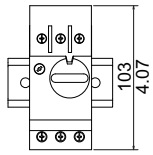


Combination GV2P + TeSys D range contactor



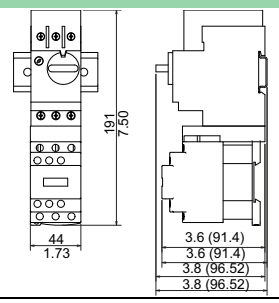
GV2P + GV2GH7

for UL 508 Type E application



GV2P + GV2GH7 + TeSys D contactor

for UL 508 Type E application

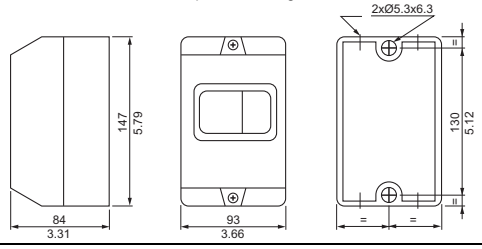


GV2ME +	LC2D09 to D18	LC2D25 and D32
b	7.4 (188.6)	7.8 (199)
c1	3.6 (92.7)	3.9 (99)
c	3.9 (98.2)	4.11 (104.5)
d1	3.9 (98.3)	3.9 (98.3)
d	4.1 (103.8)	1.4 (103.8)

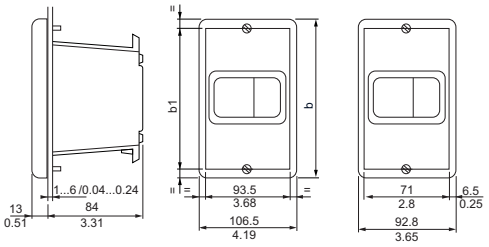
GV2P +	LC2D09 to D18	LC2D25 and D32
b	6.61 (168.1)	7.9 (199.5)
c1	4.6 (116.8)	4.6 (116.8)
c	4.8 (122.3)	4.8 (122.3)
—	—	—
—	—	—

Surface mounting enclosure GV2MC0●

4 knock-outs for 16 mm plastic cable glands or no. 16 conduit.



Flush mounting enclosure GV2MP0● (bracket cut-out)



GV2	b		b1	
	in.	mm	in.	mm
MP01, MP02	5.51	140	5.00	127
MP03, MP04	5.24	133	4.61	117

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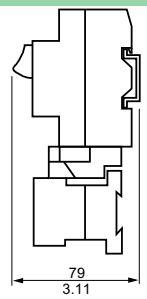
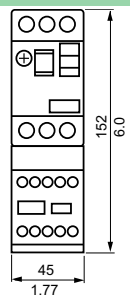
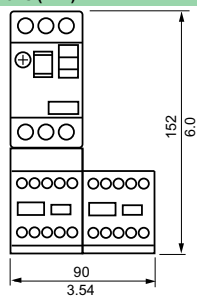
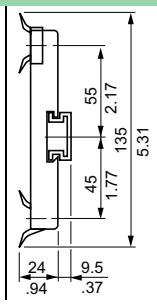
Table 18.201: TeSys GV2 and GV3 Manual Starter and Protector Dimensions (cont'd)

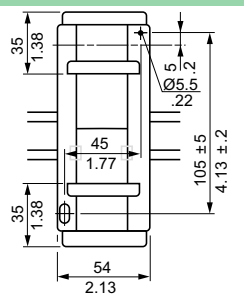
GV2M with GK2AF01 and LC1K	GV2M with GV2AF01 and LC1K	GV2M with GV2AF01 and LC2K	Adapter Plate GK2AF01
Dimensions (mm)			



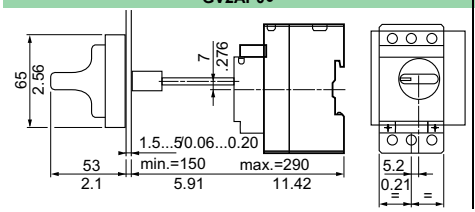


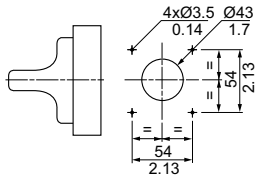


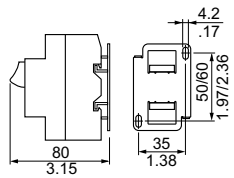


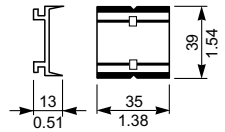


Mounting external operator GV2AP0●	Door cut-out	GV2M on panel with GV2AF02 adapter plate	7.5 mm height compensation plate GV1F03

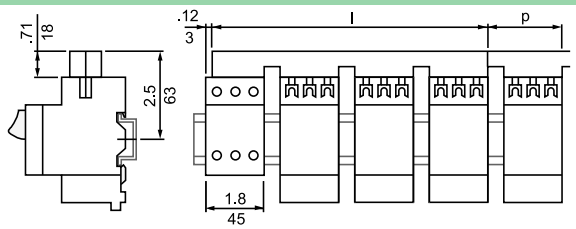


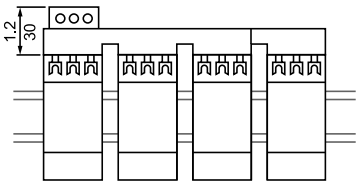


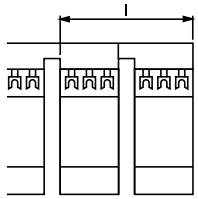




Sets of bus bars, GV2G445, GV2G454, GV2G472 with terminal block GV2G05	Sets of bus bars with terminal block GV1G09	Sets of bus bars GV2G245, GV2G254, GV2G272







		I	P
GV2G445	0.16 x 1.8 in. (4 x 45 mm)	7.0 in. (179 mm)	1.8 in. (45 mm)
GV2G454	0.16 x 2.1 in. (4 x 54 mm)	8.1 in. (206 mm)	2.1 in. (54 mm)
GV2G472	0.16 x 1.8 in. (4 x 45 mm)	10.2 in. (260 mm)	2.8 in. (72 mm)

		I
GV2G245	0.08 x 1.8 in. (2 x 45 mm)	3.5 in. (89 mm)
GV2G254	0.08 x 2.1 in. (2 x 54 mm)	3.9 in. (98 mm)
GV2G272	0.08 x 2.8 in.(2 x 72 mm)	4.6 in. (116 mm)
GV2G354	0.12 x 2.1 in. (3 x 54 mm)	6.0 in. (152 mm)

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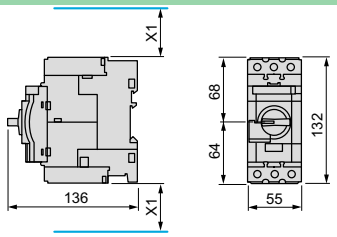
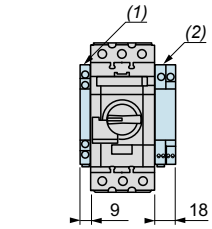
GV3P

Dimension

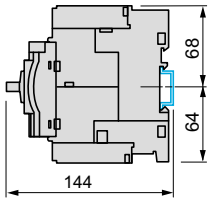


X1 = Electrical clearance (ISC max)
40 mm for Ue < 500 V; 50 mm for Ue < 690 V

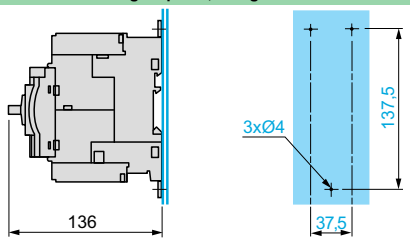


Blocks GV AN●●, GV AD●●, GV AM11
Block GV3 AU●● and GV3 AS●●

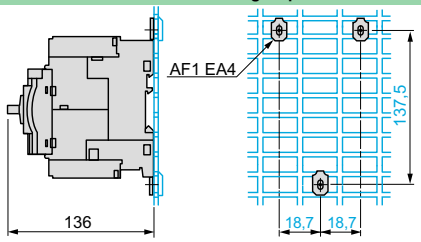
Mounting on rail AM1 DE200 or AM1 ED201

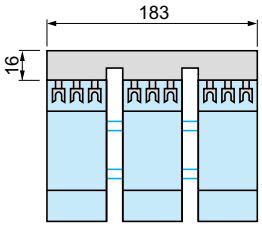


Mounting on panel, using M4 screws



Mounting on pre-slotted mounting plate AM1PA





NOTE: Leave a space of 9 mm between 2 manual motor protectors: either an empty space or side-mounting add-on contact blocks.
Horizontal mounting is possible: please consult your regional sales office.

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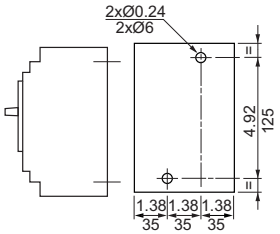
2/15/2017

TeSys GV7 Manual Starter and Protector Dimensions

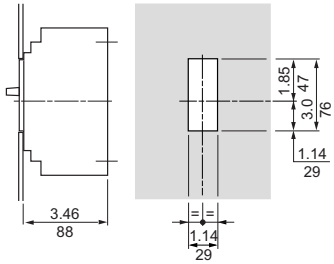
Table 18.202: TeSys GV7 Manual Starter and Protector Dimensions

1 GV7R

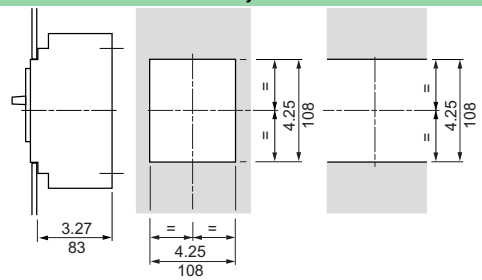
Panel Mounting



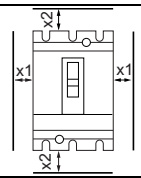
Flush Mounting



Side by Side

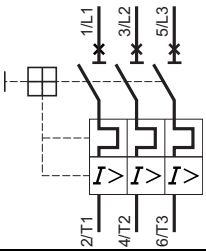


Minimum Clearance		x1 in. (mm)	x2 in. (mm)
Painted or insulated metal plate, insulation or insulated bar		0 (0)	1.18 (30)
Bare metal plate	U < 440 V	0.20 (5)	1.38 (35)
	440 V < U < 600 V	0.39 (10)	1.38 (35)
	U > 600 V	0.79 (20)	1.38 (35)



NOTE: Minimum distance between 2 units mounted side by side = 0.

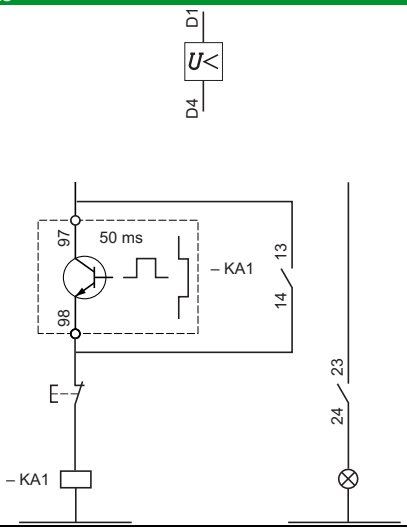
Motor Controllers GV7R



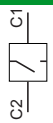
Add-on Auxiliary Contacts, GV7AE11, GV7AB11

NOTE: A self-adhesive label, supplied with the contact, can be affixed to the front face of the starter to allow personalized marking according to the function of the contact or contacts.

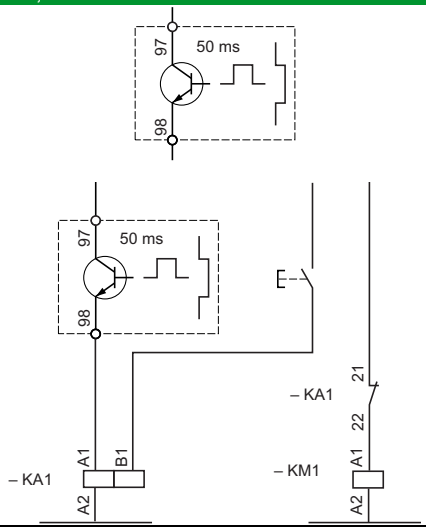
GV7AU•••



GV7AS•••



GV7AD111, AD112



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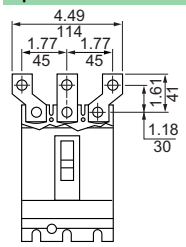
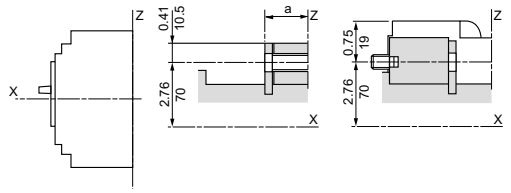
GV7AC03

Spreaders



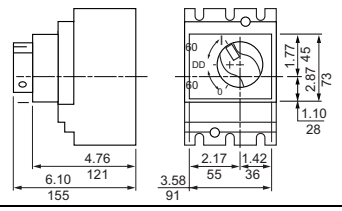
Cabling	Smooth Terminals	Connectors



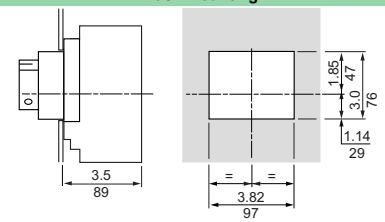
	a (in./mm)
GV7R●	0.77/19.5
GV7R●220	0.85/21.5

GV7AP03, GV7A04

Direct Rotary Handle

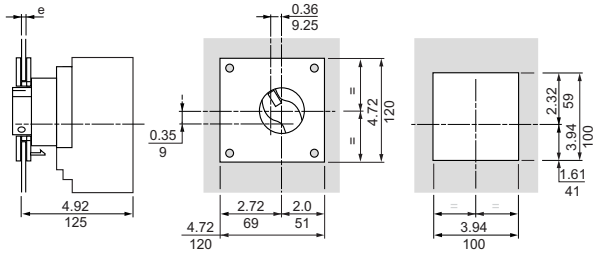


Flush Mounting



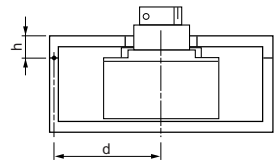
GV7AP03 or GV7AP04, GV7AP05

Direct Rotary Handle



Front Fuse Center

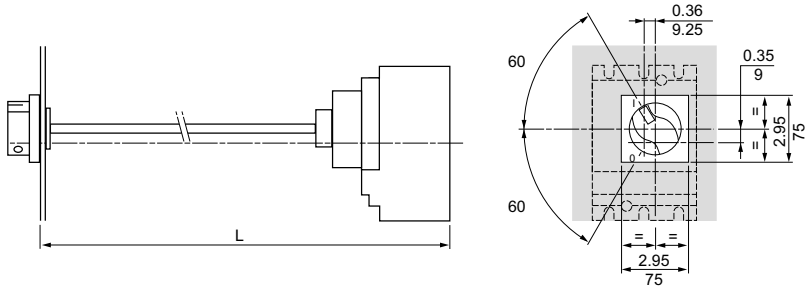
Enclosure Viewed from Top



Door cutouts require a minimum distance between the center of the manual motor protector and the door hinge point (h) of d ≥ 3.94 in (100 mm) + (h x 5)

GV7AP01, GV7AP02

Extended Rotary Handle



L: 7.28 in. (185 mm) minimum, 23.62 in. (600 mm) maximum.
The shaft of the extended rotary handle GV7AP01 or GV7AP02 must be cut to length: L – 4.96 in. (126 mm)

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Section 19

Push Buttons and Operator Interface

XVL Compact Light

Type J Compact Light

16 mm XB6

22 mm XB4

122 mm XB5

XB5R Wireless, Batteryless Push Button

XB5S Biometric Switch

30 mm Type K

30 mm Type SK

30 mm Type KX

Type KY Enclosure

Type B Wall Station

Pendant Stations

Tower Lights

Type A Foot Switch

Rotary Cam Switch

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Push Button and Pilot Light Selection Guide

Family	XVL	Type J	XB6	XB6E
	XVLA1•• XVLA2•• XVLA3••			New!
Type of Product	Mini Pilot Light	Compact Pilot Light	16 mm Push Button (plastic)	16mm Push Button (plastic)
Mounting Hole Diameter	8 mm / 12 mm	17.5 mm (0.68 in)	16.2 mm	16.2 mm
Approvals	UL Recognized File E164353, CCN NKCR	UL File E78403, CCN NKCR	UL File E164353, CCN NKCR	UL File E164353, CCN NKCR
	CSA File LR44078, Class 3211-03	CSA File LR25490, Class 3211-03	CSA File LR44087 Class 3211-03	CSA File LR44087 Class 3211-03
Conforming to Standards	CE Marked RoHS Compliant IEC337-2 NF C 63-140 VDE 0660-200	CE Marked RoHS Compliant	CE Marked RoHS Compliant EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-5 EN/IEC 60204-1 and EN/ISO 13850: 2006 (trigger action and mechanical latching Emergency Stop push buttons) JIS C 4520 and 853 UL 508 and CSA C22-2 no. 14 Gost CCC	CE Marked RoHS Compliant EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-5, EN/IEC 60947-5-5 EN/IEC 60204-1 and EN/ISO 13850: 2006 (trigger action and mechanical latching Emergency Stop push buttons) UL 508 and CSA C22-2 no. 14 CCC
Degree of Protection	IP40 (IP65 with seal)	NEMA 4, 13	IP65 NEMA 1, 4, 4X, 12	IP65 NEMA 4, 4X, 13
Operating Temperature F° (C°)	-13 to 158 (-25 to 70)	104 (40) Max	-13 to 158 (-25 to 70)	14 to 151 (-10 to 55)
Storage Temperature F° (C°)	-40 to 158 (-40 to 70)		-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)
Electric Shock Protection	—	—	—	—
Electrical Consumption	—	—	—	—
LED	25 mA	—	6-30 Vac/Vdc: 15 mA 48–120 Vac: 20 mA	10 mA
Rated Operational Characteristics	—	—	AC-15; B300 Ue = 240 Vac and Ie = 1.5A Ue = 120 Vac and Ie = 3 A Continuous 5 A	AC-13; Ue = 240 Vac and Ie = 0.7A Ue = 120 Vac and Ie = 1A Continuous 5 A
	—	—	DC-13; R300 Ue = 250 Vdc and Ie = 0.1 A Ue = 125 Vdc and Ie = 0.22 A	DC-13; Ue = 125 Vdc and Ie = 0.15 A Ue = 24 Vdc and Ie = 0.7 A
Connection Type	XVLA1** and XVLA2** = 2.8mm x 0.5mm Faston XVLA3** = Screw Terminals	Screw Terminal —	Quick Connect/ Solder Tabs 0.11 x 0.02 in. (2.8 x 0.5 mm)	Quick Connect/ Solder Tabs 0.11 x 0.02 in. (2.8 x 0.5 mm)
Cable Size	1 x 1.5 mm² max.	2 x 14 AWG (copper only)	—	—
Digest Location	XVL, page 19-10	Type J, page 19-11	XB6, page 19-12	XB6E, page 19-21

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Push Button Selection Guide

Family	XB4	XB5	XB7	9001K	9001SK	9001KX
			New!			
Type of Product	*22 mm Push Button (metal)	**22 mm Push Button (plastic)	***22mm Push Button (plastic)	****30 mm Push Button (metal)	****30 mm Push Button (plastic)	****30 mm Push Button (metal, square)
Mounting Hole Diameter	22.5 mm	22.5 mm	22.5 mm	31 mm (1.22 in)	31 mm (1.22 in)	31 mm (1.22 in)
Approvals	UL Listed File E164353, CCN NKCR UL Recognized File E164353. CCN NKCR2	UL Listed File E164353, CCN NKCR UL Recognized File E164353., CCN NKCR2	UL File E164353, CCN NKCR	UL File E78403. CCN NKCR	UL File E78403. CCN NKCR	UL File E78403. CCN NKCR
	CSA File LR44087. Class 3211-03	CSA File LR44087. Class 3211-03	CSA File LR44087-122 Class 3211-03	CSA File LR25490. Class 3211-03	CSA File LR25490. Class 3211-03	CSA File LR25490. Class 3211-03
Conforming to Standards	CE Marked RoHS Compliant	CE Marked RoHS Compliant	CE Marked RoHS Compliant	CE Marked RoHS Compliant	CE Marked RoHS Compliant	CE Marked RoHS Compliant
	EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4, EN/IEC 60947-5-5	EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4, EN/IEC 60947-5-5	EN/IEC 60947-1, EN/IEC 60947-5-1 for push buttons, pilot lights, illuminated push buttons and selector switches EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-5,	EN/IEC 60947-1	EN/IEC 60947-1	
	EN/IEC 60204-1 and EN/ISO 13850: 2006 (trigger action and mechanical latching emergency stop push buttons)	EN/IEC 60204-1 and EN/ISO 13850: 2006 (trigger action and mechanical latching emergency stop push button).	EN/IEC 60204-1 and EN/ISO 13850 for Emergency Stop trigger action push buttons	EN/IEC60947-5-1	EN/IEC60947-5-1	
	EN/IEC 60364-5-53 (emergency switching of mechanical latching push buttons)	EN/IEC 60364-5-53 (emergency switching of mechanical latching push buttons)		EN/IEC60947-5-4	EN/IEC60947-5-4	
	—	EN81-1 (emergency stop trigger action and mechanical latching push buttons with mechanical state indicator)				
	JIS C 4520	JIS C 4520		JIS C 4520 and 852	JIS C 4520 and 852	
	UL 508	UL 508	UL 508	UL 508	UL 508	
	CSA C22.2 No.14	CSA C22.-2 No.14	CSA C22 No.14	CSA C22.2 No.14	CSA C22.2 No.14	
	GOST	GOST				
	CCC	CCC	CCC			
			GB 14048.5 for all XB7 range			
Degree of Protection	IP65	IP65	IP54, IP65	IP65	IP65	IP66
	IP66 for booted	IP66 for booted	—	—	—	—
	NEMA 1, 2, 3, 4, 4X, 12, 13	NEMA 1, 2, 3, 3R, 4, 4X, 12, 13	NEMA 3, 4, 12	NEMA 1, 2, 3, 3R, 4, 12, 13	NEMA 1, 2, 3, 3R, 4, 4X, 12, 13	NEMA 1, 2, 3, 3R, 4, 12, 13
Operating Temperature F° (C°)	-13 to 158 (-40 to 70) LED and Neon -13 to 131 (-25 to 55) Incandescent	-13 to 158 (-40 to 70) LED and Neon -13 to 131 (-25 to 55) Incandescent	-13 to 158 (-25 to 70)	-22 to 140 (-30 to 60)	-22 to 140 (-30 to 60)	-22 to 140 (-30 to 60)
Storage Temperature F° (C°)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)
Electric Shock Protection	Class I	Class I	—	Class II	Class II	Class II
Electrical Consumption						
LED	24 Vac/Vdc: 18 mA	24 Vac/Vdc: 18 mA	Illuminated Push Buttons: 24V - 18mA 120V - 12mA 230V - 22mA Pilot Lights 24V - 20mA 120V - 18mA 230V - 16mA	Incandescent and LED bulbs. For ratings, see Standard Light Modules, page 19-91.	Incandescent and LED bulbs. For ratings, see Standard Light Modules, page 19-91.	—
	120 Vac: 14 mA	120 Vac: 14 mA				
	240 Vac: 14 mA	240 Vac: 14 mA				
Rated Operational Characteristics	AC-15; B600 Ue = 600 Vac and Ie = 1.2 A Ue = 240 Vac and Ie = 3A Ue = 120 Vac and Ie = 6A Continuous 10 A	AC-15; B600 Ue = 600 Vac and Ie = 1.2 A Ue = 240 Vac and Ie = 3 A Ue = 120 Vac and Ie = 6 A Continuous 10 A	AC-14; D300 Ue = 240 Vac and Ie = 0.3A Ue = 120 Vac and Ie = 0.6A Continuous 4 A	AC-15; A600 Continuous 10 A	AC-15; A600 Continuous 10 A	AC-15; A600 Continuous 10 A
	DC-13; Q600 Ue = 600 Vdc and Ie = 0.1 A Ue = 250 Vdc and Ie = 0.27 A Ue = 125 Vdc and Ie = 0.55 A	DC-13; Q600 Ue = 600 Vdc and Ie = 0.1 A Ue = 250Vdc and Ie = 0.27 A Ue = 125 Vdc and Ie = 0.55 A	DC-13; R300 Ue = 250 Vdc and Ie = 0.1A Ue = 125 Vdc and Ie = 0.22A	DC-13; Q600 Ue = 600 Vdc and Ie = 0.1 A Ue = 250 Vdc and Ie = 0.27 A Ue = 125 Vdc and Ie = 0.55 A	DC-13; Q600 Ue = 600 Vdc and Ie = 0.1 A Ue = 250 Vdc and Ie = 0.27 A Ue = 125 Vdc and Ie = 0.55 A	DC-13; Q600 Ue = 600 Vdc and Ie = 0.1 A Ue = 250 Vdc and Ie = 0.27 A Ue = 125 Vdc and Ie = 0.55 A
Connection Type	IP20 Fingersafe Screw or Spring Terminal		Screw and captive clamp terminal connections Faston clip connections (pilot lights)	IP20 Fingersafe Screw Terminal		
	Screw Terminal:	Spring Terminal:				
Cable Size	1 x 24 AWG (0.22 mm²) min. 2 x 14 AWG (2.5 mm²) max. 2 x 16 AWG (1.5 mm²) max.	1 x 24 AWG (0.22 mm²) min. 2 x 14 AWG (2.5 mm²) max. 2 x 16 AWG (1.5 mm²) max.		1 x 24 AWG (0.22 mm²) min. 2 x 16 AWG (1.5 mm²) max	1 x 24 AWG (0.22 mm²) min. 2 x 16 AWG (1.5 mm²) max	1 x 24 AWG (0.2 2mm²) min. 2 x 16 AWG (1.5 mm²) max
Digest Location	XB4, page 19-24	XB5, page 19-43	XB7, page 19-68	Type K, page 19-72	Type SK, page 19-82	KX, page 19-102

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Control Station Selection Guide

Family	XAL	XAP	9001B	9001KY/SKY	Point of Purchase (PoP)
	XALD02	XAPA1100 XAPA1104	NEMA 1 Surface Mounting 9001BG•• NEMA 1 Flush Mounting 9001BF•• NEMA 4 9001BW•• NEMA 7 and 9 9001BR••	9001KYSS3 9001KY3 9001KYAF3 9001SKY2	New!
Type of Product/ Material	XALD—Polycarbonate XALK—Polycarbonate	XAPA—glass filled polyester XAPG—die cast zinc XAPE—anodized aluminum	9001BG—plastic cover 9001BF—stainless steel 9001BW—die cast zinc 9001BR—cast aluminum	9001KYAF—sheet steel 9001KYSS—stainless steel 9001KY—die cast zinc 9001KZ—die cast zinc 9001SKY—Polyester	Push Buttons, Pendants, Tower lights, Relays
Number of holes	1 to 3	0 to 16	1 to 3	1 to 6	
Type of Operators	XB5 (22mm)	XB5 (22mm)	Built in	9001K/SK (30mm)	
Available without Operators	Yes	Yes	No	Yes	
Available with Operators	Yes	No	Yes	Yes	
Approvals	UL File E164353 CCN NKCR	UL File E164353 CCN NKCR	UL File E78403 CCN NKCR	UL File E78403 CCN NKCR	UL, CSA, CE, ROHS
	CSA File LR 44087 Class 3211-03	CSA File LR 44087 Class 3211-03	CSA File LR 25490 Class 3211-03	CSA File LR 25490 Class 3211-03	
Conforming to Standards	CE Marked	CE Marked	CE Marked	CE Marked	
	EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4,	EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4,	EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4,	EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4,	
	JIS C 4520	JIS C 4520	JIS C 4520	JIS C 4520	
	UL 508	UL 508	UL 508	UL 508	
	CSA C22.2 No.14	CSA C22.2 No.14	CSA C22.2 No.14	CSA C22.2 No.14	
Degree of Protection	1, 4, 4X, 13 IP65 IP66 - Booted	XAPA - 4, 4X, 12, IP65 XAPG - 4, 12, IP65 XAPE - 4, 4X, 12, IP65	9001BG - 1 9001BF - 1 9001BW - 4 9001BR - 7, 9	9001KYAF - 3, 13 9001KYSS - 3, 4, 4X, 13 9001KY - 3, 4, 13 9001KZ - 3, 13 9001SKY - 3, 4, 4X, 13	
Operating Temperature F° (C°)	-13 to 158 (-25 to 70)	-13 to 158 (-25 to 70)			
Storage Temperature F° (C°)	-40 to 158 (-10 to 70)	-40 to 158 (-10 to 70)			
Cable Entry	No. 13 knock out	XAPA—undrilled XAPG—Tapped 3/4NPT XAPE—flush mount (n/a)	9001BG—1/2 &3/4 knockout 9001BF—N/A 9001BW—1/2-14NPT 9001BR—1/2-14NPT	9001KYAF—customer provided 9001KYSS—G conduit hub 9001KY—customer provided 9001KZ—1/2 & 3/4 knockout 9001SKY—G conduit hub	
Digest Location	XAL, page 19-107	XAP, page 19-107	9001B, page 19-110	KY/SKY, page 19-112	PoP Products, page 19-114

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Tower Lights and Beacons Selection Guide (1 of 2)

Family	XVB L	XVB C
Type of Product	Beacon	Tower Light
Diameter	70mm	70mm
Features	Product for Customer Configuration	Product for Customer Configuration
Approvals	UL File E164353 CCN NKCR CSA File LR 44087 Class 3211 03	UL File E164353 CCN NKCR CSA File LR 44087 Class 3211 03
Conforming to Standards	CE Marked IEC/EN 60947-5-1 UL 508 CSA 22.2 No 14	CE Marked IEC/EN 60947-5-1 UL 508 CSA 22.2 No 14
Degree of Protection	IP65	IP65
Operating Temperature F° (C°)	-13 to122 (-25 to 50)	-13 to122 (-25 to 50)
Storage Temperature F° (C°)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)
Light Source	LED / Incandescent	LED / Incandescent
Electrical Consumption		
LED Steady	24 Vac/dc: < 30 mA 120–230 Vac: < 30 mA	24 Vac/dc: < 30 mA 120–230 Vac: < 30 mA
LED Flashing with Buzzer	24 Vac/dc: < 40 mA 120–230 Vac: < 15mA 1 Hz (1 flash per second)	24 Vac/dc: < 40 mA 120–230 Vac: < 15mA 1 Hz (1 flash per second)
Strobe (Energized)	24 Vdc: 5 Joules unit < 430 mA; 10 J unit: < 850 mA 120 Vac: 5 Joules unit: < 130 mA; 10 J unit: < 260 mA 230 Vac: 5 Joules unit: < 105 mA; 10 J unit: < 210 mA 1 Hz (1 flash per second)	24 Vdc: 5 Joules unit < 430 mA; 10 J unit: < 850 mA 120 Vac: 5 Joules unit: < 130 mA; 10 J unit: < 260 mA 230 Vac: 5 Joules unit: < 105 mA; 10 J unit: < 210 mA 1 Hz (1 flash per second)
Audible Sounders	12–48 Vac/dc: < 20 mA 120–230 Vac: < 50 mA 90 decibels at 1 meter	12–48 Vac/dc: < 20 mA 120–230 Vac: < 50 mA 90 decibels at 1 meter
Connection Type	Screw Clamp	Screw Clamp
Cable Size	1 x 16 AWG (1.5 mm²) With Cable End	1 x 16 AWG (1.5 mm²) With Cable End
Digest Location	XVB 70 mm Beacons, page 19-115	XVB 70 mm Components, page 19-116

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Tower Lights and Beacons Selection Guide (2 of 2)

Family	XVC 4	XVC 6	XVC 1	XVU	XVGU	XVR	XVS
				New!	New!		
Type of Product	*Tower Light	*Tower Light	*Tower Light	**Tower Light	**Tower Light	***Rotating Mirror Beacon	***Siren and Electronic Alarm
Diameter	40 mm	60 mm	100 mm	60mm	60mm	84/106/120/130 mm	—
Features	All devices are pre-assembled and pre-wired			Programmable LED module with multiple colors, flashing, blinking, and rotating	Programmable with Magelis through USB	All devices are pre-assembled and pre-wired. XVR12•••S includes buzzer: 70 to 90 decibels	Adjustable Tones XVS14BMW, 0 to 105 decibels, 43 tones XVS72BM••, 0 to 90 decibels, 16 tones
Approvals	UL Recognized E164353 CNN NKCR	UL Recognized E164353 CNN NKCR	UL Recognized E164353 CNN NKCR	UL file: E164353 CCN : NKCR	UL File E164353 CCN NKCR	UL Recognized E164353 CNN NKCR	UL Recognized E164353 CNN UCST
	CSA LR44087 Class 3211-03	CSA LR44087 Class 3211-03	CSA LR44087 Class 3211-03	CSA File : 225619 CLASS : 3211-07	cUL File: E164353 CCN: NKCR7	CSA LR44087 Class 3211-03	CSA LR44087 Class 3211-03
Conforming to Standards	CE Marked	CE Marked	CE Marked	CE Marked	CE Marked	CE Marked	CE Marked
	EN61000-6-2	EN61000-6-2	EN61000-6-2	EN 60947-1	EN 61000-6-2	EN61000-6-2	—
	EN61000-6-3	EN61000-6-3	EN61000-6-3	EN 60947-5-1		EN61000-6-4	—
	—	EN61000-6-4	EN61000-6-4		EN 61000-6-2	—	—
	UL 508	UL 508	UL 508	UL508	UL508	UL 508	UL 508
	CSA 22.2 No. 14	CSA 22.2 No. 14	CSA 22.2 No. 14	CSA C22.2 No.14	CSA C22.2 No.14	CSA 22.2 No. 14	CSA 22.2 No. 14
Degree of Protection	IP54	IP54	IP54	IP65	IP42	IP23 / IP65 / IP66	IP53 / IP54
Operating Temperature F° (C°)	-13 to122 (-25 to 50)	-13 to122 (-25 to 50)	-13 to122 (-25 to 50)	-13 to 122 (-25 to 50)	32 to 131 (0 to 55)	-14 to 122 (-10 to 50)	-4 to 122 (-20 to 50)
Storage Temperature F° (C°)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-13 to 150 (-25 to 65)	-31 to 158 (-35 to 70)	-31 to 158 (-35 to 70)	-31 to 158 (-35 to 70)
Light Source	LED	LED	LED	LED	LED	LED	—
Electrical Consumption				Body unit ≤ 400mA	400mA		
LED Steady	24 V: 1 unit = 40mA; 2 unit = 80mA; 3 unit = 120mA 4 unit = 160mA; 5 unit = 200mA		24 V: 1 unit = 100mA; 2 unit = 200mA; 3 unit = 300mA 4 unit = 400mA; 5 unit = 500mA	LED Units ≤ 50 mA	Programmable with Magelis through USB	XVR08, XVR10, XVR12, and XVR13 (without buzzer) 12 Vac/dc: 360mA 24 Vac/dc: 180mA	—
LED Flashing ** with Buzzer	**24 V: 1 unit = 90 mA; 2 unit = 130 mA; 3 unit = 170 mA 4 unit = 210 mA; 5 unit = 250 mA 0.7 to 3 Hz (1 flash per 0.7 to 3 sec)		24 V: 1 unit = 150mA; 2 unit = 250mA; 3 unit = 350mA 4 unit = 450mA; 5 unit = 550mA 3 to 3.5 Hz (1 flash per 3 to 3.5 sec)	Buzzer ≤ 70 mA Flasher and multi-color ≤ 70 mA	Programmable with Magelis through USB	XVR12 with buzzer: 12 Vac/dc: 400 mA 24 Vac/dc: 230 mA 3 Hz (1 flash per 3 sec)	—
Strobe (Energized)	—	—	—	—	—	—	—
Audible Sounders	*70 to 85 decibels at 1 meter*	70 to 85 decibels at 1 meter	60 to 85 decibels at 1 meter	—	—	—	XVS14BMW 12 Vdc: 350mA 24 Vdc: 400 mA 105 decibels at 1 m
	—	—	—	—	—	—	XVS72BM 12 Vdc: 280 mA 24 Vdc: 190 mA 90 decibels at 1 m
Connection Type	Pre-Wired, Color-Coded Wires **cable length:** 600mm XVC4•• 900mm XVC4••K 500mm XVC4••5S	Pre-Wired, Color-Coded Wires **cable length:** 600mm XVC6•• 850mm XVC6••K 550mm XVC6••5S 850mm XVC6••5SK	Pre-Wired, Color-Coded Wires **cable length:** 500mm XVC1••K 500mm XVC1••SK 550mm XVC6••5S 850mm XVC6••5SK	Screw Clamp	USB power cable: - 300 mm/ 11.81 in. for tube mounting - 400 mm/15.75 in. for direct mounting	Pre-Wired cable length: 500mm XVR08••• 400mm XVR10••• 400mm XVR12••• 400mm XVR13•••	XVS14BMW Pre-Wired, Color-Coded Wires **cable length:** 500mm XVS14
							XVS72BM•• **Not** Pre-Wired
Cable Size	22 AWG (0.33 mm²)	22 AWG (0.33 mm²)	22 AWG (0.33 mm²)	22 - 16 AWG	—	18 AWG (0.75 mm²)	—
Digest Location	XVC, page 19-118	XVC, page 19-118	XVC, page 19-118	XVU, page 19-120	XVGU, page 19-122	XVR, page 19-123	XVS, page 19-124
	For Tower Lights catalog numbers: ●○ first dot denotes voltage selection ○● second dot denotes color selection						

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Pendant Station Selection Guide

Family	XAR eXL Hoist	9001BW	XACA2	XACA0	9001SKYP
Type of Product	*Wireless Pendant	**2-Button Pendant	**2-Button Pistol Grip Pendant	**General Purpose Pendant	**Heavy Duty Pendant
Number of operators	6	2	2	2, 3, 4, 6, 8, 12	2, 4, 6, 8, 10
Approvals	UL File E164353, CCN NKCR/NKR7 (cULus) CSA File LR44087 Class 3211-07	UL File E78403 CNN NKCR CSA File LR25490 Class 3211-03	UL File E164353 CNN NKCR CSA File LR 44087 Class 3211-03	UL File E164353 CNN NKCR CSA File LR 44087 Class 3211-03	UL File E78403 CNN NKCR CSA File LR25490 Class 3211-03
Conforming to Standards	EN/IEC 60947-5-1, EN/IEC 60204-32, UL 508, CSA 22-2 No. 14 and EN/ISO 13849-1, EN/IEC 62061, EN/IEC 61508, EN/ISO 13850 EN 13557, EN 15011 UL, CSA, CE, CCC RoHS Compliant	CE Marked	EN/IEC 60947-5-1, EN/IEC 60204-32, EN/IEC 60947-5-5, and EN/ISO 13850 (for versions with trigger action emergency stop) UL 508 CSA C22-2 No. 14 RoHS compliant	EN/IEC 60947-5-1, EN/IEC 60204-32, EN/IEC 60947-5-5, and EN/ISO 13850 (for versions with trigger action emergency stop) UL 508 CSA C22-2 No. 14 RoHS compliant	CE Marked
Degree of Protection	IP65, NEMA 4	NEMA 1, 3, 3R, 4, 4X	NEMA 1, 4, 4X, 5 IP65 IK08	NEMA 1, 4, 4X, 5 IP65 IK08	NEMA 1,2, 3, 4, 4X, 12, 13
Operating Temperature F° (C°)	-4 to 140 (-20 to 60)	-13 to 140 (-25 to 60)	-13 to 140 (-25 to 60)	-13 to 140 (-25 to 60)	-13 to 140 (-25 to 60)
Storage Temperature F° (C°)	-4 to 140 (-20 to 60)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)	-40 to 158 (-40 to 70)
Housing Material	Polycarbonate (PBT)	Polycarbonate / PET Polyester Blend	Yellow Polypropylene	Yellow Polypropylene	Yellow Polycarbonate
Rated Operational Characteristics *[1]*	ZBRH●H AC - C300 ZBRH●W AC - B300 DC - R300	AC - B600	AC-15: A600 or Ue = 600V, Ie = 1.2A or Ue = 240V, Ie = 3A	AC-15: A600 or Ue = 600V, Ie = 1.2A or Ue = 240V, Ie = 3A	SKRU2-SKRU5 AC - B300 DC - P600
		DC - P600	DC-13: Q600 or Ue = 600V. Ie = 0.1A or Ue = 250V, Ie = 0.27A	DC-13: Q600 or Ue = 600V. Ie = 0.1A or Ue = 250V, Ie = 0.27A	SKRU1, 10, 11 AC - A600 DC - P600
Thermal Current	ZBRH●H - 4A ZBRH●W - 6A	Continuous 5A	Continuous 10A	Continuous 10A	—
Connection Type	—	1/2 in. NPT screw clamp terminals	8–26 mm cable entry screw clamp terminals	8–26 mm cable entry screw clamp terminals	NPT threaded conduit entry screw clamp terminals
Cable Size	None: Wireless	—	1 x 0.5 mm² (20AWG) min. 2 x 1.5 mm² (16AWG) max. 1 x 2.5 mm² (14AWG) max.	1 x 14 AWG (copper only)	—
Digest Location	XAR, page 19-125	Type BW, page 19-127	XAC, page 19-128	XAC, page 19-128	SKYP, page 19-131

[1] OSHA Section 1910.179, *Overhead and Gantry Cranes*, limits voltage at pendant push buttons to 150 Vac or 300 Vdc max.

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XB4–XB5 Common Operators

Table 19.1: BLACK—Start Push Buttons (flush head)

Operator Style	Description	Contact Block	Type	Legend Plate
XB4 Die Cast Chrome		1 N.O.	XB4BA21	ZBY2303
XB5 Double Insulated		1 N.O.	XB5AA21	ZBY2303

Table 19.2: RED—Stop Push Buttons (extended head)

Operator Style	Description	Contact Block	Type	Legend Plate
XB4 Die Cast Chrome		1 N.C.	XB4BL42	ZBY2304
XB5 Double Insulated		1 N.C.	XB5AL42	ZBY2304

Table 19.3: BLACK—Off-On Selector Switch

Operator Style	Description	Contact Block	Type	Legend Plate
XB4 Die Cast Chrome		1 N.O.	XB4BD21	ZBY2367
XB5 Double Insulated		1 N.O.	XB5AD21	ZBY2367

Table 19.4: Hand-Off-Auto Selector Switch

Operator Style	Description	Contact Block	Type	Legend Plate
XB4 Die Cast Chrome		2 N.O.	XB4BD33	ZBY2387
XB5 Double Insulated		2 N.O.	XB5AD33	ZBY2387

Table 19.5: RED—120 Vac LED—On Pilot Light

Operator Style	Description	Contact Block	Type	Legend Plate
XB4 Die Cast Chrome		120 Vac Red LED	XB4BVG4	ZBY2311
XB5 Double Insulated		120 Vac Red LED	XB5AVG4	ZBY2311

Table 19.6: GREEN—120 Vac LED—Off Pilot Light

Operator Style	Description	Contact Block	Type	Legend Plate
XB4 Die Cast Chrome		120 Vac Green LED	XB4BVG3	ZBY2312
XB5 Double Insulated		120 Vac Green LED	XB5AVG3	ZBY2312

Table 19.7: RED—40 mm Mushroom Stop (Push-Pull)

Operator Style	Description	Contact Block	Type	Legend Plate
XB4 Die Cast Chrome		1 N.C.	XB4BT42	ZBY9330
XB5 Double Insulated		1 N.C.	XB5AT42	ZBY9330

Table 19.8: RED—40 mm Mushroom Emergency Stop (Trigger Action, Turn-to-Release)

Operator Style	Description	Contact Block	Type	Legend Plate 60 mm Round
XB4 Die Cast Chrome		1 N.O. / 1 N.C.	XB4BS8445	ZBY9330
XB5 Double Insulated		1 N.O./ 1 N.C.	XB5AS8445	ZBY9330

When ordering, please specify:
Quantity Type or Catalog Number

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Type K and SK Common Operators

Table 19.9: BLACK—Start Push Buttons

Operator Style	Description	Contact Block	Type *[1]*	Legend Plate *[1]*
30 mm Industrial (Metal)			KR1BH13	KN201
30 mm Corrosion Resistant (Non-Metallic)			SKR1BH13	KN101SP

Table 19.10: RED—Stop Push Buttons

Operator Style	Description	Contact Block	Type *[1]*	Legend Plate *[1]*
30 mm Industrial (Metal)			KR1RH13	KN202
30 mm Corrosion Resistant (Non-Metallic)			SKR1RH13	KN102RP

Table 19.11: BLACK—Off-On Selector Switch

Operator Style	Description	Contact Sequence (Contact Block Included)	Type *[1]*	Legend Plate *[1]*
30 mm Industrial (Metal)			KS11BH13	KN244
30 mm Corrosion Resistant (Non-Metallic)			SKS11BH13	KN144SP

Table 19.12: BLACK—Hand-Off-Auto Selector Switch

Operator Style	Description	Contact Sequence (Contact Block Included)	Type *[1]*	Legend Plate *[1]*
30 mm Industrial (Metal)			KS43BH13	KN260
30 mm Corrosion Resistant (Non-Metallic)			SKS43BH13	KN160SP

Table 19.13: RED—120 Vac—On Pilot Light

Operator Style	Description	Type *[1]*	Legend Plate *[1]*
30 mm Industrial (Metal)		KP1R31	KN203
30 mm Corrosion Resistant (Non-Metallic)		SKP1R31	KN103SP

Table 19.14: GREEN—120 Vac—Off Pilot Light

Operator Style	Description	Type *[1]*	Legend Plate *[1]*
30 mm Industrial (Metal)		KP1G31	KN204
30 mm Corrosion Resistant (Non-Metallic)		SKP1G31	KN104SP

Table 19.15: RED—120 Vac—On Push-To-Test Pilot Light

Operator Style	Description	Type *[1]*	Legend Plate *[1]*
30 mm Industrial (Metal)		KT1R31	KN203
30 mm Corrosion Resistant (Non-Metallic)		SKT1R31	KN103SP

Table 19.16: GREEN—120 Vac—Off Push-To-Test Pilot Light

Operator Style	Description	Type *[1]*	Legend Plate *[1]*
30 mm Industrial (Metal)		KT1G31	KN204
30 mm Corrosion Resistant (Non-Metallic)		SKT1G31	KN104RP

When ordering, please specify:
Quantity
Class Number (if appropriate)
Type or Catalog Number

[1] When ordering, add prefix 9001 to the catalog number.

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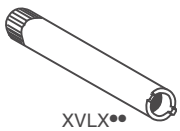
XVLA1●●

XVLA2●●

XVLA3●●



XVLX●●

XVLZ91●

XVL Miniature LED

Table 19.17: Specifications

Conforming to standards	IEC 337-2, NF C 63-140, VDE 0660-200
Degree of protection	IP40 (IP65 with seal) conforming to IEC 529 and NF C 20-010
Current consumption	25 mA
Cabling	XVLA1●●, XVLA2●●: tags for 2.8 x 0.5 mm Faston connectors, also for soldered connections. XVLA3••: threaded connectors, clamping, capacity: min. 1 x 0.2 mm^2, max. 1 x 1.5 mm^2

Table 19.18: With Black Bezel, Raised LED

Description	Supply Voltage DC	Color	Catalog Number
Ø 8 mm *[1]* with integral ballast resistor and reverse polarity protection diode Degree of protection IP40 LED pilot lights Ø 8 mm, with black bezel, visible LED XVLA1●●	12 V	Green	XVLA123
		Red	XVLA124
		Amber	XVLA125
	24 V	Green	XVLA133
		Red	XVLA134
		Amber	XVLA135

Table 19.19: With Integral Lens Cap, Covered LED

Description	Supply Voltage DC	Color	Catalog Number
Ø 8 mm*[1]* with integral ballast resistor and reverse polarity protection diode Degree of protection IP40 Ø 8 mm, with lens incorporated, LED XVLA2	12 V	Green	XVLA223
		Red	XVLA224
		Amber	XVLA225
	24 V	Green	XVLA233
		Red	XVLA234
		Amber	XVLA235
Ø 12 mm *[2]* with integral ballast resistor and reverse polarity protection diode Degree of protection IP40 Ø 12 mm, with lens incorporated, LED XVLA3	12 V	Green	XVLA323
		Red	XVLA324
		Amber	XVLA325
	24 V	Green	XVLA333
		Red	XVLA334
		Amber	XVLA335

Table 19.20: Accessories

Description		Catalog Number
Tightening tools (Sold singly)	For Ø 8 mm pilot lights	XVLX08
	For Ø 12 mm pilot lights	XVLX12
Seals (IP65) (Sold in lots of 10)	For Ø 8 mm pilot lights	XVLZ911
	For Ø 12 mm pilot lights	XVLZ912

[1] Quick connects (2.8 x 0.5 mm).
[2] Screw termination.

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Type JP1R29

Standard, Push-To-Test, and Remote Test Pilot Lights

Class 9001 Type J compact pilot lights are designed to be mounted in a 0.69 in. (11⁄16 in. or 17.5 mm) diameter mounting hole. Each terminal accepts up to two 14 AWG wires (CU only). Type J compact pilot lights meet NEMA 4 (watertight) and NEMA 13 (oiltight). Type JT push-to-test pilot lights have contacts built into the encapsulated body. Type JTR remote test pilot lights have dual inputs for one push remote testing—all you need is a push button with a current rating equal to or greater than the total lamp draw. Type JTR remote test pilot lights can also be energized from two separate input signals of the same voltage and polarity. This is done by wiring the Test terminal to the second input signal.

Table 19.21: Standard Pilot Light *[3]*

Style/Voltage		Color Cap*[4]*				Lamp	Replacement Lamp
		None	Red	Green	Yellow		
Transformer, 110–120 V, 50–60 Hz		JP1	JP1R29	JP1G29	JP1Y29	6.3 V, 0.15 A	2550101020
Incandescent, 120 Vac/Vdc		JP38	JP38R29	JP38G29	JP38Y29	120 V, 0.015 A	2550101040
Incandescent, 24–28 Vac/Vdc		JP35	JP35R29	JP35G29	JP35Y29	28 V, 0.040 A	2550101024
LED, 24–28 Vac		—	JP35LRR29	JP35LGG29	JP35LYY29	28 V, 0.03 A	—
LED, 24–28 Vdc		—	JP35DRR29	JP35DGG29	JP35DYY29	28 V, 0.03 A	—
LED, 120 Vac		—	JP38LRR29	JP38LGG29	JP38LYY29	28 V, 0.03 A	—
Replacement LED, 120 Vac	Red	—	—	—	—	—	6508805207
	Yellow	—	—	—	—	—	6508805208
	Green	—	—	—	—	—	6508805209

Table 19.22: Push-To-Test Pilot Light *[3]*

Style/Voltage		Color Cap*[4]*				Lamp	Replace-ment Lamp
		None	Red	Green	Yellow		
Transformer, 110–120 V, 50–60 Hz		JT1	JT1R29	JT1G29	JT1Y29	6.3 V, 0.15 A	2550101020
Incandescent, 120 Vac/Vdc		JT38	JT38R29	JT38G29	JT38Y29	120 V, 0.015 A	2550101040
Incandescent, 24-28 Vac/ Vdc		JT35	JT35R29	JT35G29	JT35Y29	28 V, 0.040 A	2550101024
LED, 24–28 Vac		—	JT35LRR29	JT35LGG29	JT35LYY29	28 V, 0.03 A	—
LED, 24–28 Vdc		—	JT35DRR29	JT35DGG29	JT35DYY29	28 V, 0.03 A	—
LED, 120 Vac		—	JT38LRR29	JT38LGG29	JT38LYY29	28 V, 0.03 A	—
Replacement LED, 120 Vac	Red	—	—	—	—	—	6508805207
	Yellow	—	—	—	—	—	6508805208
	Green	—	—	—	—	—	6508805209

Table 19.23: Color Caps, Class 9001 Type J

Color	Replacement Color Caps
	Plastic*[4]*
Red	R29
Green	G29
Amber	A29
Blue	L29
White	W29
Yellow	Y29

Table 19.24: Legend Plates

Description			Maximum Number of Lines	Maximum Number of Characters	Catalog Number*[4]*
	Blank	Black Field Red Field	2	8	JN100 JN100R
	Special Marking (Specify Marking)	Black Field Red Field			JN199 JN199R
	Blank	Aluminum Field	2	16	JN700
	Special Marking (Specify Marking)	Aluminum Field			JN799

[3] Other voltages are available. Refer to Catalog 9001CT0001.
[4] When ordering, add prefix 9001 to the catalog number.

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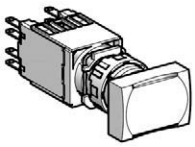
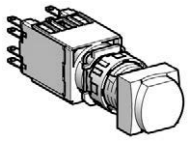
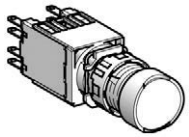

XB6DW•••B


XB6CE•••B


XB6AF•••B

XB6 Complete Devices

Table 19.25: Illuminated Push Buttons (12–24 Vac/Vdc LED included)
Complete Units with Quick Connectors/Solder Tabs

Type of Operator	Type of Contact		Color	Rectangular	Square	Round
	N.O.	N.C.		Catalog Number		
Flush, spring return	1	—	White	XB6DW1B1B	XB6CW1B1B	XB6AW1B1B
			Green	XB6DW3B1B	XB6CW3B1B	XB6AW3B1B
			Yellow	XB6DW5B1B	XB6CW5B1B	XB6AW5B1B
			Blue	XB6DW6B1B	XB6CW6B1B	XB6AW6B1B
	—	1	Red	XB6DW4B2B	XB6CW4B2B	XB6AW4B2B
	1	1	White	XB6DW1B5B	XB6CW1B5B	XB6AW1B5B
			Green	XB6DW3B5B	XB6CW3B5B	XB6AW3B5B
			Red	XB6DW4B5B	XB6CW4B5B	XB6AW4B5B
			Yellow	XB6DW5B5B	XB6CW5B5B	XB6AW5B5B
			Blue	XB6DW6B5B	XB6CW6B5B	XB6AW6B5B
Flush, maintained	1	—	White	XB6DF1B1B	XB6CF1B1B	XB6AF1B1B
			Green	XB6DF3B1B	XB6CF3B1B	XB6AF3B1B
			Yellow	XB6DF5B1B	XB6CF5B1B	XB6AF5B1B
			Blue	XB6DF6B1B	XB6CF6B1B	XB6AF6B1B
	—	1	Red	XB6DF4B2B	XB6CF4B2B	XB6AF4B2B
	1	1	White	XB6DF1B5B	XB6CF1B5B	XB6AF1B5B
			Green	XB6DF3B5B	XB6CF3B5B	XB6AF3B5B
			Red	XB6DF4B5B	XB6CF4B5B	XB6AF4B5B
			Yellow	XB6DF5B5B	XB6CF5B5B	XB6AF5B5B
			Blue	XB6DF6B5B	XB6CF6B5B	XB6AF6B5B
Extended, spring return	1	—	White	XB6DE1B1B	XB6CE1B1B	XB6AE1B1B
			Green	XB6DE3B1B	XB6CE3B1B	XB6AE3B1B
			Yellow	XB6DE5B1B	XB6CE5B1B	XB6AE5B1B
			Blue	XB6DE6B1B	XB6CE6B1B	XB6AE6B1B
	—	1	Red	XB6DE4B2B	XB6CE4B2B	XB6AE4B2B
	1	1	White	XB6DE1B5B	XB6CE1B5B	XB6AE1B5B
			Green	XB6DE3B5B	XB6CE3B5B	XB6AE3B5B
			Red	XB6DE4B5B	XB6CE4B5B	XB6AE4B5B
			Yellow	XB6DE5B5B	XB6CE5B5B	XB6AE5B5B
			Blue	XB6DE6B5B	XB6CE6B5B	XB6AE6B5B

Table 19.26: Illuminated Push Buttons (120 Vac LED included)
Complete Units with Quick Connectors/Solder Tabs

Type of Operator	Type of Contact		Color	Rectangular	Square	Round
	N.O.	N.C.		Catalog Number		
Flush, spring return	1	—	White	XB6DW1G1B	XB6CW1G1B	XB6AW1G1B
			Green	XB6DW3G1B	XB6CW3G1B	XB6AW3G1B
			Yellow	XB6DW5G1B	XB6CW5G1B	XB6AW5G1B
			Blue	XB6DW6G1B	XB6CW6G1B	XB6AW6G1B
	—	1	Red	XB6DW4G2B	XB6CW4G2B	XB6AW4G2B
	1	1	White	XB6DW1G5B	XB6CW1G5B	XB6AW1G5B
			Green	XB6DW3G5B	XB6CW3G5B	XB6AW3G5B
			Red	XB6DW4G5B	XB6CW4G5B	XB6AW4G5B
			Yellow	XB6DW5G5B	XB6CW5G5B	XB6AW5G5B
			Blue	XB6DW6G5B	XB6CW6G5B	XB6AW6G5B
Flush, maintained	1	—	White	XB6DF1G1B	XB6CF1G1B	XB6AF1G1B
			Green	XB6DF3G1B	XB6CF3G1B	XB6AF3G1B
			Yellow	XB6DF5G1B	XB6CF5G1B	XB6AF5G1B
			Blue	XB6DF6G1B	XB6CF6G1B	XB6AF6G1B
	—	1	Red	XB6DF4G2B	XB6CF4G2B	XB6AF4G2B
	1	1	White	XB6DF1G5B	XB6CF1G5B	XB6AF1G5B
			Green	XB6DF3G5B	XB6CF3G5B	XB6AF3G5B
			Red	XB6DF4G5B	XB6CF4G5B	XB6AF4G5B
			Yellow	XB6DF5G5B	XB6CF5G5B	XB6AF5G5B
			Blue	XB6DF6G5B	XB6CF6G5B	XB6AF6G5B
Extended, spring return	1	—	White	XB6DE1G1B	XB6CE1G1B	XB6AE1G1B
			Green	XB6DE3G1B	XB6CE3G1B	XB6AE3G1B
			Yellow	XB6DE5G1B	XB6CE5G1B	XB6AE5G1B
			Blue	XB6DE6G1B	XB6CE6G1B	XB6AE6G1B
	—	1	Red	XB6DE4G2B	XB6CE4G2B	XB6AE4G2B
	1	1	White	XB6DE1G5B	XB6CE1G5B	XB6AE1G5B
			Green	XB6DE3G5B	XB6CE3G5B	XB6AE3G5B
			Red	XB6DE4G5B	XB6CE4G5B	XB6AE4G5B
			Yellow	XB6DE5G5B	XB6CE5G5B	XB6AE5G5B
			Blue	XB6DE6G5B	XB6CE6G5B	XB6AE6G5B

For Legends, see XB6 Legend Plates and Legends, page 19-20

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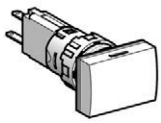

XB6DV••B

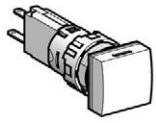

XB6CV••B

Table 19.27: Pilot Lights (12–24 Vac/Vdc LED included)
Complete Units with Quick Connectors/Solder Tabs

Color	Rectangular	Square	Round
	Catalog Number		
White	XB6DV1BB	XB6CV1BB	XB6AV1BB
Green	XB6DV3BB	XB6CV3BB	XB6AV3BB
Red	XB6DV4BB	XB6CV4BB	XB6AV4BB
Yellow	XB6DV5BB	XB6CV5BB	XB6AV5BB
Blue	XB6DV6BB	XB6CV6BB	XB6AV6BB

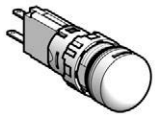
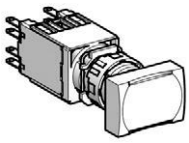

XB6AV••B

Table 19.28: Pilot Lights (120 Vac LED)
Complete Units with Quick Connectors/Solder Tabs

Color	Rectangular	Square	Round
	Catalog Number		
White	XB6DV1GB	XB6CV1GB	XB6AV1GB
Green	XB6DV3GB	XB6CV3GB	XB6AV3GB
Red	XB6DV4GB	XB6CV4GB	XB6AV4GB
Yellow	XB6DV5GB	XB6CV5GB	XB6AV5GB
Blue	XB6DV6GB	XB6CV6GB	XB6AV6GB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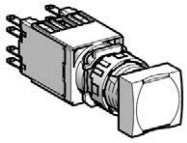

XB6CA••B

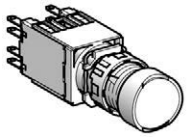
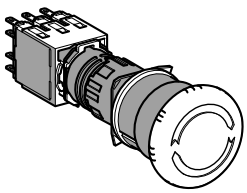

XB6AA••B

Table 19.29: Push Buttons (Non-Illuminated)
Complete Units with Quick Connectors/Solder Tabs

Type of Push	Type of Contact		Color	Rectangular	Square	Round
	N.O.	N.C.		Catalog Number		
Flush, spring return	1	—	White	XB6DA11B	XB6CA11B	XB6AA11B
			Black	XB6DA21B	XB6CA21B	XB6AA21B
			Green	XB6DA31B	XB6CA31B	XB6AA31B
			Yellow	XB6DA51B	XB6CA51B	XB6AA51B
			Blue	XB6DA61B	XB6CA61B	XB6AA61B
	—	1	Black	XB6DA22B	XB6CA22B	XB6AA22B
			Red	XB6DA42B	XB6CA42B	XB6AA42B
	1	1	White	XB6DA15B	XB6CA15B	XB6AA15B
			Black	XB6DA25B	XB6CA25B	XB6AA25B
			Green	XB6DA35B	XB6CA35B	XB6AA35B
			Red	XB6DA45B	XB6CA45B	XB6AA45B
			Yellow	XB6DA55B	XB6CA55B	XB6AA55B
			Blue	XB6DA65B	XB6CA65B	XB6AA65B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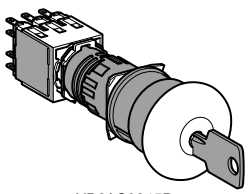
XB6AS9345B

Table 19.30: Trigger Action Emergency Stop Mushroom Head Push Buttons (Color Red) *[1]*

Shape of Head	Type of Push	Type of Contact		Diameter of Head (mm)	Catalog Number
		N.O.	N.C.		
	Turn-to-release	—	1	30	XB6AS8342B
		1	1	30	XB6AS8345B
	Key release	—	1	30	XB6AS9342B *[2]*
		1	1	30	XB6AS9345B *[2]*

ZB6Y7330

Table 19.31: Circular Legends, 45 mm

Description	Color	Text	Catalog Number
Circular legends, 45 mm	Yellow	Blank	ZB6Y7001
		Emergency stop	ZB6Y7330

For Legends, see XB6 Legend Plates and Legends, page 19-20

[1] Complies with ISO 13850 standards for Emergency Stop push buttons when used with circular Legend Plate ZB6Y7330 (see Table 19.31 Circular Legends, 45 mm, page 19-13)
[2] Ronis 200 key

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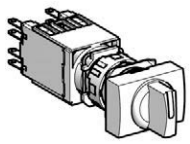
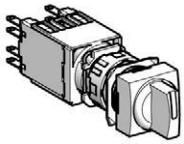

XB6DD•••B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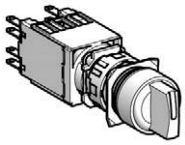
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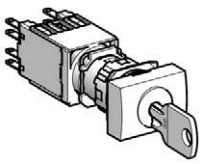
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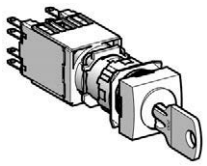
XB6CG••B

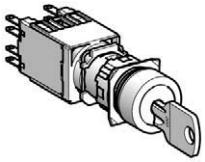
XB6AG••B

Table 19.32: Selector Switches (Switching Angle: Handle: 60) Complete Units with Quick Connectors/Solder Tabs

Type of Operator	Type of Contact		Number and Type of Positions		Rectangular	Square	Round
	N.O.	N.C.			Catalog Number		
Handle	1	—	2-maintained		XB6DD221B	XB6CD221B	XB6AD221B
	1	1	2-maintained		XB6DD225B	XB6CD225B	XB6AD225B
			3-maintained		XB6DD235B	XB6CD235B	XB6AD235B
	2	—	3-maintained		XB6DD233B	XB6CD233B	XB6AD233B

Table 19.33: Selector Switches (Switching Angle: Key: 70°) Complete Units with Quick Connectors/Solder Tabs

Type of Operator	Type of Contact		Number and Type of Positions		Rectangular	Square	Round
	N.O.	N.C.			Catalog Number		
Key	1	1	2-maintained		XB6DGC5B	XB6CGC5B	XB6AGC5B
			2-maintained		XB6DGB5B	XB6CGB5B	XB6AGB5B
			3-maintained		XB6DGH5B	XB6CGH5B	XB6AGH5B
	2	—	3-maintained		XB6DGH3B	XB6CGH3B	XB6AGH3B

NOTE: The symbol ⚷ indicates key withdrawal position(s).

Table 19.34: Selector Switch Sequence

2 Position Selector Switch		
		Contact block guide *[3]*
O	X	1 N.O. (left or right)
X	O	1 N.C. (left or right)
O X	X O	1 N.O. and 1 N.C.

3 Position Selector Switch			
			Contact block guide *[3]*
O	O	X	1 N.O. (left)
X	O	X	2 N.O. wired in **parallel** (side by side)
X	O	O	1 N.O. (right)
O	X	X	1 N.C. (right)
X	X	O	1 N.C. (left)
O	X	O	2 N.C. wired in **series** (side by side)

For Legends, see Legend Plates and Legends, page 19-20

[3] As viewed from the front of the panel.

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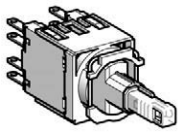
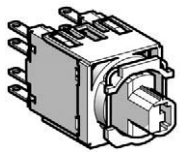

ZB6ZB●●B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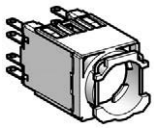
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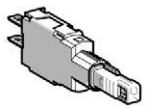
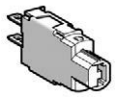

ZB6E●●B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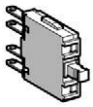
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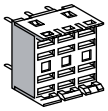
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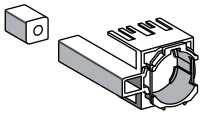
ZB6Y011

XB6 Electrical Components

Table 19.35: Contact Blocks and Light Modules for Illuminated Push Buttons *[4]*

Description	Supply Voltage	Type of Contact		Color of Light Source	Catalog Number
		N.O.	N.C.		
Quick connectors/solder tabs					
Integral LED *[5]*	12–24 Vac/ Vdc	1	—	White	ZB6ZB11B
				Green	ZB6ZB31B
				Yellow	ZB6ZB51B
				Blue	ZB6ZB61B
		—	1	Red	ZB6ZB42B
				Yellow	ZB6ZB52B
		1	1	White	ZB6ZB15B
				Green	ZB6ZB35B
				Red	ZB6ZB45B
				Yellow	ZB6ZB55B
				Blue	ZB6ZB65B
	120 Vac	1	—	White	ZB6ZG11B
				Green	ZB6ZG31B
				Yellow	ZB6ZG51B
				Blue	ZB6ZG61B
		—	1	Red	ZB6ZG42B
				Yellow	ZB6ZG52B
		1	1	White	ZB6ZG15B
				Green	ZB6ZG35B
				Red	ZB6ZG45B
				Yellow	ZB6ZG55B
				Blue	ZB6ZG65B
Direct for incandescent bulb (not included) *[6]*	< 24 Vac/Vdc	1	—	—	ZB6ZH01B
		—	1	—	ZB6ZH02B
		1	1	—	ZB6ZH05B

Table 19.36: Contact Blocks for Push Buttons and Selector Switches

Description	Type of Contact		Catalog Number
	N.O.	N.C.	
Quick connectors/solder tabs			
Contact blocks with mounting base	1	—	ZB6Z1B
	—	1	ZB6Z2B
	2	—	ZB6Z3B
	—	2	ZB6Z4B
	1	1	ZB6Z5B

Table 19.37: Light Modules for Pilot Lights

Description	Supply Voltage	Color of Light Source	Catalog Number
Quick connectors/solder tabs *[7]*			
Integral LED *[8]*	12–24 Vac/Vdc	White	ZB6EB1B
		Green	ZB6EB3B
		Red	ZB6EB4B
		Yellow	ZB6EB5B
		Blue	ZB6EB6B
	120 Vac	White	ZB6EG1B
		Green	ZB6EG3B
		Red	ZB6EG4B
		Yellow	ZB6EG5B
		Blue	ZB6EG6B
With resistor for 95 V neon bulb (not included) *[6]* *[9]*	110 Vac	—	ZB6EG0B
	230 Vac	—	ZB6EM0B
Direct supply for 0.6 W max. incandescent bulb (not included) *[6]*	< 24 Vac/Vdc	—	ZB6EH0B

Table 19.38: Separate Contact Blocks (Maximum of 3 contacts per mounting base.)

Contact Material	For use with mounting base	Type of Contact		Catalog Number
		N.O.	N.C.	
Silver alloy	Quick connectors/solder tabs	1	—	ZB6E1B
		—	1	ZB6E2B
Gold flashed	Quick connectors/solder tabs	1	—	ZB6E1E
		—	1	ZB6E2E

Table 19.39: Accessories for Printed Circuit Board Installations

Description	for use with	Catalog Number
Plug-in Socket Adapter	contact blocks and light modules	ZB6Y010
Body Bracket	plug-in socket adapter	ZB6Y011

[4] Illuminated selector switches can be assembled by using a contact block/light module assembly in conjunction with a selector switch head, supplied without handle, and a transparent handle. See XB6 Illuminated Operators, page 19-16.
[5] The LED must be the same color as the push button cap.
[6] Order bulbs separately. See Additional XB6 Accessories, page 19-20.
[7] Electrical components with connection by printed circuit board pins are available. See Additional XB6 Accessories, page 19-20.
[8] The LED must be the same color as the lens.
[9] Neon bulb can only be used with a red, yellow, or white cap.

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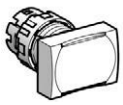

ZB6DW•

ZB6CE•

ZB6AF•

XB6 Illuminated Operators

Table 19.40: Heads for Illuminated Push Buttons *[10]*

Type of Push	Color	Rectangular	Square	Round
		Catalog Number		
Flush, spring return	White	ZB6DW1	ZB6CW1	ZB6AW1
	Green	ZB6DW3	ZB6CW3	ZB6AW3
	Red	ZB6DW4	ZB6CW4	ZB6AW4
	Yellow	ZB6DW5	ZB6CW5	ZB6AW5
	Blue	ZB6DW6	ZB6CW6	ZB6AW6
	5 colors *[11]*	ZB6DW9	ZB6CW9	ZB6AW9
Flush, maintained	White	ZB6DF1	ZB6CF1	ZB6AF1
	Green	ZB6DF3	ZB6CF3	ZB6AF3
	Red	ZB6DF4	ZB6CF4	ZB6AF4
	Yellow	ZB6DF5	ZB6CF5	ZB6AF5
	Blue	ZB6DF6	ZB6CF6	ZB6AF6
	5 colors *[11]*	ZB6DF9	ZB6CF9	ZB6AF9
Extended, spring return	White	ZB6DE1	ZB6CE1	ZB6AE1
	Green	ZB6DE3	ZB6CE3	ZB6AE3
	Red	ZB6DE4	ZB6CE4	ZB6AE4
	Yellow	ZB6DE5	ZB6CE5	ZB6AE5
	Blue	ZB6DE6	ZB6CE6	ZB6AE6
	5 colors*[11]*	ZB6DE9	ZB6CE9	ZB6AE9

ZB6DV•

ZB6CV•

ZB6AV•

Table 19.41: Heads for Pilot Lights *[10]*

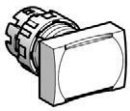
Color	Rectangular	Square	Round
	Catalog Number		
White	ZB6DV1	ZB6CV1	ZB6AV1
Green	ZB6DV3	ZB6CV3	ZB6AV3
Red	ZB6DV4	ZB6CV4	ZB6AV4
Yellow	ZB6DV5	ZB6CV5	ZB6AV5
Blue	ZB6DV6	ZB6CV6	ZB6AV6
5 colors *[11]*	ZB6DV9	ZB6CV9	ZB6AV9

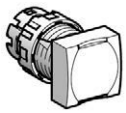
For legends, see Legend Plates and Legends, page 19-20

XB6 Non-Illuminated Operators

Table 19.42: Heads for Push Buttons *[12]*

Type of Push	Color	Rectangular	Square	Round
		Catalog Number		
Flush, spring return	White	ZB6DA1	ZB6CA1	ZB6AA1
	Black	ZB6DA2	ZB6CA2	ZB6AA2
	Green	ZB6DA3	ZB6CA3	ZB6AA3
	Red	ZB6DA4	ZB6CA4	ZB6AA4
	Yellow	ZB6DA5	ZB6CA5	ZB6AA5
	Blue	ZB6DA6	ZB6CA6	ZB6AA6
	6 colors*[13]*	ZB6DA9	ZB6CA9	ZB6AA9

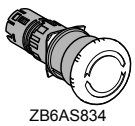

ZB6DA•


ZB6CA•

ZB6AA•

Table 19.43: Mushroom Heads for Trigger Action Push Buttons (30 mm) *[14]*

Shape of Head	Type of Push	Cap Color	Catalog Number
	Turn-to-release	Red	ZB6AS834
	Key release	Red	ZB6AS934 *[15]*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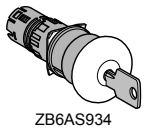
ZB6AS934

Table 19.44: Circular Legends, 45 mm

Description	Color	Text	Catalog Number
Circular legends, 45 mm	Yellow	Blank	ZB6Y7001
		Emergency stop	ZB6Y7330

ZB6Y7330

[10] To combine with light modules, see XB6 Electrical Components.
[11] Six different color caps included with head (white, black, green, red, yellow, and blue).
[12] To combine with complete bodies and contact blocks, see XB6 Electrical Components, page 19-15
[13] Six different color caps included with head (white, black, green, red, yellow, and blue).
[14] Complies with ISO 13850 standards for Emergency Stop push buttons when used with circular Legend Plate ZB6Y7330
[15] Ronis 200 key

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ZB6DD●●

ZB6CD●●

ZB6AD●●

XB6 Non-Illuminated Selector Switches

Table 19.45: Heads for Non-Illuminated Selector Switches *[16][17]*
(To combine with complete bodies and contact blocks, see XB6 Electrical Components, page 19-15.)

Number and Type of Positions		Color of Handle	Rectangular	Square	Round
			Catalog Number		
Switching angle: maintained positions 60°, spring return positions 45°					
2-maintained		Black	ZB6DD22	ZB6CD22	ZB6AD22
2-maintained		Black	ZB6DD28 *[18]*	ZB6CD28 *[18]*	ZB6AD28 *[18]*
3-maintained		Black	ZB6DD23	ZB6CD23	ZB6AD23
2-spring return to center		Black	ZB6DD24	ZB6CD24	ZB6AD24
3-spring return to center		Black	ZB6DD25	ZB6CD25	ZB6AD25
3-spring return from right to center		Black	ZB6DD26	ZB6CD26	ZB6AD26
3-spring return from left to center		Black	ZB6DD27	ZB6CD27	ZB6AD27

Legends: Legend Plates and Legends, page 19-20

[16] For bodies with 2 contact blocks, maximum.
[17] For slector switch sequence charts, see XB6 Keyed Selector Switches, page 19-18.
[18] Switching angle: maintained positions 90°.

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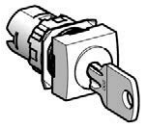
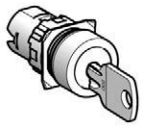
ZB6DG●


ZB6CG●


ZB6AG●

XB6 Keyed Selector Switches

Table 19.46: Heads for Ronis Key Operated Selector Switches *[19]*
(To combine with complete bodies and contact blocks, see XB6 Electrical Components, page 19-15.)

Number and Type of Positions		Key Withdrawal	Rectangular	Square	Round
			Catalog Number		
Switching angle: maintained positions 70°, spring return positions 45°					
2-maintained		Right-hand position	ZB6DGA	ZB6CGA	ZB6AGA
		Center position	ZB6DGB	ZB6CGB	ZB6AGB
		Both positions	ZB6DGC	ZB6CGC	ZB6AGC
2-spring return from right to center		Center position	ZB6DGL	ZB6CGL	ZB6AGL
3-maintained		Left-hand position	ZB6DGD	ZB6CGD	ZB6AGD
		Center position	ZB6DGE	ZB6CGE	ZB6AGE
		Left-hand and center positions	ZB6DGF	ZB6CGF	ZB6AGF
		Right-hand position	ZB6DGG	ZB6CGG	ZB6AGG
		All 3 positions	ZB6DGH	ZB6CGH	ZB6AGH
		Left-hand and right-hand positions	ZB6DGJ	ZB6CGJ	ZB6AGJ
		Right-hand and center positions	ZB6DGK	ZB6CGK	ZB6AGK
3-spring return from right to center		Left-hand position	ZB6DGQ	ZB6CGQ	ZB6AGQ
		Center position	ZB6DGR	ZB6CGR	ZB6AGR
		Left-hand and center positions	ZB6DGS	ZB6CGS	ZB6AGS
3-spring return to center		Center position	ZB6DGT	ZB6CGT	ZB6AGT

Indicates key withdrawal position.

Table 19.47: Selector Switch Sequence
(using contact block assemblies, see XB6 Electrical Components, page 19-15)

2 Position Selector Switch		
		Contact block guide *[20]*
O	X	1 N.O. (left or right)
X	O	1 N.C. (left or right)
O X	X O	1 N.O. and 1 N.C.

3 Position Selector Switch			
			Contact block guide *[20]*
O	O	X	1 N.O. (left)
X	O	X	2 N.O. wired in **parallel** (side by side)
X	O	O	1 N.O. (right)
O	X	X	1 N.C. (right)
X	X	O	1 N.C. (left)
O	X	O	2 N.C. wired in **series** (side by side)

For legends, see Legend Plates and Legends, page 19-20

[19] Ronis 200 key standard.
[20] As viewed from the front of the panel.

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ZB6YD•10

ZB6YC•10

ZB6YA•10

ZB6YD•17

ZB6YD•19

ZB6YC•19

ZB6YA•19

XB6 Push Button Caps

Table 19.48: Push Button Caps—Marked

Ink Marking Color: White on colored cap Black on white cap	Color	Rectangular	Square	Round
		Catalog Number		
For non-illuminated push buttons				
0	White	ZB6YD100	ZB6YC100	ZB6YA100
	Black	ZB6YD200	ZB6YC200	ZB6YA200
1	White	ZB6YD101	ZB6YC101	ZB6YA101
	Black	ZB6YD201	ZB6YC201	ZB6YA201
2	White	ZB6YD102	ZB6YC102	ZB6YA102
	Black	ZB6YD202	ZB6YC202	ZB6YA202
3	White	ZB6YD103	ZB6YC103	ZB6YA103
	Black	ZB6YD203	ZB6YC203	ZB6YA203
4	White	ZB6YD104	ZB6YC104	ZB6YA104
	Black	ZB6YD204	ZB6YC204	ZB6YA204
5	White	ZB6YD105	ZB6YC105	ZB6YA105
	Black	ZB6YD205	ZB6YC205	ZB6YA205
6	White	ZB6YD106	ZB6YC106	ZB6YA106
	Black	ZB6YD206	ZB6YC206	ZB6YA206
7	White	ZB6YD107	ZB6YC107	ZB6YA107
	Black	ZB6YD207	ZB6YC207	ZB6YA207
8	White	ZB6YD108	ZB6YC108	ZB6YA108
	Black	ZB6YD208	ZB6YC208	ZB6YA208
9	White	ZB6YD109	ZB6YC109	ZB6YA109
	Black	ZB6YD209	ZB6YC209	ZB6YA209
ON	White	ZB6YD117	ZB6YC117	ZB6YA117
	Green	ZB6YD317	ZB6YC317	ZB6YA317
OFF	Black	ZB6YD224	ZB6YC224	ZB6YA224
	Red	ZB6YD424	ZB6YC424	ZB6YA424
I	White	ZB6YD111	ZB6YC111	ZB6YA111
	Green	ZB6YD311	ZB6YC311	ZB6YA311
O	Black	ZB6YD210	ZB6YC210	ZB6YA210
	Red	ZB6YD410	ZB6YC410	ZB6YA410
R	Black	ZB6YD226	ZB6YC226	ZB6YA226
	Blue	ZB6YD626	ZB6YC626	ZB6YA626
START	White	ZB6YD140	ZB6YC140	ZB6YA140
	Green	ZB6YD340	ZB6YC340	ZB6YA340
STOP	Black	ZB6YD241	ZB6YC241	ZB6YA241
	Red	ZB6YD441	ZB6YC441	ZB6YA441
II	White	ZB6YD112	ZB6YC112	ZB6YA112
	Black	ZB6YD212	ZB6YC212	ZB6YA212
III	White	ZB6YD113	ZB6YC113	ZB6YA113
	Black	ZB6YD213	ZB6YC213	ZB6YA213
+	White	ZB6YD114	ZB6YC114	ZB6YA114
	Black	ZB6YD214	ZB6YC214	ZB6YA214
-	White	ZB6YD115	ZB6YC115	ZB6YA115
	Black	ZB6YD215	ZB6YC215	ZB6YA215
UP	White	ZB6YD127	ZB6YC127	ZB6YA127
	Black	ZB6YD227	ZB6YC227	ZB6YA227
DOWN	White	ZB6YD128	ZB6YC128	ZB6YA128
	Black	ZB6YD228	ZB6YC228	ZB6YA228
CLOSE	White	ZB6YD132	ZB6YC132	ZB6YA132
	Black	ZB6YD232	ZB6YC232	ZB6YA232
⬆	White	ZB6YD119	ZB6YC119	ZB6YA119
	Black	ZB6YD219	ZB6YC219	ZB6YA219
⬇	White	ZB6YD120	ZB6YC120	ZB6YA120
	Black	ZB6YD220	ZB6YC220	ZB6YA220
➡	White	ZB6YD121	ZB6YC121	ZB6YA121
	Black	ZB6YD221	ZB6YC221	ZB6YA221
⬅	White	ZB6YD122	ZB6YC122	ZB6YA122
	Black	ZB6YD222	ZB6YC222	ZB6YA222

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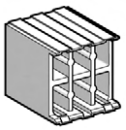
ZB6Y905

ZB6Y009

ZB6Y002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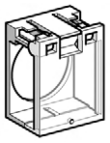
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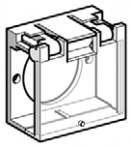
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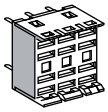
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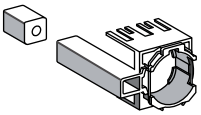

ZB6Y011

Additional XB6 Accessories

Table 19.49: Accessories

Description	Application	Catalog Number
Body	Fitting contact blocks	ZB6Y009
Bezel tightening tool + bulb extractor	Fixing the switch and changing bulbs	ZB6Y905
Three piece tool kit	—	ZB6Y019
Nut	Fixing head to panel	ZB6Y002
Adaptor	Flush mounting a circular head push button or pilot light in Ø 22 mm cut-out	ZB6YA002
Shroud	Protecting contacts against touching	ZB6Y001
Protective cover	Circular and square head push buttons and switches	ZB6YA001
	Rectangular head push buttons and switches	ZB6YD001
Female Quick connector/Solder tab	Sold in lots of 100 pieces	ZB6Y004
Blanking plug	Plugging an unused knockout	ZB6Y005
Ronis key, 2 pieces	Key operated selector switches and emergency stop mushroom	ZB6Y007
Incandescent bulbs, bayonet T1 1/4	6 V	ZB6YA006
	12 V	ZB6YJ012
	28 V*[21]*	ZB6YB028
Neon bulbs	110/230 V *[22]*	ZB6YG095

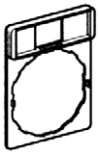
Table 19.50: Accessories for Printed Circuit Board Installations

Description	for use with	Catalog Number
Plug-in Socket Adapter	contact blocks and light modules	ZB6Y010
Body Bracket	plug-in socket adapter	ZB6Y011

XB6 Legend Plates and Legends

Table 19.51: Standard Legend Plate (24 X 28 mm) for 8 X 21 mm Legend *[23]*

Description	Background Color of Legend	Catalog Number
Without legend insert	—	ZB6YD20
With blank legend insert	White or yellow	ZB6YD21
	Black or red	ZB6YD22


ZB6YD20

ZB6Y2178

ZB6Y2304

Table 19.52: 8 x 21 mm Marked Legends (for 24 x 28 mm legend holder ZB6YD20) *[23]*

Color	Marking		Catalog Number
White Text Red Background (Stop and Fault) Black Background (all others)	International	O-I	ZB6Y2178
		I-II	ZB6Y2179
		I-O-II	ZB6Y2186
		O	ZB6Y2190
	English	HAND-O-AUTO	ZB6Y2387
		CLOSE	ZB6Y2314
		DOWN	ZB6Y2308
		FORWARD	ZB6Y2305
		FAULT	ZB6Y2334
		LEFT	ZB6Y2310
		OFF	ZB6Y2312
		ON	ZB6Y2303
		OPEN	ZB6Y2313
		RESET	ZB6Y2323
		REVERSE	ZB6Y2306
		RIGHT	ZB6Y2309
		RUN	ZB6Y2311
		STOP	ZB6Y2304
		UP	ZB6Y2307

Table 19.53: Circular Legends, 45 mm

Description	Color	Text	Catalog Number
Circular legends, 45 mm	Yellow	Blank	ZB6Y7001
		Emergency stop	ZB6Y7330

[21] 28 V bulb supplied, for use on 24 V.
[22] 95 V bulb supplied, for use on 110/230 V.
[23] Additional legend plate sizes and markings are available in Catalog 9001CT1102.

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XB6EAA●●P

XB6ECA●●P

XB6EDA●●P

New!

XB6E Flush, Spring Return Push Buttons

Table 19.54: Push Buttons, Flush, Spring Return

Shape of head	Type of contacts CO	Color	Sold in lots of	Catalog Number
Circular	1	White	5	XB6EAA11P
		Black	5	XB6EAA21P
		Green	5	XB6EAA31P
		Red	5	XB6EAA41P
		Yellow	5	XB6EAA51P
		Blue	5	XB6EAA61P
	2	White	5	XB6EAA12P
		Black	5	XB6EAA22P
		Green	5	XB6EAA32P
		Red	5	XB6EAA42P
		Yellow	5	XB6EAA52P
		Blue	5	XB6EAA62P
Square	1	White	5	XB6ECA11P
		Black	5	XB6ECA21P
		Green	5	XB6ECA31P
		Red	5	XB6ECA41P
		Yellow	5	XB6ECA51P
		Blue	5	XB6ECA61P
	2	White	5	XB6ECA12P
		Black	5	XB6ECA22P
		Green	5	XB6ECA32P
		Red	5	XB6ECA42P
		Yellow	5	XB6ECA52P
		Blue	5	XB6ECA62P
Rectangular	1	White	5	XB6EDA11P
		Black	5	XB6EDA21P
		Green	5	XB6EDA31P
		Red	5	XB6EDA41P
		Yellow	5	XB6EDA51P
		Blue	5	XB6EDA61P
	2	White	5	XB6EDA12P
		Black	5	XB6EDA22P
		Green	5	XB6EDA32P
		Red	5	XB6EDA42P
		Yellow	5	XB6EDA52P
		Blue	5	XB6EDA62P

XB6EAV●●P

XB6ECV●●P

XB6EDV●●P

New!

XB6E Pilot Lights

Table 19.55: XB6E Pilot Lights with 12 or 24 V Integral LED

Shape of head	Color	Sold in lots of	Catalog Number	
			With 12 V LED	With 24 V LED
Circular	White	5	XB6EAV1JP	XB6EAV1BP
	Green	5	XB6EAV3JP	XB6EAV3BP
	Red	5	XB6EAV4JP	XB6EAV4BP
	Yellow	5	XB6EAV5JP	XB6EAV5BP
	Blue	5	XB6EAV6JP	XB6EAV6BP
	Orange	5	XB6EAV8JP	XB6EAV8BP
Square	White	5	XB6ECV1JP	XB6ECV1BP
	Green	5	XB6ECV3JP	XB6ECV3BP
	Red	5	XB6ECV4JP	XB6ECV4BP
	Yellow	5	XB6ECV5JP	XB6ECV5BP
	Blue	5	XB6ECV6JP	XB6ECV6BP
	Orange	5	XB6ECV8JP	XB6ECV8BP
Rectangular	White	5	XB6EDV1JP	XB6EDV1BP
	Green	5	XB6EDV3JP	XB6EDV3BP
	Red	5	XB6EDV4JP	XB6EDV4BP
	Yellow	5	XB6EDV5JP	XB6EDV5BP
	Blue	5	XB6EDV6JP	XB6EDV6BP
	Orange	5	XB6EDV8JP	XB6EDV8BP

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XB6EAW●●●P

XB6ECW●●●P

XB6EDW●●●P

New!

XB6E Illuminated Push Buttons, Spring Return

Table 19.56: Illuminated Push Buttons, Flush, Spring Return, with 12 or 24 V Integral LED

Shape of head	Type of contacts CO	Color	Sold in lots of	Catalog Number With 12 V LED	Catalog Number With 24 V LED
Circular	1	White	5	XB6EAW1J1P	XB6EAW1B1P
		Green	5	XB6EAW3J1P	XB6EAW3B1P
		Red	5	XB6EAW4J1P	XB6EAW4B1P
		Yellow	5	XB6EAW5J1P	XB6EAW5B1P
		Blue	5	XB6EAW6J1P	XB6EAW6B1P
		Orange	5	XB6EAW8J1P	XB6EAW8B1P
	2	White	5	XB6EAW1J2P	XB6EAW1B2P
		Green	5	XB6EAW3J2P	XB6EAW3B2P
		Red	5	XB6EAW4J2P	XB6EAW4B2P
		Yellow	5	XB6EAW5J2P	XB6EAW5B2P
		Blue	5	XB6EAW6J2P	XB6EAW6B2P
		Orange	5	XB6EAW8J2P	XB6EAW8B2P
Square	1	White	5	XB6ECW1J1P	XB6ECW1B1P
		Green	5	XB6ECW3J1P	XB6ECW3B1P
		Red	5	XB6ECW4J1P	XB6ECW4B1P
		Yellow	5	XB6ECW5J1P	XB6ECW5B1P
		Blue	5	XB6ECW6J1P	XB6ECW6B1P
		Orange	5	XB6ECW8J1P	XB6ECW8B1P
	2	White	5	XB6ECW1J2P	XB6ECW1B2P
		Green	5	XB6ECW3J2P	XB6ECW3B2P
		Red	5	XB6ECW4J2P	XB6ECW4B2P
		Yellow	5	XB6ECW5J2P	XB6ECW5B2P
		Blue	5	XB6ECW6J2P	XB6ECW6B2P
		Orange	5	XB6ECW8J2P	XB6ECW8B2P
Rectangular	1	White	5	XB6EDW1J1P	XB6EDW1B1P
		Green	5	XB6EDW3J1P	XB6EDW3B1P
		Red	5	XB6EDW4J1P	XB6EDW4B1P
		Yellow	5	XB6EDW5J1P	XB6EDW5B1P
		Blue	5	XB6EDW6J1P	XB6EDW6B1P
		Orange	5	XB6EDW8J1P	XB6EDW8B1P
	2	White	5	XB6EDW1J2P	XB6EDW1B2P
		Green	5	XB6EDW3J2P	XB6EDW3B2P
		Red	5	XB6EDW4J2P	XB6EDW4B2P
		Yellow	5	XB6EDW5J2P	XB6EDW5B2P
		Blue	5	XB6EDW6J2P	XB6EDW6B2P
		Orange	5	XB6EDW8J2P	XB6EDW8B2P

XB6EAF●●●P

XB6ECF●●●P

XV6EDF●●●P

New!

XB6E Illuminated Push Buttons, Latching

Table 19.57: Illuminated Push Buttons, Flush, Latching, with 12 or 24 V Integral LED

Shape of Head	Type of Contacts CO	Color	Sold in lots of	Catalog Number With 12 V LED	Catalog Number With 24 V LED
Circular	1	White	5	XB6EAF1J1P	XB6EAF1B1P
		Green	5	XB6EAF3J1P	XB6EAF3B1P
		Red	5	XB6EAF4J1P	XB6EAF4B1P
		Yellow	5	XB6EAF5J1P	XB6EAF5B1P
		Blue	5	XB6EAF6J1P	XB6EAF6B1P
		Orange	5	XB6EAF8J1P	XB6EAF8B1P
	2	White	5	XB6EAF1J2P	XB6EAF1B2P
		Green	5	XB6EAF3J2P	XB6EAF3B2P
		Red	5	XB6EAF4J2P	XB6EAF4B2P
		Yellow	5	XB6EAF5J2P	XB6EAF5B2P
		Blue	5	XB6EAF6J2P	XB6EAF6B2P
		Orange	5	XB6EAF8J2P	XB6EAF8B2P
Square	1	White	5	XB6ECF1J1P	XB6ECF1B1P
		Green	5	XB6ECF3J1P	XB6ECF3B1P
		Red	5	XB6ECF4J1P	XB6ECF4B1P
		Yellow	5	XB6ECF5J1P	XB6ECF5B1P
		Blue	5	XB6ECF6J1P	XB6ECF6B1P
		Orange	5	XB6ECF8J1P	XB6ECF8B1P
	2	White	5	XB6ECF1J2P	XB6ECF1B2P
		Green	5	XB6ECF3J2P	XB6ECF3B2P
		Red	5	XB6ECF4J2P	XB6ECF4B2P
		Yellow	5	XB6ECF5J2P	XB6ECF5B2P
		Blue	5	XB6ECF6J2P	XB6ECF6B2P
		Orange	5	XB6ECF8J2P	XB6ECF8B2P
Rectangular	1	White	5	XB6EDF1J1P	XB6EDF1B1P
		Green	5	XB6EDF3J1P	XB6EDF3B1P
		Red	5	XB6EDF4J1P	XB6EDF4B1P
		Yellow	5	XB6EDF5J1P	XB6EDF5B1P
		Blue	5	XB6EDF6J1P	XB6EDF6B1P
		Orange	5	XB6EDF8J1P	XB6EDF8B1P
	2	White	5	XB6EDF1J2P	XB6EDF1B2P
		Green	5	XB6EDF3J2P	XB6EDF3B2P
		Red	5	XB6EDF4J2P	XB6EDF4B2P
		Yellow	5	XB6EDF5J2P	XB6EDF5B2P
		Blue	5	XB6EDF6J2P	XB6EDF6B2P
		Orange	5	XB6EDF8J2P	XB6EDF8B2P

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XB6ET●●●P

XB6ETN521P

New!

Table 19.58: Emergency Stop Mushroom Head Push Button

Shape of Head	Type of Push	Type of Contacts N. C.	Sold in lots of	Catalog Number With 12 V LED	Catalog Number With 24 V LED
Illuminated					
Circular, Ø 32 mm /1.260 in.	Trigger action, turn to release, pull to release	2	5	XB6ETI522P	XB6ETI523P
Non-Illuminated					
Circular, Ø 32 mm /1.260 in.	Trigger action, turn to release, pull to release	2	5	XB6ETN521P	—

New!

XB6E Selector Switches

Table 19.59: Selector Switches with Standard Handle or Key Switches

Shape of Head	Type of push	Type of contacts CO	Number and type of positions		Sold in lots of	Catalog Number
Circular	Standard black handle	1	2–maintained		5	XB6EAD221P
		2	2–maintained		5	XB6EAD222P
		2	3–maintained		5	XB6EAD232P
	Key *[24]*	1	2–maintained		5	XB6EAG221P
		2	2–maintained		5	XB6EAG222P
		2	3–maintained		5	XB6EAG232P
Square	Standard black handle	1	2–maintained		5	XB6ECD221P
		2	2–maintained		5	XB6ECD222P
		2	3–maintained		5	XB6ECD232P
	Key *[24]*	1	2–maintained		5	XB6ECG221P
		2	2–maintained		5	XB6ECG222P
		2	3–maintained		5	XB6ECG232P
Rectangular	Standard black handle	1	2–maintained		5	XB6EDD221P
		2	2–maintained		5	XB6EDD222P
		2	3–maintained		5	XB6EDD232P
	Key *[24]*	1	2–maintained		5	XB6EDG221P
		2	2–maintained		5	XB6EDG222P
		2	3–maintained		5	XB6EDG232P

XB6EAD●●●P

XB6EAG●●●P

XB6ECD●●●P

XB6ECG●●●P

XB6EDD●●●P

XB6EDG●●●P

New!

XB6E Accessories

Table 19.60: Fast Connector Sockets

For use with	Type of Contacts CO	Sold in lots of	Catalog Number
Illuminated Push Button	1	10	ZB6YF01
	2	10	ZB6YF02
Pilot Lights	—	10	ZB6YF03
Push Button and Selector Switches	1	10	ZB6YF04
	2	10	ZB6YF05

Table 19.61: Accessories for Push Buttons

For use with	For use with	Sold in lots of	Catalog Number
Bezel Tightening tool + Bulb Extractor	Tightening and slackening the bezel changing	2	ZB6Y905
Protective Covers	Circle or square push buttons	1	ZB6YA001
	Rectangular push buttons	1	ZB6YD001
Blanking Plug	—	10	ZB6Y005

Table 19.62: Legends for Emergency Stop Mushroom Head Push Buttons

Shape	Color	Marking	Sold in lots of	Catalog Number
Circular	Yellow	EMERGENCY STOP	10	ZB6Y56

ZB6YF●●

XB6E●● + ZB6YF●●

ZB6YA●●

ZB6YD●●

ZB6Y005

[24] Key No. 132, withdrawal from all positions. 2 keys supplied with product.

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XB4BA31

XB4BA4322

XB4BP51

XB4BL42

XB4BC21

XB4 Complete Devices—Non-Illuminated

Table 19.63: Non-Illuminated Push Buttons, Momentary (screw clamp terminal connections)

Shape of Head	Type of Push	Type of Contact N.O.	Type of Contact N.C.	Marking	Cap Color	Catalog Number	Components
	Flush	1	—	—	Black	XB4BA21	(ZB4BZ101 + ZB4BA2)
					Green	XB4BA31	(ZB4BZ101 + ZB4BA3)
					Yellow	XB4BA51	(ZB4BZ101 + ZB4BA5)
					Blue	XB4BA61	(ZB4BZ101 + ZB4BA6)
		—	1	—	Red	XB4BA42	(ZB4BZ102 + ZB4BA4)
		1	1	—	Black	XB4BA25	(ZB4BZ105 + ZB4BA2)
					Green	XB4BA35	(ZB4BZ105 + ZB4BA3)
					Red	XB4BA45	(ZB4BZ105 + ZB4BA4)
					Yellow	XB4BA55	(ZB4BZ105 + ZB4BA5)
					Blue	XB4BA65	(ZB4BZ105 + ZB4BA6)
	Flush	1	—	"I" (white)	Green	XB4BA3311	(ZB4BZ101 + ZB4BA331)
	Flush	—	1	"O" (white)	Red	XB4BA4322	(ZB4BZ102 + ZB4BA432)
	Flush with clear silicone boot (color of pusher unobscured)	1	—	—	Black	XB4BP21	(ZB4BZ101 + ZB4BP2)
					Green	XB4BP31	(ZB4BZ101 + ZB4BP3)
					Yellow	XB4BP51	(ZB4BZ101 + ZB4BP5)
					Blue	XB4BP61	(ZB4BZ101 + ZB4BP6)
		—	1	—	Red	XB4BP42	(ZB4BZ102 + ZB4BP4)
	Extended	—	1	—	Red	XB4BL42	(ZB4BZ102 + ZB4BL4)
		1	1	—	Red	XB4BL45	(ZB4BZ105 + ZB4BL4)
	Mushroom head Ø 40 mm	1	—	—	Black	XB4BC21	(ZB4BZ101 + ZB4BC2)

XB4BL73415

Table 19.64: Two Button Push Buttons, Momentary (screw clamp terminal connections)

Shape of Head	Type of Push	Type of Contact N.O.	Type of Contact N.C.	Marking	Degree of Protection	Catalog Number	Components
	One flush green push* One extended red push**	1	1	*"I" (white) ***"O" (white)	IP66 IP69K	XB4BL73415	(ZB4BZ105 + ZB4BL7341)

XB4BL73731●5

Table 19.65: Two Button Push Buttons, Momentary + one white central pilot light (screw clamp terminal connections)

Shape of Head	Type of Push	Type of Contact N.O.	Type of Contact N.C.	Marking	Degree of Protection	Pilot Light Voltage	Catalog Number
Protected LED	One flush green push* One extended red push** One white central pilot light block	1	1	*"I" (white) **"O" (white)	IP66 IP69K	24 120 240	XB4BW73731B5 XB4BW73731G5 XB4BW73731M5

XB4BA731327

Table 19.66: Three Button Push Buttons, Momentary (screw clamp terminal connections)

Shape of Head	Type of Push	Type of Contact N.O.	Type of Contact N.C.	Degree of Protec-tion	Marking and Cap Color	Catalog Number
	Two flush pushes + one central projecting red push*	2	1	IP66 IP69K	White "I" on green background White "II" on green background *White "Stop" on red background	XB4BA731327
					Black "➔" on white background White "⇦" on black background *White "Stop" on red background	XB4BA711237

For Legends, refer to XB4 Legend Holders, page 19-38, XB4 Legend Inserts, page 19-39 and XB4 Legend Sheets, page 19-39.
For Caps, refer to XB4 Accessories, page 19-40.

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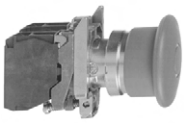
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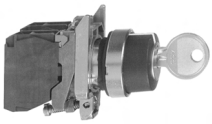
XB4BS9445

XB4BS542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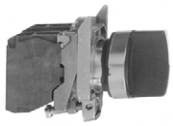
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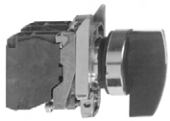
XB4BJ33

Table 19.67: Non-Illuminated Trigger Action Emergency Stop Push Buttons, Ø 40 mm, Red (screw clamp terminal connections)

Shape of Head	Type of Push	Type of Contact			Catalog Number	Components
		N.O.	N.C.			
	Trigger action push-pull *[1]*	1	1		XB4BT845	(ZB4BZ105 + ZB4BT84)
	Trigger action turn-to-release *[1]*	1	1		XB4BS8445	(ZB4BZ105 + ZB4BS844)
		1	2		XB4BS84441	(ZB4BZ141 + ZB4BS844)
	Trigger action Key release *[1]* (No. 455)	1	1		XB4BS9445	(ZB4BZ105 + ZB4BS944)
	Trigger action Push-pull *[1]*	—	1		XB4BT842	(ZB4BZ105 + ZB4BT84)
	Trigger action Turn-to-release *[1]*	—	1		XB4BS8442	(ZB4BZ102 + ZB4BS844)
	Trigger action Key release *[1]* (No. 455)	—	1		XB4BS9442	(ZB4BZ102 + ZB4BS944)

Table 19.68: Non-Illuminated Selector Switches and Key Switches (screw clamp terminal connections) *[2]*

Shape of Head	Type of Operator	Type of Contact		Number and Type of Positions		Catalog Number	Components
		N.O.	N.C.				
	Standard lever, black	1	—	2-maintained		XB4BD21	(ZB4BZ101 + ZB4BD2)
		1	1	2-maintained		XB4BD25	(ZB4BZ105 + ZB4BD2)
		2	—	3-maintained		XB4BD33	(ZB4BZ103 + ZB4BD3)
				3-momentary to center		XB4BD53	(ZB4BZ103 + ZB4BD5)
	Extended lever, black	1	—	2-maintained		XB4BJ21	(ZB4BZ101 + ZB4BJ2)
		2	—	3-maintained		XB4BJ33	(ZB4BZ103 + ZB4BJ3)
				3-momentary to center		XB4BJ53	(ZB4BZ103 + ZB4BJ5)
	Key (No. 455)	1	—	2-maintained		XB4BG21	(ZB4BZ101 + ZB4BG2)
						XB4BG41	(ZB4BZ101 + ZB4BG4)
				2-momentary to left		XB4BG61	(ZB4BZ101 + ZB4BG6)
		2	—	3-maintained		XB4BG03	(ZB4BZ103 + ZB4BG0)
						XB4BG33	(ZB4BZ103 + ZB4BG3)

NOTE: The symbol ⚷ indicates key withdrawal position(s).

For Legends, refer to XB4 Legend Holders, page 19-38, XB4 Legend Inserts, page 19-39 and XB4 Legend Sheets, page 19-39.

[1] Trigger action mushroom heads are tamper proof in that a change of contact state is not possible by teasing or floating the operator. For emergency stop applications, always use a trigger action push button (per EN/IEC 13850).

[2] For contact configurations, see Table 19.82 Sequence of Contacts on Selector Switch Bodies, page 19-30.

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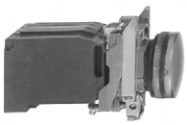
XB4BVB5

XB4BV64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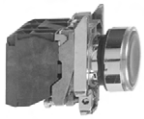
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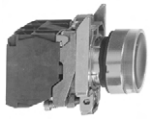
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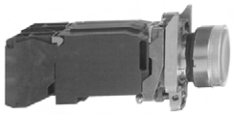
XB4BW3545

XB4 Complete Devices—Illuminated

Table 19.69: Pilot Lights with Protected LED™ (screw clamp terminal connections) [3]

Shape of Head	Supply Voltage	Color	Catalog Number	Components
	24 Vac/Vdc	White	XB4BVB1	(ZB4BVB1 + ZB4BV013)
		Green	XB4BVB3	(ZB4BVB3 + ZB4BV033)
		Red	XB4BVB4	(ZB4BVB4 + ZB4BV043)
		Yellow	XB4BVB5	(ZB4BVB5 + ZB4BV053)
		Blue	XB4BVB6	(ZB4BVB6 + ZB4BV063)
	110–120 Vac	White	XB4BVG1	(ZB4BVG1 + ZB4BV013)
		Green	XB4BVG3	(ZB4BVG3 + ZB4BV033)
		Red	XB4BVG4	(ZB4BVG4 + ZB4BV043)
		Yellow	XB4BVG5	(ZB4BVG5 + ZB4BV053)
		Blue	XB4BVG6	(ZB4BVG6 + ZB4BV063)

Table 19.70: Pilot Lights for BA9s Bulb (screw clamp terminal connections)

Shape of Head	Supply Voltage	Color	Catalog Number	Components
Direct supply, for BA9s (incandescent, LED, neon) V < 250 V, 2.4 W bulb (bulb not included)				
	< 250 Vac/Vdc	White	XB4BV61	(ZB4BV6 + ZB4BV01)
		Green	XB4BV63	(ZB4BV6 + ZB4BV03)
		Red	XB4BV64	(ZB4BV6 + ZB4BV04)
		Yellow	XB4BV65	(ZB4BV6 + ZB4BV05)
Transformer type with 1.2 VA, 6 V secondary. BA9s incandescent bulb included				
	110–120 Vac 50/60 Hz	White	XB4BV31	(ZB4BV3 + ZB4BV01)
		Green	XB4BV33	(ZB4BV3 + ZB4BV03)
		Red	XB4BV34	(ZB4BV3 + ZB4BV04)
		Yellow	XB4BV35	(ZB4BV3 + ZB4BV05)

Table 19.71: Illuminated Push Buttons, Momentary (screw clamp terminal connections) [3]

Shape of Head	Description	Type of Contact N.O.	Type of Contact N.C.	Supply Voltage	Color of Push	Catalog Number	Components
Flush							
		1	1	24 Vac/Vdc	White	XB4BW31B5	(ZB4BW0B15 + ZB4BW313)
					Green	XB4BW33B5	(ZB4BW0B35 + ZB4BW333)
					Red	XB4BW34B5	(ZB4BW0B45 + ZB4BW343)
					Yellow	XB4BW35B5	(ZB4BW0B55 + ZB4BW353)
					Blue	XB4BW36B5	(ZB4BW0B65 + ZB4BW363)
				110–120 Vac	White	XB4BW31G5	(ZB4BW0G15 + ZB4BW313)
					Green	XB4BW33G5	(ZB4BW0G35 + ZB4BW333)
					Red	XB4BW34G5	(ZB4BW0G45 + ZB4BW343)
					Yellow	XB4BW35G5	(ZB4BW0G55 + ZB4BW353)
					Blue	XB4BW36G5	(ZB4BW0G65 + ZB4BW363)
	Direct supply for BA9s 2.4 W max. bulb not included	1	1	< 250 Vac/ Vdc	White	XB4BW3165	(ZB4BW065 + ZB4BW31)
					Green	XB4BW3365	(ZB4BW065 + ZB4BW33)
					Red	XB4BW3465	(ZB4BW065 + ZB4BW34)
					Yellow	XB4BW3565	(ZB4BW065 + ZB4BW35)
	Transformer type 1.2 VA, 6 V secondary. BA9s incandescent bulb included	1	1	110–120 Vac 50/60 Hz	White	XB4BW3135	(ZB4BW035 + ZB4BW31)
					Green	XB4BW3335	(ZB4BW035 + ZB4BW33)
					Red	XB4BW3435	(ZB4BW035 + ZB4BW34)
					Yellow	XB4BW3535	(ZB4BW035 + ZB4BW35)
				230–240 Vac 50/60 Hz	White	XB4BW3145	(ZB4BW045 + ZB4BW31)
					Green	XB4BW3345	(ZB4BW045 + ZB4BW33)
					Red	XB4BW3445	(ZB4BW045 + ZB4BW34)
					Yellow	XB4BW3545	(ZB4BW045 + ZB4BW35)
Extended							
		1	1	24 Vac/Vdc	White	XB4BW11B5	(ZB4BW0B15 + ZB4BW113)
					Green	XB4BW13B5	(ZB4BW0B35 + ZB4BW133)
					Red	XB4BW14B5	(ZB4BW0B45 + ZB4BW143)
					Yellow	XB4BW15B5	(ZB4BW0B55 + ZB4BW153)
					Blue	XB4BW16B5	(ZB4BW0B65 + ZB4BW163)
				110–120 Vac	White	XB4BW11G5	(ZB4BW0G15 + ZB4BW113)
					Green	XB4BW13G5	(ZB4BW0G35 + ZB4BW133)
					Red	XB4BW14G5	(ZB4BW0G45 + ZB4BW143)
					Yellow	XB4BW15G5	(ZB4BW0G55 + ZB4BW153)
					Blue	XB4BW16G5	(ZB4BW0G65 + ZB4BW163)

For legends, refer to XB4 Legend Holders, page 19-38, XB4 Legend Inserts, page 19-39, and XB4 Legend Sheets, page 19-39.

[3] For 240 V LED, replace the last “B” or “G” in the catalog number with an “M”. For example, XB4BV**B**1 (24 V) becomes XB4BV**M**1 (240 V—AC only).

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ZB4BA0

ZB4BA4

ZB4BA38

ZB4BP18

ZB4BL1

ZB4BA36

XB4 Operators

Table 19.72: Non-Illuminated Operators, Momentary—Unmarked

Shape of Head	Type of Push	Cap Color	Catalog Number
	Flush, without color cap *[4]*	—	ZB4BA0
	Flush, with set of 6 color caps	White Black Green Red Yellow Blue	ZB4BA9
	Flush	White Black Green Red Yellow Blue Gray	ZB4BA1 ZB4BA2 ZB4BA3 ZB4BA4 ZB4BA5 ZB4BA6 ZB4BA8
	Flush with transparent cap, for insertion of legend *[5]*	White Green Red Yellow Blue	ZB4BA18 ZB4BA38 ZB4BA48 ZB4BA58 ZB4BA68
	Booted Flush (clear silicone) Cap color unobscured	White Black Green Red Yellow Blue	ZB4BPA1 ZB4BPA2 ZB4BPA3 ZB4BPA4 ZB4BPA5 ZB4BPA6
	Booted Extended (clear silicone) Cap color unobscured	White Black Green Red Yellow Blue	ZB4BP1 ZB4BP2 ZB4BP3 ZB4BP4 ZB4BP5 ZB4BP6
	Booted (colored silicone) Cap color unobscured	White Black Green Red Yellow Blue	ZB4BP1S ZB4BP2S ZB4BP3S ZB4BP4S ZB4BP5S ZB4BP6S
	Booted (clear silicone) for insertion of legend *[5]* Cap color unobscured	White Green Red Yellow Blue	ZB4BP18 ZB4BP38 ZB4BP48 ZB4BP58 ZB4BP68
	Extended	White Black Green Red Yellow Blue	ZB4BL1 ZB4BL2 ZB4BL3 ZB4BL4 ZB4BL5 ZB4BL6
	Guarded Head	White Black Green Red Yellow Blue	ZB4BA16 ZB4BA26 ZB4BA36 ZB4BA46 ZB4BA56 ZB4BA66

ZB4BA331

ZB4BA334

ZB4BL432

Table 19.73: Non-Illuminated Operators, Momentary—Premarked

Shape of Head	Type of Push	Marking Text	Marking Color	Cap Color	Catalog Number
	Flush	I	White	Green	ZB4BA331
			Black	White	ZB4BA131
		START	White	Green	ZB4BA333
			Black	White	ZB4BA133
		ON	White	Green	ZB4BA341
			Black	White	ZB4BA141
		RESET	White	Black	ZB4BA222
		JOG	White	Black	ZB4BA245
		O	White	Red	ZB4BA432
				Black	ZB4BA232
		STOP	White	Red	ZB4BA434
				Black	ZB4BA234
		OFF	White	Red	ZB4BA435
				Black	ZB4BA235
		↑ *[6]*	Black	White	ZB4BA334
			White	Black	ZB4BA335
	Extended	O	White	Red	ZB4BL432
				Black	ZB4BL232
		STOP	White	Red	ZB4BL434
				Black	ZB4BL234
		OFF	White	Red	ZB4BL435
				Black	ZB4BL235

For Legends, refer to XB4 Legend Holders, page 19-38, XB4 Legend Inserts, page 19-39, and XB4 Legend Sheets, page 19-39.

[4] Color cap to be ordered separately, see XB4 Accessories, page 19-40.
[5] For legend ordering information, see XB4 Legend Sheets, page 19-39.
[6] Cap supplied not clipped-in, allowing orientation of arrow in any one of 4 directions:

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ZB4BH02

Table 19.74: Non-Illuminated Push-on/Push-off Operators

Shape of Head	Type of Push	Color of Push	Catalog Number
	Flush	White	ZB4BH01
		Black	ZB4BH02
		Green	ZB4BH03
		Red	ZB4BH04
		Yellow	ZB4BH05
		Blue	ZB4BH06
	Extended	White	ZB4BH1
		Black	ZB4BH2
		Green	ZB4BH3
		Red	ZB4BH4
		Yellow	ZB4BH5
		Blue	ZB4BH6

ZB4BA73133

ZB4BA71124

Table 19.75: Three Head Operators, Momentary

Shape of Head	Description	Marking	Cap Color	Degree of Protection	Catalog Number
Premarked					
Two flush + one central projecting red push marked "Stop"	Two flush	"I" (white) "II" (white)	Green Green	IP66 IP69K	ZB4BA73132
		"←" (white) "→" (white)	Green Green		ZB4BA73133
		"↑" (white) "↓" (white)	Green Green		ZB4BA73134
		"+" (white) "-" (white)	Green Green		ZB4BA73135
		"+" (black) "-" (black)	White White		ZB4BA71115
		"←" (black) "→" (white)	White Black		ZB4BA71123
		"↑" (black) "↓" (white)	White Black		ZB4BA71124
		"↑" (white) "↓" (white)	Black Black		ZB4BA72124
Without caps					
	Two flush without caps	—	—	IP66 IP69K	ZB4BA791

ZB4BA7121

ZB4BL7341

Table 19.76: Two Head Operators, Momentary

Shape of Head	Description	Marking	Cap Color	Degree of Protection	Catalog Number
No Marking					
	Two flush	—	Green Red	IP66 IP69K	ZB4BA7340
		—	White Black		ZB4BA7120
	One flush One extended	—	Green Red		ZB4BL7340
Premarked					
	Two flush	"I" (white) "O" (white)	Green Red	IP66 IP69K	ZB4BA7341
		"I" (black) "O" (white)	White Black		ZB4BA7121
	One flush One extended	"I" (white) "O" (white)	Green Red		ZB4BL7341
Without caps					
	Two flush without caps	—	—	IP66 IP69K	ZB4BA79

For Legends, refer to XB4 Legend Holders, page 19-38, XB4 Legend Inserts, page 19-39, and XB4 Legend Sheets, page 19-39.

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ZB4BC24

ZB4BC2

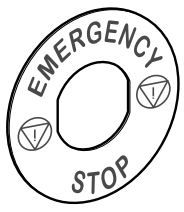
ZB4BR2

ZB4BS834

ZB4BT4

ZB4BS64

ZB4BS74



ZBY9330

ZBY9320

XB4 Operators and Emergency Stop Operators

Table 19.77: Mushroom Heads, Momentary

Shape of Head	Diameter of Head	Color of Head	Catalog Number
	30 mm	Black	ZB4BC24
		Green	ZB4BC34
		Red	ZB4BC44
		Yellow	ZB4BC54
		Blue	ZB4BC64
	40 mm	Black	ZB4BC2
		Green	ZB4BC3
		Red	ZB4BC4
		Yellow	ZB4BC5
		Blue	ZB4BC6
	60 mm	Black	ZB4BR2
		Green	ZB4BR3
		Red	ZB4BR4
		Yellow	ZB4BR5
		Blue	ZB4BR6

Table 19.78: Mushroom Heads for Maintained Push Buttons

Shape of Head	Type of Push	Diameter of Head	Color	Catalog Number
For use in Emergency Stop applications				
	Trigger action Push-pull *[7]*	40 mm	Red	ZB4BT84
		60 mm	Red	ZB4BX84
	Trigger action Turn-to-release *[7]*	30 mm	Red	ZB4BS834
		40 mm	Red	ZB4BS844
			Red marked “EMO”	ZB4BS84430
		60 mm	Red	ZB4BS864
	Trigger action Key release (No. 455) *[7]*	30 mm	Red	ZB4BS934
		40 mm	Red	ZB4BS944 *[8]*
		60 mm	Red	ZB4BS964
For use in non-Emergency Stop applications				
	Push-pull	40 mm	Black	ZB4BT2
		60 mm	Black	ZB4BX2
	Turn-to-release	30 mm	Black	ZB4BS42
		40 mm	Black	ZB4BS52
			Yellow	ZB4BS55
			Yellow marked “Robot Stop”	ZB4BS5550
		60 mm	Black	ZB4BS62
	Key release (No. 455)	30 mm	Black	ZB4BS72
		40 mm	Black	ZB4BS12
		60 mm	Black	ZB4BS22

Table 19.79: Circular Legends for Emergency Stop Mushroom Heads (yellow background)

Diameter	Text	Catalog Number
60 mm	Blank	ZBY9101
	EMERGENCY STOP	ZBY9330
90 mm	Blank	ZBY8101
	EMERGENCY STOP	ZBY8330
60 mm Bezeled	Blank	ZBY9121
	Emergency Stop	ZBY9320
	Prada de Emergencia	ZBY9420
	Not Halt	ZBY9220

For Legends, refer to XB4 Legend Holders, page 19-38,XB4 Legend Inserts, page 19-39, andXB4 Legend Sheets, page 19-39.

[7] Trigger action mushroom heads are tamper proof in that a change of contact state is not possible by teasing or floating the operator. For emergency stop applications, always use a trigger action push button (per EN/IEC 13850).

[8] Other key numbers:
—key no. 421E: add the suffix 12 to the catalog number.
—key no. 458A: add the suffix 10 to the catalog number.
—key no. 520E: add the suffix 14 to the catalog number.
—key no. 3131A: add the suffix 20 to the catalog number.
Example: The catalog number for a Ø 40 mm red mushroom head for a trigger action, maintained push button, with release by key no. 421E becomes: ZB5AS94412.

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ZB4BD4
Standard Lever

ZB4BJ3
Extended Lever

XB4 Selector Switches

Table 19.80: Non-Illuminated Selector Switches [9]

Color	Number and Type of Positions		Standard Lever [10]	Extended Lever
			Catalog Number	
Black	2-maintained		ZB4BD2	ZB4BJ2
Black	2-momentary from right to left		ZB4BD4	ZB4BJ4
Black	3-maintained		ZB4BD3	ZB4BJ3
Black	3-momentary to center		ZB4BD5	ZB4BJ5
Black	3-momentary from left to center		ZB4BD7	ZB4BJ7
Black	3-momentary from right to center		ZB4BD8	ZB4BJ8

ZB4BG8

Table 19.81: Non-Illuminated Key Switches [9]

Type of Operator	Number and Type of Positions		Catalog Number
	2-maintained		ZB4BG2
			ZB4BG02
			ZB4BG4
	2-momentary from right to left		ZB4BG6
	3-maintained		ZB4BG0
			ZB4BG3
			ZB4BG03
			ZB4BG04
			ZB4BG5
			ZB4BG9
			ZB4BG09
	3-momentary from left to center		ZB4BG1
			ZB4BG01
	3-momentary to center		ZB4BG7
	3-momentary from right to center		ZB4BG8
			ZB4BG05
			ZB4BG08

Key (No. 455)

NOTE: The symbol ⚷ indicates key withdrawal position(s).
Other key numbers:
—key no. 421E: add the suffix 12 to the catalog number.
—key no. 458A: add the suffix 10 to the catalog number.
—key no. 520E: add the suffix 14 to the catalog number.
—key no. 3131A: add the suffix 20 to the catalog number.
—key no. 8D1: add the suffix D to the catalog number.

Example: The catalog number for a head with key no. 421E for a 2 position maintained, lockable selector switch, with key withdrawal from the left-hand position, becomes: ZB5AG212

Table 19.82: Sequence of Contacts on Selector Switch Bodies

Unit Type		Selector Switches														
		2-position						3-position								
Note: L=Left, C=Center, R=Right, O=Open, X=Closed		315°		45°				315°			0°			45°		
Operator Plunger Position	Up															
	Down															
Contact Block Location		L	C	R	L	C	R	L	C	R	L	C	R	L	C	R
Contacts	N.O.	O	O	O	X	X	X	X	X	O	O	O	O	O	X	X
	N.C.	X	X	X	O	O	O	O	O	X	X	X	X	X	O	O

For Legends, refer to XB4 Legend Holders, page 19-38, XB4 Legend Inserts, page 19-39, and XB4 Legend Sheets, page 19-39.

For Selector Switch Sequence, refer to Table 19.96 Sequence of Contacts on Illuminated Selector Switch Bodies, page 19-34.

[9] For contact configurations, see Table 19.82 Sequence of Contacts on Selector Switch Bodies, page 19-30.
[10] For colored lever, add the following code to the end of part number: 01–white, 03–green, 04–red, 05–yellow, 06–blue (Example: ZB4BD**04**).

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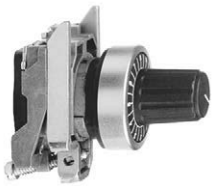
ZB4BD922

XD4PA12

ZB4BD28

XB4BA8●1

XB4 Specialty Operators

Table 19.83: Potentiometer Operator (with Mounting Collar)

Shape of Head	Description	Application	Catalog Number
	For potentiometer with shaft length 1.73 to 1.97 in. (45 to 50 mm) (potentiometer not included)	For shaft Ø 1/4 in. (6.35 mm)	ZB4BD922
		For shaft Ø 0.24 in. (6 mm)	ZB4BD912

Table 19.84: Joysticks (54 mm, Extended Operating Shaft) *[11]*

Description	Contact Operation	Action	Catalog Number
2 direction	1 step 1 N.O. contact per direction	Maintained	XD4PA12
		Momentary	XD4PA22
4 direction	1 step 1 N.O. contact per direction	Maintained	XD4PA14
		Momentary	XD4PA24

Table 19.85: Legends for Joysticks

Description	For use with	Color	Catalog Number
Legends 30 x 48 mm for customer engraving	2 direction	Black one side Red reverse	ZBG2201
		White one side Yellow reverse	ZBG2401
Legends 48 x 48 mm for customer engraving	4 direction	Black one side Red reverse	ZBG4201
		White one side Yellow reverse	ZBG4401

Table 19.86: Two Position Toggle Switch

Shape of Head	Color	Type of Positions	Catalog Number
	Black	Maintained	ZB4BD28
	Black	Momentary	ZB4BD48

Table 19.87: Reset Operators, Flush, Adjustable Shaft

Shape of Head	Travel		Actuation Distance		Color	Catalog Number
	in.	mm	in.	mm		
	0.39	10	0.24–0.63	6–16	Black	XB4BA821
					Red	XB4BA841
					Blue	XB4BA861
			0.63–1.02	16–26	Black	XB4BA822
					Red	XB4BA842
					Blue	XB4BA862
	0.55	14	1.18–5.12	30–130	Black	XB4BA921
					Red	XB4BA941
					Blue	XB4BA961
			5.12–10.12	130–257	Black	XB4BA922
					Red	XB4BA942
					Blue	XB4BA962

For Legends, refer to XB4 Legend Holders, page 19-38, XB4 Legend Inserts, page 19-39, and XB4 Legend Sheets, page 19-39.

[11] Do not use standard contact blocks ZBE10• (single) or ZBE20• (double).

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ZB4BV063

ZB4BV04

ZB4BV043S

ZB4BV6

ZB4BV•

ZB4BV••

XB4 Pilot Lights

Table 19.88: Pilot Light Heads

Shape of Head	For Use with Body Comprising Light Module Type	Color of Lens	Catalog Number
	Protected LED™ only	White Green Red Yellow Blue	ZB4BV013 ZB4BV033 ZB4BV043 ZB4BV053 ZB4BV063
	Protected LED only Fresnel (jeweled) lens *[12]*	White Green Red Amber Blue	ZB4BV013S ZB4BV033S ZB4BV043S ZB4BV053S ZB4BV063S
	For BA9s incandescent bulb, neon or LED only *[13]*	White Green Red Yellow Blue Clear	ZB4BV01 ZB4BV03 ZB4BV04 ZB4BV05 ZB4BV06 ZB4BV07
	For BA9s incandescent bulb, neon or LED Fresnel (jeweled) lens *[13]*	White Green Red Amber Blue Clear	ZB4BV01S ZB4BV03S ZB4BV04S ZB4BV05S ZB4BV06S ZB4BV07S

Table 19.89: Complete Bodies (Mounting Collar + Light Module for BA9s Incandescent Bulb, Neon or LED)

Description	Light Source	Supply Voltage (V)	Catalog Number
Screw clamp terminal connections			
Direct supply	BA9s bulb 2.4 W max. Not included *[13]*	<250	ZB4BV6
Direct supply	BA9s incandescent bulb included	24 v 2 Watt	ZB4BV624
Direct supply	BA9s incandescent bulb included	120 v 2.4 Watt	ZB4BV6120
Transformer type 1.2 VA, 6 V secondary	BA9s incandescent bulb included	110–120 Vac 50/60 Hz	ZB4BV3
		230–240 Vac 50/60 Hz	ZB4BV4
		400–50 Hz	ZB4BV5
		440–480 Vac 60 Hz	ZB4BV8
		550–600 Vac 60 Hz	ZB4BV9

Table 19.90: Complete Bodies (Mounting Collar + Light Module with Protected LED™) *[14]*

Light Source	Supply Voltage	Color of Light Source	Catalog Number
Screw clamp terminal connections *[15]*			
Protected LED™	12 Vac/Vdc	White Green Red Yellow Blue	ZB4BVJ1 ZB4BVJ3 ZB4BVJ4 ZB4BVJ5 ZB4BVJ6
	24 Vac/Vdc	White Green Red Yellow Blue	ZB4BVB1 ZB4BVB3 ZB4BVB4 ZB4BVB5 ZB4BVB6
	24–120 Vac/Vdc	White Green Red Yellow Blue	ZB4BVBG1 ZB4BVBG3 ZB4BVBG4 ZB4BVBG5 ZB4BVBG6
	110–120 Vac	White Green Red Yellow Blue	ZB4BVG1 ZB4BVG3 ZB4BVG4 ZB4BVG5 ZB4BVG6
Flashing Protected LED™	24 Vac/Vdc	White Green Red Yellow Blue	ZB4BV18B1 ZB4BV18B3 ZB4BV18B4 ZB4BV18B5 ZB4BV18B6
	110–120 Vac	White Green Red Yellow Blue	ZB4BV18G1 ZB4BV18G3 ZB4BV18G4 ZB4BV18G5 ZB4BV18G6

For Legends, refer to XB4 Legend Holders, page 19-38, XB4 Legend Inserts, page 19-39 and XB4 Legend Sheets, page 19-39.

[12] For use in bright ambient conditions, for example, in sunlight.
[13] Order bulb separately; see Table 19.118 BA9s Bulbs and Associated Accessories, page 19-41. For BA9 LED, see Table 19.403 LED, BA9s Base, page 19-129.
[14] For 240 V LED, replace the last "B" or "G" in the catalog number with an "M". For example, ZB4BV**B**1 (24 V) becomes ZB4BV**M**1 (240 V).
[15] For Quick-Connect version, add "3" to the end of the catalog number Example: ZB4BVJ13 (Quick-Connect size 1 x 1/40" or 2 x 0.110").

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ZB4BW333

ZB4BW563

ZB4BW113

ZB4BW33

ZB4BW14

ZB4BW643

ZB4BH033

ZB4BH63

XB4 Illuminated Operators

Table 19.91: Heads for Momentary Illuminated Push Buttons

Shape of Head	Type of Push	Color	Catalog Number
Only use with Protected LED™ light modules			
	Flush	White	ZB4BW313
		Green	ZB4BW333
		Red	ZB4BW343
		Yellow	ZB4BW353
		Blue	ZB4BW363
	Flush with clear silicone boot	White	ZB4BW513
		Green	ZB4BW533
		Red	ZB4BW543
		Yellow	ZB4BW553
		Blue	ZB4BW563
	Flush for insertion of legend	White	ZB4BA18
		Green	ZB4BA38
		Red	ZB4BA48
		Yellow	ZB4BA58
		Blue	ZB4BA68
	Extended	White	ZB4BW113
		Green	ZB4BW133
		Red	ZB4BW143
		Yellow	ZB4BW153
		Blue	ZB4BW163
	Mushroom (40 mm)	Clear	ZB4BW413
		Green	ZB4BW433
		Red	ZB4BW443
		Yellow	ZB4BW453
		Blue	ZB4BW463
Only use with light modules for a BA9s incandescent bulb, neon or LED			
	Flush	White	ZB4BW31
		Green	ZB4BW33
		Red	ZB4BW34
		Yellow	ZB4BW35
		Blue	ZB4BW36
		Clear	ZB4BW37
	Extended	White	ZB4BW11
		Green	ZB4BW13
		Red	ZB4BW14
		Yellow	ZB4BW15
		Blue	ZB4BW16
		Clear	ZB4BW17

Table 19.92: Heads for Maintained Illuminated Push Buttons

Shape of Head	Type of Push	Color of Lens	Catalog Number
Only use with Protected LED light modules			
	Push/Pull Mushroom (40 mm)	Clear	ZB4BW613
		Green	ZB4BW633
		Red	ZB4BW643
		Yellow	ZB4BW653
		Blue	ZB4BW663

Table 19.93: Illuminated Push-On/Push-Off Operators

Shape of Head	Type of Push	Color of Lens	Catalog Number
Only use with Protected LED light modules			
	Flush	White	ZB4BH013
		Green	ZB4BH033
		Red	ZB4BH043
		Yellow	ZB4BH053
		Blue	ZB4BH063
	Extended	White	ZB4BH13
		Green	ZB4BH33
		Red	ZB4BH43
		Yellow	ZB4BH53
		Blue	ZB4BH63

For Legends, refer to XB4 Legend Holders, page 19-38, XB4 Legend Inserts, page 19-39 and XB4 Legend Sheets, page 19-39.

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ZB4BW7A3741

ZB4BW7A1721

Table 19.94: Two Button with Clear Pilot Light, Momentary

Shape of Head	Description	Marking	Cap Color	Degree of Protection	Catalog Number
No Marking					
Protected LED	Two flush	—	Green Red	IP66 IP69K	ZB4BW7A3740
		—	White Black		ZB4BW7A1720
Protected LED	One flush One extended	—	Green Red		ZB4BW7L3740
Premarked					
Protected LED	Two flush	"I" (white) "O" (white)	Green Red	IP66 IP69K	ZB4BW7A3741
		"I" (black) "O" (white)	White Black		ZB4BW7A1721
Protected LED	One flush One extended	"I" (white) "O" (white)	Green Red		ZB4BW7L3741
Protected LED	Two flush	"⇑" (black) "⇓" (white)	White Black		ZB4BW7A1724
Protected LED	Two flush	"+" (black) "-" (white)	White Black		ZB4BW7A1715
Without caps					
	Two flush without caps	—	—	IP66 IP69K	ZB4BW7A9

ZB4BK1343

Table 19.95: Illuminated Selector Switches, Standard Lever

Shape of Head	Number and Type of Positions		Catalog Number [16]
Only use with Protected LED light modules			
	2-maintained		ZB4BK12●3
	2-momentary from right to left		ZB4BK14●3
	3-maintained		ZB4BK13●3
	3-momentary to center		ZB4BK15●3
	3-momentary from right to center		ZB4BK18●3
	3-momentary from left to center		ZB4BK17●3

Table 19.96: Sequence of Contacts on Illuminated Selector Switch Bodies

Unit Type		Selector Switches									
		2-position				3-position					
		315°		45°		315°		0°		45°	
Operator Plunger Position	Up										
	Down										
Contact Block Location		L	R	L	R	L	R	L	R	L	R
Contacts	N.O.	O	O	X	X	X	O	O	O	O	X
	N.C.	X	X	O	O	O	X	X	X	X	O

Note: L=Left, R=Right, O=Open, X=Closed

2 Position Selector Switch		
		Contact block guide
O	X	1 N.O. (left or right)
X	O	1 N.C. (left or right)
O	X	1 N.O. and 1 N.C.
X	O	

3 Position Selector Switch			
			Contact block guide
O	O	X	1 N.O. (left)
X	O	X	2 N.O. wired in **parallel** (side by side)
X	O	O	1 N.O. (right)
O	X	X	1 N.C. (right)
X	X	O	1 N.C. (left)
O	X	O	2 N.C. wired in **series** (side by side)

For Legends, refer to XB4 Legend Holders, page 19-38, XB4 Legend Inserts, page 19-39, and XB4 Legend Sheets, page 19-39.
For Caps, refer to XB4 Accessories, page 19-40.

[16] ● Designate color as follows: 1—white, 3—green, 4—red, 5—yellow, 6—blue.

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ZB4BZ101

ZB4BW0••3

ZB4BW06•

ZB4BW0•5

XB4 Electrical Components

Table 19.97: Contact Blocks (Mounting Collar with Contact Blocks)

Description	Type of Contact		Catalog Number
	N.O.	N.C.	
Screw clamp terminal connections	1	—	ZB4BZ101
	—	1	ZB4BZ102
	2	—	ZB4BZ103
	—	2	ZB4BZ104
	1	1	ZB4BZ105
	1	2	ZB4BZ141

For Quick-Connect version add “3” to the end of the catalog number Example: ZB4BZ1013 (Quick-Connect size 1 x 0.250" or 2 x 0.110").
For Ring Tongue compatible blocks add “9” to the end of the catalog number (Example: ZB4BZ1029).
Electrical components with connection by printed circuit board pins are available. Refer to Catalog 9001CT0001.
Electrical components with connection by plug-in connector are available. Refer to Catalog 9001CT0001.

Table 19.98: Complete Bodies (Mounting Collar + Single Contact Block + Light Module with Protected LED™)

Light Source	Type of Contact *[17]*		Color	Supply Voltage *[18]*	
	N.O.	N.C.		24 Vac/Vdc	110–120 Vac
				Catalog Number	
Screw clamp terminal connections					
Protected LED	1	—	White	ZB4BW0B11	ZB4BW0G11
			Green	ZB4BW0B31	ZB4BW0G31
			Red	ZB4BW0B41	ZB4BW0G41
			Yellow	ZB4BW0B51	ZB4BW0G51
			Blue	ZB4BW0B61	ZB4BW0G61
	—	1	White	ZB4BW0B12	ZB4BW0G12
			Green	ZB4BW0B32	ZB4BW0G32
			Red	ZB4BW0B42	ZB4BW0G42
			Yellow	ZB4BW0B52	ZB4BW0G52
			Blue	ZB4BW0B62	ZB4BW0G62
	2	—	White	ZB4BW0B13	ZB4BW0G13
			Green	ZB4BW0B33	ZB4BW0G33
			Red	ZB4BW0B43	ZB4BW0G43
			Yellow	ZB4BW0B53	ZB4BW0G53
			Blue	ZB4BW0B63	ZB4BW0G63
	1	1	White	ZB4BW0B15	ZB4BW0G15
			Green	ZB4BW0B35	ZB4BW0G35
			Red	ZB4BW0B45	ZB4BW0G45
			Yellow	ZB4BW0B55	ZB4BW0G55
			Blue	ZB4BW0B65	ZB4BW0G65

Table 19.99: Mounting Collar, Contact Block and Light Module (with screw clamp terminal connections)

Supply	Light Source	Supply Voltage	Type of Contact *[19]*		Color of Light Source	Catalog Number
			N.O.	N.C.		
Screw clamp terminal connections						
Direct supply	BA9s 2.4 W max. bulb Not included *[20]*	< 250 Vac/Vdc	1	—	—	ZB4BW061
			—	1	—	ZB4BW062
			2	—	—	ZB4BW063
			1	1	—	ZB4BW065
Transformer type 1.2 VA, 6 V secondary	BA9s incandescent bulb included	110–120 Vac 50/60 Hz	1	—	—	ZB4BW031
			1	1	—	ZB4BW035
		230–240 Vac 50/60 Hz	1	—	—	ZB4BW041
			1	1	—	ZB4BW045
		440–480 Vac 60 Hz	1	—	—	ZB4BW081
			1	1	—	ZB4BW085

[17] Can be fitted with additional contact blocks, seeTable 19.101 Add-On Contact Block (with screw clamp terminal connections) , page 19-36.
[18] For 240V LED, replace the “B” or “G” with “M”. (Example: change “ZB4BW0**B**11 (24V) to ZB4BW0**M**11 (240V))
[19] Can be fitted with additional contact blocks, seeTable 19.101 Add-On Contact Block (with screw clamp terminal connections) , page 19-36.
[20] Order bulb separately, see BA9s Bulbs and Associated Accessories.

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ZB4BZ009

ZBE101

ZBE203

ZBVB•

Table 19.100: Body/Mounting Collar

For use with	Catalog Number
Electrical block (contact or light module)	ZB4BZ009

Table 19.101: Add-On Contact Block (with screw clamp terminal connections) *[21] [22]*

Description		Type of Contact N.O.	Type of Contact N.C.	Catalog Number
Standard **single** contact blocks *[23][24]*		1	—	ZBE101
		—	1	ZBE102
Standard **double** contact blocks *[23][24]*		2	—	ZBE203
		—	2	ZBE204
		1	1	ZBE205
Special contact blocks for low power switching *[25]*		1	—	ZBE1016
		—	1	ZBE1026
Low-power switching	Dusty environment *[25]* (IP5X, 50 µm dust)	1	—	ZBE1016P
		—	1	ZBE1026P
Staggered contacts	Early make N.O.	1	–	ZBE201
	Late break N.C.	—	1	ZBE202
	Overlapping N.O.+N.C.	1	1	ZB4BZ106
	Staggered N.O.+N.C.	—	2	ZB4BZ107

Table 19.102: Light Modules (with screw clamp terminal connections) *[21][22]*

Description	Supply Voltage	Color of Light Source	Catalog Number
Protected LED	12 Vac/Vdc	White	ZBVJ1
		Green	ZBVJ3
		Red	ZBVJ4
		Yellow	ZBVJ5
		Blue	ZBVJ6
	24 Vac/Vdc	White	ZBVB1
		Green	ZBVB3
		Red	ZBVB4
		Yellow	ZBVB5
		Blue	ZBVB6
	110–120 Vac	White	ZBVG1
		Green	ZBVG3
		Red	ZBVG4
		Yellow	ZBVG5
		Blue	ZBVG6
	24–120 Vac/Vdc	White	ZBVBG1
		Green	ZBVBG3
		Red	ZBVBG4
		Yellow	ZBVBG5
		Blue	ZBVBG6
	230–240 Vac	White	ZBVM1
		Green	ZBVM3
		Red	ZBVM4
		Yellow	ZBVM5
		Blue	ZBVM6
Direct supply for BA9s 2.4 W max. bulb not included See Table 19.118 BA9s Bulbs and Associated Accessories, page 19-41	< 250 Vac/Vdc	—	ZBV6

[21] Electrical components with connection by printed circuit board pins are available. Refer to Catalog 9001CT0001 for more details.
[22] Electrical components with connection by plug-in connector are available. Refer to Catalog9001CT0001for more details.
[23] For Quick-Connect version add “3” to the end of the catalog number Example: ZBE1013 (Quick-Connect size 1 x 0.250" or 2 x 0.110").
[24] For Ring Tongue compatible blocks add “9” to the end of the catalog number (Example: ZBE1029).
[25] Cannot stack additional contact blocks onto these blocks.

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ZB4BZ009

ZBE1015

ZB4BZ1015

Table 19.103: Body/Mounting Collar

For use with	Catalog Number
Contact block or light module	ZB4BZ009

Table 19.104: Contact Blocks *[26]*

Spring Terminal Connections, Contacts for Standard Applications				
Description	Type of contact	N.O.	N.C.	Catalog Number
Contact blocks	Single	1	–	ZBE1015
		–	1	ZBE1025
	Single with body/mounting collar	1	–	ZB4BZ1015
		–	1	ZB4BZ1025
		2	–	ZB4BZ1035
		–	2	ZB4BZ1045
		1	1	ZB4BZ1055

Table 19.105: Light Modules *[26]*

Spring Terminal Connections			
Description	Supply voltage	Color of light source	Catalog Number
Integral LED (to combine with heads for integral LED) Protected LED	12 Vac/Vdc	White	ZBVJ15
		Green	ZBVJ35
		Red	ZBVJ45
		Orange	ZBVJ55
		Blue	ZBVJ65
	24 Vac/Vdc	White	ZBVB15
		Green	ZBVB35
		Red	ZBVB45
		Orange	ZBVB55
		Blue	ZBVB65
	110–120 Vac	White	ZBVG15
		Green	ZBVG35
		Red	ZBVG45
		Orange	ZBVG55
		Blue	ZBVG65
	230–240 Vac	White	ZBVM15
		Green	ZBVM35
		Red	ZBVM45
		Orange	ZBVM55
		Blue	ZBVM65

[26] Additional blocks **cannot** be attached to the back of these contact blocks or light modules. However, spring terminal contact blocks can be mounted behind screw terminal contact blocks.

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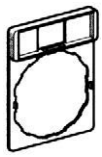
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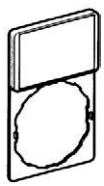
ZBY•101

ZBY2303

ZBZ33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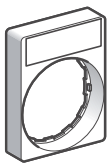
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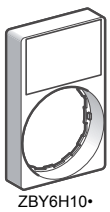
ZBZ35


ZBY6H10•

XB4 Legend Holders

Table 19.106: Standard (30 x 40 mm) Legend Holders for 8 x 27 mm Legends

Description	Legend		Catalog Number
	Color	Text	
Without legend *[27]*	—	—	ZBZ32
With blank legend (for engraving)	Black or red background	—	ZBY2101
	White or yellow background	—	ZBY4101
Custom Legend (Specify Engraving) 2 lines of 11 characters (including spaces) maximum per line	Black background	White	ZBY2002
	Red background	White	ZBY2004
	White background	Black	ZBY4001
	Yellow background	Black	ZBY4005
With legend marked with international language	Black or red background *[28]*	O (black background)	ZBY2146
		O (red background)	ZBY2931
		I	ZBY2147
		II	ZBY2148
		O-I	ZBY2178
		I-II	ZBY2179
		I-O-II	ZBY2186
With legend marked with English language	Black or red background *[28]*	AUTO	ZBY2115
		AUTO-HAND	ZBY2364
		AUTO-O-HAND	ZBY2385
		CLOSE	ZBY2314
		DOWN	ZBY2308
		EMERGENCY STOP	ZBY2330
		FAST	ZBY2328
		FORWARD	ZBY2305
		FOR-REV	ZBY2371
		HAND	ZBY2316
		HAND-OFF-AUTO	ZBY2387
		INCH	ZBY2321
		JOG	ZBY2382
		LEFT	ZBY2310
		OFF	ZBY2312
		OFF-ON	ZBY2367
		ON	ZBY2311
		OPEN	ZBY2313
		POWER ON	ZBY2326
		RESET (red background)	ZBY2323
		RESET (black background)	ZBY2322
		REVERSE	ZBY2306
		RIGHT	ZBY2309
		RUN	ZBY2334
		SLOW	ZBY2327
		START	ZBY2303
		STOP	ZBY2304
		STOP-START	ZBY2366
		UP	ZBY2307

Table 19.107: Large (30 x 50 mm) Legend Holders for 18 x 27 mm Legends

Description *[29]*	Color	Catalog Number
Without legend insert	—	ZBZ33
With blank legend insert	Black or red background	ZBY6101
	White or yellow background	ZBY6102

Table 19.108: 30 x 40 mm legend holder (flush mounting with bezel) for 8 x 27 mm legends

Description *[29]*	Color	Catalog Number
Without legend	—	ZBZ34
With blank legend	Black or red background	ZBY2H101
	White or yellow background	ZBY4H101

Table 19.109: 30 x 50 mm legend holder (flush mounting with bezel) for 18 x 27 mm legends

Description *[29]*	Color	Catalog Number
Without legend	—	ZBZ35
With blank legend	Black or red background	ZBY6H101
	White or yellow background	ZBY6H102

[27] For marked legends, see, Table 19.110 Marked Legends for 30 x 40 mm legend holders, page 19-39.
[28] Start functions: white letters on black background. Stop functions: white letters on red background (unless otherwise specified above).
[29] For custom Legends, see Table 19.111 Legends for Customer Engraving (inserts only), page 19-39 and Table 19.112 Legends for Factory Engraving (inserts only), page 19-39.

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ZBY02178

ZBY02303

XB4 Legend Inserts

Table 19.110: Marked Legends for 8 x 27 mm (for 30 x 40 mm legend holders ZBZ32)

Color	Marking	Text	Catalog Number
Black or red background *[30]*	International	O (black background)	ZBY02146
		O (red background)	ZBY02931
		I	ZBY02147
		II	ZBY02148
		O-I	ZBY02178
		I-II	ZBY02179
		I-O-II	ZBY02186
	English	AUTO	ZBY02115
		AUTO-HAND	ZBY02364
		AUTO-O-HAND	ZBY02385
		CLOSE	ZBY02314
		DOWN	ZBY02308
		EMERGENCY STOP	ZBY02330
		FAST	ZBY02328
		FORWARD	ZBY02305
		FOR-REV	ZBY02371
		HAND	ZBY02316
		HAND-OFF-AUTO	ZBY02387
		INCH	ZBY02321
		JOG	ZBY02382
		LEFT	ZBY02310
		OFF	ZBY02312
		OFF-ON	ZBY02367
		ON	ZBY02311
		OPEN	ZBY02313
		POWER ON	ZBY02326
		RESET (red background)	ZBY02323
		RESET (black background)	ZBY02322
		REVERSE	ZBY02306
		RIGHT	ZBY02309
		RUN	ZBY02334
		SLOW	ZBY02327
		START	ZBY02303
		STOP	ZBY02304
		STOP-START	ZBY02366
		UP	ZBY02307

Table 19.111: Legends for Customer Engraving (inserts only)

Description	For use with	Color	Text Color	Catalog Number
8 x 27 mm	30 x 40 mm legend holders	Black or red background	White	ZBY0101
		White or yellow background	Black	ZBY0102
18 x 27 mm	30 x 50 mm legend holders	Black or red background	White	ZBY5101
		White or yellow background	Black	ZBY5102

Table 19.112: Legends for Factory Engraving (inserts only)

Description	For use with	Color	Text Color	Catalog Number
8 x 27 mm Custom Legend/Insert Only (Specify Engraving) 2 lines of 11 characters (including spaces) maximum per line (**Example:** ZBY01002 marked "Robot")	30 x 40 mm legend holders	Black background	White	ZBY01002
		Red background	White	ZBY01004
		White background	Black	ZBY01001
		Yellow background	Black	ZBY01005
18 x 27 mm Custom Legend/Insert Only (Specify Engraving) 3 lines of 11 characters (including spaces) maximum per line (**Example:** ZBY05002 marked "Robot")	30 x 50 mm legend holders	Black background	White	ZBY05002
		Red background	White	ZBY05004
		White background	Black	ZBY05001
		Yellow background	Black	ZBY05005

XB4 Legend Sheets

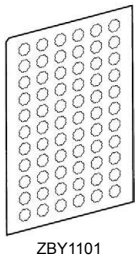
ZBY1101

Table 19.113: Sheets of Legends for Push Buttons, Switches, and Pilot Lights

Description	Marking	Text	Catalog Number
Sheets of 66 circular peel-off transparent self-adhesive legends	Blank		ZBY1101
	International	O	ZBY1146
		I	ZBY1147
		II	ZBY1148
		III	ZBY1149
		STOP	ZBY1304
		→	ZBY1912
	English	HAND	ZBY1316
		OFF	ZBY1312
		ON	ZBY1311
		START	ZBY1303
SiS Label Software	Legend Design Software: English, French, German, Spanish, Italian		XBY2U

[30] Start functions: white letters on black background. Stop functions: white letters on red background (unless otherwise specified above).

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ZBA●

ZBL●

ZBA●33

XB4 Accessories

Table 19.114: Push Button Caps—Unmarked

For use with	Type of Push	Color	Catalog Number
ZB4BA0 push button heads	Flush	White	ZBA1
		Black	ZBA2
		Green	ZBA3
		Red	ZBA4
		Yellow	ZBA5
		Blue	ZBA6
		6 colors *[31]*	ZBA9
	Extended	White	ZBL1
		Black	ZBL2
		Green	ZBL3
		Red	ZBL4
		Yellow	ZBL5
		Blue	ZBL6
		6 colors *[31]*	ZBL9

Table 19.115: Push Button Caps—Marked

For use with	Type of Push	Marking		Cap Color	Catalog Number
		Text *[32]*	Color		
ZB4BA0 push button heads	Flush	I *[33]*	White	Green	ZBA331
			Black	White	ZBA131
		START *[33]*	White	Green	ZBA333
			Black	White	ZBA133
		ON	White	Green	ZBA341
			Black	White	ZBA141
		UP *[33]*	Black	White	ZBA343
		DOWN *[33]*	White	Black	ZBA344
		⏉ *[33]*	White	Green	ZBA345
		⏉ *[33]*	White	Black	ZBA245
		◇	White	Green	ZBA346
		↑	Black	White	ZBA334 *[34]*
			White	Black	ZBA335 *[34]*
		O *[33]*	White	Red	ZBA432
				Black	ZBA232
		STOP *[33]*	White	Red	ZBA434
				Black	ZBA234
		OFF	White	Red	ZBA435
				Black	ZBA235
		R *[34]*	White	Blue	ZBA639

[31] Set of 6 different colored caps: white, black, green, red, yellow, blue.
[32] Start functions: white letters on black background. Stop functions: white letters on red background (unless otherwise specified).
[33] Double injection molded marking.
[34] Cap supplied not clipped-in, allowing orientation of arrow in any one of 4 directions: ↑, ↓, ←, or →

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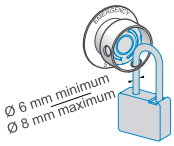
ZBA7235 ZBA7331

ZBA7432

ZBA79



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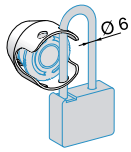

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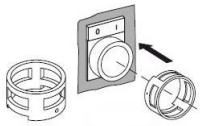
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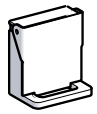
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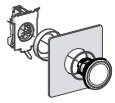
ZB4BZ011

DL1CE●●●

DL1CF●●●

XBFX13

ZBZ8

Table 19.116: Multiple-head and XB5R Push Button Caps[35]

For use with	Type of Push	Marking	Cap Color	Catalog Number
Double push button heads Tripe push button heads ZB4RZA0 ZB5RZA0	Flush	Unmarked	White	ZBA71
		"I" black		ZBA7131
		➟ black		ZBA7134
		"+" black		ZBA7138
		Unmarked	Black	ZBA72
		"O" white		ZBA7232
		"+" white		ZBA7233
		⇨ white		ZBA7235
		"I" white		ZBA7237
		Unmarked	Green	ZBA73
		"I" white		ZBA7331
		"+" white		ZBA7333
		⇧ white		ZBA7335
		"II" white		ZBA7336
		Unmarked	Red	ZBA74
		"O" white		ZBA7432
		Unmarked	Yellow	ZBA75
		Unmarked	Blue	ZBA76
		Assorted	10 colors[36]	ZBA79

Table 19.117: Accessories

Description	Application	Color	Catalog Number
Padlocking kit Conforming to EN/ISO 13850 [37] (See legends below)	For Emergency Stop function only, with the following Ø 40 trigger-action push buttons: XB4BT8● XB4BS8● XB4BS9● ZB4BT8● ZB4BS8● ZB4BS9●	Yellow	ZBZ3605
Metal guards Padlockable	For Emergency Stop function only with the following Ø 40 mm trigger-action push buttons: XB4BT8● XB4BS8● XB4BS9● ZB4BT8● (except ZB5AT8643M) ZB4BS8● ZB4BS9●	Chrome Plated	ZBZ1600
		Black	ZBZ1602
		Red	ZBZ1604
		Yellow	ZBZ1605
		Blue	ZBZ1606
Metal guard, padlockable	For Emergency Stop function with XB4 and XB5 E-Stop 30 mm and 40 mm operators	Chrome Plated	ZBZ1700
Metal guard	For XB4 illuminated push buttons	Chrome Plated	ZBZ1800
Plastic guards[38]	Round Guard for ZB4BS5430, 2.5" dia EMO Mushroom Operators	Yellow	ZB4BZ1905
	Narrow Flange Guard for ZB4BS5430 or ZB4BS84430 EMO Mushroom Operators[39]	Yellow	ZB4BZ2005
	Trigger Action Guard for ZB4BS84430, 3" dia EMO Mushroom Operators	Yellow	ZB4BZ2105
Padlockable flaps	For push buttons	Black	ZB4BZ62
		Red	ZB4BZ64
Mounting kit	For push buttons ZB4B● with flush mounting bezel head For 30 mm mounting hole. Minimum quantity 10		ZB4BZ011
Metal blanking plug, round chrome plated [40]	For Ø 22 mm control and signalling units		ZB4SZ3
Plastic blanking plug, round black with mounting nut	For Ø 22 mm control and signalling units		ZB5SZ3

Description	Marking	Color	Catalog Number
Ø 60 mm Legend for padlocking device ZBZ3605	Without	Yellow	ZBY9101T
	EMERGENCY STOP	Yellow	ZBY9330T

Table 19.118: BA9s Bulbs and Associated Accessories

Description	Characteristics	Catalog Number
Replacement bulbs (Type BA9s) Incandescent	6 V, 1.2 W	DL1CB006
	12 V, 2 W	DL1CE012
	24 V, 2 W	DL1CE024
	120–130 V, 2.4 W	DL1CE130
Neon bulbs	120–130 V, 1.8 mA	DL1CF110
	230–240 V, 1,8 mA	DL1CF220
Bulb extractor	—	XBFX13
Lens cap tightening tool	Illuminated push buttons with flush push	ZBZ8
Power driver bits for mounting and wiring (package of 5)	Cross headed screw (POZIDRIV type 1)	ZB4BZ905
Mounting Adapter	For mounting 22 mm push button in 30 mm KO	ZBZ41

[35] Sold in lots of 10.
[36] Set of 10 different caps: white, black, green, red, yellow, blue, white "I" on green background, black "I" on white background, white "O" on red background, white "O" on black background.
[37] Standard circular legends are not compatible with this product. Use special legends ZBY• •T listed above.
[38] For additional information, refer to publication 9001DB0601R6/06.
[39] Maximum panel thickness is 2.5 mm.
[40] Requires a ZB4BZ009 body/mounting collar for mounting, see XB4 Electrical Components, page 19-35.

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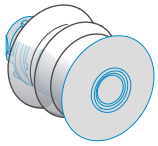
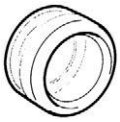

ZBZ_8

ZBDD2

ZBG455

ZBG455P


ZBP0

ZBA709

ZBV01•3

ZBV01•

Table 19.119: Bellows Seals for Harsh Environments (IP 69K) *[41]*

Description	For use with	Color & Material	Sold in Lots of	Catalog Number
Bellows seals for harsh environments (Humidity, dust, high-pressure cleaning)	Any Harmony XB4 metal, mushroom head push button Ø 40 mm or Ø 60 mm (except ZB4BR•16)	Red Silicone	2	ZBZ48
		Black EPDM	2	ZBZ28
		Yellow EPDM	2	ZBZ58

Table 19.120: Boot for Standard Selector Switch Handle

Description	For use with	Catalog Number
Boot for standard handle	ZB4BD••	ZBD D2

Table 19.121: Replacement Keys

Description	Key Number	Catalog Number
Set of 2 keys	455	ZBG455
	421E	ZBG421E
	458A	ZBG458A
	520E	ZBG520E
	3131A	ZBG3131A
Set of 2 keys, One of which is supplied booted (rubber boot)	455	ZBG455P
	421E	ZBG421EP
	458A	ZBG458AP
	520E	ZBG520EP
	3131A	ZBG3131AP

Table 19.122: Clear Boots

Description	For use with	Material	Catalog Number
Single boots	Booted push buttons with circular head	Silicone	ZBPA
	Booted push buttons with circular head used in food industry applications		ZBP0A
Double boots	Double-headed push buttons, two flush		ZBA708
	Double-headed push buttons, one flush + one projecting		ZBA710
Triple boot	Triple-headed push buttons, two flush + one projecting		ZBA709

Table 19.123: Colored boots

Description	Color	Catalog Number
Single boot (can be replaced without dismantling the head)	Black	ZB2 BP012
	Green	ZB2 BP013
	Red	ZB2 BP014
	Yellow	ZB2 BP015
	Blue	ZB2 BP016

Table 19.124: Lens Caps

For use with	Color	Catalog Number
Lens caps for Protected LED™ light modules		
Pilot lights	White	ZBV0113
	Green	ZBV0133
	Red	ZBV0143
	Yellow	ZBV0153
	Blue	ZBV0163
Illuminated push buttons with flush push	White	ZBW9113
	Green	ZBW9133
	Red	ZBW9143
	Yellow	ZBW9153
	Blue	ZBW9163
Illuminated push buttons with extended push	White	ZBW9313
	Green	ZBW9333
	Red	ZBW9343
	Yellow	ZBW9353
	Blue	ZBW9363
Lens caps for BA9 light modules		
Pilot lights	White	ZBV011
	Green	ZBV013
	Red	ZBV014
	Yellow	ZBV015
	Blue	ZBV016
	Clear	ZBV017
Illuminated push buttons with flush push	White	ZBW911
	Green	ZBW913
	Red	ZBW914
	Yellow	ZBW915
	Blue	ZBW916
	Clear	ZBW917
Illuminated push buttons with extended push	White	ZBW931
	Green	ZBW933
	Red	ZBW934
	Yellow	ZBW935
	Blue	ZBW936
	Clear	ZBW937

[41] Only when mounted on control stations. Use special legends ZBY• •T.

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XB5AA31

XB5AA4322

XB5AP51

XB5AL42

XB5AC21

XB5AL73415

XB5AW73731●5

XB5AA731327

XB5 Complete Devices

Table 19.125: Non-Illuminated Push Buttons, Momentary (screw clamp terminal connections)

Shape of Head	Type of Push	Type of Contact N.O.	Type of Contact N.C.	Marking	Cap Color	Catalog Number	Components
	Flush	1	—	—	Black	XB5AA21	(ZB5AZ101 + ZB5AA2)
					Green	XB5AA31	(ZB5AZ101 + ZB5AA3)
					Yellow	XB5AA51	(ZB5AZ101 + ZB5AA5)
					Blue	XB5AA61	(ZB5AZ101 + ZB5AA6)
		—	1	—	Red	XB5AA42	(ZB5AZ102 + ZB5AA4)
		1	1	—	Black	XB5AA25	(ZB5AZ105 + ZB5AA2)
					Green	XB5AA35	(ZB5AZ105 + ZB5AA3)
					Red	XB5AA45	(ZB5AZ105 + ZB5AA4)
					Yellow	XB5AA55	(ZB5AZ105 + ZB5AA5)
					Blue	XB5AA65	(ZB5AZ105 + ZB5AA6)
	Flush	1	—	"I" (white)	Green	XB5AA3311	(ZB5AZ101 + ZB5AA331)
	Flush	—	1	"O" (white)	Red	XB5AA4322	(ZB5AZ102 + ZB5AA432)
	Flush with clear silicone boot (color of pusher unobscured)	1	—	—	Black	XB5AP21	(ZB5AZ101 + ZB5AP2)
					Green	XB5AP31	(ZB5AZ101 + ZB5AP3)
					Yellow	XB5AP51	(ZB5AZ101 + ZB5AP5)
					Blue	XB5AP61	(ZB5AZ101 + ZB5AP6)
		—	1	—	Red	XB5AP42	(ZB5AZ102 + ZB5AP4)
	Extended	—	1	—	Red	XB5AL42	(ZB5AZ102 + ZB5AL4)
		1	1	—	Red	XB5AL45	(ZB5AZ105 + ZB5AL4)
	Mushroom head Ø 40 mm	1	—	—	Black	XB5AC21	(ZB5AZ101 + ZB5AC2)

Table 19.126: Two Button Push Buttons, Momentary (screw clamp terminal connections)

Shape of Head	Type of Push	Type of Contact N.O.	Type of Contact N.C.	Marking	Degree of Protection	Catalog Number	Components
	One flush green push* One extended red push**	1	1	*"I" (white) **"O" (white)	IP66 IP69K	XB5AL73415	(ZB5AZ105 + ZB5AL7341)

Table 19.127: Two Button Push Buttons, Momentary + one white central pilot light (screw clamp terminal connections)

Shape of Head	Type of Push	Type of Contact N.O.	Type of Contact N.C.	Marking	Degree of Protection	Pilot Light Voltage	Catalog Number
Protected LED	One flush green push* One extended red push** One white central pilot light block	1	1	*"I" (white) **"O" (white)	IP66 IP69K	24	XB5AW73731B5
						120	XB5AW73731G5
						240	XB5AW73731M5

Table 19.128: Three Button Push Buttons, Momentary (screw clamp terminal connections)

Shape of Head	Type of Push	Type of Contact N.O.	Type of Contact N.C.	Degree of Protection	Marking and Cap Color	Catalog Number
	Two flush pushes + one central projecting red push*	2	1	IP66 IP69K	White "I" on green background White "II" on green background *White "Stop" on red background	XB5AA731327
					Black "➡" on white background White "⇦" on black background *White "Stop" on red background	XB5AA711237

For Legends, see XB5 Legend Holders, page 19-58 and XB5 Legend Inserts, page 19-59.
Caps, see XB5 Accessories, page 19-60.

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XB5AS9445

XB5AT842

XB5AS542

Table 19.129: Non-Illuminated Trigger Action Emergency Stop Push Buttons, Ø 40 mm (Red) (screw clamp terminal connections)

Shape of Head	Type of Push	Type of Contact N.O.	Type of Contact N.C.	Catalog Number	Components
	Trigger action push-pull *[42]*	1	1	XB5AT845	(ZB5AZ105 + ZB5AT84)
	Trigger action turn-to-release *[42]*	1	1	XB5AS8445	(ZB5AZ105 + ZB5AS844)
		—	2	XB5AS8444	(ZB5AZ104 + ZB5AS844)
	Trigger action Key release (No. 455) *[42]*	1	1	XB5AS9445	(ZB5AZ105+ ZB5AS944)
	Trigger action Push-pull *[42]*	—	1	XB5AT842	(ZB5AZ102 + ZB5AT84)
	Trigger action Turn-to-release *[42]*	—	1	XB5A8442	(ZB5AZ102 + ZB5AS844)
	Trigger action Key release (No. 455) *[42]*	—	1	XB5AS9442	(ZB5AZ102 + ZB5AS944)

XB5AD33

XB5AJ33

XB5AG33

Table 19.130: Non-Illuminated Selector Switches and Key Switches (screw clamp terminal connections) *[43]*

Shape of Head	Type of Operator	Type of Contact N.O.	Type of Contact N.C.	Number and Type of Positions		Catalog Number	Components
	Standard lever, black	1	—	2-maintained		XB5AD21	(ZB5AZ101 + ZB5AD2)
		1	1	2-maintained		XB5AD25	(ZB5AZ105 + ZB5AD2)
		2	—	3-maintained		XB5AD33	(ZB5AZ103 + ZB5AD3)
				3-momentary to center		XB5AD53	(ZB5AZ103 + ZB5AD5)
	Extended lever, black	1	—	2-maintained		XB5AJ21	(ZB5AZ101 + ZB5AJ2)
		2	—	3-maintained		XB5AJ33	(ZB5AZ103 + ZB5AJ3)
				3-momentary to center		XB5AJ53	(ZB5AZ103 + ZB5AJ5)
	Key (No. 455)	1	—	2-maintained		XB5AG21	(ZB5AZ101 + ZB5AG2)
						XB5AG41	(ZB5AZ101 + ZB5AG4)
				2-momentary to left		XB5AG61	(ZB5AZ101 + ZB5AG6)
		2	—	3-maintained		XB5AG03	(ZB5AZ103 + ZB5AG0)
						XB5AG33	(ZB5AZ103 + ZB5AG3)

NOTE: The symbol ⚷ indicates key withdrawal position(s).

For Legends, see XB5 Legend Holders, page 19-58 and XB5 Legend Inserts Only, page 19-59

[42] Trigger action mushroom heads are tamper proof in that a change of contact state is not possible by teasing or floating the operator. For emergency stop applications, always use a trigger action push button (per EN/IEC 13850).

[43] For contact configurations, see Table 19.144 Sequence of Contacts on Selector Switch Bodies , page 19-50.

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XB5AVB1

XB5AV63

XB5AV34

XB5AW31B5

XB5AW3465

XB5AW3335

Table 19.131: Pilot Lights with Protected LED™ (screw clamp terminal connections)[44]

Shape of Head	Supply Voltage	Color	Catalog Number	Components
Protected LED	24 Vac/Vdc	White	XB5AVB1	(ZB5AVB1 + ZB5AV013)
		Green	XB5AVB3	(ZB5AVB3 + ZB5AV033)
		Red	XB5AVB4	(ZB5AVB4 + ZB5AV043)
		Yellow	XB5AVB5	(ZB5AVB5 + ZB5AV053)
		Blue	XB5AVB6	(ZB5AVB6 + ZB5AV063)
	110–120 Vac	White	XB5AVG1	(ZB5AVG1 + ZB5AV013)
		Green	XB5AVG3	(ZB5AVG3 + ZB5AV033)
		Red	XB5AVG4	(ZB5AVG4 + ZB5AV043)
		Yellow	XB5AVG5	(ZB5AVG5 + ZB5AV053)
		Blue	XB5AVG6	(ZB5AVG6 + ZB5AV063)

Table 19.132: Pilot Lights for BA9s Bulb (screw clamp terminal connections)

Shape of Head	Supply Voltage	Color	Catalog Number	Components
Direct supply, for BA9s (incandescent, LED, neon) V < 250 V, 2.4 W bulb (bulb not included) [45]				
	< 250 Vac/Vdc	White	XB5AV61	(ZB5AV6 + ZB5AV01)
		Green	XB5AV63	(ZB5AV6 + ZB5AV03)
		Red	XB5AV64	(ZB5AV6 + ZB5AV04)
		Yellow	XB5AV65	(ZB5AV6 + ZB5AV05)
Transformer type with 1.2 VA, 6 V secondary. BA9s incandescent bulb included				
	110–120 Vac 50/60 Hz	White	XB5AV31	(ZB5AV3 + ZB5AV01)
		Green	XB5AV33	(ZB5AV3 + ZB5AV03)
		Red	XB5AV34	(ZB5AV3 + ZB5AV04)
		Yellow	XB5AV35	(ZB5AV3 + ZB5AV05)

Table 19.133: Illuminated Push Buttons, Momentary (screw clamp terminal connections) [44]

Shape of Head	Description	Type of Contact N.O.	Type of Contact N.C.	Supply Voltage	Color of Push	Catalog Number	Components
Flush							
Protected LED		1	1	24 Vac/Vdc	White	XB5AW31B5	(ZB5AW0B15 + ZB5AW313)
					Green	XB5AW33B5	(ZB5AW0B35 + ZB5AW333)
					Red	XB5AW34B5	(ZB5AW0B45 + ZB5AW343)
					Yellow	XB5AW35B5	(ZB5AW0B55 + ZB5AW353)
					Blue	XB5AW36B5	(ZB5AW0B65 + ZB5AW363)
				110–120 Vac	White	XB5AW31G5	(ZB5AW0G15 + ZB5AW313)
					Green	XB5AW33G5	(ZB5AW0G35 + ZB5AW333)
					Red	XB5AW34G5	(ZB5AW0G45 + ZB5AW343)
					Yellow	XB5AW35G5	(ZB5AW0G55 + ZB5AW353)
					Blue	XB5AW36G5	(ZB5AW0G65 + ZB5AW363)
	Direct supply for BA9s 2.4 W max. bulb **not** included	1	1	< 250 Vac/Vdc	White	XB5AW3165	(ZB5AW065 + ZB5AW31)
					Green	XB5AW3365	(ZB5AW065 + ZB5AW33)
					Red	XB5AW3465	(ZB5AW065 + ZB5AW34)
					Yellow	XB5AW3565	(ZB5AW065 + ZB5AW35)
	Transformer type 1.2 VA, 6 V secondary. BA9s incandescent bulb included	1	1	110–120 Vac 50/60 Hz	White	XB5AW3135	(ZB5AW035 + ZB5AW31)
					Green	XB5AW3335	(ZB5AW035 + ZB5AW33)
					Red	XB5AW3435	(ZB5AW035 + ZB5AW34)
					Yellow	XB5AW3535	(ZB5AW035 + ZB5AW35)
				230–240 Vac 50/60 Hz	White	XB5AW3145	(ZB5AW045 + ZB5AW31)
					Green	XB5AW3345	(ZB5AW045 + ZB5AW33)
					Red	XB5AW3445	(ZB5AW045 + ZB5AW34)
					Yellow	XB5AW3545	(ZB5AW045 + ZB5AW35)
Extended							
Protected LED		1	1	24 Vac/Vdc	White	XB5AW11B5	(ZB5AW0B15 + ZB5AW113)
					Green	XB5AW13B5	(ZB5AW0B35 + ZB5AW133)
					Red	XB5AW14B5	(ZB5AW0B45 + ZB5AW143)
					Yellow	XB5AW15B5	(ZB5AW0B55 + ZB5AW153)
					Blue	XB5AW16B5	(ZB5AW0B65 + ZB5AW163)
				110–120 Vac	White	XB5AW11G5	(ZB5AW0G15 + ZB5AW113)
					Green	XB5AW13G5	(ZB5AW0G35 + ZB5AW133)
					Red	XB5AW14G5	(ZB5AW0G45 + ZB5AW143)
					Yellow	XB5AW15G5	(ZB5AW0G55 + ZB5AW153)
					Blue	XB5AW16G5	(ZB5AW0G65 + ZB5AW163)

For legends, see XB5 Legend Holders, page 19-58 and XB5 Legend Inserts Only, page 19-59.

[44] For 240V LED, replace the "B" or "G" with "M". (Example: XB5APV**B**1 (24 V) to XB5APV**M**1 (240 Vac only))
[45] For bulb information, refer to Table 19.183 BA9s Bulbs and Associated Accessories, page 19-61

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ZB5AA0

ZB5AA5

ZB5AL3

ZB5AP1

ZB5CA2

XB5 Non-Illuminated Operators

Table 19.134: Non-Illuminated Operators, Momentary—Unmarked

Shape of Head	Type of Push	Cap Color	Catalog Number
	Flush, without color cap *[46]*	—	ZB5AA0
	Flush, with set of 6 color caps	6 colors *[47]*	ZB5AA9
	Flush	White	ZB5AA1
		Black	ZB5AA2
		Green	ZB5AA3
		Red	ZB5AA4
		Yellow	ZB5AA5
		Blue	ZB5AA6
		Gray	ZB5AA8
	Flush with transparent cap, for insertion of legend *[48]*	White	ZB5AA18
		Green	ZB5AA38
		Red	ZB5AA48
		Yellow	ZB5AA58
		Blue	ZB5AA68
	Extended	White	ZB5AL1
		Black	ZB5AL2
		Green	ZB5AL3
		Red	ZB5AL4
		Yellow	ZB5AL5
		Blue	ZB5AL6
	Booted Flush (clear) Cap color unobscured	White	ZB5APA1
		Black	ZB5APA2
		Green	ZB5APA3
		Red	ZB5APA4
		Yellow	ZB5APA5
		Blue	ZB5APA6
	Booted Extended (clear) Cap color unobscured	White	ZB5AP1
		Black	ZB5AP2
		Green	ZB5AP3
		Red	ZB5AP4
		Yellow	ZB5AP5
		Blue	ZB5AP6
	Booted (colored) Cap color unobscured	White	ZB5AP1S
		Black	ZB5AP2S
		Green	ZB5AP3S
		Red	ZB5AP4S
		Yellow	ZB5AP5S
		Blue	ZB5AP6S
	Booted (clear) for insertion of legend *[48]* Cap color unobscured	White	ZB5AP18
		Green	ZB5AP38
		Red	ZB5AP48
		Yellow	ZB5AP58
		Blue	ZB5AP68
	Flush Plunger (with high guard)	White	ZB5AA14
		Black	ZB5AA24
		Green	ZB5AA34
		Red	ZB5AA44
		Yellow	ZB5AA54
		Blue	ZB5AA64
	Flush	White	ZB5CA1
		Black	ZB5CA2
		Green	ZB5CA3
		Red	ZB5CA4
		Yellow	ZB5CA5
		Blue	ZB5CA6
	Extended	White	ZB5CL1
		Black	ZB5CL2
		Green	ZB5CL3
		Red	ZB5CL4
		Yellow	ZB5CL5
		Blue	ZB5CL6
	Heads only Recessed (high guard)	White	ZB5AA16
		Black	ZB5AA26
		Green	ZB5AA36
		Red	ZB5AA46
		Yellow	ZB5AA56
		Blue	ZB5AA66
	Heads only Recessed (high guard)	White	ZB5CA16
		Black	ZB5CA26
		Green	ZB5CA36
		Red	ZB5CA46
		Yellow	ZB5CA56
		Blue	ZB5CA66

For Legends, see XB5 Legend Holders, page 19-58 and XB5 Legend Inserts Only, page 19-59

[46] Order color cap separately, see XB5 Accessories , page 19-60.
[47] Six colored caps included with head (white, black, green, red, yellow, blue).
[48] For legend ordering information see XB5 Accessories, page 19-60.

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ZB5AA331

ZB5AA432

ZB5AL232

Table 19.135: Non-Illuminated Operators, Momentary—Premarked

Shape of Head	Type of Push	Marking		Cap Color	Catalog Number
		Text	Color		
	Flush	I	White	Green	ZB5AA331
			Black	White	ZB5AA131
		START	White	Green	ZB5AA333
			Black	White	ZB5AA133
		ON	White	Green	ZB5AA341
			Black	White	ZB5AA141
		T	White	Green	ZB5AA345
		O	White	Red	ZB5AA432
				Black	ZB5AA232
		STOP	White	Red	ZB5AA434
				Black	ZB5AA234
		OFF	White	Red	ZB5AA435
				Black	ZB5AA235
		UP	Black	White	ZB5AA343
		DOWN	White	Black	ZB5AA344
		↑ [49]	Black	White	ZB5AA334
			White	Black	ZB5AA335
	Extended	O	White	Red	ZB5AL432
				Black	ZB5AL232
		STOP	White	Red	ZB5AL434
				Black	ZB5AL234
		OFF	White	Red	ZB5AL435
				Black	ZB5AL235
	Flush	I	White	Green	ZB5CA331
		O	White	Red	ZB5CA432

ZB5AC24

ZB5AC2

ZB5AR4

Table 19.136: Mushroom Heads, Momentary

Shape of Head	Diameter of Head	Color of Head	Catalog Number
	30 mm	Black	ZB5AC24
		Green	ZB5AC34
		Red	ZB5AC44
		Yellow	ZB5AC54
		Blue	ZB5AC64
	40 mm	Black	ZB5AC2
		Green	ZB5AC3
		Red	ZB5AC4
		Yellow	ZB5AC5
		Blue	ZB5AC6
	60 mm	Black	ZB5AR2
		Green	ZB5AR3
		Red	ZB5AR4
		Yellow	ZB5AR5
		Blue	ZB5AR6

For legends, see XB5 Legend Holders, page 19-58 and XB5 Legend Inserts Only, page 19-59

[49] Cap supplied not clipped-in, allowing orientation of arrow in any one of 4 directions:

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ZB5AH04

Table 19.137: Non-Illuminated Push-on/Push-off Operators

Shape of Head	Type of Push	Color of Push	Catalog Number
	Flush	White	ZB5AH01
		Black	ZB5AH02
		Green	ZB5AH03
		Red	ZB5AH04
		Yellow	ZB5AH05
		Blue	ZB5AH06
	Extended	White	ZB5AH1
		Black	ZB5AH2
		Green	ZB5AH3
		Red	ZB5AH4
		Yellow	ZB5AH5
		Blue	ZB5AH6
	Flush	White	ZB5CH01
		Black	ZB5CH02
		Green	ZB5CH03
		Red	ZB5CH04
		Yellow	ZB5CH05
		Blue	ZB5CH06

ZB5AL7341

ZB5AA7121

Table 19.138: Two Head Operators, Momentary

Shape of Head	Description	Marking	Cap Color	Degree of Protection	Catalog Number
No Marking					
	Two flush	—	Green Red	IP66 IP69K	ZB5AA7340
		—	White Black		ZB5AA7120
	One flush One extended	—	Green Red		ZB5AL7340
Premarked					
	Two flush	"I" (white) "O" (white)	Green Red	IP66 IP69K	ZB5AA7341
		"I" (black) "O" (white)	White Black		ZB5AA7121
	One flush One extended	"I" (white) "O" (white)	Green Red		ZB5AL7341
Without caps					
	Two flush without caps	—	—	IP66 IP69K	ZB5AA79

ZB5AA73133

ZB5AA71124

Table 19.139: Three Head Operators, Momentary

Shape of Head	Description	Marking	Cap Color	Degree of Protection	Catalog Number
Premarked					
Two flush + one central projecting red push marked "Stop"	Two flush	"I" (white) "II" (white)	Green Green	IP66 IP69K	ZB5AA73132
		"⇐" (white) "⇒" (white)	Green Green		ZB5AA73133
		"⇑" (white) "⇓" (white)	Green Green		ZB5AA73134
		"+" (white) "-" (white)	Green Green		ZB5AA73135
		"+" (black) "-" (black)	White White		ZB5AA71115
		"⇐" (black) "⇒" (white)	White Black		ZB5AA71123
		"⇑" (black) "⇓" (white)	White Black		ZB5AA71124
		"⇑" (white) "⇓" (white)	Black Black		ZB5AA72124
Without caps					
	Two flush without caps	—	—	IP66 IP69K	ZB5AA791

For caps, see XB5 Accessories, page 19-60

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ZB5AS844

ZB5AS934

ZB5AT84

ZB5AS834

ZB5AS864

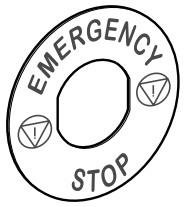
XB5 Emergency Stop Operators

Table 19.140: Mushroom Heads for Maintained Push Buttons

Shape of Head	Type of Push	Diameter of Head	Color	Catalog Number
For use in Emergency Stop applications				
	Trigger action Push-pull *[50]*	30 mm	Red	ZB5AT844
		40 mm	Red	ZB5AT84
		60 mm	Red	ZB5AX84
	Trigger action Turn-to-release *[50]*	30 mm	Red	ZB5AS834
		40 mm	Red	ZB5AS844
		60 mm	Red	ZB5AS864
	Trigger action Key release (No. 455) *[50]*	30 mm	Red	ZB5AS934
		40 mm	Red	ZB5AS944 *[51]*
		60 mm	Red	ZB5AS964
For use in non-Emergency Stop applications				
	Push-pull	30 mm	Black	ZB5AT24
		40 mm	Black	ZB5AT2
		60 mm	Black	ZB5AX2
	Turn-to-release	30 mm	Black	ZB5AS42
		40 mm	Black	ZB5AS52
			Yellow	ZB5AS55
		60 mm	Black	ZB5AS62
	Key release (No. 455)	30 mm	Black	ZB5AS72
		40 mm	Black	ZB5AS12
		60 mm	Black	ZB5AS22

Table 19.141: Circular Legends for Emergency Stop Mushroom Heads (yellow background)

Diameter	Text	Catalog Number
60 mm	Blank	ZBY9101
	EMERGENCY STOP	ZBY9330
90 mm	Blank	ZBY8101
	EMERGENCY STOP	ZBY8330
60 mm Bezeled	Blank	ZBY9121
	Emergency Stop	ZBY9320
	Prada de Emergencia	ZBY9420
	Not Halt	ZBY9220



ZBY9330

ZBY9320

For Legends, see XB5 Legend Holders, page 19-58 and XB5 Legend Inserts, page 19-59

[50] Trigger action mushroom heads are tamper proof in that a change of contact state is not possible by teasing or floating the operator. For emergency stop applications, always use a trigger action push button (per EN/IEC 13850).

[51] Other key numbers:
—key no. 421E: add the suffix 12 to the catalog number.
—key no. 458A: add the suffix 10 to the catalog number.
—key no. 520E: add the suffix 14 to the catalog number.
—key no. 3131A: add the suffix 20 to the catalog number.
Example: The catalog number for a Ø 40 mm red mushroom head for a trigger action, maintained push button, with release by key no. 421E becomes: ZB5AS94412.

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ZB5AD•
Standard Lever

ZB5AJX•
Extended Lever

XB5 Selector Switches

Table 19.142: Non-Illuminated Selector Switches

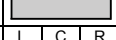
Color	Number and Type of Positions		Standard Lever [52]	Extended Lever [52]
			Catalog Number	
Black	2-maintained		ZB5AD2	ZB5AJ2
Black	2-momentary from right to left		ZB5AD4	ZB5AJ4
Black	3-maintained		ZB5AD3	ZB5AJ3
Black	3-momentary to center		ZB5AD5	ZB5AJ5
Black	3-momentary from left to center		ZB5AD7	ZB5AJ7
Black	3-momentary from right to center		ZB5AD8	ZB5AJ8

ZB5AG•

Table 19.143: Non-Illuminated Key Switches

Type of Operator	Number and Type of Positions		Catalog Number [53]
Key (No. 455) [53] **NOTE:** The symbol ⚷ indicates key withdrawal position(s).	2-maintained		ZB5AG2
			ZB5AG4
			ZB5AG02
	2-momentary from right to left		ZB5AG6
	3-maintained		ZB5AG0
			ZB5AG3
			ZB5AG5
			ZB5AG9
			ZB5AG09
	3-momentary from left to center		ZB5AG1
	3-momentary to center		ZB5AG7
	3-momentary from right to center		ZB5AG8
			ZB5AG08
			ZB5AG05

Table 19.144: Sequence of Contacts on Selector Switch Bodies

Unit Type		Selector Switches														
		2-position						3-position								
Note: L=Left, C=Center, R=Right, O=Open, X=Closed		315°			45°			315°			0°			45°		
Operator Plunger Position	Up															
	Down															
Contact Block Location		L	C	R	L	C	R	L	C	R	L	C	R	L	C	R
Contacts	N.O.	O	O	O	X	X	X	X	X	O	O	O	O	O	X	X
	N.C.	X	X	X	O	O	O	O	O	X	X	X	X	X	O	O

For Selector Switch Sequence, see Table 19.96 Sequence of Contacts on Illuminated Selector Switch Bodies, page 19-34

[52] For colored lever, add the following code to the end of catalog number: 01—white, 03—green, 04—red, 05—yellow, 06—blue (Example: ZB5AD204).

[53] Other key numbers:
—key no. 421E: add the suffix 12 to the catalog number.
—key no. 458A: add the suffix 10 to the catalog number.
—key no. 520E: add the suffix 14 to the catalog number.
—key no. 3131A: add the suffix 20 to the catalog number.
—key no. 8D1: add the suffix D to the catalog number.
Example: The catalog number for a head with key no. 421E for a 2 position maintained, lockable selector switch, with key withdrawal from the left-hand position, becomes: ZB5AG212

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XB5AA

XD5PA12

XB5DS●

XB5KS●

ZB5AD28

XB5 Specialty Operators

Table 19.145: Reset Operators

Shape of Head	Actuation Distance in	Actuation Distance mm	Text	Color	Catalog Number
Flush	**Adjustable Shaft** *[54]*				
	0.67–4.72	17–120	Without	Green	XB5AA831
				Red	XB5AA841
				Blue	XB5AA861
			O	Red	XB5AA84101
			R	Blue	XB5AA86102
	4.72–10.12	120–257	Without	Green	XB5AA832
				Red	XB5AA842
				Blue	XB5AA862
			O	Red	XB5AA84201
			R	Blue	XB5AA86202
Extended					
	0.67–4.72	17–120	O	Red	XB5AL84101
	4.72–10.12	120–257	O	Red	XB5AL84201

Table 19.146: Potentiometer Operator (with Mounting Collar)

Shape of Head	Description	Application	Catalog Number
	For potentiometer with shaft length 1.73 to 1.97 in. (44 to 50 mm) (potentiometer not included)	For shaft Ø 0.25 in. (6.35 mm)	ZB5AD922
		For shaft Ø 0.24 in. (6 mm)	ZB5AD912

Table 19.147: Joystick (54 mm, Extended Operating Shaft) *[55]*

Description	Contact Operation	Action	Catalog Number
2 direction	1 step 1 N.O. contact per direction	Maintained	XD5PA12
		Momentary	XD5PA22
4 direction	1 step 1 N.O. contact per direction	Maintained	XD5PA14
		Momentary	XD5PA24

Table 19.148: Legends for Joystick

Description	For use with	Color	Catalog Number
Legends 30 x 48 mm for engraving	2 direction	Black one side Red reverse	ZBG2201
		White one side Yellow reverse	ZBG2401
Legends 48 x 48 mm for engraving	4 direction	Black one side Red reverse	ZBG4201
		White one side Yellow reverse	ZBG4401

Table 19.149: Hour Counters *[56]*

Characteristics	Supply Voltage	Catalog Number
Indication 0–9999.9 (IP40 NEMA 1)	12–24 Vdc or Vac, 50/60 Hz	XB5DSB
	120 Vac, 60 Hz	XB5DSG
	230–240 Vac, 50 Hz	XB5DSM

Table 19.150: Buzzer *[56]*

Characteristics	Supply Voltage	Catalog Number
85 db buzzer:4kHz, continuous or intermittent (IP40 NEMA 1)	24 Vdc or Vac, 50/60 Hz	XB5KSB
	120 Vac, 60 Hz	XB5KSG
	230–240 Vac, 50 Hz	XB5KSM

Table 19.151: Two Position Toggle Switch

Shape of Head	Color	Type of Positions	Catalog Number
	Black	Maintained	ZB5AD28
	Black	Momentary	ZB5AD48

For legends, see XB5 Legend Holders, page 19-58, XB5 Legend Inserts, page 19-59, and Table 19.178 Sheets of Legends for Push Buttons, Switches, and Pilot Lights, page 19-60.

[54] Shaft only (short) is W40437632
[55] Do not use standard contact blocks ZBE10• (single) or ZBE20• (double)
[56] UR E191025, XHNR2 and XHNR8.

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ZB5AV053

ZB5AV01

ZB5CV063

XB5 Pilot Lights

Table 19.152: Pilot Light Heads

Shape of Head	For use with Body Comprising Light Module Type	Color of Lens	Catalog Number
	Protected LED™ only	White Green Red Yellow Blue	ZB5AV013 ZB5AV033 ZB5AV043 ZB5AV053 ZB5AV063
	Protected LED only Fresnel (jeweled) lens *[57]*	White Green Red Amber Blue	ZB5AV013S ZB5AV033S ZB5AV043S ZB5AV053S ZB5AV063S
	For BA9s incandescent bulb, neon or LED only *[58]*	White Green Red Yellow Blue Clear	ZB5AV01 ZB5AV03 ZB5AV04 ZB5AV05 ZB5AV06 ZB5AV07
	For BA9s incandescent bulb, neon or LED Fresnel (jeweled) lens *[58]*	White Green Red Amber Blue Clear	ZB5AV01S ZB5AV03S ZB5AV04S ZB5AV05S ZB5AV06S ZB5AV07S
	Protected LED only	White Green Red Yellow Blue	ZB5CV013 ZB5CV033 ZB5CV043 ZB5CV053 ZB5CV063

For legends, refer to XB5 Legend Holders, page 19-58, XB5 Legend Inserts, page 19-59, and Table 19.178 Sheets of Legends for Push Buttons, Switches, and Pilot Lights, page 19-60

ZB5AV6

ZB5AV3

Table 19.153: Complete Bodies (Mounting Collar + Light Module for BA9s Incandescent Bulb, Neon or LED)

Description	Light Source	Supply Voltage (V)	Catalog Number
Screw clamp terminal connections			
Direct supply	BA9s bulb 2.4 W max. Not included *[58]*	<250	ZB5AV6
Direct supply	BA9s incandescent, bulb included	24 V 2 W	ZB5AV624
Direct supply	BA9s incandescent, bulb included	120 V 2.4 W	ZB5AV6120
Transformer type 1.2 VA, 6 V secondary	BA9s incandescent bulb included	110–120 Vac, 50/60 Hz	ZB5AV3
		230–240 Vac, 50/60 Hz	ZB5AV4
		400–50 Hz	ZB5AV5
		440–480 Vac, 60 Hz	ZB5AV8
		550–600 Vac, 60 Hz	ZB5AV9

ZB5AV●●

Table 19.154: Complete Bodies (Mounting Collar + Protected LED™ Light Module) *[59][60]*

Light Source	Supply Voltage	Color of Light Source	Catalog Number
Screw clamp terminal connections			
Protected LED	12 Vac/Vdc	White Green Red Yellow Blue	ZB5AVJ1 ZB5AVJ3 ZB5AVJ4 ZB5AVJ5 ZB5AVJ6
	24 Vac/Vdc	White Green Red Yellow Blue	ZB5AVB1 ZB5AVB3 ZB5AVB4 ZB5AVB5 ZB5AVB6
	24–120 Vac/Vdc	White Green Red Yellow Blue	ZB5AVBG1 ZB5AVBG3 ZB5AVBG4 ZB5AVBG5 ZB5AVBG6
	110–120 Vac	White Green Red Yellow Blue	ZB5AVG1 ZB5AVG3 ZB5AVG4 ZB5AVG5 ZB5AVG6
Flashing Protected LED	24 Vac/Vdc	White Green Red Yellow Blue	ZB5AV18B1 ZB5AV18B3 ZB5AV18B4 ZB5AV18B5 ZB5AV18B6
	110–120 Vac	White Green Red Yellow Blue	ZB5AV18G1 ZB5AV18G3 ZB5AV18G4 ZB5AV18G5 ZB5AV18G6

[57] For use in bright ambient conditions (i.e., sunlight).
[58] Order bulb separately; see Table 19.183 BA9s Bulbs, page 19-61. For BA9 LED, see Table 19.403 Lamps, BA9s Base, page 19-129.
[59] For Quick-Connect version, add “3” to the end of the catalog number Example: ZB5AVJ13 (Quick-Connect size 1 x 0.250" or 2 x 0.110").
[60] For 240 V LED, replace the “B” or “G” with “M”. (Example: ZB5AV**B**1 (24V) to ZB5AV**M**1 (240V))

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ZB5AW313

ZB5AW363

ZB5AW143

ZB5CW313

ZB5AW33

XB5 Illuminated Operators

Table 19.155: Heads for Momentary Illuminated Push Buttons

Shape of Head	Type of Push	Color	Catalog Number
Only use with Protected LED™ light modules			
	Flush	White	ZB5AW313
		Green	ZB5AW333
		Red	ZB5AW343
		Yellow	ZB5AW353
		Blue	ZB5AW363
	Flush with clear boot	White	ZB5AW513
		Green	ZB5AW533
		Red	ZB5AW543
		Yellow	ZB5AW553
		Blue	ZB5AW563
	Flush for insertion of legend	White	ZB5AA18
		Green	ZB5AA38
		Red	ZB5AA48
		Yellow	ZB5AA58
		Blue	ZB5AA68
	Extended	White	ZB5AW113
		Green	ZB5AW133
		Red	ZB5AW143
		Yellow	ZB5AW153
		Blue	ZB5AW163
	Flush for insertion of legend	White	ZB5CW313
		Green	ZB5CW333
		Red	ZB5CW343
		Yellow	ZB5CW353
		Blue	ZB5CW363
	Extended	White	ZB5CW113
		Green	ZB5CW133
		Red	ZB5CW143
		Yellow	ZB5CW153
		Blue	ZB5CW163
Only use with light modules for a BA9s incandescent bulb, neon or LED			
	Flush	White	ZB5AW31
		Green	ZB5AW33
		Red	ZB5AW34
		Yellow	ZB5AW35
		Blue	ZB5AW36
		Clear	ZB5AW37
	Extended	White	ZB5AW11
		Green	ZB5AW13
		Red	ZB5AW14
		Yellow	ZB5AW15
		Blue	ZB5AW16
		Clear	ZB5AW17

Table 19.156: Illuminated Push-on/Push-off Operators

Shape of Head	Type of Push	Color of Lens	Catalog Number
Only use with Protected LED light modules			
	Flush	White	ZB5AH013
		Green	ZB5AH033
		Red	ZB5AH043
		Yellow	ZB5AH053
		Blue	ZB5AH063
	Extended	White	ZB5AH13
		Green	ZB5AH33
		Red	ZB5AH43
		Yellow	ZB5AH53
		Blue	ZB5AH63

For legends, refer to XB5 Legend Holders, page 19-58, XB5 Legend Inserts, page 19-59, and Table 19.178 Sheets of Legends for Push Buttons, Switches, and Pilot Lights, page 19-60

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ZB5AW7A3741

ZB5AW7A1721

Table 19.157: Two Button with Clear Pilot Light, Momentary

Shape of Head	Description	Marking	Cap Color	Degree of Protection	Catalog Number
No Marking					
Protected LED	Two flush	—	Green Red	IP66 IP69K	ZB5AW7A3740
		—	White Black		ZB5AW7A1720
Protected LED	One flush One extended	—	Green Red		ZB5AW7L3740
Premarked					
Protected LED	Two flush	"I" (white) "O" (white)	Green Red	IP66 IP69K	ZB5AW7A3741
		"I" (black) "O" (white)	White Black		ZB5AW7A1721
Protected LED	One flush One extended	"I" (white) "O" (white)	Green Red		ZB5AW7L3741
Protected LED	Two flush	"↑" (black) "↓" (white)	White Black		ZB5AW7A1724
Protected LED	Two flush	"+" (black) "-" (black)	White White		ZB5AW7A1715
Without caps					
Two flush without caps		—	—	IP66, IP69K	ZB5AW7A9

ZB5AW7•

Table 19.158: Heads for Maintained Illuminated Push Buttons

Shape of Head	Type of Push	Color	Catalog Number
Only use with Protected LED light modules			
	Turn-to-Release Mushroom (40 mm)	White	ZB5AW713
		Green	ZB5AW733
		Red	ZB5AW743
		Yellow	ZB5AW753
		Blue	ZB5AW763

ZB5AT8643M

Table 19.159: Emergency Stop, Trigger Action and Mech Latching Push Button with Mech State Indicator for Elevator Inspection Box Applications—Heads Only

Shape of Head	Type of Reset	Color	Catalog Number
	Push-pull (40 mm)	Red	ZB5AT8643M

NOTE: ZB5AT8643M not to be used with ZBZ16* guard.

ZB5AK1213

ZB5AK1463

Table 19.160: Illuminated Selector Switches, Standard Lever

Shape of Head	Number and Type of Positions		Catalog Number *[61]*
Only use with Protected LED light modules			
	2-maintained		ZB5AK12●3
	2-momentary from right to left		ZB5AK14●3
	3-maintained		ZB5AK13●3
	3-momentary to center		ZB5AK15●3
	3-momentary from right to center		ZB5AK18●3
	3-momentary from left to center		ZB5AK17●3

Table 19.161: Sequence of Contacts on Selector Switch Bodies

Unit Type		Selector Switches													
		2-position						3-position							
Note: *L=Left, C=Center, R=Right,* *O=Open, X=Closed*		315°			45°			315°			0°			45°	
Operator Plunger Position	Up														
	Down														
Contact Block Location		L	C	R	L	C	R	L	C	R	L	C	R	L	C	R
Contacts	N.O.	O	O	O	X	X	X	X	X	O	O	O	O	O	X	X
	N.C.	X	X	X	O	O	O	O	O	X	X	X	X	X	O	O

For legends, see XB5 Legend Holders, page 19-58, XB5 Legend Inserts, page 19-59, and Table 19.178 Sheets of Legends for Push Buttons, Switches, and Pilot Lights, page 19-60.
For Caps, see Table 19.189 Lens Caps, page 19-62

[61] ● Designate color as follows: 1—white, 3—green, 4—red, 5—yellow, 6—blue

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ZB5AZ101

ZB5AW0••1

ZB5AW065

ZB5AW035

XB5 Electrical Components

NOTE: For the Quick-Connect version, add the numeral **3** to the end of the number. Example: ZB5AZ101**3** (Quick-Connect size 1 x 0.250" or 2 x 0.110").

Table 19.162: Contact Blocks (Mounting Collar with Contact Blocks) *[62] [63] [64]*

Description	Type of Contact		Catalog Number
	N.O.	N.C.	
Screw clamp terminal connections	1	—	ZB5AZ101
	—	1	ZB5AZ102
	2	—	ZB5AZ103
	—	2	ZB5AZ104
	1	1	ZB5AZ105
	1	2	ZB5AZ141

Table 19.163: Complete Bodies (Mounting Collar + Single Contact Block + Light Module with Protected LED™)

Light Source	Type of Contact *[65]*		Color	Supply Voltage *[66]*	
	N.O.	N.C.		24 Vac/Vdc	110–120 Vac
				Catalog Number	
Screw clamp terminal connections					
Protected LED	1	—	White	ZB5AW0B11	ZB5AW0G11
			Green	ZB5AW0B31	ZB5AW0G31
			Red	ZB5AW0B41	ZB5AW0G41
			Yellow	ZB5AW0B51	ZB5AW0G51
			Blue	ZB5AW0B61	ZB5AW0G61
	—	1	White	ZB5AW0B12	ZB5AW0G12
			Green	ZB5AW0B32	ZB5AW0G32
			Red	ZB5AW0B42	ZB5AW0G42
			Yellow	ZB5AW0B52	ZB5AW0G52
			Blue	ZB5AW0B62	ZB5AW0G62
	2	—	White	ZB5AW0B13	ZB5AW0G13
			Green	ZB5AW0B33	ZB5AW0G33
			Red	ZB5AW0B43	ZB5AW0G43
			Yellow	ZB5AW0B53	ZB5AW0G53
			Blue	ZB5AW0B63	ZB5AW0G63
	1	1	White	ZB5AW0B15	ZB5AW0G15
			Green	ZB5AW0B35	ZB5AW0G35
			Red	ZB5AW0B45	ZB5AW0G45
			Yellow	ZB5AW0B55	ZB5AW0G55
			Blue	ZB5AW0B65	ZB5AW0G65

Table 19.164: Mounting Collar, Contact Block and Light Module (with screw clamp terminal connections)

Supply	Light Source	Supply Voltage	Type of Contact *[65]*		Color of Light Source	Catalog Number
			N.O.	N.C.		
Screw clamp terminal connections						
Direct supply	BA9s 2.4 W max. bulb Not included *[67]*	< 250 Vac/ Vdc	1	—	—	ZB5AW061
			—	1	—	ZB5AW062
			2	—	—	ZB5AW063
			1	1	—	ZB5AW065
Transformer type 1.2 VA, 6 V secondary	BA9s incandescent bulb included	110–120 Vac 50/60 Hz	1	—	—	ZB5AW031
			1	1	—	ZB5AW035
		230–240 Vac 50/60 Hz	1	—	—	ZB5AW041
			1	1	—	ZB5AW045
		440–480 Vac 60 Hz	1	—	—	ZB5AW081
			1	1	—	ZB5AW085

[62] For Ring Tongue compatible blocks add “9” to the end of the catalog number (Example: ZB5AZ1029).
[63] Electrical components with connection by printed circuit board pins are available. Refer to Catalog9001CT0001 for more information.
[64] Electrical components with connection by plug-in connector are available. Refer to Catalog 9001CT0001 for more information.
[65] Can be fitted with additional contact blocks, see Table 19.166 Add-On Contact Blocks, page 19-56.
[66] For 240V LED, replace the “B” or “G” with “M”. (Example: change “ZB5AW0**B**11 (24 V) to ZB5AW0**M**11 (240 V))
[67] Order bulbs separately, see Table 19.183 BA9s Bulbs and Associated Accessories, page 19-61

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ZB5AZ009

ZBE101

ZBE203

ZBVB•

Table 19.165: Body/Mounting Collar

For use with	Catalog Number
Electrical block (contact or light module)	ZB5AZ009

Table 19.166: Add-On Contact Block (with screw clamp terminal connections) *[68] [69]*

Description		Type of Contact		Catalog Number
		N.O.	N.C.	
Standard **single** contact blocks*[70][71]*		1	—	ZBE101
		—	1	ZBE102
Standard **double** contact blocks*[70][71]*		2	—	ZBE203
		—	2	ZBE204
		1	1	ZBE205
Special contact blocks for low-power switching *[72]*		1	—	ZBE1016
		—	1	ZBE1026
Low-power switching	Dusty environment *[72]* (IP5X, 50 µm dust)	1	—	ZBE1016P
		—	1	ZBE1026P
Staggered contacts	Early make N.O.	1	–	ZBE201
	Late break N.C.	—	1	ZBE202
	Overlapping N.O. + N.C.	1	1	ZB4BZ106
	Staggered N.O. + N.O.	—	2	ZB4BZ107

Table 19.167: Light Modules (with screw clamp terminal connections)*[68][69]*

Description	Supply Voltage	Color of Light Source	Catalog Number
Protected LED™	12 Vac/Vdc	White	ZBVJ1
		Green	ZBVJ3
		Red	ZBVJ4
		Yellow	ZBVJ5
		Blue	ZBVJ6
	24 Vac/Vdc	White	ZBVB1
		Green	ZBVB3
		Red	ZBVB4
		Yellow	ZBVB5
		Blue	ZBVB6
	110–120 Vac	White	ZBVG1
		Green	ZBVG3
		Red	ZBVG4
		Yellow	ZBVG5
		Blue	ZBVG6
	24–120 Vac/Vdc	White	ZBVBG1
		Green	ZBVBG3
		Red	ZBVBG4
		Yellow	ZBVBG5
		Blue	ZBVBG6
	230–240 Vac	White	ZBVM1
		Green	ZBVM3
		Red	ZBVM4
		Yellow	ZBVM5
		Blue	ZBVM6
Direct supply for BA9s (2.4 W max. bulb not included—see Table 19.183 BA9s Bulbs and Associated Accessories, page 19-61)	< 250 Vac/Vdc	—	ZBV6

[68] Electrical components with connection by printed circuit board pins are available. Refer to Catalog 9001CT0001 for more details.
[69] Electrical components with connection by plug-in connector are available. Refer to Catalog 9001CT0001 for more details.
[70] For Quick-Connect version add “3” to the end of the catalog number (Example: ZBE1013) (Quick-Connect size 1 x 0.250" or 2 x 0.110").
[71] For Ring Tongue compatible blocks add “9” to the end of the catalog number (Example: ZBE1029).
[72] Cannot stack additional contact blocks onto these blocks.

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ZB5AZ009

ZBE1015

ZB4BZ1015

Table 19.168: Body/Mounting Collar

For use with	Catalog Number
Contact block or light module	ZB5AZ009

Table 19.169: Contact Blocks *[73]*

Spring Terminal Connections, Contacts for Standard Applications				
Description	**Type of contact**	**N.O.**	**N.C.**	**Catalog Number**
Contact blocks	Single	1	–	ZBE1015
		–	1	ZBE1025
	Single with body/mounting collar	1	–	ZB4BZ1015
		–	1	ZB4BZ1025
		2	–	ZB4BZ1035
		–	2	ZB4BZ1045
		1	1	ZB4BZ1055

Table 19.170: Light Modules *[73]*

Spring Terminal Connections			
Description	**Supply voltage**	**Color of light source**	**Catalog Number**
Integral LED (to combine with heads for integral LED) Protected LED	12 Vac/Vdc	White	ZBVJ15
		Green	ZBVJ35
		Red	ZBVJ45
		Orange	ZBVJ55
		Blue	ZBVJ65
	24 Vac/Vdc	White	ZBVB15
		Green	ZBVB35
		Red	ZBVB45
		Orange	ZBVB55
		Blue	ZBVB65
	110–120 Vac	White	ZBVG15
		Green	ZBVG35
		Red	ZBVG45
		Orange	ZBVG55
		Blue	ZBVG65
	230–240 Vac	White	ZBVM15
		Green	ZBVM35
		Red	ZBVM45
		Orange	ZBVM55
		Blue	ZBVM65

[73] Additional blocks **cannot** be attached to the back of these contact blocks or light modules. However, spring terminal contact blocks can be mounted behind screw terminal contact blocks.

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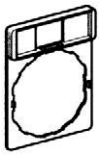

ZBZ32

ZBY•101

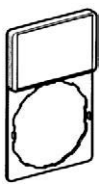
ZBY2303

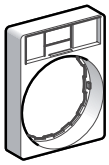
XB5 Legend Holders

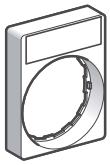
Table 19.171: Standard (30 x 40 mm) Legend Holders for 8 x 27 mm Legends

Description	Legend		Catalog Number
	Color	Text	
Without legend *[74]*	—	—	ZBZ32
With blank legend (for engraving)	Black or red background	—	ZBY2101
	White or yellow background	—	ZBY4101
Custom Legend (Specify Engraving) 2 lines of 11 characters (including spaces) maximum per line	Black background	White	ZBY2002
	Red background	White	ZBY2004
	White background	Black	ZBY4001
	Yellow background	Black	ZBY4005
With legend marked with international language	Black or red background *[75]*	O (black background)	ZBY2146
		O (red background)	ZBY2931
		I	ZBY2147
		II	ZBY2148
		O-I	ZBY2178
		I-II	ZBY2179
		I-O-II	ZBY2186
With legend marked with English language	Black or red background *[75]*	AUTO	ZBY2115
		AUTO-HAND	ZBY2364
		AUTO-O-HAND	ZBY2385
		CLOSE	ZBY2314
		DOWN	ZBY2308
		EMERGENCY STOP	ZBY2330
		FAST	ZBY2328
		FORWARD	ZBY2305
		FOR-REV	ZBY2371
		HAND	ZBY2316
		HAND-OFF-AUTO	ZBY2387
		INCH	ZBY2321
		JOG	ZBY2382
		LEFT	ZBY2310
		OFF	ZBY2312
		OFF-ON	ZBY2367
		ON	ZBY2311
		OPEN	ZBY2313
		POWER ON	ZBY2326
		RESET (red background)	ZBY2323
		RESET (black background)	ZBY2322
		REVERSE	ZBY2306
		RIGHT	ZBY2309
		RUN	ZBY2334
		SLOW	ZBY2327
		START	ZBY2303
		STOP	ZBY2304
		STOP-START	ZBY2366
		UP	ZBY2307

ZBZ33


ZBY610•


ZBZ34


ZBY•H101

ZBZ35

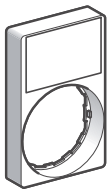

ZBY6H10•

Table 19.172: Large (30 x 50 mm) Legend Holders for 18 x 27 mm Legends

Description *[76]*	Color	Catalog Number
Without legend insert	—	ZBZ33
With blank legend insert	Black or red background	ZBY6101
	White or yellow background	ZBY6102

Table 19.173: 30 x 40 mm legend holder (flush mounting with bezel) for 8 x 27 mm legends

Description *[76]*	Color	Catalog Number
Without legend	—	ZBZ34
With blank legend	Black or red background	ZBY2H101
	White or yellow background	ZBY4H101

Table 19.174: 30 x 50 mm legend holder (flush mounting with bezel) for 18 x 27 mm legends

Description *[76]*	Color	Catalog Number
Without legend	—	ZBZ35
With blank legend	Black or red background	ZBY6H101
	White or yellow background	ZBY6H102

[74] For legends, see XB5 Legend Inserts Only, page 19-59.
[75] Start functions: white letters on black background. Stop functions: white letters on red background (unless otherwise specified above).
[76] For custom legends, see Table 19.178 Sheets of Legends for Push Buttons, Switches, and Pilot Lights, page 19-60

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ZBY02178

ZBY02303

XB5 Legend Inserts

Table 19.175: Marked Legends for 8 x 27 mm (for 30 x 40 mm legend holders ZBZ32)

Color	Marking	Text	Catalog Number
Black or red background *[77]*	International	O (black background)	ZBY02146
		O (red background)	ZBY02931
		I	ZBY02147
		II	ZBY02148
		O-I	ZBY02178
		I-II	ZBY02179
		I-O-II	ZBY02186
	English	AUTO	ZBY02115
		AUTO-HAND	ZBY02364
		AUTO-O-HAND	ZBY02385
		CLOSE	ZBY02314
		DOWN	ZBY02308
		EMERGENCY STOP	ZBY02330
		FAST	ZBY02328
		FORWARD	ZBY02305
		FOR-REV	ZBY02371
		HAND	ZBY02316
		HAND-OFF-AUTO	ZBY02387
		INCH	ZBY02321
		JOG	ZBY02382
		LEFT	ZBY02310
		OFF	ZBY02312
		OFF-ON	ZBY02367
		ON	ZBY02311
		OPEN	ZBY02313
		POWER ON	ZBY02326
		RESET (red background)	ZBY02323
		RESET (black background)	ZBY02322
		REVERSE	ZBY02306
		RIGHT	ZBY02309
		RUN	ZBY02334
		SLOW	ZBY02327
		START	ZBY02303
		STOP	ZBY02304
		STOP-START	ZBY02366
		UP	ZBY02307

Table 19.176: Legends for Customer Engraving (inserts only)

Description	For use with	Color	Text Color	Catalog Number
8 x 27 mm	30 x 40 mm legend holders	Black or red background	White	ZBY0101
		White or yellow background	Black	ZBY0102
18 x 27 mm	30 x 50 mm legend holders	Black or red background	White	ZBY5101
		White or yellow background	Black	ZBY5102

Table 19.177: Legends for Factory Engraving (inserts only)

Description	For use with	Color	Text Color	Catalog Number
8 x 27 mm Custom Legend/Insert Only (Specify Engraving) 2 lines of 11 characters (including spaces) maximum per line (**Example:** ZBY01002 marked "Robot")	30 x 40 mm legend holders	Black background	White	ZBY01002
		Red background	White	ZBY01004
		White background	Black	ZBY01001
		Yellow background	Black	ZBY01005
18 x 27 mm Custom Legend/Insert Only (Specify Engraving) 3 lines of 11 characters (including spaces) maximum per line (**Example:** ZBY05002 marked "Robot")	30 x 50 mm legend holders	Black background	White	ZBY05002
		Red background	White	ZBY05004
		White background	Black	ZBY05001
		Yellow background	Black	ZBY05005

[77] Start functions: white letters on black background. Stop functions: white letters on red background (unless otherwise specified above).

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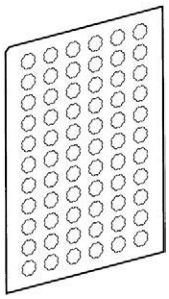

ZBY1101

ZBA●

ZBL●

ZBA●33

XB5 Accessories

Table 19.178: Sheets of Legends for Push Buttons, Switches, and Pilot Lights

Description	Marking	Text	Catalog Number
Sheets of 66 circular peel-off transparent self-adhesive legends	Blank Round		ZBY1101
	Blank–Square legends		ZBCY1101
	International	O	ZBY1146
		I	ZBY1147
		II	ZBY1148
		III	ZBY1149
		STOP	ZBY1304
		→	ZBY1912
	English	HAND	ZBY1316
		OFF	ZBY1312
		ON	ZBY1311
		START	ZBY1303
SiS Label Software	Legend Design Software: English, French, German, Spanish, Italian		XBY2U

Table 19.179: Push Button Caps—Unmarked

For use with	Type of Push	Color	Catalog Number
ZB4BA0 push button heads	Flush	White	ZBA1
		Black	ZBA2
		Green	ZBA3
		Red	ZBA4
		Yellow	ZBA5
		Blue	ZBA6
		6 colors *[78]*	ZBA9
	Extended	White	ZBL1
		Black	ZBL2
		Green	ZBL3
		Red	ZBL4
		Yellow	ZBL5
		Blue	ZBL6
		6 colors *[78]*	ZBL9

Table 19.180: Push Button Caps—Marked

For use with	Type of Push	Marking		Cap Color	Catalog Number
		Text *[79]*	Color		
ZB4BA0 push button heads	Flush	I *[80]*	White	Green	ZBA331
			Black	White	ZBA131
		START *[80]*	White	Green	ZBA333
			Black	White	ZBA133
		ON	White	Green	ZBA341
			Black	White	ZBA141
		UP *[80]*	Black	White	ZBA343
		DOWN *[80]*	White	Black	ZBA344
		⏉ *[80]*	White	Green	ZBA345
		⏉ *[80]*	White	Black	ZBA245
		◇	White	Green	ZBA346
		↑	Black	White	ZBA334 *[81]*
			White	Black	ZBA335 *[81]*
		O *[80]*	White	Red	ZBA432
				Black	ZBA232
		STOP *[80]*	White	Red	ZBA434
				Black	ZBA234
		OFF	White	Red	ZBA435
				Black	ZBA235
		R *[80]*	White	Blue	ZBA639

[78] Set of 6 different colored caps: white, black, green, red, yellow, blue.
[79] Start functions: white letters on black background. Stop functions: white letters on red background (unless otherwise specified).
[80] Double injection molded marking.
[81] Cap supplied not clipped-in, allowing orientation of arrow in any one of 4 directions: ↑, ↓, ←, or →

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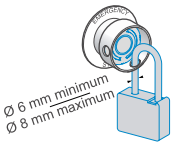
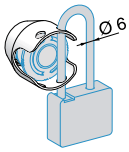
ZBA7235 ZBA7331

ZBA7432

ZBA79

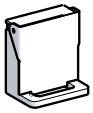


ZBZ3605



ZBZ160●

ZBZ1700


ZB4BZ6●

ZB4SZ3

ZB5SZ3

DL1CE●●●

DL1CF●●●

XBFX13

ZBZ8

ZBZ_8

Table 19.181: Multiple-head and XB5R Push Button Caps *[82]*

For use with	Type of Push	Marking	Cap Color	Catalog Number
Double push button heads Tripe push button heads ZB4RZA0 ZB5RZA0	Flush	Unmarked	White	ZBA71
		“I” black		ZBA7131
		➙ black		ZBA7134
		“+” black		ZBA7138
		Unmarked	Black	ZBA72
		“O” white		ZBA7232
		“+” white		ZBA7233
		⇨ white		ZBA7235
		“I” white		ZBA7237
		Unmarked	Green	ZBA73
		“I” white		ZBA7331
		“+” white		ZBA7333
		⇧ white		ZBA7335
		“II” white		ZBA7336
		Unmarked	Red	ZBA74
		“O” white		ZBA7432
		Unmarked	Yellow	ZBA75
		Unmarked	Blue	ZBA76
		Assorted	10 colors *[83]*	ZBA79

Table 19.182: Accessories

Description	Application	Color	Catalog Number
Padlocking kit Conforming to EN/ISO 13850 *[84]* (See legends below)	For Emergency Stop function only, with the following Ø 40 trigger-action push buttons: XB5AT8●, XB5AS8●, XB5AS9●, ZB5AT8●, ZB5AS8●, ZB5AS9●	Yellow	ZBZ3605
Metal guards Padlockable	For Emergency Stop function only with the following Ø 40 mm trigger-action push buttons: XB5AT8●, XB5AS8●, XB5AS9●, ZB5AT8● (except ZB5AT8643M), ZB5AS8●, ZB5AS9●	Chrome Plated	ZBZ1600
		Black	ZBZ1602
		Red	ZBZ1604
		Yellow	ZBZ1605
		Blue	ZBZ1606
	For Emergency Stop function with XB4 and XB5 E-Stop 30 mm and 40 mm operators	Chrome plated	ZBZ1700
Plastic guards *[85]*	Round Guard for ZB4BS5430, 2.5” dia EMO Mushroom Operators	Yellow	ZB4BZ1905
	Narrow Flange Guard for ZB4BS5430 or ZB4BS84430 EMO Mushroom Operators *[86]*	Yellow	ZB4BZ2005
	Trigger Action Guard for ZB4BS84430, 3” dia EMO Mushroom Operators	Yellow	ZB4BZ2105
Padlockable flaps	For push buttons	Black	ZB4BZ62
		Red	ZB4BZ64
Plastic blanking plug, round *[87]*	For Ø 22 mm units with round heads	Black	ZB5SZ3
Plastic blanking plug, square *[87]*	For Ø 22 mm units with square heads	Black	ZB5SZ5
Square insert	To give square appearance to ZB5A round heads	Black	ZB5AZ31
Mounting nut	Operator	—	ZB5AZ901
Tool	For tightening mounting nut ZB5AZ901	—	ZB5AZ905
Plate	Anti-rotation of head	—	ZB5AZ902
Ø 60 mm Legend for padlocking device ZBZ3605	Without	Yellow	ZBY9101T
	EMERGENCY STOP	Yellow	ZBY9330T

Table 19.183: BA9s Bulbs and Associated Accessories

Description	Characteristics	Catalog Number
Replacement bulbs (Type BA9s) Incandescent	6 V, 1.2 W	DL1CB006
	12 V, 2 W	DL1CE012
	24 V, 2 W	DL1CE024
	120–130 V, 2.4 W	DL1CE130
Neon bulbs	120–130 V, 1.8 mA	DL1CF110
	230–240 V, 1,8 mA	DL1CF220
Bulb extractor	—	XBFX13
Lens cap tightening tool	Illuminated push buttons with flush push	ZBZ8
Power driver bits for mounting and wiring (package of 5)	Cross headed screw (POZIDRIV type 1)	ZB4BZ905
Mounting Adapter	For mounting 22 mm push button in 30 mm KO	ZBZ41

Table 19.184: Bellows Seals for Harsh Environments (IP 69K) *[88]*

Description	For use with	Color & Material	Sold in Lots of	Catalog Number
Bellows seals for harsh environments (Humidity, dust, high-pressure cleaning)	Any Harmony XB4 metal, mushroom head push button Ø 40 mm or Ø 60 mm (except ZB4BR●16)	Red Silicone	2	ZBZ48
		Black EPDM	2	ZBZ28
		Black EPDM	2	ZBZ58

[82] Sold in lots of 10.
[83] Set of 10 different caps: white, black, green, red, yellow, blue, white “I” on green background, black “I” on white background, white “O” on red background, white “O” on black background.
[84] Standard circular legends are not compatible with this product. Use special legends ZBY●T listed above.
[85] For additional information, refer to publication 9001DB0601R6/06.
[86] Maximum panel thickness is 2.5 mm.
[87] Mounting nut included with blanking plug.
[88] Only when mounted on control stations. Use special legends ZBY••T.

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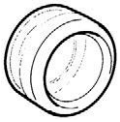
ZBDD2

ZBG455

ZBG455P


ZBP0

ZBA709

ZBV01●3

ZBV01●

Table 19.185: Boot for Standard Selector Switch Handle

Description	For use with	Catalog Number
Boot for standard handle	ZB4BD●●	ZBD D2

Table 19.186: Replacement Keys

Description	Key Number	Catalog Number
Set of 2 keys	455	ZBG455
	421E	ZBG421E
	458A	ZBG458A
	520E	ZBG520E
	3131A	ZBG3131A
Set of 2 keys, One of which is supplied booted (rubber boot)	455	ZBG455P
	421E	ZBG421EP
	458A	ZBG458AP
	520E	ZBG520EP
	3131A	ZBG3131AP

Table 19.187: Clear Boots

Description	For use with	Material	Catalog Number
Single boots	Booted push buttons with circular head	Silicone	ZBPA
	Booted push buttons with circular head used in food industry applications		ZBP0A
Double boots	Double-headed push buttons, two flush		ZBA708
	Double-headed push buttons, one flush + one projecting		ZBA710
Triple boot	Triple-headed push buttons, two flush + one projecting		ZBA709

Table 19.188: Colored boots

Description	Color	Catalog Number
Single boot (can be replaced without dismantling the head)	Black	ZB2BP012
	Green	ZB2BP013
	Red	ZB2BP014
	Yellow	ZB2BP015
	Blue	ZB2BP016

Table 19.189: Lens Caps

For use with	Color	Catalog Number
Lens caps for Protected LED™ light modules		
Pilot lights	White	ZBV0113
	Green	ZBV0133
	Red	ZBV0143
	Yellow	ZBV0153
	Blue	ZBV0163
Illuminated push buttons with flush push	White	ZBW9113
	Green	ZBW9133
	Red	ZBW9143
	Yellow	ZBW9153
	Blue	ZBW9163
Illuminated push buttons with extended push	White	ZBW9313
	Green	ZBW9333
	Red	ZBW9343
	Yellow	ZBW9353
	Blue	ZBW9363
Lens caps for BA9 light modules		
Pilot lights	White	ZBV011
	Green	ZBV013
	Red	ZBV014
	Yellow	ZBV015
	Blue	ZBV016
	Clear	ZBV017
Illuminated push buttons with flush push	White	ZBW911
	Green	ZBW913
	Red	ZBW914
	Yellow	ZBW915
	Blue	ZBW916
	Clear	ZBW917
Illuminated push buttons with extended push	White	ZBW931
	Green	ZBW933
	Red	ZBW934
	Yellow	ZBW935
	Blue	ZBW936
	Clear	ZBW937
Square lens caps for Protected LED light modules (ZB5C operators only)		
Pilot lights	White	ZBCV0113
	Green	ZBCV0133
	Red	ZBCV0143
	Yellow	ZBCV0153
	Blue	ZBCV0163
Illuminated push buttons with flush push	White	ZBCW9113
	Green	ZBCW9133
	Red	ZBCW9143
	Yellow	ZBCW9153
	Blue	ZBCW9163
Illuminated push buttons with extended push	White	ZBCW9313
	Green	ZBCW9333
	Red	ZBCW9343
	Yellow	ZBCW9353
	Blue	ZBCW9363

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XB5RFA02

ZBRT1

ZB4RZA0

ZB5RTA4

New!

XB5R Plastic and XB4R Metal Wireless, Batteryless Push Buttons

Table 19.190: Ready-to-use Packs *[89]*

Description	Transmitter Type	Voltage Receiver V	Receiver Type	Catalog Number
Packs include: - 1 push button/ transmitter - 1 receiver The push button and receiver are factory-paired *[90]*	Ø 22 mm plastic head + 1 set of 10 different colored caps	~/⎓ 24 to 240	Programmable receiver with: - 2 relay outputs type RT 3A *[91]*	XB5RFA02
	Ø 22 mm metallic head + 1 set of 10 different colored caps			XB4RFA02
	Ø 22 mm plastic head	⎓ 24	Non-programmable receiver with: - 1 relay output type RT 3A *[92]*	XB5RFB01
	Ø 22 mm metallic head			XB4RFB01
Packs include: - 1 push button/ transmitter in handy box *[93]* - 1 receiver The push button and receiver are factory-paired *[90]*	Ø 22 mm plastic head + 1 set of 10 different colored caps	~/⎓ 24 to 240	Programmable receiver with: - 2 relay outputs type RT 3A *[91]*	XB5RMA04
	Ø 22 mm metallic head + 1 operator head	⎓ 24	Non-programmable receiver with: - 1 relay output type RT 3A *[92]*	XB5RMB03

Table 19.191: Transmitter Components for Wireless, Batteryless Push Buttons

Description	Type of Push	Cap Color	Catalog Number
Transmitter for wireless, batteryless push buttons *[94]* *[95]*	1 radio frame sent at the push of the button	—	ZBRT1
	Dual Action: 1 radio frame sent at the push of the button 1 radio frame sent at therelease of the button	—	ZBRT2
Spring return push button heads for transmitter ZBRT1	Plastic	Without cap *[96]*	ZB5RZA0
	Metal	Without cap *[96]*	ZB4RZA0
Wireless, batteryless push buttons including: - a transmitter fitted with mounting collar - a spring return push button head with clipped-in cap *[97]*	Plastic	White	ZB5RTA1
		Black	ZB5RTA2
		Green	ZB5RTA3
		Green with white “I”	ZB5RTA331
		Red	ZB5RTA4
		Red with white “O”	ZB5RTA432
		Yellow	ZB5RTA5
		Blue	ZB5RTA6
	Metal	White	ZB4RTA1
		Black	ZB4RTA2
		Green	ZB4RTA3
		Green with white “I”	ZB4RTA331
		Red	ZB4RTA4
		Red with white “O”	ZB4RTA432
		Yellow	ZB4RTA5
		Blue	ZB4RTA6

[89] Wireless and batteryless push button and receiver, factory-paired.
[90] For additional components, these devices can be field-paired.
[91] Supplied with output function set to momentary. Outputs programmable to maintained and Start-Stop.
[92] Non-programmable momentary output function.
[93] Supplied with a magnet.
[94] Mounting collar ZB5AZ009 (plastic) or ZB4BZ009 (metal) to be ordered separately.
[95] Only heads ZB4RZA0 and ZB5RZA0 are mechanically compatible.
[96] Cap to be ordered separately: see Caps for Harmony Push Button Heads ZB5RZA0 and ZB4RZA0.
[97] This cap is fitted by Schneider Electric and cannot be removed (risk of damage).

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ZBRRA

ZBA7235 ZBA7331

ZBA7432

ZBA79

Table 19.192: Programmable Receivers

Description	Output Type	Voltage Receiver V	Catalog Number
Programmable receivers equipped with: - 2 buttons ("Scroll-through", "Ok") - 6 indicating LEDs (power ON, outputs, signal strength)	4 PNP outputs, 200 mA / 24 V	⎓ 24	ZBRRC
	2 relay outputs type RT 3A *[98]*	∿/⎓ 24 to 240	ZBRRD
	2 relay outputs type RT 3A *[98]*	∿/⎓ 24 to 240	ZBRRA

NOTE: Also refer to Access Point for advanced features in programmable receivers.

Table 19.193: Caps for Harmony Push Button Heads ZB5RZA0 and ZB4RZA0

Description	Background Color	Marking	Sold in lots of	Catalog Number
Sets of 10 different colored caps with identical marking *[99]*	White	Without	10	ZBA71
		"I" (black)	10	ZBA7131
		"⇕" (black)	10	ZBA7134
		"+" (black)	10	ZBA7138
	Black	Without	10	ZBA72
		"O" (white)	10	ZBA7232
		"+" (white)	10	ZBA7233
		"⇕" (white)	10	ZBA7235
		"I" (white)	10	ZBA7237
	Green	Without	10	ZBA73
		"I" (white)	10	ZBA7331
		"+" (white)	10	ZBA7333
		"⇕" white	10	ZBA7335
		"II" (white)	10	ZBA7336
	Red	Without	10	ZBA74
		"O" (white)	10	ZBA7432
	Yellow	Without	10	ZBA75
	Blue	Without	10	ZBA76
Set of 10 different colored caps with different markings *[99]*	White, black, green, red, yellow, blue, white "I" on green background, black "I" on white background, white "O" on red background, white "O" on black background		10	ZBA79

ZBRM22

ZBRACS

XALD02H7

Table 19.194: Boxes for Wireless, Batteryless Push Buttons

Description	For use with:	Marking	Sold in lots of	Catalog Number
Mobile box, plastic, empty *[100]*	For mobile and fixed applications with wireless and batteryless push buttons	1 cut-out	1	ZBRM21
		2 cut-outs	1	ZBRM22
	Support for tube or wall specific for ZBRM21 and ZBRM22	—	1	ZBRACS
Empty plastic boxes for wireless and batteryless pushbuttons *[101]*	For fixed or on-board wireless and batteryless pushbuttons	1 cut-out	1	XALD01H7
		2 cut-outs	1	XALD02H7

New!

XB5R and XB4R Accessories

Table 19.195: Accessories

Description	For use with:	Marking	Sold in lots of	Catalog Number
External antenna *[102]*	Between transmitter and receiver, used to increase the range and/or get around obstacles	∿/⎓ 24 to 240 V - 5m cable - 1 power-ON LED - 2 LEDs reception/transmission	1	ZBRA1
Mounting collar	–	Plastic	10	ZB5AZ009
		Metal	10	ZB4BZ009
Legend plate, 27 x 8 mm, for engraving	For adhering to handy box ZBRM01	Self-adhesive, blank, black background	10	ZBY0101T
External antenna access point 2 m/6.56 ft cable with 1 RF connector	Access point (ZBRN1 or ZBRN2) Used to increase the distance of transmission			ZBRA2

NOTE: The ZBRN2 has embedded communication port for Modbus Serial Line, where as ZBRN1 must be plugged with a communication module to support different protocols.

ZBRA1

ZBRA2

[98] Supplied with output function set to momentary Outputs programmable to maintained and Start-Stop.
[99] Cap can be clipped-in at 90° steps, through 360°.
[100] Cannot be used for wired contacts (no cable gland outlet).
[101] Box equipped with cable gland outlets, compatible with Harmony ZB5 push button heads.
[102] Not wired to the receiver.

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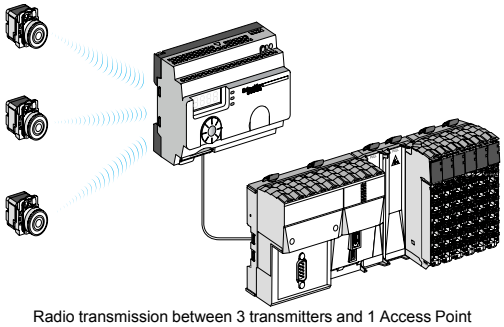
New!

ZBRN1 and ZBRN2 Access Points

The access point of Harmony wireless and batteryless range provides network connectivity openness by operating as an intermediate equipment between the transmiter and the PLC (Programmable Logic Controller). The access point receives radio signals from the transmitters and converts them to communication protocols. Based on the model, it is connected to the PLC using either RS485 Modbus Serial line or Modbus/TCP protocol.

The access point can be used with transmitters such as XB4R and XB5R wireless and batteryless push buttons, rope pull switch, mushroom head pushbutton (1), and all PLCs that support Modbus Serial line over RS485 or Modbus/TCP protocols.

Depending on the application, an external or a relay antenna can be used to improve signal reception. An access point can support up to 60 radio transmitters



Radio transmission between 3 transmitters and 1 Access Point

ZBRN2

ZBRN1

ZBRCETH

Table 19.196: Configurable Access Points

Description	Data Function	Output Type	Receiver Voltage (V)	Catalog Number
Configurable access points equipped with: - 7-segment display - jog dial - 8 indicating LEDs (power ON, functions mode, communication status, signal strength) - external antenna connector and protective plug	Monostable (adjustable from 100 ms to 1 s)	2 RS485 connectors that provides connectivity for Modbus RS485 Serial line	~/⎓ 24 to 240	ZBRN2
	Monostable (adjustable from 100 ms to 1 s)	1 slot for communication module ZBRCETH (should be ordered separately)	~/⎓ 24 to 240	ZBRN1

Table 19.197: Communication Module

Description	Characteristics	Communication Port	Catalog Number
Modbus/TCP network communication module	Modbus/TCP protocol with embedded Web pages in 5 languages for configuration, monitoring and diagnostics	2 RJ45 connectors that provides connectivity for daisy chain and daisy chain loop operation	ZBRCETH

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Stand-alone biometric switch
(XB5S1/XB5S2)

Stand-alone USB biometric switch
(XB5S3/XB5S4)

USB biometric switch dedicated to Schneider HMI
(XB5S5)

Biometric Switches

The biometric switches of the Harmony® XB5S range are designed to control and secure access to systems and machines by checking users' authorization through fingerprint recognition.

The following types of biometric switches are available:

- Stand-alone biometric switches
  - type XB5S1, with 2 fixed states (bistable)
  - type XB5S2, with pulse control (monostable)
- Stand-alone USB biometric switches
  - type XB5S3, with 2 fixed states (bistable)
  - type XB5S4, with pulse control (monostable)
- USB biometric switches dedicated to Schneider HMI
  - type XB5S5, connected permanently with HMI

The biometric switches are aimed at 2 categories:

- Administrators, who decide and manage the list of users
  - the only people who can record the fingerprints in the device memory
- Users, who are authorized to use the biometric switch as a control unit
  - at least 1 of their fingerprints should be recorded in the device memory
  - access is granted when the finger is placed on the sensing screen

The USB switches communicate with the PC/HMI via the USB port to manage the user database. This database can be visualized, saved, and duplicated by PC/HMI with XB5SSoft application *[103] [104]*. The fingerprint records can also be erased in the absence of users.

The Schneider HMI *[105]* with VijeoDesigner software *[106]* enables the switches to authorize different access levels and trace HMI operations of each user.

The switch operates on 24 Vdc and provides protection against:

- Reverse polarity
- Overload and short-circuit (switching capacity ≤ 200 mA)

Mounting

The product is of monolithic design (a single plastic housing) and is mounted by means of a nut (hand-tightened without need for tools) in a standard 22.5 mm/0.886 in. diameter hole. It can be installed on a flat, horizontal, or vertical surface.

A protective cover is available as an accessory to protect the active face of the sensing screen. This cover is mounted using a self-adhesive hinge.

A Female/Female USB extension cable makes it possible for the USB biometric switch to have the female USB port within a 22 mm/0.866 in. diameter hole on the control panel front.

Environment

- Conformity to standards: UL, CSA, GOST, and CE
- Product certifications:
  - CSA C22-2 No. 14
  - UL 508
  - IEC 61000-6-2 and IEC 61000-6-4
- Degree of protection conforming to standard IEC 60529:
  - IP 65
  - NEMA 12
- Ambient air temperature:
  - For storage: -13 to 158°F (-25 to 70° C)
  - For operation: 23 to 122°F (-5 to 50° C)

[103] Compatible with all versions of Harmony XB5SSoft application. The XB5SSoft is a freeware application and can be downloaded from our website www.schneider-electric.com.
[104] The user database cannot be uploaded from USB biometric switch to the PC.
[105] Compatible with Magelis iPC, STU, OT, GXO, GT (except GT1000 series), GK, GH, and GTO models .
[106] Compatible with VijeoDesigner HMI editor software V6.1, Service pack 2.

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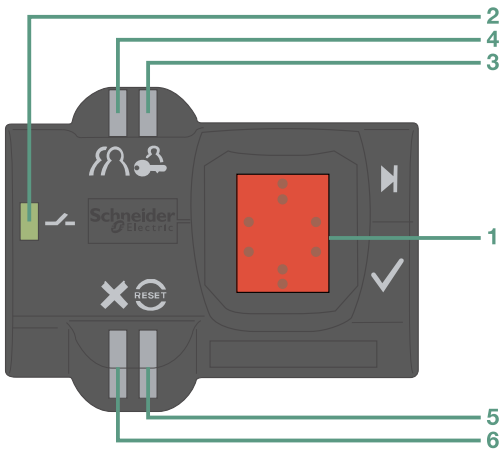

Description

- The stand-alone biometric switch (XB5S1/XB5S2) consists of a dark gray housing, with the following on its front face:
  - A sensing screen **1** that allows the registration and subsequent recognition of the registered fingerprints,
  - A green LED output state indicator **2** that illuminates when the output is activated (solid-state N.O. contact),
  - An orange LED **3**, indicating an administrator's "Registration" mode,
  - An orange LED **4**, indicating an operator's "Registration" mode,
  - A red "RESET" LED **5** which indicates, in "Delete" mode, that the administrator is deleting all or part of the memory,
  - A red LED **6** which flashes when the reader is presented with an "unrecognized" fingerprint or in the event of incorrect operation.
- The stand-alone USB biometric switch (XB5S3/XB5S4) consists of a dark gray housing with a sensing screen **1** for fingerprints, a green LED **2** for indicating the output state, and a red LED **6** for the unrecognized fingerprint on its front face.
- The USB biometric switch dedicated to Schneider HMI (XB5S5) consists of a dark gray housing with a sensing screen **1** for fingerprints on its front face.

Table 19.198: Biometric Switch Catalog Numbers

Description	Connection	Catalog Number
Bistable biometric switch 24 V DC PNP output	By 2 m/6.56 ft cable	XB5S1B2L2
	By M12 connector	XB5S1B2M12
Monostable biometric switch 24 V DC PNP output	By 2 m/6.56 ft cable	XB5S2B2L2
	By M12 connector	XB5S2B2M12
Bistable USB biometric switch 24 V DC PNP output	By 2 m/6.56 ft cable	XB5S3B2L2
	By M12 connector	XB5S3B2M12
Monostable USB biometric switch 24 V DC PNP output	By 2 m/6.56 ft cable	XB5S4B2L2
	By M12 connector	XB5S4B2M12
USB biometric switch dedicated to Schneider HMI 24 V DC	By 2 m/6.56 ft cable	XB5S5B2L2

Table 19.199: Accessories

Description	Function	Catalog Number
Female/Female USB extension cable with Ø 22 mm/0.866 in. female USB port on one end	For connecting biometric switch to the PC via the Ø 22 mm/0.866 in. hole on the control panel front	XB5SFFUSBEXT
Protective cover, translucent and self-adhesive	Protection of sensing screen	ZB5SZ70
Mounting nut, Ø 22 mm/0.866 in.	Spare part	ZB5SZ71
Legend plate, 27 x 8 mm/ 1.06 x 0.32 in., self-adhesive, blank, black background, for engraving	—	ZBY0101T
Stainless-steel protective cover	Protects switch from outside elements and vandalism	ZB5SZ72

XB5S1B••••

XB5S3B••••

XB5SFFUSBEXT

ZB5SZ70

ZB5SZ72

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XB7NA31

XB7NL4●

XB7NH2●

XB7NA3133

XB7NA4234

XB7NL4232

New!

XB7 Push Buttons

Table 19.200: Push Buttons Without Marking

Shape of Head	Type of Push Button	Type of Contact		Marking		Color of Push Button	Sold in Lots of	Catalog Number
		N.O.	N.C.	Text	Color			
Spring return push button without marking								
	Flush	1	—	—	—	White	10	XB7NA11
		1	—	—	—	Black	10	XB7NA21
		1	—	—	—	Green	10	XB7NA31
		1	—	—	—	Yellow	10	XB7NA81
		1	1	—	—	White	10	XB7NA15
		1	1	—	—	Black	10	XB7NA25
		1	1	—	—	Green	10	XB7NA35
		1	1	—	—	Red	10	XB7NA45
		1	1	—	—	Blue	10	XB7NA65
		1	1	—	—	Yellow	10	XB7NA85
		—	1	—	—	Red	10	XB7NA42
		2	—	—	—	Black	10	XB7NA23
		2	—	—	—	Green	10	XB7NA33
		—	2	—	—	Red	10	XB7NA44
	Projecting	—	1	—	—	Red	10	XB7NL42
		1	1	—	—	Red	10	XB7NL45
		—	2	—	—	Red	10	XB7NL44
Latching push button without marking								
	Flush	1	—	—	—	Black	10	XB7NH21
		1	—	—	—	Green	10	XB7NH31
		1	1	—	—	Black	10	XB7NH25
		1	1	—	—	Green	10	XB7NH35
		1	—	—	—	Yellow	10	XB7NH81

Table 19.201: Push Buttons With Marking

Shape of Head	Type of Push Button	Type of Contact		Marking		Color of Push Button	Sold in Lots of	Catalog Number
		N.O.	N.C.	Text	Color			
Spring return push button with marking								
	Flush	1	–	I	White	Green	10	XB7NA3131
		1	–	II	White	Green	10	XB7NA3136
		1	–	START	White	Green	10	XB7NA3133
		1	–	⇓	Black	White	10	XB7NA11343
		1	–	⇑	Black	White	10	XB7NA11341
		1	–	⇩	White	Black	10	XB7NA21343
		1	–	⇧	White	Black	10	XB7NA21341
		–	1	O	White	Red	10	XB7NA4232
		–	1	STOP	White	Red	10	XB7NA4234
		2	–	I	White	Green	10	XB7NA3331
		2	–	II	White	Green	10	XB7NA3336
		2	–	START	White	Green	10	XB7NA3333
		1	1	O	White	Red	10	XB7NA4532
		1	1	STOP	White	Red	10	XB7NA4534
		1	1	⇓	Black	White	10	XB7NA15343
		1	1	⇑	Black	White	10	XB7NA15341
		1	1	⇩	White	Black	10	XB7NA25343
		1	1	⇧	White	Black	10	XB7NA25341
	Projecting	–	1	O	White	Red	10	XB7NL4232
		–	1	STOP	White	Red	10	XB7NL4234
		1	1	O	White	Red	10	XB7NL4532
		1	1	STOP	White	Red	10	XB7NL4534

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XB7NW33●1

New!

XB7 Illuminated Push Buttons with Projecting Push

Table 19.202: With Integral LED

Shape of head	Type of push and contacts	Color of lens	Sold in lots of	Unit reference by supply voltage *[107]*		
				24 V ∿/⎓	120 V ∿	230 V ∿
	Spring return push with N.O. and N.C. contacts *[107]*	Green	10	XB7NW33B1	XB7NW33G1	XB7NW33M1
		Red	10	XB7NW34B1	XB7NW34G1	XB7NW34M1
			10	XB7NW34B2	XB7NW34G2	XB7NW34M2
		Orange	10	XB7NW35B1	XB7NW35G1	XB7NW35M1
		Blue	10	XB7NW36B1	XB7NW36G1	XB7NW36M1
		Clear	10	XB7NW37B1	XB7NW37G1	XB7NW37M1
		Yellow	10	XB7NW38B1	XB7NW38G1	XB7NW38M1
	Latching push	Green	10	XB7NJ03B1	XB7NJ03G1	XB7NJ03M1
		Red	10	XB7NJ04B1	XB7NJ04G1	XB7NJ04M1
			10	XB7NJ04B2	XB7NJ04G2	XB7NJ04M2
		Orange	10	XB7NJ05B1	XB7NJ05G1	XB7NJ05M1
		Blue	10	XB7NJ06B1	XB7NJ06G1	XB7NJ06M1
		Clear	10	XB7NJ07B1	XB7NJ07G1	XB7NJ07M1
		Yellow	10	XB7NJ08B1	XB7NJ08G1	XB7NJ08M1

XB7NW3361

Table 19.203: With BA 9s Base Fitting *[108]*

Shape of head	Type of push	Type of contact		Color of lights	Sold in lots of	Catalog Number 250 V ∿
		N.O.	N.C.			
	Spring return	1	–	Green	10	XB7NW3361
		1	–	Red	10	XB7NW3461
		1	–	Orange	10	XB7NW3561
		1	–	Blue	10	XB7NW3661
		1	–	Clear	10	XB7NW3761
		1	–	Yellow	10	XB7NW3861
	Latching	1	–	Green	10	XB7NJ0361
		1	–	Red	10	XB7NJ0461
		1	–	Orange	10	XB7NJ0561
		1	–	Blue	10	XB7NJ0661
		1	–	Clear	10	XB7NJ0761
		1	–	Yellow	10	XB7NJ0861

XB7EV08●P

New!

XB7 Pilot Lights

Table 19.204: With Integral LED

Shape of head	Type of light source (included)	Color of lens	Sold in lots of	Catalog Number by supply voltage *[109]*		
				24 V ∿/⎓	120 V ∿	230 V ∿
	Integral LED	Green	10	XB7EV03BP	XB7EV03GP	XB7EV03MP
		Red	10	XB7EV04BP	XB7EV04GP	XB7EV04MP
		Yellow	10	XB7EV05BP	XB7EV05GP	XB7EV05MP
		Blue	10	XB7EV06BP	XB7EV06GP	XB7EV06MP
		Clear	10	XB7EV07BP	XB7EV07GP	XB7EV07MP
		Orange	10	XB7EV08BP	XB7EV08GP	XB7EV08MP

XB7EV75P

Table 19.205: With BA 9s base fitting

Shape of head	Supply	Color of lens	Sold in lots of	Catalog Number *[109]*	
				With bulb	Without bulb
	With resistor, for 130 V, 2.6 W bulb Supply voltage: 230 V ∿, 50-60 Hz	Green	10	XB7EV73P	XB7EV730P
		Red	10	XB7EV74P	XB7EV740P
		Yellow	10	XB7EV75P	XB7EV750P
		Blue	10	XB7EV76P	XB7EV760P
		Clear	10	XB7EV77P	XB7EV770P
		Orange	10	XB7EV78P	XB7EV780P
	Direct for BA 9s base fitting incandescent bulb Supply voltage: ≤ 250 V *[110]*	Green	10	–	XB7EV63P
		Red	10	–	XB7EV64P
		Yellow	10	–	XB7EV65P
		Blue	10	–	XB7EV66P
		Clear	10	–	XB7EV67P
		Orange	10	–	XB7EV68P

[107] All product references ending in "1" are for products with "NO" contacts (example: XB7NW34B1). All product references ending in "2" are for products with "NC" contacts (example: XB7NW34B2).
[108] Bulb, 1.2 W maximum, to be ordered separately
[109] For Faston connection version (1 x 6.35 mm and 2 x 2.8 mm), add the number "3" to the end of the reference. Example: XB7EV07BP becomes XB7EV07BP3.
[110] Bulb characteristics for direct supply pilot lights: 250 V, 2.6 W.

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XB7ND2●

XB7NG33

New! XB7 Selector Switches and Key Switches

Table 19.206: Title

Shape of head	Type of operator	Type of contact N.O.	Type of contact N.C.	Number and type of positions		Sold in lots of	Catalog Number
	Standard handle, black	1	—	2, maintained		10	XB7ND21
		1	1	2, maintained		10	XB7ND25
		2	—	3, maintained		10	XB7ND33
	Key (key No. 455)	1	—	2, key withdrawal in LH position		10	XB7NG21
		2	—	3, key withdrawal in center position		10	XB7NG33

NOTE: The symbol ⚷ indicates key withdrawal position(s).

XB7NS84●

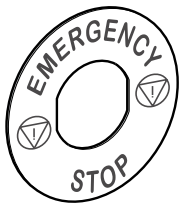
New! XB7 Mushroom Head Push Buttons

Table 19.207: Ø 40 mm Emergency Stop Trigger Action and Mechanically Latching Mushroom Head Pushbuttons

Shape of head	Type of push	Standards	Type of contact N.O.	Type of contact N.C.	Color	Sold in lots of	Catalog Numbers
	Turn to release	EN/IEC 60204-1, EN/ISO 13850, EN/IEC 60947-5-5, Machinery directive 2006/42/EC and UL	–	1	Red	10	XB7NS8442
			1	1	Red	10	XB7NS8445
			–	2	Red	10	XB7NS8444
	Push-pull		–	1	Red	10	XB7NT842
			1	1	Red	10	XB7NT845
			–	2	Red	10	XB7NT844
	Key release (n° 455)		–	2	Red	10	XB7NS9444
			–	1	Red	10	XB7NS9445

Table 19.208: Circular Legends, Yellow, For Mushroom Head Push Buttons

Used for "Emergency Stop" function *[111]*			
Conforming to Standards	**Diameter (mm)**	**Marking on Yellow Background**	**Catalog Number**
EN/IEC 60204-1 and EN/ISO 13850 *[111]*	60	ARRET D'URGENCE	ZBY9130
		EMERGENCY STOP	ZBY9330
		NOT-HALT	ZBY9230
		PARADA DE EMERGENCIA	ZBY9430
		ARRESTO DE EMERGENZA	ZBY9630
	90	ARRET D'URGENCE	ZBY8130
		EMERGENCY STOP	ZBY8330
		PARADA DE EMERGENCIA	ZBY8430
		ARRESTO DE EMERGENZA	ZBY8630



ZBY9330

[111] For compliance with standard EN/ISO 13850, paragraph 4.4.6, the Emergency stop logo has been added.

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New!

XB7 Legend Holders and Legends

Table 19.209: Standard (30 x 40 mm) Legend Holders for 8 x 27 mm Legends

Text	Sold in lots of	Catalog Number
Without legend	10	ZBZ32

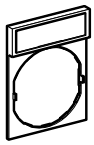

ZBY2101

Table 19.210: Legend Holder, 30 x 40 mm with Legend (black or red background)

Text	Sold in lots of	Catalog Number
With blank legend		
Without legend	10	ZBY2101
With marked legend (sold singly)		

Start functions: White characters on black background.
Stop functions: White characters on red background.

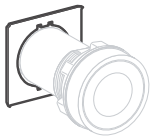
Text	Catalog Number	Text	Catalog Number
Auto	ZBY2115	Reset	ZBY2323
Down	ZBY2308	Reverse	ZBY2306
Forward	ZBY2305	Right	ZBY2309
Hand	ZBY2316	Start	ZBY2303
Inch	ZBY2321	Stop	ZBY2304
Left	ZBY2310	Up	ZBY2307
Off	ZBY2312	O	ZBY2146
On	ZBY2311	I	ZBY2147
Power on	ZBY2326	O-I	ZBY2178

Table 19.211: Standard (30 x 50 mm) Legend Holders for 18 x 27 mm Legends

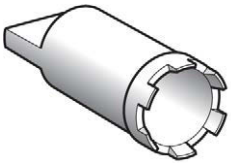
Text	Sold in lots of	Catalog Number
Without legend	10	ZBZ33

New!

XB7 Accessories


ZB5AZ902

ZB5AZ901


ZB5AZ905

ZB5SZ3

DL1CE•••

DL1CF•••

Table 19.212: XB7 Push Button Accessories

Description	Color	Sold in lots of	Catalog Number
Anti-rotation plate	—	10	ZB5AZ902
Mounting nut	—	10	ZB5AZ901
Mounting nut tightening tool	—	1	ZB5AZ905
Grooved lenses for BA 9s pilot lights	White	10	ZB7EV01
	Green	10	ZB7EV03
	Red	10	ZB7EV04
	Yellow	10	ZB7EV05
	Blue	10	ZB7EV06
	Clear	10	ZB7EV07
	Orange	10	ZB7EV08
Plastic circular blanking plug (with mouinting nut)	Black	10	ZB5SZ3

Table 19.213: BA 9s Bulbs

Description	Voltage (V)	Power (W)	Sold in lots of	Catalog Number
Incandescent bulbs, long life Ø 11 mm max. length 28 mm max.	6	1.2	10	DL1CB006
	24	2.0	10	DL1CE024
	130	2.6	10	DL1CE130
Neon bulbs	120–130	—	10	DL1CF110
	230–240	—	10	DL1CF220

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Type K Heavy Duty Operators

Table 19.214: Non-Illuminated Momentary Push Button Operators

Description		Color	Operator with 1 N.O. and 1 N.C. Contact (KA1) *[1]*	Operator with 1 N.O. Contact (KA2) *[1]*	Operator with 1 N.C. Contact (KA3) *[1]*	Operator Only with No Contacts *[1]*
9001KR1B	Full Guard	Black	KR1BH13	KR1BH5	KR1BH6	KR1B
		Red	KR1RH13	KR1RH5	KR1RH6	KR1R
		Green	KR1GH13	KR1GH5	KR1GH6	KR1G
		Universal *[2]*	KR1UH13	KR1UH5	KR1UH6	KR1U
		Other *[3]*	KR1■H13	KR1■H5	KR1■H6	KR1■
9001KR3B	No Guard	Black	KR3BH13	KR3BH5	KR3BH6	KR3B
		Red	KR3RH13	KR3RH5	KR3RH6	KR3R
		Green	KR3GH13	KR3GH5	KR3GH6	KR3G
		Universal *[2]*	KR3UH13	KR3UH5	KR3UH6	KR3U
		Other *[3]*	KR3■H13	KR3■H5	KR3■H6	KR3■
9001KR2B	Extended Guard	Black	KR2BH13	KR2BH5	KR2BH6	KR2B
		Red	KR2RH13	KR2RH5	KR2RH6	KR2R
		Green	KR2GH13	KR2GH5	KR2GH6	KR2G
		Universal *[2]*	KR2UH13	KR2UH5	KR2UH6	KR2U
		Other*[3]*	KR2■H13	KR2■H5	KR2■H6	KR2■
9001KR4B	1-3/8 in. (35 mm) Diameter Mushroom Button	**Snap-In Plastic Mushroom Button**				
		Black	KR4BH13	KR4BH5	KR4BH6	KR4B
		Red	KR4RH13	KR4RH5	KR4RH6	KR4R
		Red *[4]*	KR4R05H13	KR4R05H5	KR4R05H6	KR4R05
		Green	KR4GH13	KR4GH5	KR4GH6	KR4G
		Other *[3]*	KR4■H13	KR4■H5	KR4■H6	KR4■
		Screw-On Mushroom Button with Set Screw Security, Plastic Head				
		Black	KR24BH13	KR24BH5	KR24BH6	KR24B
		Red	KR24RH13	KR24RH5	KR24RH6	KR24R
		Green	KR24GH13	KR24GH5	KR24GH6	KR24G
		Other*[3]*	KR24■H13	KR24■H5	KR24■H6	KR24■
9001KR24BM	1-1/2 in. (40 mm) Diameter Mushroom Button	**Screw-On Metal Mushroom Button with Set Screw Security**				
		Black	—	—	—	9001KR24BM
		Red	—	—	—	9001KR24RM
		Green	—	—	—	9001KR24GM
9001KR5B	2-1/4 in. (57 mm) Diameter Mushroom Button	**Snap-In Plastic Mushroom Button**				
		Black	KR5BH13	KR5BH5	KR5BH6	KR5B
		Red	KR5RH13	KR5RH5	KR5RH6	KR5R
		Red *[4]*	KR5R05H13 *[4]*	KR5R05H5 *[4]*	KR5R05H6 *[4]*	KR5R05 *[4]*
		Green	KR5GH13	KR5GH5	KR5GH6	KR5G
		Other*[3]*	KR5■H13	KR5■H5	KR5■H6	KR5■
		Screw-On Mushroom Button with Set Screw Security, Plastic Head				
		Black	KR25BH13	KR25BH5	KR25BH6	KR25B
		Red	KR25RH13	KR25RH5	KR25RH6	KR25R
		Green	KR25GH13	KR25GH5	KR25GH6	KR25G
		Other*[3]*	KR25■H13	KR25■H5	KR25■H6	KR25■
9001KR25BM	2-3/8 in. (60 mm) Diameter Mushroom Button	**Screw-On Metal Mushroom Button with Set Screw Security**				
		Black	—	—	—	9001KR25BM
		Red	—	—	—	9001KR25RM
		Green	—	—	—	9001KR25GM

NOTE: To select contact blocks, light modules, and accessories, see Type KA Contact Blocks, page 19-90.

Table 19.215: Color Codes

Color	KR1, 2, 3 Place Color Code in Type Number	KR4, 5, 24, 25 Place Color Code in Type Number
Blue	L	L
Yellow	Y	Y
White	W	—
Orange	S	S
Gray	E	—

NOTE: For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92. Contact blocks and legend plate not included unless otherwise noted.

[1] When ordering, add prefix 9001 to the catalog number.
[2] The universal push button operators contain one each of the following color inserts: black, red, green, yellow, orange, blue and white.
[3] ■ Choose color code fromTable 19.217 Color Codes for Type K Operators, page 19-73.
[4] Knob has the words “Emergency Stop” in raised letters highlighted in white for readability.

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Table 19.216: 30 mm Multifunction Operators

Description *[5]*		Color	With 2 N.C. Contacts (1 KA3, 1 KA5) *[6]*	With 1 N.O. & 1 N.C. Contact (1 KA1) *[6]*	Without Contacts *[6] [7]*
Non-Illuminated Push-Pull Mushroom Operators					
KR9R94H13 Set Screw Style	Position, Plastic Head 1-5/8 in. (40 mm), Screw-0n Momentary Pull Maintained Neutral Momentary Push *[8]*	Red Green Other *[9]*	KR8RH25 KR8GH25 KR8▼H25	— — —	KR8R KR8G KR8▼
	2 Position, Plastic Head 1-5/8 in. (40 mm), Screw-0n Maintained Pull Maintained Push *[10]*	Red *[11]* Green Other *[9]*	— — —	KR9RH13 KR9GH13 KR9▼H13	KR9R KR9G KR9▼
	2 Position , Plastic Head 1-5/8 in. (40 mm), Screw-0n Head with Set Screw Maintained Pull Maintained Push *[10]*	Red	—	KR9R94H13	KR9R94
9001KR9RM94	2 Position, Metal Head 1-1/2 in. (40 mm) Diameter	Black Red Green	— — —	—	9001KR9BM94 9001KR9RM94 9001KR9GM94
9001KR9RM95	2 Position, Metal Head 2-3/8 in. (60 mm) Diameter	Black Red Green	— — —	—	9001KR9BM95 9001KR9RM95 9001KR9GM95
Description		**Color**	**With 1 N.O. & 1 N.C. Contact (KA1)**	**With 2 N.O. & 2 N.C. Contacts (KA2)**	**Without Contacts**
Non-Illuminated Turn-to-Release Mushroom Operators					
9001KR16H2 Trigger Action	2 Position, Plastic Head Turn-to-Release Trigger Action	Red	KR16H13	KR16H2	KR16

9001KR9P1
1.625 in. Diameter Knob
For 1-3/8 in. or 2-1/4 in. Diameter Knob *[5]*
Includes Type KN379
Legend Plate Marked
Pull To Start Push To Stop

Screw-On Plastic Illuminated Push-Pull Mushroom Operators *[6] [12] [9]*				
Description *[5]*	Voltage	With Red Knob and 2 N.C. Contacts (1 KA3, 1 KA5)	With Other Color Knob and 2 N.C. Contacts (1 KA3, 1 KA5)	With Other Color Knob Without Contacts *[7]*
3 Position Illuminated Momentary Pull Maintained Neutral Momentary Push *[8]*	110-120 V, 50-60 Hz Other—Transformer, LED, Flashing *[13]* Other—Full Voltage, Resistor, Neon *[14]*	KR8P1RH25 KR8P▲RH25 KR8P▲RH25	KR8P1▼H25 KR8P▲▼H25 KR8P▲▼H25	KR8P1▼ KR8P▲▼ KR8P▲▼
Description *[5]*	Voltage	With Red *[11]* Knob & 1 N.O. & 1 N.C. Contact (KA1)	With Other Color Knob and 1 N.O. & 1 N.C. Contact (KA1)	With Other Color Knob Without Contacts
2 Position Illuminated Maintained Pull Maintained Push	110–120 V, 50–60 Hz Other—Transformer, LED, Flashing *[13]* Other—Full Voltage, Resistor, Neon *[14]*	KR9P1RH13 KR9P▲RH13 KR9P▲RH13	KR9P1▼H13 KR9P▲▼H13 KR9P▲▼H13	KR9P1▼ KR9P▲▼ KR9P▲▼

Table 19.217: Color Codes for 30 mm Multifunction Operators ▼

Color	KR8, KR9
Black *[15]*	B
Red	R
Green	G
Blue	L
Yellow	Y
White	W
Orange *[15]*	S
Clear	C
Amber	A
Gray	—

Table 19.218: Contact Sequences

9001 KR8RH1 or H13				
		Pull	Ctr	Push
(KA1)	KA3	X	O	O
	KA2	O	O	X

9001 KR8RH25			
KA3	X	O	O
KA5	X	X	O
KA2	O	O	X

NOTE: To select contact blocks, light modules, and accessories, see Type KA Contact Blocks, page 19-90.

[5] For 1-3/8 in. or 2-1/4 in. Dia. Knob:
a) Order Type -20 or -21 knob from Additional Accessories for Type K and SK Operators, page 19-99.
b) Order 9001K54 adapter—allows Type -20 or -21 knob to fit on push pull operators. Voids UL and NEMA 6 rating.
c) Can order assembled operator by adding color code to Type -20 or -21. **Example: 9001KR9R** would be **9001KR9R20** or **9001KR9R21**.
[6] When ordering, add prefix 9001 to the catalog number.
[7] These operators can be ordered complete with contact blocks. For maximum block usage, see Table 19.280 "H" Codes, page 19-93. Add the chosen "H" number to the end of the operator.
[8] For contact sequences, see Table 19.218 Contact Sequences, page 19-73
[9] ▼ Choose one color from the Color Codes table here, and insert the color code in Type number. **Example: KR9** with a yellow knob = **KR9Y**
[10] For color codes, see Color Codes for 30 mm Multifunction Operators, page 19-73.
[11] To obtain a red knob with "Push Emergency Stop" printed on the red knob—substitute "R05" in place of "R"
[12] ▲ Add the voltage assembly code as chosen from Table 19.274 Standard Light Modules for Types K, SK, and KX Control Units, page 19-91. **Example: KR8P** with a 277 V 50–60 Hz voltage = **KR8P8**.
[13] The knob must be the same color as the LED light module chosen, for example, for a green LED, use a green knob.
[14] On neon light modules, use clear knobs only.
[15] These colors are not available on illuminated push-pull operators.

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Table 19.219: Illuminated Momentary Push Button Operators

Description		Voltage and Frequency	Style	With Red Color Cap and 1 N.O. and 1 N.C. Contact (KA1) *[16]*	With Green Color Cap and 1 N.O. and 1 N.C. Contact (KA1) *[16]*	With Other Color Cap Without Contact Block *[17] [18] [16]*
9001K1L1	Full Guard Illuminated Push Button Clear Plastic Top	110–120 V, 50–60 Hz	Transformer	K1L1RH13	K1L1GH13	K1L1▼
		220–240 V, 50–60 Hz	Transformer	K1L7RH13	K1L7GH13	K1L7▼
		24–28 Vac/Vdc	Full Voltage	K1L35RH13	K1L35GH13	K1L35▼
		For other voltages*[19]*■	Transformer or Flashing	K1L■RH13	K1L■GH13	K1L■▼
			Full Voltage	K1L■RH13	K1L■GH13	K1L■ *[18]*
			Resistor or Neon*[20]*	K1L■RH13	K1L■GH13	K1L■▼
			LED *[21]*	K1L■RH13	K1L■GH13	K1L■▼
9001K3L1	Full Guard Illuminated Push Button Metal Top	110–120 V, 50–60 Hz	Transformer	K3L1RH13	K3L1GH13	K3L1▼
		220–240 V, 50–60 Hz	Transformer	K3L7RH13	K3L7GH13	K3L7▼
		24–28 Vac/Vdc	Full Voltage	K3L35RH13	K3L35GH13	K3L35▼
		For other voltages*[19]*■	Transformer or Flashing	K3L■RH13	K3L■GH13	K3L■▼
			Full Voltage	K3L■RH13	K3L■GH13	K3L■ *[18]*
			Resistor or Neon *[20]*	K3L■RH13	K3L■GH13	K3L■▼
			LED *[21]*	K3L■RH13	K3L■GH13	K3L■▼
9001K2L1	No Guard Illuminated Push Button	110–120 V, 50–60 Hz	Transformer	K2L1RH13	K2L1GH13	K2L1▼
		220–240 V, 50–60 Hz	Transformer	K2L7RH13	K2L7GH13	K2L7▼
		24–28 Vac/Vdc	Full Voltage	K2L35RH13	K2L35GH13	K2L35▼
		For other voltages*[19]*■	Transformer or Flashing	K2L■RH13	K2L■GH13	K2L■ *[18]*
			Full Voltage	K2L■RH13	K2L■GH13	K2L■▼
			Resistor or Neon *[20]*	K2L■RH13	K2L■GH13	K2L■▼
			LED *[21]*	K2L■RH13	K2L■GH13	K2L■▼
9001K2LR20	1-3/8 in. (35 mm) Illuminated Mushroom, Screw-On Plastic Head	110–120 V, 50–60 Hz	Transformer	K2L1R20H13	K2L1G20H13	Order K2L ■▼ Above *[22]*
		220–240 V, 50–60 Hz	Transformer	K2L7R20H13	K2L7G20H13	
		24–28 Vac/Vdc	Full Voltage	K2L35R20H13	K2L35G20H13	
		For other voltages*[19]*■	Transformer or Flashing	K2L■R20H13	K2L■G20H13	
			Full Voltage	K2L■R20H13	K2L■G20H13	
			Resistor or Neon *[20]*	K2L■R20H13	K2L■G20H13	
			LED *[21]*	K2L■R20H13	K2L■G20H13	
9001K2LR21	2-1/4 in. (57 mm) Illuminated Mushroom, Screw-On Plastic Head	110–120 V, 50–60 Hz	Transformer	K2L1R21H13	K2L1G21H13	Order K2L■▼ Above *[22]*
		220–240 V, 50–60 Hz	Transformer	K2L7R21H13	K2L7G21H13	
		24–28 Vac/Vdc	Full Voltage	K2L35R21H13	K2L35G21H13	
		For other voltages*[19]*■	Transformer or Flashing	K2L■R21H13	K2L■G21H13	
			Full Voltage	K2L■R21H13	K2L■G21H13	
			Resistor or Neon *[20]*	K2L■R21H13	K2L■G21H13	
			LED *[21]*	K2L■R21H13	K2L■G21H13	

NOTE: To select contact blocks, light modules, and accessories, see Type KA Contact Blocks, page 19-90.

Table 19.220: Color Caps

Color	Color Codes▼		
	K1L, K2L, K3L	1-3/8 in. Mushroom	2-1/4 in. Mushroom
Red	R	R20	R21
Green	G	G20	G21
Blue	L	L20	L21
Yellow	Y	Y20	Y21
White	W	W20	W21
Clear	C	C20	C21
Amber	A	A20	A21

NOTE: UL Types 4, 13/NEMA 4, 13 For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92. Contact blocks and legend plate not included unless otherwise noted.

[16] When ordering, add prefix 9001 to the catalog number.
[17] These operators can be ordered complete with contact blocks. For maximum block usage, see Table 19.280 "H" Codes, page 19-93. Add the "H" number to the end of the operator type number.
[18] Add the color code as chosen from the color cap table. **Example: K2L25 with a blue 1–3/8 in. mushroom button = K2L25L20**.
[19] ■ Add the voltage assembly code as chosen from Standard and Shallow Depth Light Modules, page 19-91. **Example: K2L** with 240 Vac/Vdc = **K2L25**.
[20] On neon light modules, use clear color caps only.
[21] The cap must be the same color as the LED light module chosen, e.g., for red LED, use red color cap.
[22] The only difference between a no guard (K2L_) operator and mushroom button operator is the color cap.

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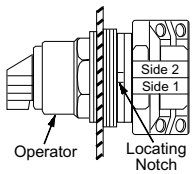
9001K 2-Position Selector Switches

Table 19.221: 2-Position Selector Switches

Contact Block Required						1 — Contact Closed 0 — Contact Open			
Contact Block Position	Quantity and Type KA1 or KA2 or KA3			Mount on Side KA1 or KA2 or KA3			Left	Right	Left	Right
 **Top View**	KA1	or	KA3	KA1 #2	or	KA3 #2	1	0	0	1
			KA2			KA2 #2	0	1	1	0
	KA1	or	KA3	KA1 #1	or	KA3 #1	1	0	0	1
			KA2			KA2 #1	0	1	1	0
For cam, see Type K, KX, and SK Selector Switch Guide, page 19-78.							E		D	

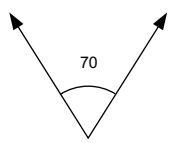
Non-Illuminated Operators	Cat. No. *[23]*	Cat. No. *[23]*
Manual Return *[24]*, Operator Only (without contact blocks)		
Without Knob	KS11	KS12
With Knob (select style and color from Table 19.222 Selector Switch Assembly Codes, page 19-75) *[25]*	KS11♦	KS12♦
Key Operated with E10 Key (Code1,2,3) *[25]*	KS11K♦	KS12K♦
Operator with Contact Blocks and Standard black knob		
With 1 KA1 on Side #2	KS11BH13	—
With 1 KA1 on Side #1	KS11BH1	—
With 1 KA1 on Side #1 and 1 KA1 on side #2	KS11BH2	—
Spring Return from Left *[24]*, **Operator Only (without contact blocks)**		
Without Knob	KS25	—
With Knob (select style and color from Table 19.222 Selector Switch Assembly Codes, page 19-75) *[25]*	KS25♦	—
Key Operated with E10 Key (Code 2 only) *[26]*	KS25K2	—
Spring Return from Right *[24]*, **Operator Only (without contact blocks)**		
Without Knob	—	KS34
With Knob (select style and color from Table 19.222 Selector Switch Assembly Codes, page 19-75) *[25]*	—	KS34♦
Key Operated with E10 Key (Code 1 only)	—	KS34K1

Illuminated Operators	Cat. No. *[23]*	Cat. No. *[23]*
Manual Return *[24]*, **Operator Only (without contact blocks)**		
Without Knob, 110-120V 50-60 Hz Transformer	K11J1	K12J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	K11J1R	K12J1R
With Other Color Knob and other voltage Light Module *[27]*. *[25]*	K11J■♦	K12J■♦
Spring Return from Left *[24]*, **Operator Only (without contact blocks)**		
Without Knob, 110-120V 50-60 Hz Transformer	K25J1	—
With Standard Red Knob, 110-120V 50-60 Hz Transformer	K25J1R	—
With Other Color Knob and other voltage Light Module *[27]*. *[25]*	K25J■♦	—
Spring Return from Right *[24]*, **Operator Only (without contact blocks)**		
Without Knob, 110-120V 50-60 Hz Transformer	—	K34J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	—	K34J1R
With Other Color Knob and other voltage Light Module *[27]*. *[25]*	—	K34J■♦

Table 19.222: Selector Switch Assembly Code and Knob Cat. No.

Color	Standard Knob		Gloved Hand Knob	
	♦ Knob Code	Cat. No. *[23]*	♦ Knob Code	Cat. No. *[23]*
Black	B	B11	FB	B25
Red	R	R8	FR	R24
Green	G	G8	FG	G24
Yellow	Y	Y8	FY	Y24
Blue	L	L8	FL	L24
White	W	W8	FW	W24
Amber	A	A8	FA	A24
Clear	C	C8	FC	C24

Table 19.223: Key Withdrawl Codes



2 Position

Code	Position
1	Left Only
2	Right Only
3	Left and Right

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

[23] When ordering, add prefix 9001 to the catalog number.
[24] These operators can be ordered complete with contact blocks. Add the "H code" from Table 19.280 "H" Codes, page 19-93 as needed for your application.
[25] ♦ Add the knob color code from Table 19.222 Selector Switch Assembly Codes, page 19-75
[26] Add the key withdrawal code from Table 19.223 Key Withdrawl Codes, page 19-75
[27] ■ Add the voltage assembly code as chosen from Standard and Shallow Depth Light Modules, page 19-91. Example: K25J■ with 208Vac = K25J3

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9001K 3-Position Selector Switches

Table 19.224: 3-Position Selector Switches

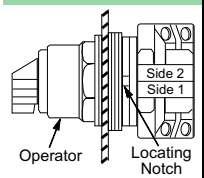
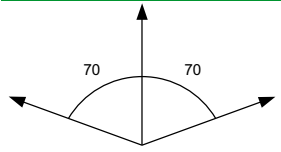
Contact Block Required					1 - Contact Closed 0- Contact Open								
Contact Block Position	Quantity and Type		Mount on Side		Left Right	Left Right	Left Right	Left Right	Left Right	Left Right	Left Right	Left Right	Left Right
 Top View	KA1	KA3	KA1 #2	KA3 #2	1 0 0	1 0 0	0 0 1	1 0 0	1 0 0	1 0 0	1 0 0	0 1 0	1 1 0
	or	KA2	or	KA2 #2	0 1 1	0 0 1	0 1 0	0 1 0	0 0 1	0 1 1	0 1 1	1 0 0	0 0 1
	KA1	KA3	KA1 #1	KA3 #1	0 0 1	1 0 0	0 0 1	1 0 0	0 1 0	0 0 1	1 0 1	0 0 1	0 1 1
	or	KA2	or	KA2 #1	1 1 0	0 0 1	0 1 0	0 1 0	0 0 1	1 0 0	0 1 0	0 1 0	1 0 0
For cam, see Type K, KX, and SK Selector Switch Guide, page 19-78.					B	C	D	E	F	G	J	L	M
Non-Illuminated Operators					Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
Manual Return, Operator Only (without contact blocks) *[29]*													
Without Knob					KS42	KS43	KS44	KS45	KS46	KS47	KS49	KS401	KS402
With Knob ♦*[30]*					KS42♦	KS43♦	KS44♦	KS45♦	KS46♦	KS47♦	KS49♦	KS401♦	KS402♦
Key Operated with E10 Key (Code 4 through 10) ▼*[31]*					KS42K▼	KS43K▼	KS44K▼	KS45K▼	KS46K▼	KS47K▼	KS49K▼	KS401K▼	KS402K▼
Operator with Contact Blocks and Standard black knob *[32]*													
With 1 KA1 on Side #2 (H13)					KS42B-H13	KS43B-H13	KS44B-H13	KS45BH13	KS46BH13	KS47BH13	KS49BH13	KS401B-H13	KS402B-H13
With 1 KA1 on Side #1 (H1)					KS42BH1	KS43BH1	KS44BH1	KS45BH1	KS46BH1	KS47BH1	KS49BH1	KS401BH1	KS402BH1
With 1 KA1 on Side #1 and 1 KA1 on side #2 (H2)					KS42BH2	KS43BH2	KS44BH2	KS45BH2	KS46BH2	KS47BH2	KS49BH2	KS401BH2	KS402BH2
Spring Return from Left to Center, Operator Only (without contact blocks) *[29]*													
Without Knob					KS62	KS63	KS64	KS65	KS66	KS67	KS69	KS601	KS602
With Knob ♦*[30]*					KS62♦	KS63♦	KS64♦	KS65♦	KS66♦	KS67♦	KS69♦	KS601♦	KS602♦
Key Operated with E10 Key (Code 5, 6 or 9 only) ▼*[31]*					KS62K▼	KS63K▼	KS64K▼	KS65K▼	KS66K▼	KS67K▼	KS69K▼	KS601K▼	KS602K▼
Spring Return from Right to Center, Operator Only (without contact blocks) *[29]*													
Without Knob					KS72	KS73	KS74	KS75	KS76	KS77	KS79	KS701	KS702
With Knob ♦*[30]*					KS72♦	KS73♦	KS74♦	KS75♦	KS76♦	KS77♦	KS79♦	KS701♦	KS702♦
Key Operated with E10 Key (Code 4, 5 or 7 only) ▼*[31]*					KS72K▼	KS73K▼	KS74K▼	KS75K▼	KS76K▼	KS77K▼	KS79K▼	KS701K▼	KS702K▼
Spring Return from Both Sides to Center, Operator Only (without contact blocks) *[29]*													
Without Knob					KS52	KS53	KS54	KS55	KS56	KS57	KS59	KS501	KS502
With Knob ♦*[30]*					KS52♦	KS53♦	KS54♦	KS55♦	KS56♦	KS57♦	KS59♦	KS501♦	KS502♦
Key Operated with E10 Key (Code 4, 5 or 7 only) ▼*[31]*					KS52K▼	KS53K▼	KS54K▼	KS55K▼	KS56K▼	KS57K▼	KS59K▼	KS501K▼	KS502K▼
Illuminated Operators					Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
Manual Return, Operator Only (without contact blocks) *[29]*													
Without Knob, 110-120V 50-60 Hz Transformer					K42J1	K43J1	K44J1	K45J1	K46J1	K47J1	K49J1	K401J1	K402J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer					K42J1R	K43J1R	K44J1R	K45J1R	K46J1R	K47J1R	K49J1R	K401J1R	K402J1R
With Other Color Knob and other voltage Light Module ■*[33]* ♦*[30]*					K42J■♦	K42J■♦	K44J■♦	K45J■♦	K46J■♦	K47J■♦	K49J■♦	K401J■♦	K402J■♦
Spring Return from Left to Center, Operator Only (without contact blocks) *[29]*													
Without Knob, 110-120V 50-60 Hz Transformer					K62J1	K63J1	K64J1	K65J1	K66J1	K67J1	K69J1	K601J1	K602J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer					K62J1R	K63J1R	K64J1R	K65J1R	K66J1R	K67J1R	K69J1R	K601J1R	K602J1R
With Other Color Knob and other voltage Light Module ■*[33]* ♦*[30]*					K62J■♦	K62J■♦	K64J■♦	K65J■♦	K66J■♦	K67J■♦	K69J■♦	K601J■♦	K602J■♦
Spring Return from Right to Center, Operator Only (without contact blocks) *[29]*													
Without Knob, 110-120V 50-60 Hz Transformer					K72J1	K73J1	K74J1	K75J1	K76J1	K77J1	K79J1	K701J1	K702J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer					K72J1R	K73J1R	K74J1R	K75J1R	K76J1R	K77J1R	K79J1R	K701J1R	K702J1R
With Other Color Knob and other voltage Light Module ■*[33]* ♦*[30]*					K72J■♦	K72J■♦	K74J■♦	K75J■♦	K76J■♦	K77J■♦	K79J■♦	K701J■♦	K702J■♦
Spring Return from Both Sides to Center, Operator Only (without contact blocks) *[29]*													
Without Knob, 110-120V 50-60 Hz Transformer					K52J1	K53J1	K54J1	K55J1	K56J1	K57J1	K59J1	K501J1	K502J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer					K52J1R	K53J1R	K54J1R	K55J1R	K56J1R	K57J1R	K59J1R	K501J1R	K502J1R
With Other Color Knob and other voltage Light Module ■*[33]* ♦*[30]*					K52J■♦	K53J■♦	K54J■♦	K55J■♦	K56J■♦	K57J■♦	K59J■♦	K501J■♦	K502J■♦

Table 19.225: Selector Switch Assembly Code and Knob Cat. No. ♦

Color	Standard Knob		Gloved Hand Knob	
	[30] Knob Code	Cat. No. *[28]*	*[30]* Knob Code	Cat. No. *[28]*
Black	B	B11	FB	B25
Red	R	R8	FR	R24
Green	G	G8	FG	G24
Yellow	Y	Y8	FY	Y24
Blue	L	L8	FL	L24
White	W	W8	FW	W24
Amber	A	A8	FA	A24
Clear	C	C8	FC	C24

Table 19.226: Key Withdrawal Codes *[34]*



3 Position

Code	Position
4	Left Only
5	Center Only
6	Right Only
7	Left and Center
8	Left and Right
9	Center and Right
10	Left, Center, and Right

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

[28] When ordering, add prefix 9001 to the catalog number.
[29] These operators can be ordered complete with contact blocks. Add the "H code" from Table 19.280 "H" Codes, page 19-93 as needed for your application.
[30] ♦ Add the knob color code from Table 19.225 Selector Switch Assembly Code, page 19-76. For LED, knob color must match LED.
[31] ▼ Add the key withdrawal code from Key Widthdrawl Codes table. **Example: KS43K** with key withdrawal in the right position only = **KS43K6**.
[32] For other color knobs replace the B with knob color code from the Selector Switch Assembly Code table.
[33] ■ Add the voltage assembly code as chosen from page 19–86.
[34] Add the key withdrawal code from Key Widthdrawl Codes table. **Example: KS43K** with key withdrawal in the right position only = **KS43K6**.

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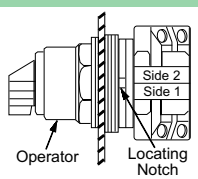
9001K 4-Position Selector Switches

Table 19.227: 4-Position Selector Switches

Contact Block Required						
Contact Block Position	Quantity and Type KA1 or KA2 or KA3			Mount on Side KA1 or KA2 or KA3			1—Contact Closed 0—Contact Open
 **Top View**	KA1	or	KA3 KA2	KA1 #2	or	KA3 #2 KA2 #2	1 0 0 0 0 0 1 0
	KA1	or	KA3 KA2	KA1 #1	or	KA3 #1 KA2 #1	0 0 0 1 0 1 0 0
For cam, see Type K, KX, and SK Selector Switch Guide, page 19-78.							**H**

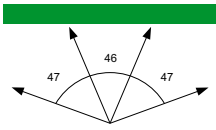
Non-Illuminated Operators	Cat. No. *[35]*
Manual Return *[36]*, Operator Only (without contact blocks)	
Without Knob	KS88
With Knob♦*[37]*	KS88♦
Key Operated with E10 Key (Codes 11, 12, 13, 14, 15)	KS88K*[38]*

Illuminated Operators	Cat. No. *[35]*
Manual Return *[36]*, Operator Only (without contact blocks)	
Without Knob, 110-120V 50-60 Hz Transformer	KS88J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	KS88J1R
With Other Color Knob and other voltage Light Module ■*[39]* ♦*[37][40]*	KS88J■♦

Table 19.228: Selector Switch Assembly Code and Knob Cat. No.

Color	Standard Knob		Gloved Hand Knob	
	Knob Code	Cat. No.	Knob Code	Cat. No.
Black	B	B11	FB	B25
Red	R	R8	FR	R24
Green	G	G8	FG	G24
Yellow	Y	Y8	FY	Y24
Blue	L	L8	FL	L24
White	W	W8	FW	W24
Amber	A	A8	FA	A24
Clear	C	C8	FC	C24

Table 19.229: Key Withdrawl Codes



4 Position

Code	Position
11	1 and 4
12	4 only
13	1 only
14	1, 2, 3 and 4
15	2, 3, and 4

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

Potentiometers with Dial Plate

Table 19.230: Potentiometers with Dial Plate (not UL listed)—Maximum Voltage 300 Vac

Power	Description	Ratings	Type
2 W	Operator Only, for Single Potentiometer	NEMA 4, 13	K20
	Operator with Single Potentiometer		K21
	Operator Only, for Tandem Potentiometer		K22
	Operator with Tandem Potentiometer		K23

Table 19.231: Potentiometer Suffixes

Single Potentiometer			
Suffix *[41]*	**Resistance**	**Suffix** *[41]*	**Resistance**
01	50 Ω	07	5 kΩ
02	100 Ω	08	10 kΩ
04	500 Ω	09	25 kΩ
05	1 kΩ	13	500 kΩ
39	2 kΩ	37	750 kΩ
06	2.5 kΩ	14	1 MΩ

Tandem Potentiometer		
Suffix *[41]*	**Resistance**	
	Front	**Rear**
82	1 kW	1 kW

NOTE: Any potentiometer with a shaft 7/8" long and 1/4" diameter may be used with these operators.

[35] When ordering, add prefix 9001 to the catalog number.
[36] These operators can be ordered complete with contact blocks. Add the "H code" from Table 19.280 "H" Codes, page 19-93 as needed for your application.
[37] ♦ Add the knob color code from the Selector Switch Assembly Code table. For LED, knob color must match LED.
[38] Add the key withdrawal code from the Key Withdrawl Codes table.
[39] ■ Add the key withdrawal code from Key Widthdrawl Codes table. **Example: KS43K** with key withdrawal in the right position only = **KS43K6**.
[40] Add the knob color code from the Selector Switch Assembly Code table. For LED, knob color must match LED.
[41] For the complete part number, add the suffix from Table 19.231 Potentiometer Suffixes, page 19-77 to the catalog number. Example: 9001K2105.

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Selection
Shown below is a simplified method of selecting a selector switch to meet almost any combination of contact sequences.

Step No. 1
Determine the contact sequence(s) required. Set up a target table like the one shown for the example below.

Contact Sequence 0—contact open 1—contact closed	↖	↑	↗
A	1	0	0
B	0	1	0
C	0	0	1

Step No. 2
Look for a cam type common to all sequences in:
Table 19.232 2 Position Selector Switch, page 19-78,
Table 19.233 3 Position Selector Switch, page 19-78, or
Table 19.234 4 Position Selector Switch, page 19-78.
For the example above, Table 19.233 3 Position Selector Switch, page 19-78 would be used.
For the contact sequences A (1 0 0), B (0 1 0) and C (0 0 1) of the example above, cam types F and L are common to all three sequences.

Step No. 3
Next, use the cam type common to all the sequences (if several cam types are common, choose one) to find the operator type number. Go to the proper reference topic as indicated in the table below:

Number of Positions	Push Button Line	Reference topics
2	Type K, Type SK, Type KX	Type K, page 19-75 Type SK, page 19-85 "H" Numbers, page 19-93 Type KX with Contacts, page 19-102 Type KX without Contacts, page 19-104
3	Type K, Type SK, Type KX	Type K, page 19-76 Type SK, page 19-86 "H" Numbers, page 19-93 Type KX with Contacts, page 19-102 Type KX without Contacts, page 19-104
4	Type K, Type SK, Type KX	Type K, page 19-77 Type SK, page 19-87 Type KX, page 19-102

If for the example above a manual return operator with a standard black knob is required and:
The F cam type is chosen, the operator type number is:

- Type K—Class 9001 Type KS46B, page 19-76
- Type SK—Class 9001 Type SKS46B, page 19-86
- Type KX—Class 9001 Type KXSDFB, page 19-104

The L cam type is chosen, the operator type number is:

- Type K—Class 9001 Type KS401B, page 19-76
- Type SK—Class 9001 Type SKS401B, page 19-86
- Type KX—Class 9001 Type KXSDLB, page 19-104

Step No. 4:
Determine the contact blocks required by using the same table in Step No. 2.
If, for the example above, the F cam type is chosen:

- Use a 9001KA3 mounted on side no. 2 for sequence A (1 0 0).
- Use a 9001KA3 mounted on side no. 1 for sequence B (0 1 0).
- Use a 9001KA2 mounted on side no. 1 or 2 for sequence C (0 0 1).

If, for the example above, the L cam type is chosen:

- Use a 9001KA2 mounted on side no. 2 for sequence A (1 0 0).
- Use a 9001KA2 mounted on side no. 1 or a 9001KA3 mounted on side no. 2 for sequence B (0 1 0).
- Use a 9001KA3 mounted on side no. 1 for sequence C (0 0 1).

One Type KA1 double circuit block can be used in place of one Type KA2 single circuit block plus one Type KA3 single circuit block mounted on the same side.

Type K, KX, and SK Selector Switch Guide

Table 19.232: 2 Position Selector Switch

If you require contact sequence— ↖	↗	Use Cam Type	Use Contact Block Type	Mount on side no. *[42]*
1	0	E	KA3	1 or 2
		D	KA2	1 or 2
0	1	E	KA2	1 or 2
		D	KA3	1 or 2

Table 19.233: 3 Position Selector Switch

If you require contact sequence— ↖	↑	↗	Use Cam Type	Use Contact Block Type	Mount on side no. *[42]*
1	0	0	G M	KA2	1
			L	KA2	2
			C E	KA3	1
			B C E F G J	KA3	2
			B G J	KA5 *[43]*	2
0	1	0	D E J L	KA2	1
			D E	KA2	2
			F	KA3	1
			L	KA3	2
0	0	1	C F	KA2	1 or 2
			B D G L	KA3	1
			D	KA3	2
			B	KA5*[43]*	1
			M	KA2	2
1	1	0	B	KA2	1
			C F	KA5 *[43]*	1 or 2
			M	KA3	2
0	1	1	B G J	KA2	2
			G	KA5*[43]*	1
			L	KA5 *[43]*	2
			M	KA3	1
1	0	1	J	KA3	1
			D E J L	KA5*[43]*	1
			D E	KA5*[43]*	2

Table 19.234: 4 Position Selector Switch

If you require contact sequence— ↖	↖	↗	↗	Use Cam Type	Use Contact Block Type	Mount on side no. *[42]*
1	0	0	0	H	(A) KA3	2
0	1	0	0	H	(B) KA2	1
0	0	1	0	H	(C) KA2	2
0	0	0	1	H	(D) KA3	1
1	0	0	1	H	A & D Wired in Parallel	
1	1	0	0	H	A & B Wired in Parallel	
0	1	1	0	H	B & C Wired in Parallel	
0	0	1	1	H	C & D Wired in Parallel	
1	1	1	0	H	A, B & C Wired in Parallel	
0	1	1	1	H	B, C & D Wired in Parallel	
1	0	1	0	H	A & C Wired in Parallel	
0	1	0	1	H	B & D Wired in Parallel	
1	1	0	1	H	KA5 *[43]*	2
1	0	1	1	H	KA5 *[43]*	1

NOTE: For Outline Dimensions see Catalog 9001CT1103

NOTE: When ordering, add prefix 9001 to the catalog number.

When ordering, please specify:

- Quantity
- Class Number
- Type or Catalog Number

For "H" Numbers, see Type K, SK, and KX Contact Block "H" Numbers, page 19-93

[42] See Type K, SK, and KX Contact Block "H" Numbers, page 19-93
[43] Type KA5 must be the last block on either side. If more than one KA5 is required on either side—contact your local Square D sales office.

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Type K Heavy Duty Pilot Lights

When ordering, add prefix 9001 to the catalog number.

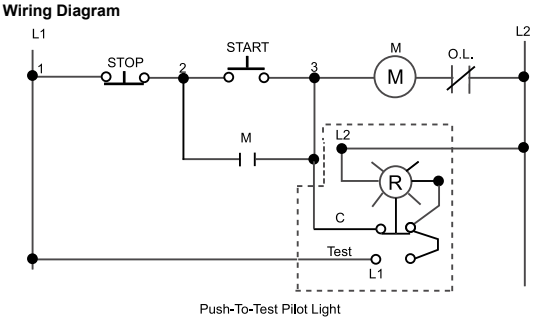
Table 19.235: Pilot Lights—UL Types 4, 13/NEMA 4 & 13 *[44][45]*

Description	Voltage	Style	With Red Fresnel Color Cap *[46]*	With Green Fresnel Color Cap *[46]*	With Other Color Cap *[46] [47]*	Without Color Cap *[46]*
Standard Pilot Light (Plastic Fresnel Color Cap Shown)	110–120 V, 50–60 Hz 220–240 V, 50–60 Hz 24–28 Vac/Vdc	Transformer Transformer Full Voltage	KP1R31 KP7R31 KP35R31	KP1G31 KP7G31 KP35G31	KP1■ KP7■ KP35■	KP1 KP7 KP35
	For other voltages see Standard and Shallow Depth Light Modules, page 19-91.	Transformer, Flashing or LED *[48]* Full Voltage, Neon or Resistor *[49]*	KP▲R31 KP▲R31	KP▲G31 KP▲G31	KP▲■ KP▲■	KP▲ KP▲
Push-To-Test Pilot Light (Glass Color Cap Shown)	110–120 V, 50–60 Hz 220–240 V, 50–60 Hz 24–28 Vac/Vdc	Transformer Transformer Full Voltage	KT1R31 KT7R31 KT35R31	KT1G31 KT7G31 KT35G31	KT1■ KT7■ KT35■	KT1 KT7 KT35
	For other voltages see Standard and Shallow Depth Light Modules, page 19-91.	Transformer, Flashing or LED *[48]* Full Voltage, Neon or Resistor *[49]*	KT▲R31 KT▲R31	KT▲G31 KT▲G31	KT▲■ KT▲	KT▲ KT▲
Remote Test Pilot Light (Glass Color Cap Shown)	120 Vac Only 24–28 Vac Only for other voltages	Resistor *[50]* Full Voltage *[50]*	KTR38R31 KTR35R31	KTR38G31 KTR35G31	KTR38■ KTR35■	KTR38 KTR35
	See Standard and Shallow Depth Light Modules, page 19-91.*[50]*	Full Voltage or Resistor *[50]*	KTR▲R31	KTR▲G31	KTR ▲■	KTR▲

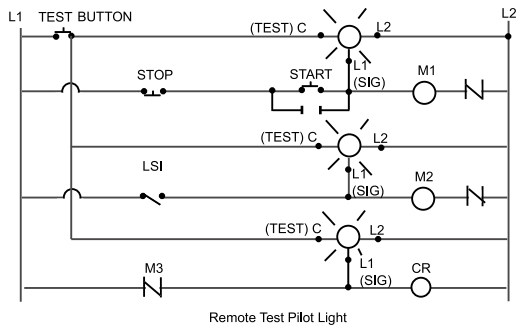
Table 19.236: Color Caps

Color	Plastic Fresnel	Plastic Domed	Glass
Amber	A31	A9	A6
Blue	L31	L9	L6
Clear	C31	C9	C6
Green	G31	G9	G6
Red	R31	R9	R6
White	W31	W9	W6
Yellow	Y31	Y9	Y6

Typical Wiring Diagram



Push-To-Test Pilot Light



Remote Test Pilot Light

For Contact Blocks, see Type KA Contact Blocks, page 19-90
For Light Modules, see Standard and Shallow Depth Light Modules, page 19-91
For Accessories, see Type K and SK Accessories, page 19-94

[44] For use in hazardous locations, see Square D Offering According to Class, Division, and Group, page 19-92
[45] Legend plates not included.
[46] When ordering, add prefix 9001 to the catalog number.
[47] ■ Add the color code as chosen from Table 19.236 Color Caps, page 19-79. **EXAMPLE: KP1 with a blue fresnel cap = KP1L31**
[48] The cap must be the same color as the LED light module chosen, e.g., for green LED, use green color cap.
[49] On neon light modules, use clear color caps only.
[50] On remote test pilot lights use only full voltage or resistor voltage assembly codes. Do not choose LED (exception - these LED codes are allowed: 38LG, 38LL, 38LR, 38LW, 38LY), neon or transformer codes. For AC use only.

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Without Latch

With Latch

Type K Heavy Duty Specialty Operators

Table 19.237: Joy Stick Operators—UL Types 4, 13/NEMA 4, 13 *[51] [52]*

Description				Operator With Contacts *[53]*	Operator Without Contacts *[54] [53]*
	3 Position—Center Off	Momentary Contact—Spring Return to Center	Without Latch	K71H7	K71
			With Latch	K70H7	K70
		Maintained Contact	Without Latch	K73H7	K73
			With Latch	K72H7	K72
	3 Position—Center Off	Momentary Contact—Spring Return to Center	Without Latch	K31H8	K31
			With Latch	K30H8	K30
		Maintained Contact	Without Latch	K33H8	K33
			With Latch	K32H8	K32
	5 Position—Center Off	Momentary Contact—Spring Return to Center	Without Latch	K35H2	K35
			With Latch	K34H2	K34
		Maintained Contact	Without Latch	K37H2	K37
			With Latch	K36H2	K36

The joy stick operator is ideal for applications where only one circuit is to be energized at one time. The three position joy stick closes one circuit in each Up-Down or Right-Left position with all circuits open in center position. The five position operator closes one circuit in each Up, Down, Left and Right position with all circuits open in center position.
Momentary contact operators are spring return to the center position. Maintained operators remain in position and must be returned manually. Operators with latch cannot be operated until the latch button in center of handle is pressed.

Table 19.238: Contact Arrangements

Operator Positions		Contact Block Type	Contact Block Location	Contact	Handle position (with reference to Nib)				
					1 ↑	2 →	OFF	3 ↓	4 ←
	3	KA3	POS 1 (3)	A	—	1	0	—	0
		KA3	POS 2 (4)	A	—	0	0	—	1
	3	KA2	POS 1 (3)	B	1	—	0	0	—
		KA2	POS 2 (4)	B	0	—	0	1	—
	5	KA1	POS 1 (3)	A	0	1	0	0	0
				B	1	0	0	0	0
		KA1	POS 2 (4)	A	0	0	0	0	1
				B	0	0	0	1	0

(1) Contact Closed (0) Contact Open

Selector Push Button
9001KQ

Inserts are field convertible. For colors not listed, order operator without insert, plus separate color insert from Additional Accessories for Type K and SK Operators, page 19-99. Up to two Type KA contact blocks can be mounted in tandem (total of four blocks). Selector push buttons cannot be illuminated.

Table 19.239: Selector Push Button Operators—UL Types 4, 13/NEMA 4, 13

Contact Block Required		Two Position Operators									
		0—Contact Open 1—Contact Closed F—Free D—Depressed									
Quantity and Type	Mount on Side	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
		FD	FD	FD	FD	FD	FD	FD	FD	FD	FD
1 KA1	#2	0 0	1 0	0 0	1 0	0 0	1 1	1 1	1 0	1 0	0 0
		0 1	0 1	0 1	0 0	0 1	0 0	0 0	0 1	0 1	0 1
1 KA1	#1	0 0	1 1	0 0	1 0	1 1	0 0	1 0	1 1	1 1	0 0
		0 1	0 0	0 1	0 0	0 0	0 1	0 1	0 0	0 0	0 1
Cam *[55]*		P		R		S		T		Y	
Color Insert		Type		Type		Type		Type		Type	
Without Insert *[56]*		KQ11		KQ12		KQ13		KQ14		KQ15	
Black		KQ11B		KQ12B		KQ13B		KQ14B		KQ15B	

Order Contact Blocks From Type KA Contact Blocks, page 19-90

Key Operated Push Button
9001KR

Key operated push buttons are used wherever unauthorized use of a push button is discouraged. Examples are locking a Start push button in the extended position or locking a Stop push button in the depressed position. The operator can also be locked in the flush position—holding all contacts open. Up to two Type KA contact blocks can be mounted in tandem (total of four blocks). (“X” = locked position) *[57]*

Table 19.240: Key Operated Push Button – UL Types 4, 13/NEMA 4, 13 *[51] [52]*

Description	Lockable Positions			Type *[53]*
	Extended	Flush	Depressed	
Push button operable only with key in lock. Key is removable in locked position only.	X	—	—	KR131
	—	X	—	KR132
	—	—	X	KR133
	X	X	X	KR137
Push button operable with or without key in lock. Push button can be locked with key only. Key removable in both locked or unlocked position.	X	—	—	KR141
	—	X	—	KR142
	—	—	X	KR143
	X	X	X	KR147
To lock the unit, rotate the key with the button in the extended position. Then, push the button to lock it in the position indicated at right. Key is removable only in this position.	—	X	—	KR152
	—	—	X	KR153

[51] For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92.
[52] Legend plate and contact block not included unless otherwise noted.
[53] When ordering, add prefix 9001 to the catalog number.
[54] These operators can be ordered complete with contact blocks—a total of four (4) contact blocks can be used. Add the “H” number chosen from Table 19.280 “H” Codes, page 19-93 to the operator type number and add the cost of the “H” number to the operator cost.
[55] Cams are not interchangeable.
[56] Order color inserts from Additional Accessories for Type K and SK Operators, page 19-99.
[57] All key operated push buttons are furnished as standard with Square D no. E10 key change. See catalog 9001CT0001 for other key changes.

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9001KR7U

9001KR11U

Table 19.241: Illuminated and Non-Illuminated Dual Operators *[58] [59] [60]*

Description	Color	With 2 N.O. Contacts (2 KA2) *[61]*	With 1 N.O. & 1 N.C. Contact (KA2, KA3) *[61]*	Without Contacts *[62]* *[61]*
Momentary Dual Function	Universal *[63]* Green-Red Other *[62]*	KR6UH7 KR6GRH7 KR6■H7	KR6UH37 KR6GRH37 KR6■H37	KR6U KR6GR KR6■
Momentary Interlocked Dual Function	Universal*[63]* Green-Red Other *[62]*	KR67UH7 KR67GRH7 KR67■H7	KR67UH37 KR67GRH37 KR67■H37	KR67U KR67GR KR67■
Maintained Interlocked Dual Function	Universal *[63]* Green-Red Other *[62]*	KR7UH7 KR7GRH7 KR7■H7	KR7UH37 KR7GRH37 KR7■H37	KR7U KR7GR KR7■
Description	**Color**		**Contacts (KA1)**	**Without Contacts *[62]***
Both Buttons Maintained Interlocked Assembly	Universal *[64]* Other *[65]*	—	KR11UH1 KR11▲H1	KR11U KR11▲
One Button Momentary One Button Maintained Interlocked Assembly	Universal *[64]* Other *[65]*	—	KR12UH1H1 KR12▲H1H1	KR12U KR12▲

Table 19.242: Emergency Break-Glass Operator—UL 4, 13/NEMA 4, 13*[66]*

Description	Type *[61]*
Operator is held in a depressed position by a glass disc. When the glass disc is broken with the hammer, button returns to a normal extended position. Package of 5 discs included with operator.	K15

Emergency Break-Glass Operator
9001K15

Table 19.243: 9001K15 Replacement Parts

Description	Part Number
Yellow bumper	3105211101
Hammer and chain	3105206750
Lower ring nut	6512232801
Top ring nut	9001K40
Package of 5 replacement discs	9001K57
Clip to hold hammer	2540902240

Table 19.244: Rocker Arm Operating Lever

Description	Type *[61]*
Allows two standard push buttons to be operated independently of each other. Price does not include push buttons or legend plates. Order push buttons and legend plates from Table 19.214 Non-Illuminated Momentary Push Button Operators, page 19-72, and Table 19.284 Legend Plates, page 19-94—specify which marking is to be inverted.	K50

Rocker Arm Operating Lever
9001K50

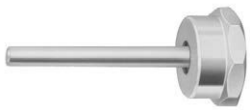
Push-on Push-off Module
9001K85

Table 19.245: Alternate Action—Push-on, Push-off Module

Description	Type *[61]*
This module can be added to standard 9001 Type K, KX, SK or T momentary push button operators. Contact blocks mounted behind this module (maximum of 2) are held in the depressed position when the operator is pressed once, and released to their normal position when the operator is pressed again. For a N.C. circuit, use a 9001KA3 or the N.C. contact of either a 9001KA1 or 9001KA4. For a N.O. circuit, use the N.O. contact of either a 9001KA4 or 9001KA6.	K85

Table 19.246: Wobble Stick

Description	Type *[61]*
For easy operation of any standard push button	K8



Wobble Stick
9001K8

Table 19.247: Off Delay Push Button—UL Types 4, 13/NEMA 4, 13

	Description	Type (All Colors)		
		Full Guard *[61]*	Extended Guard *[61]*	No Guard *[61]*
	Timed Contact 1 N.O. and 1 N.C.	KRD1UH1	KRD2UH1	KRD3UH1
	Timed Contact 2 N.O. and 2 N.C.	KRD1UH2	KRD2UH2	KRD3UH2

Time Delay Push Button
9001KRD

Timing period is adjustable from 0.1 second to 60 seconds and begins after button has been released. Devices include a pack of seven color inserts for color coding the push button. See Accessories, page 19-99 for Universal color insert. Contacts are quick make-quick break.

NOTE: When mounted in top or bottom hole of a Type K enclosure, the Off Delay Push Button requires one additional space below or above operator. When mounted other than in top or bottom hole, device may require two additional spaces, one above and one below operator. Closing plates must be installed on unused holes.

[58] Meets UL Type 13/NEMA 13 and UL Type 6/NEMA 6, which UL and NEMA consider an equivalent to UL Type 4/NEMA 4.
[59] For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92.
[60] Legend plate and contact block not included unless otherwise noted.
[61] When ordering, add prefix 9001 to the catalog number.
[62] ■ Choose one color for each button. R = red, G = green, B = Black. **Example: 9001KR6 with left red and right black = 9001KR6RB.** See Color Codes for 30 mm Multifunction Operators, page 19-72.
[63] Universal for KR6, KR67, KR7 includes 2 inserts each of black, red and green.
[64] Universal for KR11, KR12 includes 2 each of black, red, green, yellow, orange, blue, white.
[65] ▲ Choose one color for each button. R = red, G = green, B = Black. **Example: 9001KR6 with left red and right black = 9001KR6RB.** See Color Codes, page 19-72.
[66] For enclosed versions see 9001KY and 9001SKY Control Stations, page 19-112.

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30 mm Momentary Push Button Operators, UL Types 4, 4X, 13/ NEMA 4, 4X, 13

Table 19.248: Non-Illuminated Momentary Push Button Operators *[67]*

Description	Color	Operator with 1 N.O. and 1 N.C. Contact (KA1)	Operator with 1 N.O. Contact (KA2)	Operator with 1 N.C. Contact (KA3)	Operator Only No Contacts *[68]*
9001SKR1B Full Guard	Black	SKR1BH13	SKR1BH5	SKR1BH6	SKR1B
	Red	SKR1RH13	SKR1RH5	SKR1RH6	SKR1R
	Green	SKR1GH13	SKR1GH5	SKR1GH6	SKR1G
	Universal *[69]*	SKR1UH13	SKR1UH5	SKR1UH6	SKR1U
	Other *[70]*	SKR1■H13	SKR1■H5	SKR1■H6	SKR1■
9001SKR3B No Guard	Black	SKR3BH13	SKR3BH5	SKR3BH6	SKR3B
	Red	SKR3RH13	SKR3RH5	SKR3RH6	SKR3R
	Green	SKR3GH13	SKR3GH5	SKR3GH6	SKR3G
	Universal *[69]*	SKR3UH13	SKR3UH5	SKR3UH6	SKR3U
	Other *[70]*	SKR3■H13	SKR3■H5	SKR3■H6	SKR3■
9001SKR2B Extended Guard	Black	SKR2BH13	SKR2BH5	SKR2BH6	SKR2B
	Red	SKR2RH13	SKR2RH5	SKR2RH6	SKR2R
	Green	SKR2GH13	SKR2GH5	SKR2GH6	SKR2G
	Universal *[69]*	SKR2UH13	SKR2UH5	SKR2UH6	SKR2U
	Other *[70]*	SKR2■	SKR2■H5	SKR2■H6	SKR2■
9001SKR4B 1-3/8 in. (35 mm) Mushroom Button	**Snap-In Mushroom Button**				
	Black	SKR4BH13	SKR4BH5	SKR4BH6	SKR4B
	Red	SKR4RH13	SKR4RH5	SKR4RH6	SKR4R
	Red *[71]*	SKR4R05H13	SKR4R05H5	SKR4R05H6	SKR4R05
	Green	SKR4GH13	SKR4GH5	SKR4GH6	SKR4G
	Other *[72]*	SKR4▲H13	SKR4▲H5	SKR4▲H6	SKR4▲
	Screw-On Mushroom Button with Set Screw Security				
	Black	SKR24BH13	SKR24BH5	SKR24BH6	SKR24B
	Red	SKR24RH13	SKR24RH5	SKR24RH6	SKR24R
	Green	SKR24GH13	SKR24GH5	SKR24GH6	SKR24G
	Other *[72]*	SKR24▲H13	SKR24▲H5	SKR24▲H6	SKR24▲
9001SKR5 2-1/4 in. (57 mm) Mushroom Button	**Snap-In Mushroom Button, Plastic Head**				
	Black	SKR5BH13	SKR5BH5	SKR5BH6	SKR5B
	Red	SKR5RH13	SKR5RH5	SKR5RH6	SKR5R
	Red *[71]*	SKR5R05H13	SKR5R05H5	SKR5R05H6	SKR5R05
	Green	SKR5GH13	SKR5GH5	SKR5GH6	SKR5G
	Other *[72]*	SKR5▲H13	SKR5▲H5	SKR5▲H6	SKR5▲
	Screw-On Mushroom Button with Set Screw Security, Plastic Head				
	Black	SKR25BH13	SKR25BH5	SKR25BH6	SKR25B
	Red	SKR25RH13	SKR25RH5	SKR25RH6	SKR25R
	Green	SKR25GH13	SKR25GH5	SKR25GH6	SKR25G
	Other *[72]*	SKR25▲H13	SKR25▲H5	SKR25▲H6	SKR25▲

Table 19.249: Color Codes

Color	■ SKR1, 2, 3 Place Color Code in Type Number	▲ SKR4, 5, 24, 25 Place Color Code in Type Number
Blue	L	L
Yellow	Y	Y
White	W	—
Orange	S	S
Gray	E	—

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

NOTE: For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92. Contact blocks and legend plate not included unless otherwise noted.

[67] When ordering, add prefix 9001 to the catalog number.
[68] These operators can be ordered complete with contact blocks. For maximum block usage, see Table 19.280 "H" Codes, page 19-93. Add the "H" number to the end of the operator type number.
[69] The universal push button operators include one each of the following color inserts: black, red, green, yellow, orange, blue and white.
[70] ■ See Table 19.249 Color Codes , page 19-82.
[71] Knob has the words "Emergency Stop" in raised letters highlighted in white for readability.
[72] ▲ See Table 19.249 Color Codes , page 19-82.

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30 mm Multifunction Operators UL Types 4, 4X, 13/NEMA 4, 4X, 13

Table 19.250: Non-Illuminated Push-Pull Screw-on Mushroom Operators, Plastic Head *[73]*

	Description	Color	With 2 N.C. Contacts (1 KA3, 1 KA5)	With 1 N.O. / 1 N.C. Contact (1 KA1)	Without Contacts *[74]*
9001SKR9R Non-Illuminated 1-5/8 in. Diameter Knob Includes Type KN179WP Legend Plate Marked Pull To Start Push To Stop	**3 Position**				
	Momentary Pull-Maintained Neutral-Momentary Push *[75]*	Red	SKR8RH25	—	SKR8R
		Green	SKR8GH25	—	SKR8G
		Other *[76]*	SKR8▲H25	—	SKR8▲
	2 Position*[77]*				
	Maintained Pull-Maintained Push	Red	—	SKR9RH13	SKR9R
		Green	—	SKR9GH13	SKR9G
		Other *[76]*	—	SKR9▲H13	SKR9▲

Table 19.251: Non-Illuminated Turn-to-Release Mushroom Operators *[73]*

	Description	Color	With 1 N.O. Contact (KA1)	With 2 N.O. / 2 N.C. Contacts (2 KA1)	Without Contacts
9001SKR16H2	2 Position, Plastic Head Turn-to-Release Trigger Action	Red	SKR16H13	SKR16H2	SKR16

Table 19.252: Screw-On Plastic Illuminated Push-Pull Mushroom Operators *[73]*

Illuminated	Description	Voltage	With Red Knob and 2 N.C. Contacts (1 KA3, 1 KA5) *[78]*	With Other Color Knob and 2 N.C. Contacts *[76] [78]*	With Other Color Knob Without Contacts *[74] [76] [78]*
9001SKR9P1 Illuminated 1-5/8 in. Diameter Knob Includes Type KN179WP Legend Plate Marked Pull to Start Push To Stop	**3 Position**				
	Momentary Pull-Maintained Neutral-Momentary Push *[79]*	110–120 V, 50–60 Hz	SKR8P1RH25	SKR8P1▲H25	SKR8P1▲
		Other—Transformer, LED, Flashing *[80]*	SKR8P♦RH25	SKR8P♦▲H25	SKR8P♦▲
		Other—Full Voltage, Resistor, Neon *[75]*	SKR8P♦RH25	SKR8P♦▲H25	SKR8P♦▲
	Description	**Voltage**	**With Red *[77]* Knob and 1 N.O. & 1 N.C. Contact (KA1)**	**With Other Color Knob and 1 N.O. & 1 N.C. Contact (KA1) *[76]***	**With Other Color Knob Without Contacts *[76]***
	2 Position				
	Maintained Pull-Maintained Push	110–120 V, 50–60 Hz	SKR9P1RH13	SKR9P1▲H13	SKR9P1▲
		Other—Transformer, L.E.D., Flashing *[80]*	SKR9P♦RH13	SKR9P♦▲H13	SKR9P♦▲
		Other—Full Voltage, Resistor, Neon *[75]*	SKR9P♦RH13	SKR9P♦▲H13	SKR9P♦▲

Table 19.253: Color Codes

Color	SKR11, SKR12	SKR8, SKR9
Black *[81]*	B	B
Red	R	R
Green	G	G
Blue	L	L
Yellow	Y	Y
White	W	W
Orange *[81]*	S	S
Clear	—	C
Amber	—	A
Gray	E	—

Table 19.254: Positions for 9001SKR8RH1 or H13

		9001SKR8RH1 or H13		
		PULL	CTR	PUSH
(KA1)	KA3	X	O	O
	KA2	O	O	X

Table 19.255: Positions for 9001SKR8H25

	9001SKR8H25		
	PULL	CTR	PUSH
KA3	X	O	O
KA5	X	X	O
KA2	O	O	X

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

[73] When ordering, add prefix 9001 to the catalog number.
[74] These operators can be ordered complete with contact blocks. For maximum block usage, see Table 19.280 "H" Codes, page 19-93. Add the chosen "H" number to the end of the operator.
[75] On neon light modules, use clear knobs only.
[76] ▲ See Table 19.253 Color Codes, page 19-83 and insert the color code in the Type number. **Example: SKR9( ) with a yellow knob = SKR9Y**
[77] To obtain a red knob with "Push Emergency Stop" printed on the red knob—substitute "R05" in place of "R"
[78] ♦ Add the voltage assembly code as chosen from Standard and Shallow Depth Light Modules, page 19-91. **Example: SKR8P♦ with 277 V 50–60 Hz = SKR8P8**
[79] For positions, refer to Table 19.254 Positions for 9001SKR8RH1 or H13, page 19-83 and Table 19.255 Positions for 9001SKR8H25, page 19-83.
[80] The knob must be the same color as the LED light module chosen, for example, for a green LED, use a green knob.
[81] These colors are not available on illuminated push-pull operators.

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Type SK Corrosion Resistant Illuminated Operators

Table 19.256: Illuminated Push Button Operators

Description		Voltage and Frequency	Style	With Red Color Cap and 1 N.O. and 1 N.C. Contact (KA1) *[82]*	With Green Color Cap and 1 N.O.and 1 N.C. Contact (KA1) *[82]*	With Other Color Cap Without Contact Blocks *[83] [82]*
9001SK1L1	Full Guard Illuminated Push Button	110–120 V, 50–60 Hz	Transformer	SK1L1RH13	SK1L1GH13	SK1L1
		220–240 V, 50–60 Hz	Transformer	SK1L7RH13	SK1L7GH13	SK1L7
		24–28 Vac/Vdc	Full Voltage	SK1L35RH13	SK1L35GH13	SK1L35
		For other voltages See Table *[84]*	Transformer, Flashing	SK1L■RH13	SK1L■GH13	SK1L ■
			Full Voltage	SK1L■RH13	SK1L■GH13	SK1L ■
			Resistor, Neon *[85]*	SK1L■RH13	SK1L■GH13	SK1L ■
			LED *[86]*	SK1L■RH13	SK1L■GH13	SK1L ■ *[87]*
9001SK2L1	No Guard Illuminated Push Button	110–120 V, 50–60 Hz	Transformer	SK2L1RH13	SK2L1GH13	SK2L1
		220–240 V, 50–60 Hz	Transformer	SK2L7RH13	SK2L7GH13	SK2L7
		24–28 Vac/Vdc	Full Voltage	SK2L35RH13	SK2L35GH13	SK2L35
		For other voltages See Table *[84]*	Transformer, Flashing	SK2L■RH13	SK2L■GH13	SK2L ■
			Full Voltage	SK2L■RH13	SK2L■GH13	SK2L ■
			Resistor, Neon *[85]*	SK2L■RH13	SK2L■GH13	SK2L ■
			LED*[86]*	SK2L■RH13	SK2L■GH13	SK2L ■ *[87]*
9001SK2L1R20	1-3/8 in. (35 mm) Illuminated Mushroom, Screw-On Plastic Head	110–120 V, 50–60 Hz	Transformer	SK2L1R20H13	SK2L1G20H13	Order SK2L■ *[87][88]*
		220–240 V, 50–60 Hz	Transformer	SK2L7R20H13	SK2L7G20H13	
		24–28 Vac/Vdc	Full Voltage	SK2L35R20H13	SK2L35G20H13	
		For other voltages See Table *[84]*	Transformer, Flashing	SK2L■R20H13	SK2L■G20H13	
			Full Voltage	SK2L■R20H13	SK2L■G20H13	
			Resistor, Neon *[85]*	SK2L■R20H13	SK2L■G20H13	
			LED *[86]*	SK2L■R20H13	SK2L■G20H13	
9001SK2L1R21	2-1/4 in. (57 mm) Illuminated Mushroom, Screw-On Plastic Head	110–120 V, 50–60 Hz	Transformer	SK2L1R21H13	SK2L1G21H13	Order SK2L■ *[87][88]*
		220–240 V, 50–60 Hz	Transformer	SK2L7R21H13	SK2L7G21H13	
		24–28 Vac/Vdc	Full Voltage	SK2L35R21H13	SK2L35G21H13	
		For other voltages See Table *[84]*	Transformer, Flashing	SK2L■R21H13	SK2L■G21H13	
			Full Voltage	SK2L■R21H13	SK2L■G21H13	
			Resistor, Neon *[85]*	SK2L■R21H13	SK2L■G21H13	
			LED *[86]*	SK2L■R21H13	SK2L■G21H13	

Table 19.257: Color Caps

Color	Color Codes		
	SK1L/SK2L	1-3/8 in. (35 mm) Mushroom	2-1/4 in. (57 mm) Mushroom
Red	R	R20	R21
Green	G	G20	G21
Blue	L	L20	L21
Yellow	Y	Y20	Y21
White	W	W20	W21
Clear	C	C20	C21
Amber	A	A20	A21

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

NOTE: For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92. Contact blocks and legend plate not included unless otherwise noted.

[82] When ordering, add prefix 9001 to the catalog number.
[83] These operators can be ordered complete with contact blocks. For maximum block usage, see Table 19.280 “H” Codes, page 19-93. Add the “H” number to the end of the operator type number.
[84] ■ Add the voltage assembly code as chosen from Standard and Shallow Depth Light Modules, page 19-91. **EXAMPLE: SK2L_ with 240 Vac/Vdc = SK2L25.**
[85] On neon light modules, use clear color caps only.
[86] Add the color code as chosen from the color cap table below. **EXAMPLE: SK2L25 with a blue 1-3/8 in. mushroom button = SK2L25L20.**
[87] The cap must be the same color as the LED light module chosen, e.g., for green LED, use green color cap.
[88] The only difference between a no guard (SK2L) operator and mushroom button operator is the color cap.

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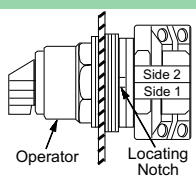
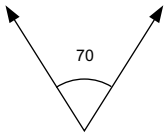
9001SK 2-Position Selector Switches

Table 19.258: 2-Position Selector Switches

Contact Block Required						1—Contact Closed 0—Contact Open			
Contact Block Position	Quantity and Type KA1 or KA2 or KA3			Mount on Side KA1 or KA2 or KA3			↖ Left	↗ Right	↖ Left	↗ Right
 **Top View**	KA1	or	KA3	KA1 #2	or	KA3 #2	1	0	0	1
			KA2			KA2 #2	0	1	1	0
	KA1	or	KA3	KA1 #1	or	KA3 #1	1	0	0	1
			KA2			KA2 #1	0	1	1	0
For Cam, see Type K, KX, and SK Selector Switch Guide, page 19-78							E		D	

Non-Illuminated Operators	Type *[89]*	Type *[89]*
Manual Return *[90]*, **Operator Only (without contact blocks)**		
Without Knob	SKS11	SKS12
With Knob *[91]*	SKS11♦	SKS12♦
Operator with Contact Blocks and Standard black knob		
With 1 KA1 on Side #2	SKS11BH13	—
With 1 KA1 on Side #1	SKS11BH1	—
With 1 KA1 on Side #1 and 1 KA1 on side #2	SKS11BH2	—
Spring Return from Left *[90]*, **Operator Only (without contact blocks)**		
Without Knob	SKS25	—
With Knob *[91]*	SKS25♦	—
Spring Return from Right *[90]*, **Operator Only (without contact blocks)**		
Without Knob	—	SKS34
With Knob *[91]*	—	SKS34♦

Illuminated Operators	Type *[89]*	Type *[89]*
Manual Return *[90]*, **Operator Only (without contact blocks)**		
Without Knob, 110-120V 50-60 Hz Transformer	SK11J1	SK12J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	SK11J1R	SK12J1R
With other Color Knob *[91]*and other Voltage Light Module *[92]*	SK11J■♦	SK12J■♦
Spring Return from Left *[90]*, **Operator Only (without contact blocks)**		
Without Knob, 110-120V 50-60 Hz Transformer	SK25J1	—
With Standard Red Knob, 110-120V 50-60 Hz Transformer	SK25J1R	—
With other Color Knob *[91]*and other Voltage Light Module *[92]*	SK25J■♦	—
Spring Return from Right *[90]*, **Operator Only (without contact blocks)**		
Without Knob, 110-120V 50-60 Hz Transformer	—	SK34J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	—	SK34J1R
With other Color Knob *[91]*and other Voltage Light Module *[92]*	—	SK34J■♦



2 Position

Table 19.259: Selector Switch Assembly Code and Knob Cat. No.

Color	Standard Knob		Gloved Hand Knob	
	Knob Code	Cat. No. *[89]*	Knob Code	Cat. No. *[89]*
Black	B	B11	FB	B25
Red	R	R8	FR	R24
Green	G	G8	FG	G24
Yellow	Y	Y8	FY	Y24
Blue	L	L8	FL	L24
White	W	W8	FW	W24
Amber	A	A8	FA	A24
Clear	C	C8	FC	C24

Contact Blocks: Contact Blocks, page 19-90,Hermetically Sealed Logic Reed Contact Blocks, page 19-92, Hermetically Sealed Power Reed Contact Blocks, page 19-92
Light Modules:Standard Light Modules, page 19-91
Knobs and Accessories:Additional Accessories for Type K and SK Operators, page 19-99

[89] When ordering, add prefix 9001 to the catalog number.
[90] These operators can be ordered complete with contact blocks. For maximum block usage, see Table 19.280 "H" Codes, page 19-93. Add the chosen "H" number to the end of the operator.
[91] ♦ Add the knob color code chosen from Table 19.259 Selector Switch Assembly Code and Knob Cat. No., page 19-85. For LED, knob color must match LED.
[92] ■ Add the voltage assembly code as chosen from Standard Light Modules, page 19-91. **Example: K25J with 208Vac = K25J3**

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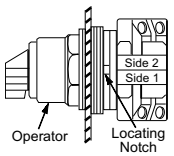
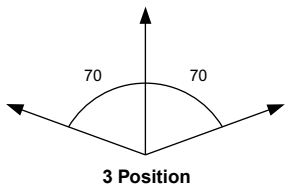
9001SK 3-Position Selector Switches

Table 19.260: 3-Position Selector Switches

Contact Block Required					1 — Contact Closed 0 — Contact Open																										
Contact Block Position	Quantity and Type			Mount on Side																											
 **Top View**	KA1	or	KA3	KA1 #2	or	KA3 #2	1	0	0	1	0	0	0	0	1	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	1	1	0
			KA2			KA2 #2	0	1	1	0	0	1	0	1	0	0	1	0	0	0	1	0	1	1	0	1	1	1	0	0	0	0	1
	KA1	or	KA3	KA1 #1	or	KA3 #1	0	0	1	1	0	0	0	0	1	1	0	0	0	1	0	0	0	1	1	0	1	0	0	1	0	1	1
			KA2			KA2 #1	1	1	0	0	0	1	0	1	0	0	1	0	0	0	1	1	0	0	0	1	0	0	1	0	1	0	0
For Cam, see Type K, KX, and SK Selector Switch Guide, page 19-78							B			C			D			E			F			G			J			L			M	

Non-Illuminated Operators *[93]*	Type	Type	Type	Type	Type	Type	Type	Type	Type
Manual Return, Operator Only (without contact blocks) *[94]*									
Without Knob	SKS42	SKS43	SKS44	SKS45	SKS46	SKS47	SKS49	SKS401	SKS402
With Knob *[95]*	SKS42♦	SKS43♦	SKS44♦	SKS45♦	SKS46♦	SKS47♦	SKS49♦	SKS401♦	SKS402♦
Operator with Contact Blocks and Standard black knob *[96]*									
With 1 KA1 on Side #2 (H13)	SKS42B-H13	SKS43B-H13	SKS44B-H13	SKS45B-H13	SKS46BH13	SKS47B-H13	SKS49B-H13	SKS401B-H13	SKS402B-H13
With 1 KA1 on Side #1 (H1)	SKS42B-H1	SKS43BH1	SKS44BH1	SKS45B-H1	SKS46BH1	SKS47BH1	SKS49BH1	SKS401BH1	SKS402BH1
With 1 KA1 on Side #1 and 1 KA1 on side #2 (H2)	SKS42B-H2	SKS43BH2	SKS44BH2	SKS45B-H2	SSKS46B-H2	SKS47BH2	SKS49BH2	SKS401BH2	SKS402BH2
Spring Return from Left to Center, Operator Only (without contact blocks) *[94]*									
Without Knob	SKS62	SKS63	SKS64	SKS65	SKS66	SKS67	SKS69	SKS601	SKS602
With Knob *[95]*	SKS62♦	SKS63♦	SKS64♦	SKS65♦	SKS66♦	SKS67♦	SKS69♦	SKS601♦	SKS602♦
Spring Return from Right to Center, Operator Only (without contact blocks) *[94]*									
Without Knob	SKS72	SKS73	SKS74	SKS75	SKS76	SKS77	SKS79	SKS701	SKS702
With Knob *[95]*	SKS72♦	SKS73♦	SKS74♦	SKS75♦	SKS76♦	SKS77♦	SKS79♦	SKS701♦	SKS702♦
Spring Return from Both Sides to Center, Operator Only (without contact blocks) *[94]*									
Without Knob	SKS52	SKS53	SKS54	SKS55	SKS56	SKS57	SKS59	SKS501	SKS502
With Knob *[95]*	SKS52♦	SKS53♦	SKS54♦	SKS55♦	SKS56♦	SKS57♦	SKS59♦	SKS501♦	SKS502♦

Illuminated Operators *[93]*	Type	Type	Type	Type	Type	Type	Type	Type	Type
Manual Return, Operator Only (without contact blocks) *[94]*									
Without Knob, 110-120V 50-60 Hz Transformer	SK42J1	SK43J1	SK44J1	SK45J1	SK46J1	SK47J1	SK49J1	SK401J1	SK402J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	SK42J1R	SK43J1R	SK44J1R	SK45J1R	SK46J1R	SK47J1R	SK49J1R	SK401J1R	SK402J1R
With other Color Knob *[95]* and other Voltage Light Module *[97]*	SK42J■♦	SK43J■♦	SK44J■♦	SK45J■♦	SK46J■♦	SK47J■♦	SK49J■♦	SK401J■♦	SK402J■♦
Spring Return from Left to Center, Operator Only (without contact blocks) *[94]*									
Without Knob, 110-120V 50-60 Hz Transformer	SK62J1	SK63J1	SK64J1	SK65J1	SK66J1	SK67J1	SK69J1	SK601J1	SK602J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	SK62J1R	SK63J1R	SK64J1R	SK65J1R	SK66J1R	SK67J1R	SK69J1R	SK601J1R	SK602J1R
With other Color Knob *[95]* and other Voltage Light Module *[97]*	SK62J■♦	SK63J■♦	SK64J■♦	SK65J■♦	SK66J■♦	SK67J■♦	SK69J■♦	SK601J■♦	SK602J■♦
Spring Return from Right to Center, Operator Only (without contact blocks) *[94]*									
Without Knob, 110-120V 50-60 Hz Transformer	SK72J1	SK73J1	SK74J1	SK75J1	SK76J1	SK77J1	SK79J1	SK701J1	SK702J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	SK72J1R	SK73J1R	SK74J1R	SK75J1R	SK76J1R	SK77J1R	SK79J1R	SK701J1R	SK702J1R
With other Color Knob *[95]* and other Voltage Light Module *[97]*	SK72J■♦	SK73J■♦	SK74J■♦	SK75J■♦	SK76J■♦	SK77J■♦	SK79J■♦	SK701J■♦	SK702J■♦
Spring Return from Both Sides to Center, Operator Only (without contact blocks) *[94]*									
Without Knob, 110-120V 50-60 Hz Transformer	SK52J1	SK53J1	SK54J1	SK55J1	SK56J1	SK57J1	SK59J1	SK501J1	SK502J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	SK52J1R	SK53J1R	SK54J1R	SK55J1R	SK56J1R	SK57J1R	SK59J1R	SK501J1R	SK502J1R
With other Color Knob *[95]* and other Voltage Light Module *[97]*	SK52J■♦	SK53J■♦	SK54J■♦	SK55J■♦	SK56J■♦	SK57J■♦	SK59J■♦	SK501J■♦	SK502J■♦



3 Position

Table 19.261: Selector Switch Assembly Code and Knob Cat. No.

Color	Standard Knob		Gloved Hand Knob	
	[98] Knob Code	Cat. No. *[93]*	*[98]* Knob Code	Cat. No. *[93]*
Black	B	B11	FB	B25
Red	R	R8	FR	R24
Green	G	G8	FG	G24
Yellow	Y	Y8	FY	Y24
Blue	L	L8	FL	L24
White	W	W8	FW	W24
Amber	A	A8	FA	A24
Clear	C	C8	FC	C24

Contact Blocks: Contact Blocks, page 19-90,Hermetically Sealed Logic Reed Contact Blocks, page 19-92, Hermetically Sealed Power Reed Contact Blocks, page 19-92
Light Modules:Standard Light Modules, page 19-91
Knobs and Accessories:Additional Accessories for Type K and SK Operators, page 19-99

[93] When ordering, add prefix 9001 to the catalog number.
[94] These operators can be ordered complete with contact blocks. Add the "H code" from Table 19.280 "H" Codes, page 19-93 as needed for your application.
[95] ♦ Add the knob color code chosen from the Selector Switch Assembly Code table. For LED, knob color must match LED.
[96] For other color knobs replace the B with knob color code. See Table 19.261 Selector Switch Assembly Code and Knob Cat. No., page 19-86 .
[97] ■ Add the voltage assembly code as chosen from Standard Light Modules, page 19-91. **Example: K25J with 208Vac = K25J3**
[98] Add the knob color code. For LED, knob color must match LED.

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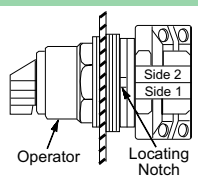
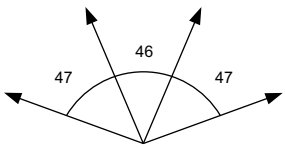
9001SK 4-Position Selector Switches

Table 19.262: 4-Position Selector Switches

Contact Block Required						1 — Contact Closed 0 — Contact Open			
Contact **Block Position**	**Quantity and Type**			**Mount on Side**					
 **Top View**	KA1	or	KA3	KA1 #2	or	KA3 #2	1	0	0	0
			KA2			KA2 #2	0	0	1	0
	KA1	or	KA3	KA1 #1	or	KA3 #1	0	0	0	1
			KA2			KA2 #1	0	1	0	0
Cam (see Type K, KX, and SK Selector Switch Guide, page 19-78)							H			

Non-Illuminated Operators	Type *[99]*
Manual Return *[100]*, **Operator Only (without contact blocks)**	
Without Knob	SKS88
With other Color Knob *[101]*	SKS88♦

Illuminated Operators	Type *[99]*
Manual Return *[100]*, **Operator Only (without contact blocks)**	
Without Knob, 110-120V 50-60 Hz Transformer	SK88J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	SK88J1R
With other Color Knob *[101]* and other Voltage Light Module *[102]*	SK88J■♦



4 Position

Table 19.263: Selector Switch Assembly Code and Knob Cat. No.

Color	Standard Knob		Gloved Hand Knob	
	[103] **Knob Code**	**Cat. No.** *[99]*	*[103]* **Knob Code**	**Cat. No.** *[99]*
Black	B	B11	FB	B25
Red	R	R8	FR	R24
Green	G	G8	FG	G24
Yellow	Y	Y8	FY	Y24
Blue	L	L8	FL	L24
White	W	W8	FW	W24
Amber	A	A8	FA	A24
Clear	C	C8	FC	C24

For Contact Blocks, see Contact Blocks, page 19-90,Hermetically Sealed Logic Reed Contact Blocks, page 19-92, Hermetically Sealed Power Reed Contact Blocks, page 19-92
For Light Modules, see Standard Light Modules, page 19-91
For Knobs and Accessories, see Additional Accessories for Type K and SK Operators, page 19-99

Potentiometers with Dial Plate

Table 19.264: Potentiometers with Dial Plate (not UL listed)—Maximum Voltage 300 Vac

Power	Description	Ratings	Type
2 W	Operator Only, for Single Potentiometer	NEMA 4, 13	SK20
	Operator with Single Potentiometer		SK21
	Operator Only, for Tandem Potentiometer		SK22
	Operator with Tandem Potentiometer		SK23
When ordering, add prefix 9001 to the catalog number.			

Table 19.265: Potentiometer Suffixes

Single Potentiometer			
Suffix *[104]*	**Resistance**	**Suffix** *[104]*	**Resistance**
01	50 Ω	07	5 kΩ
02	100 Ω	08	10 kΩ
04	500 Ω	09	25 kΩ
05	1 kΩ	13	500 kΩ
39	2 kΩ	37	750 kΩ
06	2.5 kΩ	14	1 MΩ

Tandem Potentiometer		
Suffix *[104]*	**Resistance**	
	Front	**Rear**
82	1 kΩ	1 kΩ

NOTE: Any potentiometer with a shaft 7/8 in. long and 1/4 in. diameter may be used with these operators.

[99] When ordering, add prefix 9001 to the catalog number.
[100] These operators can be ordered complete with contact blocks. Add the "H code" from Table 19.280 "H" Codes, page 19-93 as needed for your application.
[101] ♦ Add the knob color code chosen from the Selector Switch Assembly Code table. For LED, knob color must match LED.
[102] ■ Add the voltage assembly code as chosen from Standard Light Modules, page 19-91. **Example: K25J with 208Vac = K25J3**
[103] Add the knob color code from Table 19.237. For LED, knob color must match LED
[104] For the complete part number, add the suffix from this table to the catalog number from Table 19.264 Potentiometers with Dial Plate, page 19-87. Example: 9001K2105.

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Type SK Corrosion Resistant Pilot Lights

Table 19.266: Pilot Lights—UL Types 4, 4X, *[105]*

Description			Voltage	Style	With Red Fresnel Color Cap *[106]*	With Green Fresnel Color Cap *[106]*	With Other Color Cap *[106] [107]*	Without Color Cap *[106]*
	9001SKP1	Standard Pilot Light (Fresnel color cap shown)	110–120 V, 50–60 Hz	Transformer	SKP1R31	SKP1G31	SKP1■	SKP1
			220–240 V, 50–60 Hz	Transformer	SKP7R31	SKP7G31	SKP7■	SKP7
			24–28 Vac/Vdc	Full Voltage	SKP35R31	SKP35G31	SKP35■	SKP35
			For other voltages *[106]*	Transformer, Flashing or LED *[108]*	SKP▲R31	SKP▲G31	SKP■	SKP▲
				Full Voltage, Neon or Resistor *[109]*	SKP▲R31	SKP▲G31	SKP▲■	SKP▲
	9001SKT1	Push-To-Test Pilot Light (Fresnel color cap shown)	110–120 V, 50–60 Hz	Transformer	SKT1R31	SKT1G31	SKT1■	SKT1
			220–240 V, 50–60 Hz	Transformer	SKT7R31	SKT7G31	SKT7■	SKT7
			24–28 Vac/Vdc	Full Voltage	SKT35R31	SKT35G31	SKT35■	SKT35
			For other voltages *[106]*	Transformer, Flashing or LED *[108]*	SKT▲R31	SKT▲G31	SKT▲■	SKT▲
				Full Voltage, Neon or Resistor *[109]*	SKT▲R31	SKT▲G31	SKT▲■	SKT▲
	9001SKTR38	Remote Test Pilot Light (Fresnel color cap shown)	120 Vac Only	Resistor	SKTR38R31	SKTR38G31	SKTR38■	SKTR38
			24–28 Vac Only	Full Voltage	SKTR35R31	SKTR35G31	SKTR35■	SKTR35
			For other voltages *[106] [107] [110]*	Full Voltage or Resistor *[111]*	SKTR▲R31	SKTR▲G31	SKTR▲■	SKTR▲

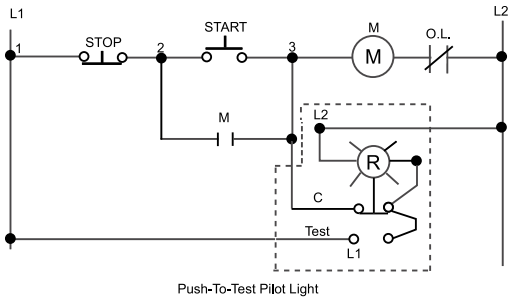
Plastic Fresnel

Plastic Domed

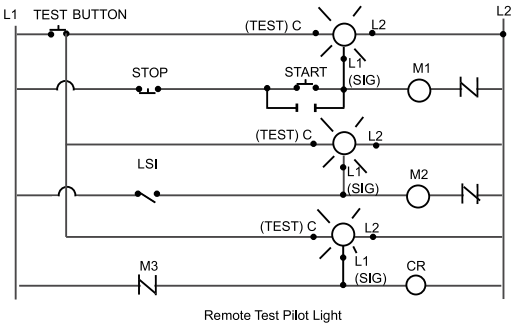
Table 19.267: Color Caps

Color	Plastic Fresnel *[112]*	Plastic Domed *[112]*
Amber	A31	A9
Blue	L31	L9
Clear	C31	C9
Green	G31	G9
Red	R31	R9
White	W31	W9
Yellow	Y31	Y9

Typical Wiring Diagram



Push-To-Test Pilot Light



Remote Test Pilot Light

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

NOTE: For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92. Contact blocks and legend plate not included unless otherwise noted.

[105] When ordering, add prefix 9001 to the catalog number.
[106] ▲ Add the voltage assembly code as chosen from Standard and Shallow Depth Light Modules, page 19-91.**EXAMPLE: SKT•••R31 with 208 Vac red LED voltage = SKT37LRR31.**
[107] ■ Add the color code as chosen from the color cap table below.**EXAMPLE: SKP1 with a blue fresnel cap = SKP1L31.**
[108] The cap must be the same color as the LED light module chosen, e.g., for a green LED, use a green color cap.
[109] On neon light modules, use clear color caps only.
[110] Use only full voltage or resistor voltage assembly codes on remote test pilot lights. Do not choose LED, neon or transformer codes. For AC use only.
[111] Use only full voltage or resistor voltage assembly codes on remote test pilot lights. Do not choose LED (exception — these LED codes are allowed: 38LG, 38LL, 38LR, 38LW, 38LY), neon or transformer codes. For AC use only.
[112] Add the color code as chosen from the color cap table below.**EXAMPLE: SKP1 with a blue fresnel cap = SKP1L31.**

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Type SK Corrosion Resistant Multifunction Operators

Table 19.268: Multifunction Operators—UL Types 4, 4X, 13/NEMA 4, 4X, 13 *[113][114]*

Interlocked Assembly		Description	Color	Contacts *[115]*	Without Contacts *[115]*
	9001SKR11U	Interlocked Assembly Both Buttons Maintained	Universal *[116]*	SKR11UH1	SKR11U
			Other *[117]*	SKR11▼H1	SKR11▼
		Interlocked Assembly One Button Momentary	Universal *[116]*	SKR12UH1H1	SKR12U
		Interlocked Assembly One Button Maintained	Other *[117]*	SKR12▼H1H1	SKR12▼

[113] For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92.
[114] Legend plate and contact block not included unless otherwise noted.
[115] When ordering, add prefix 9001 to the catalog number.
[116] Universal for SKR11,12 includes 2 each of black, red, green, yellow, orange, blue, white.
[117] ▼ Choose one color for each button. R = red, G = green, B = Black.**Example: 9001SKR11 with top button gray and bottom button orange = 9001SKR11ES.** See Table 19.253 Color Codes, page 19-83

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Table 19.269: Standard Contact Blocks

Description	Symbol	Type
(Clear Cover)	Direct-Acting	KA1
(Green Cover)		KA2
(Red Cover)	Direct-Acting	KA3
(Clear Cover)	N.O. Contact Early Closing	KA4
(Red Cover)	N.O. Contact Late Opening	KA5
(Green Cover)	N.O. Contact Early Closing	KA6

Table 19.270: Additional Circuit Arrangements

Description	Symbol		Type
Sequencing *[118]* N.O. Contact of KA4 closes before N.O. Contact on KA1	KA4	KA1	Order One Type KA4 and One Type KA1
Overlapping *[118]* N.O. Contact of KA4 closes before N.C. Contact of KA5 Opens	KA4	KA5	Order One Type KA4 and One Type KA5

Type KA Contact Blocks

The Class 9001 Type KA contact blocks are Fingersafe® contact blocks (meeting VDE 0106 Part 100). They have one screw mounting and captive (backed out) plus/minus terminal screws. These contact blocks are double-break, direct-acting contacts. Because of the wiping action of these contacts, they are suitable for use with programmable controllers. All contact blocks listed below accept up to 2 #12–#24 AWG solid or stranded wires. Recommended tightening torque for screw terminals is 7 lb-in.

Symbol	Contact Blocks with Binder Head Screws (not Fingersafe)		Gold Flashed Contacts with Standard Pressure Wire Terminals
	Type *[119]*	Quantity *[120]*	Type *[119]*
	KA21	25–Up	KA31
	KA22	25–Up	KA32
	KA23	25–Up	KA33
N.O. Early Closing	KA24	25–Up	KA34
N.C. Contact Late Opening	KA25	25–Up	KA35

Contact blocks listed below are not Fingersafe, but provide:

- Terminals that accept ring tongue/fork tongue connectors
- Short single circuit contact blocks (0.75" deep vs. 0.97" deep on the Fingersafe)
- Same as old style Series G product available prior to March, 1989.
- For assembled operators, use form Y238 (add to catalog number as suffix, for example: 9001KRU1H13Y238)

Table 19.271: Contact blocks (not Fingersafe)

Symbol	Type *[119]*	Symbol	Type *[119]*
	KA1G	N.O. Contact Early Closing	KA4G
	KA2G	N.C. Contact Late Opening	KA5G
	KA3G	N.O. Contact Early Closing	KA6G

Table 19.272: Contact blocks with Quick-Connect terminals (not Fingersafe)

Symbol	Type *[119]*
	KA12
	KA13

Table 19.273: Maximum Current Ratings for Control Circuit Contacts—Types KA1–KA6, KA21–KA25, KA31–KA35, KA1G–KA6G

Volts	AC						Volts	DC				
	Inductive (NEMA / UL Type A600) 35% Power Factor					Resistive 75% Power Factor Make, Break and Continuous Amperes		Inductive and Resistive (NEMA Q600)				
	Make		Break		Continuous Carrying Amperes			Make and Break				Continuous Carrying Capacity
	Amperes	VA	Amperes	VA				KA1	KA2 KA3	KA4	KA5 KA6	
120	60	7200	6.0	720	10	10	125	0.55	0.55	—	—	2.5
240	30		3.0				250	0.27	0.27	—	—	
480	15		1.5				600	0.10	0.10	—	—	
600	12		1.2									

[118] For push buttons or two-position selector switches only. For sequencing or overlapping contacts on other operators, refer to catalog 9001CT0001.
[119] When ordering, add prefix 9001 to the catalog number.
[120] Minimum order quanitity is 25.

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Standard and Shallow Depth Light Modules

Table 19.274: Standard Light Modules for Types K, SK, and KX Control Units *[121][122][123][124]*

Voltage	Description	Light Module Type *[125]*	Voltage Assembly Code	Rating	Replacement Lamp Part Number *[121]*
All	Full Voltage (without Bayonet Base Lamp)	KM40	40	—	None
6 Vac/Vdc	Full Voltage	KM31	31	.9 VA	2550101020
6 Vac/Vdc	LED Red	KM31LR	31LR		6508805201
6 Vac/Vdc	LED Green	KM31LG	31LG		6508805203
6 Vac/Vdc	LED Yellow	KM31LY	31LY		6508805202
12–14 Vac/Vdc	Full Voltage	KM32	32	1.2 VA	2550101037
12–14 Vac/Vdc	LED Red	KM32LR	32LR		6508805201
12–14 Vac/Vdc	LED Green	KM32LG	32LG		6508805203
12–14 Vac/Vdc	LED Yellow	KM32LY	32LY		6508805202
18 Vac/Vdc	Resistor	KM33	33	1.4 VA	2550101037
24–28 Vac/Vdc	Full Voltage	KM35	35	1.2 VA	2550101002
24–28 Vac/Vdc	LED Red	KM35LR	35LR	.28 VA	6508805210
24–28 Vac/Vdc	LED Green	KM35LG	35LG	.28 VA	6508805212
24–28 Vac/Vdc	LED Yellow	KM35LY	35LY	.28 VA	6508805211
24–28 Vac/Vdc	LED White	KM35LW	35LW	.28 VA	6508805214
24–28 Vac/Vdc	LED Blue	KM35LL	35LL	.28 VA	6508805213
48 Vac/Vdc	Full Voltage	KM36	36	2.6 VA	2550101025
110–120 V, 50–60 Hz	LED Red	KM1LR	1LR		6508805201
110–120 V, 50–60 Hz	LED Green	KM1LG	1LG		6508805203
110–120 V, 50–60 Hz	LED Yellow	KM1LY	1LY		6508805202
110–120 V, 50–60 Hz	Transformer	KM1	1	2.4 VA	2550101020
110–120 V, 50–60 Hz	Flashing	KMF1	F1	.85 VA	2550101036
120 Vac/Vdc	Full Voltage/Resistor	KM38	38	3.0 VA	2550101027
120 Vac/Vdc	Neon *[126]*	KM11	11	0.2 VA	2550101013
120 Vac/Vdc	LED Red	KM38LR	38LR	1.4 VA	6508805210
120 Vac/Vdc	LED Green	KM38LG	38LG	1.4 VA	6508805212
120 Vac/Vdc	LED Yellow	KM38LY	38LY	1.4 VA	6508805211
120 Vac/Vdc	LED White	KM38LW	38LW	1.4 VA	6508805214
120 Vac/Vdc	LED Blue	KM38LL	38LL	1.4 VA	6508805213
208–220 V, 50–60 Hz	Transformer	KM3	3	2.5 VA	2550101020
208–220 V, 50–60 Hz	LED Red	KM3LR	3LR		6508805201
208–220 V, 50–60 Hz	LED Green	KM3LG	3LG		6508805203
208–220 V, 50–60 Hz	LED Yellow	KM3LY	3LY		6508805202
208–220 V, 50–60 Hz	LED White	KM3LW	3LW		6508805215
208–220 V, 50–60 Hz	LED Blue	KM3LL	3LL		6508805216
220–240 V, 50–60 Hz	Transformer	KM7	7	2.0 VA	2550101020
220–240 V, 50–60 Hz	LED Red	KM7LR	7LR		6508805201
220–240 V, 50–60 Hz	LED Green	KM7LG	7LG		6508805203
220–240 V, 50–60 Hz	LED Yellow	KM7LY	7LY		6508805202
220–240 V, 50–60 Hz	LED White	KM7LW	7LW		6508805215
220–240 V, 50–60 Hz	LED Blue	KM7LL	7LL		6508805216
240 Vac/Vdc	Resistor	KM25	25	6.0 VA	2550101027
240 Vac/Vdc	Neon *[126]*	KM12	12	0.3 VA	2550101013
277 V, 50–60 Hz	Transformer	KM8	8	2.4 VA	2550101020
380–480 V, 50–60 Hz	Transformer	KM5	5	2.8 VA	2550101020
480 Vac/Vdc	Neon *[126]*	KM14	14	0.5 VA	2550101013
550–600 V, 50–60 Hz	Transformer	KM6	6	2.5 VA	2550101020

NOTE: Light modules are available in other voltages. For additional information, refer to Catalog **9001CT0001**.

Table 19.275: Shallow Depth Light Modules For Types K and SK Control Units *[121] [123] [127] [122]*

Voltage	Description	Light Module Type *[125]*	Voltage Assembly Code	Rating	Replacement Lamp Part Number
24–28 Vac/Vdc	Full Voltage	KM55	55	1.2 VA	2550101002
	LED Red	KM55LR	55LR	0.5 VA	6508805204
	LED Green	KM55LG	55LG		6508805206
	LED Yellow	KM55LY	55LY		6508805205
110–120 Vac/Vdc	Full Voltage	KM58	58	3.0 VA	2550101027
	LED Red	KM58LR	58LR	0.5 VA	6508805204
	LED Green	KM58LG	58LG		6508805206
	LED Yellow	KM58LY	58LY		6508805205

File: E78403
CCN: NKCR

File: LR25490
Class: 3211 03

CE marked

[121] For use with all operators except KX and remote test pilot.
[122] For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92.
[123] With LED light modules, use either a clear color cap or a cap the same color as the LED.
[124] With neon type light modules, use a **clear** color cap only.
[125] When ordering, add prefix 9001 to the catalog number.
[126] Not for use on KX operators.
[127] Reduces the depth of illuminated push buttons with contact blocks by over 33%.

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Square D Offering According to Class, Division, and Group

Table 19.277: Square D Offering According to Class, Division, and Group

For			Use	
Class	Division	Group(s)		
I	1	A	1.	Intrinsically Safe System
I	1	B, C, D	1.	9001 BR station
			2.	Intrinsically Safe System
I	2	A	1.	9001 K, SK, KX control stations with restrictions *[128] [129]*
			2.	Intrinsically Safe System
I	2	B, C, D	1.	9001 BR station
			2.	9001 K, SK, KX control stations with restrictions *[128] [129]*
			3.	Intrinsically Safe System
II	1	E, F, G	1.	9001 BR station
			2.	Intrinsically Safe System
II	2	E, F	1.	9001 BR station
			2.	9001 K, SK, KX control stations with restrictions *[128] [129]*
			3.	Intrinsically Safe System
II	2	G	1.	9001 BR station
			2.	9001 K, SK, KX control stations with restrictions *[130] [129]*
			3.	Intrinsically Safe System
III	1, 2	—	1.	9001 BR Station
			2.	9001 K, SK, KX control stations with restrictions *[130] [129]*
			3.	Intrinsically Safe System

Hazardous locations do not always require the use of explosion-proof equipment like the Class 9001 Type BR control stations. Selecting the most appropriate device for the location can save you money. For more information on the types of hazardous locations, contact your local electrical inspector.

Table 19.276: Hazardous Locations

Types K, SK	File: E10054 (N) CCN: NOIV	File: LR26817 Class: 3218 02

Hermetically Sealed Logic Reed Contact Blocks

Table 19.278: Hermetically Sealed Logic Reed Contact Blocks *[131] [132]*

Suitable for use on low energy level circuits

Description	Symbol	Type *[133]*
The maximum number of logic and/or power reed contact blocks per operator is as indicated on individual selection tables for standard contact blocks, **except**: • On 3 position selector switches with cams C, D, E, F, G, L, or M, mount reed blocks on **one side only** (either side), maximum 2 in tandem. • On 4 position selector switches, mount reed blocks on **one side only** (either side), maximum 2 in tandem. • On joysticks or on Type KR8 or SKR8 push-pull operators, mount reed blocks on **one side only** (either side), maximum 2 in tandem.		KA41
		KA42
		KA43
		KA44
		KA45

Max. Vac/Vdc	Maximum Load		
	Resistive	Inductive	Continuous
32/30	.25 A	.10 A	.5 A
120/100	8 VA	3 VA	.5 A

Hermetically Sealed Power Reed Contact Blocks

Table 19.279: Hermetically Sealed Power Reed Contact Blocks *[131] [132] [134]*

Description	Symbol	Type *[133]*
The maximum number of logic and/or power reed contact blocks per operator is as indicated on individual selection tables for standard contact blocks, **except**: • On 3 position selector switches with cams C, D, E, F, G, L, or M, mount reed blocks on **one side only** (either side), maximum 2 in tandem. • On 4 position selector switches, mount reed blocks on **one side only** (either side), maximum 2 in tandem. • On joysticks or on Type KR8 or SKR8 push-pull operators, mount reed blocks on **one side only** (either side), maximum 2 in tandem.		KA51
		KA52
		KA53
		KA54
		KA55

Volts	Make		Break		Continuous
	A	VA	A	VA	
AC NEMA C300 *[135]*					
120	10.00	1200	1.000	120	3.0
240	5.00		.500		
DC NEMA Q150 *[136]*					
115	.50	58	.50	58	3.0

[128] Any Class 9001 Type K, SK or KX operator can be used in an area classified as Class I, Division 2 hazardous locations, if:
1. Only logic (KA40 series) or power (KA50 series) reed contact blocks are used.
2. All Type K and SK illuminated operators are UL approved for use in Class I Division 2 areas. (Add Form Y243 to single lamp Push-To-Test pilot lights.)
3. Type KX illuminated operators do not use 4 lamp light modules, or 2 lamp light modules other than the transformer type. (Add Form Y243 to single lamp Push-To-Test pilot lights.)
4. The operators are mounted in any NEMA 4 & 13 enclosures.

[129] UL Listed: File E10054(N), CCN NOIV.
[130] Any Class 9001 Type K, SK, or KX operator mounted in a Class 9001 Type KY, KYSS, KYAF, SKY enclosure may be used, except potentiometer operators.
[131] Not for use in pendant stations.
[132] When ordering, add prefix 9001 to the catalog number.
[133] All contact blocks listed below accept #12–18 solid or stranded wire.
[134] The power reed contact blocks can be used with standard industrial relays and starters through NEMA Size 4. Minimum voltage is 5 V and the minimum current is 1 mA.
[135] Inductive Rating—35% Power Factor.
[136] Inductive and Resistive Ratings

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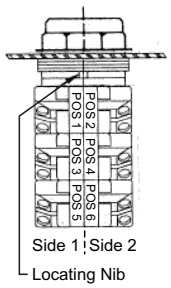
Type K, SK, and KX Contact Block "H" Numbers

The design of Class 9001 Type KA contact blocks allows them to be mounted side by side and/or in tandem. This enables you to specify an operator and a specific arrangement of contact blocks (shipped fully assembled) with a single Type number.

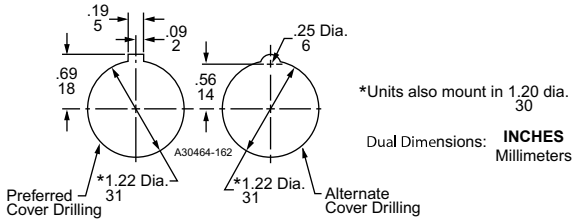
Table 19.280: "H" Codes

	Suffix No. (Add to Operator Type)	Positions					
		1	2	3	4	5	6
Example: A Type KR1B push button with 2 Type KA1 contact blocks would be Class 9001 Type KR1BH2.	H1	KA1					
	H2	KA1	KA1				
	H3	KA1	KA1	KA1			
	H4	KA1	KA1	KA1	KA1		
	H5	KA2					
	H6	KA3					
	H7	KA2	KA2				
	H8	KA3	KA3				
	H9	KA4	KA1				
	H10	KA4	KA5				
	H11	KA1	KA1		KA1		
	H12	KA2	KA3	KA2	KA3		
	H13		KA1				
	H14		KA3				
	H15	KA2	KA3				
	H16	KA2	KA3	KA2	KA3		
	H17	KA1	KA1				
	H18	KA3	KA1	KA2			
	H19	KA1	KA1	KA3		KA3	
	H21	KA2	KA3	KA1	KA1	KA1	
	H23	KA1	KA1				
	H24	KA1	KA2				
	H25	KA5	KA3	KA1	KA1	KA1	KA1



NOTE: For "H" Codes not in this table, contact your local Schneider Electric Customer Care Center.

Mounting Hole for All Types K, SK, and KX Control Units

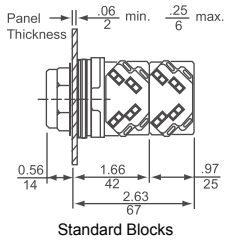


Hole Punch: Use Greenlee Tool #60242 to punch mounting hole and notch.

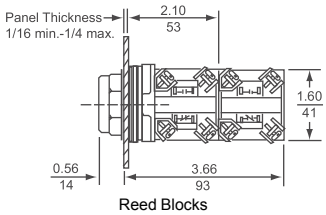
Maximum Contact Block Usage(Includes Types K, SK and KX)

- **2 blocks mounted side by side only:** Any 2, 3 or 4 position **spring return** selector switch (non-illuminated, illuminated or keyed).
- **2 blocks mounted in tandem 1 side only:** Any 2 operator interlocked push button.
- **2 blocks mounted in tandem (total of four blocks):** Any selector push button, keyed push button, 2, 3, or 4 position **maintained** selector switch (non-illuminated, illuminated or keyed), push-pull operators (non-illuminated or illuminated), joy stick, dual push button.
- **3 blocks mounted in tandem (total of six blocks):** Single momentary push buttons (non-illuminated or illuminated).

Table 19.281: Dimensions When Using Contact Blocks



Standard Blocks



Reed Blocks

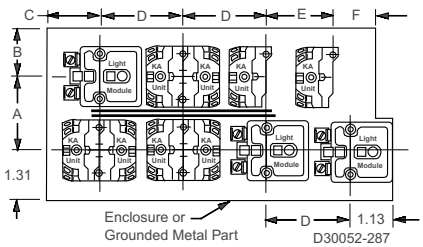


Table 19.282: Basic Operators (Without Color Caps, Mushroom Buttons, Knobs, Selector Switch Cams, Contact Blocks, Light Modules, or Legend Plates)

Description	For UL Types/NEMA	
	1, 3R, 4, 12, 13 *[137]*	4, 4X, 13 *[137]*
Non-Illuminated Push Button (Extended Guard)	KR2	SKR2
Non-Illuminated Push Button (No Guard)	KR3	SKR3
Non-Illuminated Push Button (Mushroom Button/ Screw-On)	KR20	SKR20
Non-Illuminated Dual Push Button (Momentary)	KR6	—
Non-Illuminated Dual Push Button (Momentary Interlocked)	KR67	—
Non-Illuminated Dual Push Button (Maintained Interlocked)	KR7	—
Momentary Pull—Maintained Neutral—Momentary Push	KR8 *[138] [139]*	SKR8 *[138]*
Maintained Pull—Maintained Push	KR9 *[138] [139]*	SKR9 *[138]*
Illuminated Push Button (Full Guard—Plastic Top)	K1L *[140]*	SK1L *[140]*
Illuminated Push Button and Push-To-Test (No Guard)	K2L *[140] [141]*	SK2L *[140] [141]*
Illuminated Push Button (Full Guard—Metal Top)	K3L *[140]*	—
Standard Pilot Light	KP	SKP
3 Position Maintained Selector Switch	KS4 *[138]*	SKS4 *[138]*
3 Position Spring Return Both Sides To Center—Selector Switch	KS5 *[138]*	SKS5 *[138]*
3 Position Spring Return Left To Center—Selector Switch	KS6 *[138]*	SKS6 *[138]*
3 Position Spring Return Right To Center—Selector Switch	KS7 *[138]*	SKS7 *[138]*

Table 19.283: Min. Centerline Spacing, Type K & SK Control Units

Legend Plate	Operator	Centerline Spacing (in.)					
		A	B	C	D	E	F
Legend Plate Orientation Position #1							
KN2 KN5	Standard Push Button	1.75	1.31	1.44	2.25	1.69	0.88
	1.375 in. Dia. Mushroom	1.75	1.31	1.44	2.25	1.69	0.88
	2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
	Selector Switch Knobs	1.75	1.31	1.44	2.25	1.69	0.88
KN3	Standard Push Button	2.00	1.31	1.44	2.25	1.75	0.88
	1.375 in. Dia. Mushroom	2.00	1.31	1.44	2.25	1.75	0.88
	2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
	Selector Switch Knobs	2.00	1.31	1.44	2.25	1.75	0.88
KN4	Standard Push Button	1.94	1.31	1.44	2.25	1.62	0.88
	1.375 in. Dia. Mushroom	1.94	1.31	1.44	2.25	1.62	0.88
	2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
	Selector Switch Knobs	1.74	1.31	1.44	2.25	1.62	0.88
KN6	Standard Push Button	2.38	1.62	1.44	2.25	2.25	1.12
	1.375 in. Dia. Mushroom	2.38	1.62	1.44	2.25	2.25	1.12
	2.25 in. Dia. Mushroom	2.38	1.62	1.44	2.25	2.25	1.12
	Selector Switch Knobs	2.38	1.62	1.44	2.25	2.25	1.12
Legend Plate Orientation Position #2							
KN2 KN5	Standard Push Button	1.62	1.31	1.44	2.25	1.75	0.88
	1.375 in. Dia. Mushroom	1.62	1.31	1.44	2.25	1.75	0.88
	2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
	Selector Switch Knobs	1.62	1.31	1.44	2.25	1.75	0.88
KN3	Standard Push Button	1.75	1.31	1.44	2.25	2.00	0.88
	1.375 in. Dia. Mushroom	1.75	1.31	1.44	2.25	2.00	0.88
	2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
	Selector Switch Knobs	1.75	1.31	1.44	2.25	2.00	0.88
KN4	Standard Push Button	1.62	1.31	1.44	2.25	1.94	1.00
	1.375 in. Dia. Mushroom	1.62	1.31	1.44	2.25	1.94	1.00
	2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
	Selector Switch Knobs	1.62	1.31	1.44	2.25	1.94	1.00
KN6	Standard Push Button	2.25	1.31	1.62	2.38	2.38	0.88
	1.375 in. Dia. Mushroom	2.25	1.31	1.62	2.38	2.38	0.88
	2.25 in. Dia. Mushroom	2.25	1.31	1.62	2.38	2.38	1.12
	Selector Switch Knobs	2.25	1.31	1.62	2.38	2.38	0.88

[137] When ordering, add prefix 9001 to the catalog number.
[138] Operator can be converted to an illuminated operator by removing the liner (6512240601) and adding a light module.
[139] These operators can be supplied with 1-3/8 in or 2-1/4 in dia. mushroom buttons. For 1-3/8 in.: add ( ) 20 to type number. For 2-1/4 in.: Add ( ) 21 to type number. The ( ) refers to the color chosen—see Additional Accessories for Type K and SK Operators, page 19-99. Voids UL and NEMA 6 Rating.
[140] Operator can be converted to a non-illuminated operator by adding liner (6512240601).
[141] Operator includes jumper wires for push-to-test conversion.

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Legend Plates for Types K and SK Operators

Table 19.284: Legend Plates

Standard Markings	Plastic Legend Plates *[142] [143]* for use with Types K and SK Operators									Aluminum Legend Plates *[144]* for use with Type K Operators		
	1-3/4" Square			2-1/4" Square			2-1/2" Square			Black Legend	Black Legend	Blue Legend
	Silver Legend with Black Letters	White Legend with Black Letters	Black Legend with White Letters	Silver Legend with Black Letters	White Legend with Black Letters	Black Legend with White Letters	Silver Legend with Black Letters	White Legend with Black Letters	Black Legend with White Letters			
For Push Button or Pilot Light										**KN200**	**KN300**	**KN800**
Blank	KN200SP	KN200WP	KN200BP	KN100SP	KN100WP	KN100BP	KN700SP	KN700WP	KN700BP	KN200	KN300	KN800
Blank (red)	KN200RP■	KN200RP■	KN200RP■	KN100RP■	KN100RP■	KN100RP■	KN700RP■	KN700RP■	KN700RP■	KN200R▲	KN300R▲	KN800R▲
Start	KN201SP	KN201WP	KN201BP	KN101SP	KN101WP	KN101BP	KN701SP	KN701WP	KN701BP	KN201	KN301	KN801
Stop	KN202RP■	KN202RP■	KN202RP■	KN102RP■	KN102RP■	KN102RP■	KN702RP■	KN702RP■	KN702RP■	KN202▲	KN302▲	KN802▲
On	KN203SP	KN203WP	KN203BP	KN103SP	KN103WP	KN103BP	KN703SP	KN703WP	KN703BP	KN203	KN303	KN803
Off	KN204RP■	KN204RP■	KN204RP■	KN104RP■	KN104RP■	KN104RP■	KN704RP■	KN704RP■	KN704RP■	KN204▲	KN304▲	KN804▲
Emerg. Stop	KN205RP■	KN205RP■	KN205RP■	KN105RP■	KN105RP■	KN105RP■	KN705RP■	KN705RP■	KN705RP■	KN205▲	KN305▲	KN805▲
Forward	KN206SP	KN206WP	KN206BP	KN106SP	KN106WP	KN106BP	KN706SP	KN706WP	KN706BP	KN206	KN306	KN806
Reverse	KN207SP	KN207WP	KN207BP	KN107SP	KN107WP	KN107BP	KN707SP	KN707WP	KN707BP	KN207	KN307	KN807
Close	KN208SP	KN208WP	KN208BP	KN108SP	KN108WP	KN108BP	KN708SP	KN708WP	KN708BP	KN208	KN308	KN808
Open	KN209SP	KN209WP	KN209BP	KN109SP	KN109WP	KN109BP	KN709SP	KN709WP	KN709BP	KN209	KN309	KN809
Down	KN210SP	KN210WP	KN210BP	KN110SP	KN110WP	KN110BP	KN710SP	KN710WP	KN710BP	KN210	KN310	KN810
Up	KN211SP	KN211WP	KN211BP	KN111SP	KN111WP	KN111BP	KN711SP	KN711WP	KN711BP	KN211	KN311	KN811
Fast	KN212SP	KN212WP	KN212BP	KN112SP	KN112WP	KN112BP	KN712SP	KN712WP	KN712BP	KN212	KN312	KN812
Slow	KN213SP	KN213WP	KN213BP	KN113SP	KN113WP	KN113BP	KN713SP	KN713WP	KN713BP	KN213	KN313	KN813
High	KN214SP	KN214WP	KN214BP	KN114SP	KN114WP	KN114BP	KN714SP	KN714WP	KN714BP	KN214	KN314	KN814
Low	KN215SP	KN215WP	KN215BP	KN115SP	KN115WP	KN115BP	KN715SP	KN715WP	KN715BP	KN215	KN315	KN815
Inch	KN216SP	KN216WP	KN216BP	KN116SP	KN116WP	KN116BP	KN716SP	KN716WP	KN716BP	KN216	KN316	KN816
In	KN217SP	KN217WP	KN217BP	KN117SP	KN117WP	KN117BP	KN717SP	KN717WP	KN717BP	KN217	KN317	KN817
Jog	KN218SP	KN218WP	KN218BP	KN118SP	KN118WP	KN118BP	KN718SP	KN718WP	KN718BP	KN218	KN318	KN818
Jog For.	KN219SP	KN219WP	KN219BP	KN119SP	KN119WP	KN119BP	KN719SP	KN719WP	KN719BP	KN219	KN319	KN819
Jog Rev.	KN220SP	KN220WP	KN220BP	KN120SP	KN120WP	KN120BP	KN720SP	KN720WP	KN720BP	KN220	KN320	KN820
Lower	KN221SP	KN221WP	KN221BP	KN121SP	KN121WP	KN121BP	KN721SP	KN721WP	KN721BP	KN221	KN321	KN821
Out	KN222SP	KN222WP	KN222BP	KN122SP	KN122WP	KN122BP	KN722SP	KN722WP	KN722BP	KN222	KN322	KN822
Reset	KN223SP	KN223WP	KN223BP	KN123SP	KN123WP	KN123BP	KN723SP	KN723WP	KN723BP	KN223	KN323	KN823
Run	KN224SP	KN224WP	KN224BP	KN124SP	KN124WP	KN124BP	KN724SP	KN724WP	KN724BP	KN224	KN324	KN824
Start Jog	KN225SP	KN225WP	KN225BP	KN125SP	KN125WP	KN125BP	KN725SP	KN725WP	KN725BP	KN225	KN325	KN825
Test	KN226SP	KN226WP	KN226BP	KN126SP	KN126WP	KN126BP	KN726SP	KN726WP	KN726BP	KN226	KN326	KN826
Raise	KN227SP	KN227WP	KN227BP	KN127SP	KN127WP	KN127BP	KN727SP	KN727WP	KN727BP	KN227	KN327	KN827
Decrease	KN228SP	KN228WP	KN228BP	KN128SP	KN128WP	KN128BP	KN728SP	KN728WP	KN728BP	KN228	KN328	KN828
Increase	KN229SP	KN229WP	KN229BP	KN129SP	KN129WP	KN129BP	KN729SP	KN729WP	KN729BP	KN229	KN329	KN829
Left	KN230SP	KN230WP	KN230BP	KN130SP	KN130WP	KN130BP	KN730SP	KN730WP	KN730BP	KN230	KN330	KN830
Right	KN231SP	KN231WP	KN231BP	KN131SP	KN131WP	KN131BP	KN731SP	KN731WP	KN731BP	KN231	KN331	KN831
Cycle Start	KN232SP	KN232WP	KN232BP	KN132SP	KN132WP	KN132BP	KN732SP	KN732WP	KN732BP	KN232	KN332	KN832
Feed Start	KN233SP	KN233WP	KN233BP	KN133SP	KN133WP	KN133BP	KN733SP	KN733WP	KN733BP	KN233	KN333	KN833
Cycle Stop	KN234SP	KN234WP	KN234BP	KN134SP	KN134WP	KN134BP	KN734SP	KN734WP	KN734BP	KN234	KN334	KN834
Motor Run	KN236SP	KN236WP	KN236BP	KN136SP	KN136WP	KN136BP	KN736SP	KN736WP	KN736BP	KN236	KN336	KN836
Motor Stop	KN237SP	KN237WP	KN237BP	KN137SP	KN137WP	KN137BP	KN737SP	KN737WP	KN737BP	KN237	KN337	KN837
Power On	KN238SP	KN238WP	KN238BP	KN138SP	KN138WP	KN138BP	KN738SP	KN738WP	KN738BP	KN238	KN338	KN838
Pull To Start Push To Stop	N/A	N/A	N/A	KN179SP	KN179WP	KN179BP	KN779SP	KN779WP	KN779BP	N/A	KN379	N/A
For Selector Switch or Selector Push Button												
For.-Rev.	KN239SP	KN239WP	KN239BP	KN139SP	KN139WP	KN139BP	KN739SP	KN739WP	KN739BP	KN239	KN339	KN839
Hand-Auto.	KN240SP	KN240WP	KN240BP	KN140SP	KN140WP	KN140BP	KN740SP	KN740WP	KN740BP	KN240	KN340	KN840
High-Low	KN241SP	KN241WP	KN241BP	KN141SP	KN141WP	KN141BP	KN741SP	KN741WP	KN741BP	KN241	KN341	KN841
Jog-Run	KN242SP	KN242WP	KN242BP	KN142SP	KN142WP	KN142BP	KN742SP	KN742WP	KN742BP	KN242	KN342	KN842
Man.-Auto.	KN243SP	KN243WP	KN243BP	KN143SP	KN143WP	KN143BP	KN743SP	KN743WP	KN743BP	KN243	KN343	KN843
Off-On	KN244SP	KN244WP	KN244BP	KN144SP	KN144WP	KN144BP	KN744SP	KN744WP	KN744BP	KN244	KN344	KN844
On-Off	KN245SP	KN245WP	KN245BP	KN145SP	KN145WP	KN145BP	KN745SP	KN745WP	KN745BP	KN245	KN345	KN845
Open-Close	KN246SP	KN246WP	KN246BP	KN146SP	KN146WP	KN146BP	KN746SP	KN746WP	KN746BP	KN246	KN346	KN846
Raise-Lower	KN247SP	KN247WP	KN247BP	KN147SP	KN147WP	KN147BP	KN747SP	KN747WP	KN747BP	KN247	KN347	KN847
Run-Jog	KN248SP	KN248WP	KN248BP	KN148SP	KN148WP	KN148BP	KN748SP	KN748WP	KN748BP	KN248	KN348	KN848
Slow-Fast	KN250SP	KN250WP	KN250BP	KN150SP	KN150WP	KN150BP	KN750SP	KN750WP	KN750BP	KN250	KN350	KN850
Start-Stop	KN251SP	KN251WP	KN251BP	KN151SP	KN151WP	KN151BP	KN751SP	KN751WP	KN751BP	KN251	KN351	KN851
Up-Down	KN253SP	KN253WP	KN253BP	KN153SP	KN153WP	KN153BP	KN753SP	KN753WP	KN753BP	KN253	KN353	KN853
Low-High	KN254SP	KN254WP	KN254BP	KN154SP	KN154WP	KN154BP	KN754SP	KN754WP	KN754BP	KN254	KN354	KN854
Stop-Start	KN255SP	KN255WP	KN255BP	KN155SP	KN155WP	KN155BP	KN755SP	KN755WP	KN755BP	KN255	KN355	KN855
Left-Right	KN256SP	KN256WP	KN256BP	KN156SP	KN156WP	KN156BP	KN756SP	KN756WP	KN756BP	KN256	KN356	KN856
On-Auto	KN276SP	KN276WP	KN276BP	KN176SP	KN176WP	KN176BP	KN776SP	KN776WP	KN776BP	KN276	KN376	KN876
Auto-Off-Hand	KN258SP	KN258WP	KN258BP	KN158SP	KN158WP	KN158BP	KN758SP	KN758WP	KN758BP	KN258	KN358	KN858
For.-Off-Rev.	KN259SP	KN259WP	KN259BP	KN159SP	KN159WP	KN159BP	KN759SP	KN759WP	KN759BP	KN259	KN359	KN859
Hand-Off-Auto.	KN260SP	KN260WP	KN260BP	KN160SP	KN160WP	KN160BP	KN760SP	KN760WP	KN760BP	KN260	KN360	KN860
Man-Off-Auto	KN262SP	KN262WP	KN262BP	KN162SP	KN162WP	KN162BP	KN762SP	KN762WP	KN762BP	KN262	KN362	KN862
Open-Off-Close	KN263SP	KN263WP	KN263BP	KN163SP	KN163WP	KN163BP	KN763SP	KN763WP	KN763BP	KN263	KN363	KN863
Up-Off-Down	KN264SP	KN264WP	KN264BP	KN164SP	KN164WP	KN164BP	KN764SP	KN764WP	KN764BP	KN264	KN364	KN864
Low-Off-High	KN265SP	KN265WP	KN265BP	KN165SP	KN165WP	KN165BP	KN765SP	KN765WP	KN765BP	KN265	KN365	KN865
Jog-Stop-Run	KN267SP	KN267WP	KN267BP	KN167SP	KN167WP	KN167BP	KN767SP	KN767WP	KN767BP	KN267	KN367	KN867
High-Low-Off	KN270SP	KN270WP	KN270BP	KN170SP	KN170WP	KN170BP	KN770SP	KN770WP	KN770BP	KN270	KN370	KN870
High-Off-Low	KN277SP	KN277WP	KN277BP	KN177SP	KN177WP	KN177BP	KN777SP	KN777WP	KN777BP	KN277	KN377	KN877
Auto-Man-Off	KN278SP	KN278WP	KN278BP	KN178SP	KN178WP	KN178BP	KN778SP	KN778WP	KN778BP	KN278	KN378	KN878

[142] ■ = Legend plate has red background with black letters.
[143] When ordering, add prefix 9001 to the catalog number.
[144] ▲ = Legend plate has red background with silver letters.

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Table 19.285: Legend Plates–Special Marking

Legend Plate	Description		Type *[145]*
KN100( )P (Plastic) *[146]* 2.25 in Square	Standard Markings		See Table 19.284 Legend Plates, page 19-94
	Special Marking *[147]*	Silver Field, Black Letters	KN199SP
		White Field, Black Letters	KN199WP
		Red Field, Black Letters	KN199RP
		Black Field, White Letters	KN199BP
KN200 Aluminum	Standard Markings		See Table 19.284 Legend Plates, page 19-94
	Special Marking *[147]*	Black Field	KN299
		Red Field	KN299R
KN200( )P (Plastic) *[146]* 1.7 in. Square	Standard Markings		See Table 19.284 Legend Plates, page 19-94
	Special Marking *[147]*	Silver Field, Black Letters	KN299SP
		White Field, Black Letters	KN299WP
		Red Field, Black Letters	KN299RP
		Black Field, White Letters	KN299BP
KN300 Aluminum	Standard Markings		See Table 19.284 Legend Plates, page 19-94
	Special Marking *[147]*	Black Field	KN399
		Red Field	KN399R
KN400 Aluminum	Blank		KN400
	Any Marking *[147]*		KN499
KN500 Aluminum	Standard Markings		Select from Table 19.290 Special Legend Plates, page 19-96
	Special Marking *[147]*	Black Field	KN599
		Green Red Field	KN519
KN600 Aluminum	Blank	Black Field	KN600
		Red Field	KN600R
	Any Marking *[147]*	Black Field	KN699
		Red Field	KN699R
KN700( )P (Plastic) *[146]* 2.5 in. Square	Standard Markings		Select from Table 19.284 Legend Plates, page 19-94
	Special Marking *[147]*	Silver Field, Black Letters	KN799SP
		White Field, Black Letters	KN799WP
		Red Field, Black Letters	KN799RP
		Black Field, White Letters	KN799BP
KN800 Aluminum	Standard Markings		Select from Table 19.284 Legend Plates, page 19-94
	Special Marking *[147]*	Blue Field	KN899
		Red Field	KN899R
KN900 Aluminum	Blank		KN900
	Any Marking *[147]*		KN999

Table 19.286: Maximum Number of Lines and Characters for Type KN Legend Plates

Type	KN100	KN200	KN300	KN400	KN500	KN600	KN700	KN800	KN900
Max. No. of Characters per Line	16	14	18	18	8 per field	22	17	18	18 per pos.
Max. No. of Lines	2	1	3	2	2 per field	4	2	2	1 per pos.

NOTE: The maximum number of characters and lines is a practical maximum, based on a minimum size of characters to facilitate easy reading.

Table 19.287: Circular Legends for Emergency Stop Mushroom Heads (yellow background)

Diameter	Text	Catalog Number *[145]*
60 mm	—	9001KN9100
	EMERGENCY STOP	9001KN9330
90 mm	—	9001KN8100
	EMERGENCY STOP	9001KN8330

Table 19.288: Plastic Legend Plates—Other Colors

	Plate Color	Letter Color	1.7 in. Square *[145]*	2.25 in. Square *[145]*	2.5 in. Square *[145]*
Blank Legend Plates	Yellow	Black	KN200YP	KN100YP	KN700YP
	Green	White	KN200GP	KN100GP	KN700GP
	Blue		KN200LP	KN100LP	KN700LP
	Red		KN200CP	KN100CP	KN700CP
Special Engraved Legend Plates	Yellow	Black	KN299YP	KN199YP	KN799YP
	Green	White	KN299GP	KN199GP	KN799GP
	Blue		KN299LP	KN199LP	KN799LP
	Red		KN299CP	KN199CP	KN799CP

[145] When ordering, add prefix 9001 to the catalog number.
[146] Other colors available (see Table 19.288 Plastic Legend Plates—Other Colors, page 19-95).
[147] Specify marking required.

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Table 19.289: Min. Centerline Spacing, Type K & SK Control Units

Legend Plate		Operator	Centerline Spacing (in.)					
			A	B	C	D	E	F
Legend Plate Orientation Position #1								
Legend Plate Position #1	KN2 KN5	Standard Push Button	1.75	1.31	1.44	2.25	1.69	0.88
		1.375 in. Dia. Mushroom	1.75	1.31	1.44	2.25	1.69	0.88
		2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
		Selector Switch Knobs	1.75	1.31	1.44	2.25	1.69	0.88
	KN3	Standard Push Button	2.00	1.31	1.44	2.25	1.75	0.88
		1.375 in. Dia. Mushroom	2.00	1.31	1.44	2.25	1.75	0.88
		2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
		Selector Switch Knobs	2.00	1.31	1.44	2.25	1.75	0.88
	KN4	Standard Push Button	1.94	1.31	1.44	2.25	1.62	0.88
		1.375 in. Dia. Mushroom	1.94	1.31	1.44	2.25	1.62	0.88
		2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
		Selector Switch Knobs	1.74	1.31	1.44	2.25	1.62	0.88
	KN6	Standard Push Button	2.38	1.62	1.44	2.25	2.25	1.12
		1.375 in. Dia. Mushroom	2.38	1.62	1.44	2.25	2.25	1.12
		2.25 in. Dia. Mushroom	2.38	1.62	1.44	2.25	2.25	1.12
		Selector Switch Knobs	2.38	1.62	1.44	2.25	2.25	1.12
Legend Plate Orientation Position #2								
Legend Plate Position #2	KN2 KN5	Standard Push Button	1.62	1.31	1.44	2.25	1.75	0.88
		1.375 in. Dia. Mushroom	1.62	1.31	1.44	2.25	1.75	0.88
		2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
		Selector Switch Knobs	1.62	1.31	1.44	2.25	1.75	0.88
	KN3	Standard Push Button	1.75	1.31	1.44	2.25	2.00	0.88
		1.375 in. Dia. Mushroom	1.75	1.31	1.44	2.25	2.00	0.88
		2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
		Selector Switch Knobs	1.75	1.31	1.44	2.25	2.00	0.88
	KN4	Standard Push Button	1.62	1.31	1.44	2.25	1.94	1.00
		1.375 in. Dia. Mushroom	1.62	1.31	1.44	2.25	1.94	1.00
		2.25 in. Dia. Mushroom	2.25	1.31	1.44	2.25	2.25	1.12
		Selector Switch Knobs	1.62	1.31	1.44	2.25	1.94	1.00
	KN6	Standard Push Button	2.25	1.31	1.62	2.38	2.38	0.88
		1.375 in. Dia. Mushroom	2.25	1.31	1.62	2.38	2.38	0.88
		2.25 in. Dia. Mushroom	2.25	1.31	1.62	2.38	2.38	1.12
		Selector Switch Knobs	2.25	1.31	1.62	2.38	2.38	0.88

Special Legend Plates

Table 19.290: Special Legend Plates

	Type KN500 (For Use with Dual Function Operators: KR6, KR7 and KR67)	
	Standard Markings	
Type	**Green**	**Red**
KN500	Blank	Blank
KN501	Start	Stop
KN502	On	Off

Type	**Black**	**Black**
KN520	Blank	Blank
KN521	Start	Stop
KN522	On	Off
KN523	Forward	Reverse
KN524	Up	Down
KN525	High	Low
KN526	Open	Close

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K4

K5

K97

K6

K60

K62

K96

K162

K7

K107

K108

K109

K110

K48

K56■
K56♦M▲

K68
K685

Padlock Attachments for Type K and SK Operators

Table 19.291: Padlock Attachments

Used On	Description	Type *[148]*
Type K non-illuminated push button — Standard or mushroom (KR4, KR5 mushroom buttons only).	Holds button in depressed position and can be padlocked.	K4
Types K and SK non-illuminated push buttons with or without protective boots.	Holds button in depressed position when padlocked.	K5 K97
Types K and SK non-illuminated push buttons, cover type attachment. KR, SKR	Attachment can be padlocked. Does not hold button in depressed position.	K6
Types K and SK push buttons, cover type attachment.	Spring loaded cover cannot be padlocked. Does not hold button in depressed position.	K60
Types K and SK push-pull operator and illuminated push buttons. KR8, KR9	Holds button in depressed position and can be padlocked.	K62
KR11U and **KR12U** Interlocked Assembly	Holds maintained button in depressed position and can be padlocked.	K96
Type KR9 & SKR9 Push-Pull operators—Non-Illuminated and Illuminated	Holds button in depressed position. Can be padlocked.	K162

Table 19.292: Padlock Attachments

Used On	Description	Type *[148]*
Types K and SK selector switches and potentiometers (will not work with gloved-hand knob).	Cover type attachment that can be padlocked to keep unauthorized personnel from tampering with the operator.	K7
Types K and SK selector switches and potentiometers (will not work with gloved-hand knob).	Same as 9001K7 but with spring loaded lockout cover.	K107
Types K and SK illuminated push buttons (with or without guard) and key operated push buttons.	Cover type attachment that can be padlocked to keep unauthorized personnel from tampering with the operator.	K108
Types K and SK illuminated push buttons (with or without guard) and key operated push buttons.	Same as 9001K108 but with spring loaded lockout cover.	K109
Types K and SK maintained push-pull operators using 1.375 in. dia. mushroom buttons (-20 series, see Additional Accessories for Type K and SK Operators, page 19-99).	Cover type attachment that holds mushroom button in depressed position and can be padlocked.	K110

Mushroom Button Guards for Type K and SK Operators

Table 19.293: Mushroom Button Guards

Description	Used On	Type *[149] [150] [151]*
Aluminum Mushroom Guard for 1.375 in. Mushroom Button Operator (KR4, KR24)	KR4, KR24	K48
Yellow Plastic Extended Mushroom Guard for 1.375 in. and 1.625 in. Mushroom Button Operators	KR4, SKR4	K56■
	KR8, KR9, SKR8, SKR9	K56♦M▲
Aluminum Mushroom Guard for 2.25 in. Mushroom Button Operator	KR5	K68
	KR25	K685

[148] When ordering, add prefix 9001 to the catalog number.
[149] ■ B=Black G=Green R=Red Y=Yellow
[150] ♦ R=Red Y=Yellow
[151] ▲ The mushroom guard has finger holes for push-pull operators.

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KU1

KU17

KU37

KU27

Potective Boots for Type K and SK Operators

Table 19.294: Protective Boots

For Non-Illuminated Push Buttons *[152]*		Clear Color for	Type *[153]*
Color	Type *[153]*		
Black	KU1	Standard knob selector switch	KU17
Red	KU2	Gloved-hand cap for use on standard knob selector switch	KU18
Blue	KU3		
Brown	KU4		
Green	KU5	Standard pilot light and maintained contact push buttons	KU27
Yellow	KU6		
Clear	KU7		
Clear	KU8	Push-to-test and illuminated push button without guard	KU37
(Provides Full Guard)		Illuminated push button with guard	KU47

NOTE: These Type KU protective boots are recommended for very dirty environments or severe hose down, but they are not required for UL Type 4 rating on the Type K operators or UL Type 4 or 4X rating on the Type SK operators. The K1 wrench (see Wrenches for Type K and SK Operators, page 19-101) is required for installation of these boots.

Closing Plates for Type K and SK Operators

Table 19.295: Closing Plates

Description		Type
Round (1-1/2 in. Dia.)	Gray	K51 *[154]*
	Black	K52 *[154]*

For Dimensions, see catalog 9001CT0001

[152] Use KU27 for maintained contact push buttons.
[153] When ordering, add prefix 9001 to the catalog number.
[154] Meets UL and NEMA 1, 2, 3, 4, 4X, 6, 12 and 13.

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Additional Accessories for Type K and SK Operators

Table 19.296: Accessories

Description	Color	Type *[155]*	Package Qty.
Color inserts for KR1, KR2, KR3, SKR1, SKR2, SKR3, KR11, KR12, SKR11, SKR12, KRD, T, TRD	Black Blue Gray Green Orange Red	T8BK T8BE T8GY T8GN T8OE T8RD	10
	Universal *[156]*	T8U	7
	White	T8WH	10
	Yellow	T8YW	
1.375 in. Snap-in Mushroom knob for KR4 and SKR4 *[157]*	Black Blue Green Orange Red	K16B K16L K16G K16S K16R	1
	Red *[158]*	K16R05	
	Yellow	K16Y	
2-1/4 in. Snap-in Mushroom knob for KR5 and SKR5 *[159]*	Black Blue Green Orange Red	K17B K17L K17G K17S K17R	1
	Red *[158]*	K17R05	
	Yellow	K17Y	
1-3/8 in. Screw-on Mushroom knob for KR24 and SKR24*[160]*	Black Blue Green Orange Red Yellow	K92B K92L K92G K92S K92R K92Y	1
2-1/4 in. Screw-on Mushroom knob for KR25 and SKR25 *[161]*	Black Blue Green Orange Red Yellow	K93B K93L K93G K93S K93R K93Y	1
Push-Pull Knobs for KR8, KR9, SKR8, SKR9 Operators	Amber Black *[162]* Blue Clear Green Orange *[162]* Red	A22 B23 L22 C22 G22 S23 R22	1
	Red *[163]*	R2205	
	White Yellow	W22 Y22	
Color Inserts for Dual Function Operators KR6, KR7, KR67	Black Green Red	B19 G19 R19	10
	Universal *[164]*	U19	
Standard Color Caps for Illuminated Push Buttons K1L, K2L, K3L, SK1L, SK2L	Amber Blue Clear Green Red White Yellow	A7 L7 C7 G7 R7 W7 Y7	1
Knob for KR9R94	Red	R94	1
Metal Knob for KR24	Red Green Black	K92RM K92GM K92BM	1
Metal Knob for KR25	Red Green Black	K93RM K93GM K93BM	1
Metal Knob for KR9 (40 mm)	Red Green Black	K94RM K94GM K94BM	1
Metal Knob for KR9 (60 mm)	Red Green Black	K95RM K95GM K95BM	1

Table 19.297: Accessories (Continued)

Description	Color	Type *[155]*	Package Qty.
1-3/8 in. Mushroom Knob for Illuminated Push Buttons K2L, SK2L *[165]*	Amber Blue Clear Green Red White Yellow	A20 L20 C20 G20 R20 W20 Y2	1
2-1/4 in. Mushroom Knob for Illuminated Push Buttons K2L, SK2L *[165]*	Amber Blue Clear Green Red White Yellow	A21 L21 C21 G21 R21 W21 Y21	1
Plastic Fresnel Pilot Light Lens for KP, KT, SKP, SKT	Amber Blue Clear Green Red White Yellow	A31 L31 C31 G31 R31 W31 Y31	1
Domed Plastic Pilot Light Lens for KP, KT, SKP, SKT	Amber Blue Clear Green Red White Yellow	A9 L9 C9 G9 R9 W9 Y9	1
Glass Pilot Light Lens for KP, KT	Amber Blue Clear Green Red White Yellow	A6 L6 C6 G6 R6 W6 Y6	1
Standard Selector Switch Knob for K and SK Selector Switches	Amber Black *[162]* Blue Clear Green Orange *[162]* Red White Yellow	A8 B11 L8 C8 G8 S11 R8 W8 Y8	1
Gloved-Hand Selector Switch Knob for K and SK Selector Switches	Amber Black *[162]* Blue Clear Green Orange *[162]* Red White Yellow	A24 B25 L24 C24 G24 S25 R24 W24 Y24	1
Color Inserts for KQ and TQ Selector Push Buttons	Black Blue Green Orange Red White Yellow	T5BK T5BE T5GN T5OE T5RD T5WH T5YW	10

Description	Cam	Type
Selector Switch Cams	B C D E F G H J L M	K13B K13C K13D K13E K13F K13G K13H K13J K13L K13M

[155] When ordering, add prefix 9001 to the catalog number.
[156] Includes one each of the following color inserts: Black, Red, Green, Yellow, Orange, Blue, and White.
[157] The mushroom button cap listed here may be assembled to a 9001KR1U or SKR1U to form a 9001KR4 or SKR4.
[158] "EMERGENCY STOP" is in raised letters and hot stamped white across the front of the mushroom button.
[159] The mushroom button cap listed here may be assembled to a 9001KR1U or SKR1U to form a 9001KR5 or SKR5.
[160] The mushroom button cap listed here may be assembled to a 9001KR20 to form a 9001KR24 or SKR20 to form a 9001SKR24.
[161] The mushroom button cap listed here may be assembled to a 9001KR20 to form a 9001KR25 or a SKR20 to form a 9001SKR25.
[162] These color caps are opaque and are for use on non-illuminated operators only.
[163] Red knob with "Push Emergency Stop" marked on top of knob.
[164] Includes two of each of the following color inserts: Black, Red, and Green.
[165] May be used on KR8 and KR9 operators. Order mushroom button and K54 adapter. Using the K54 adapter voids Type 6 rating.

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Ring Nuts for Type K and SK Operators

Table 19.298: Ring Nuts

Used On	Type *[166]*	Used On	Type *[166]*
K1L	K44	SK1L	SK44
K30-K37	K45	—	—
K70-K73	K45	—	—
K20, K21, K22, K23	K45	SK20, SK21, SK22, SK23	SK45
K20, K21, K22, K23 *[167]*	SK46	SK20, SK21, SK22, SK23 *[167]*	SK46
K2L	K49	SK2L	SK49
K3L (complete)	K111	—	—
K3L (metal top only)	6515802701	—	—
KP, KTR	K41	SKP, SKTR	SK41
KR1	K41	SKR1	SK41
KR11	K42	SKR11	SK42
KR12 *[168]*	K42	SKR12 *[168]*	SK42
KR12 *[169]*	K41	SKR12 *[169]*	SK41
KR13, 14, 15	K55	—	—
KR2	K42	SKR2	SK42
KR20	K49	—	—
KR24	K49	—	—
KR25	K49	SKR25	SK49
KR3	K40	SKR3	SK40
KR4	K41	SKR4	SK41
KR5	K41	SKR5	SK41
KR6	K47	—	—
KR67	K47	—	—
KR7	K47	—	—
KR8	K58	SKR8	6509704401
KR9	K41	SKR9	SK41
KS	K45	SKS	SK45
KS *[167]*	SK46	SKS *[167]* SKRU11 SKRU1,2,3,4,5,10	SK46 SK41 SK40
KT	K49	SKT	SK49

Replacement and Repair Parts for Type K and SK Operators

Table 19.300: Repair Parts

Description	Part Number
E10 Key	2941101100
Gray cap for KR11, KR12, SKR11, or SKR12	3105217001
Clear plastic top (only) for 9001K44 & SK44 Ring Nut)	4487D63XI
Gasket for Type K and SK Push-Pull Knob	6509701801
Gasket for Plastic Illuminated Lens	6509701901
Gasket for Type K and SK selector switch knob	3105406401
Black Compensating Gasket (Type K and SK Operators)	6509702001
Liner for Non-Illuminated Operators	6509704901
Locking Thrust Washer	6512231201
Nylon Spacer	6509705001
Locking Thrust Washer (Std. Type SK Operator)	6512240601
Push-Pull Mushroom Adapter *[171]*	K54
Rubber Boot for Joystick	6512243201
Knob on Joysticks without latch	4458D20X3
Knob for SK Potentiometer	3105404408
Fingersafe™ Cover for 9001KM	6508804101

Table 19.301: KU Replacement Ring Nuts (Threaded Inside and Out)

Used On	Part Number
KU1 through KU8, KU27, KU37, KU47	3105204101
KU17, KU18	3105205901

Table 19.299: Replacement Lamps For Series A–F (black) Light Modules

Light Module Type	Lamp Number (ANSI)	Square D Replacement Lamps
		Part Number
KM1	GE44*[170]*	—
KM2	GE1490	2550101003
KM3	GE44*[170]*	—
KM4	GE1490	2550101003
KM5	GE44*[170]*	—
KM6	GE44*[170]*	—
KM7	GE44*[170]*	—
KM8	GE44*[170]*	—
KM9	GE755	2550101020
KM11	CMDK1A5	2550105014
KM12	CMDK1A5	2550105014
KM13	CMDK1A5	2550105014
KM14	CMDK1A5	2550105014
KM15	CMDK1A5	2550105014
KM21	SYL12PSB	2550105003
KM22	SYL12PSB	2550105003
KM23	SYL28PSB	2550105008
KM25	SYL120PSB	2550105005
KM31	SYL6PSB	2550105007
KM32	SYL12PSB	2550105003
KM34	SYL24PSB	2550105004
KM35	SYL28PSB	2550105008
KM36	SYL48PSB	2550105009
KM37	SYL60PSB	2550105010
KM38	SYL120PSB	2550105005

[166] When ordering, add prefix 9001 to the catalog number.
[167] Secondary ring nut (holds knob on selector switch or potentiometer).
[168] Maintained button of two button operator.
[169] Momentary button of two button operator.
[170] GE44 and GE755 are interchangeable (GE755 gives longer life). If a GE44 lamp is ordered, a GE755 (2550101020) will be substituted. For a replacement lamp in a current series light module, seeStandard and Shallow Depth Light Modules, page 19-91.
[171] Allows Type -20 and -21 mushroom color caps to be used on push-pull operators. Use of 9001K54 voids Type 6 rating.

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K3

K69

K95

K1

Interlock for Type K and SK Operators

For mechanically interlocking two push buttons so that only one button can be depressed at a time. A Type K3 attachment is furnished with the **9001 KR11, KR12, SKR11, SKR12, SKRU1** and **SKRU11** operators. However, these are maintained operators and the **K3** interlock serves to release one of the buttons when the other is depressed. When used with momentary contact buttons, the **K3** interlock **does not** hold the buttons in the depressed position. It simply prevents pushing both buttons at the same time.

Table 19.302: Interlock

Description	Type
The Type **K3** interlock is mounted behind the operators. Operators not included.	K3

NOTE: When ordering, add prefix 9001 to the catalog number.

Screwdriver for Type K and SK Operators

Table 19.303: Screwdriver

Description	Type
Used to tighten mounting screws on contact blocks and light modules.	K69

NOTE: When ordering, add prefix 9001 to the catalog number.

Wrenches for Type K and SK Operators

Table 19.304: Wrenches

Where Used	Type
For tightening ring nuts on 22 and 30 mm control units	K95
For tightening threaded protective caps	K1

NOTE: When ordering, add prefix 9001 to the catalog number.

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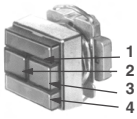
Pilot Light at
110–120 V, 50–60 Hz
Transformer



Pilot Light at
110–120 V, 50–60 Hz
Transformer

KX Square Push Buttons with Contacts

Table 19.305: Push Buttons—Single, with Contacts

Description	Button Color	Legend Marking	Contacts	Voltage	Type *[1]*
Non-Illuminated	Green	Start	1 N.O.	—	KXRA133
	Red	Stop	1 N.C.	—	KXRA134
	Amber	blank	2 N.O., 2 N.C.	—	KXRAAH2
	Green	blank	2 N.O., 2 N.C.	—	KXRAGH2
	Blue	blank	2 N.O., 2 N.C.	—	KXRALH2
Illuminated	Amber	blank	1 N.O., 1 N.C.	24	KXRB34AH1
	Green	blank	1 N.O., 1 N.C.	24	KXRB34GH1
	Red	blank	1 N.O., 1 N.C.	24	KXRB34RH1
	Amber	blank	1 N.O., 1 N.C.	110/120	KXRB1AH1
	Green	blank	1 N.O., 1 N.C.	110/120	KXRB1GH1
	Red	blank	1 N.O., 1 N.C.	110/120	KXRB1RH1

Table 19.306: Push Buttons—Dual, with Contacts

Description	Top Button (#1)	Lower Button (#2)	Contacts	Type *[1]*
Momentary	Start (Green)	Stop (Red)	2 N.O., 2 N.C.	KXRC111
Momentary	Start (Green)	Stop (Red)	1 N/O, 1 N/C	KXRC136
Momentary	Up (Green)	Down (Green)	2 N.O.	KXRD140
Momentary	blank (Blue)	blank (Blue)	2 N.O.	KXRDLLH7
Maintained*[2]*	Start (Green)	Stop (Red)	1 N.O., 1 N.C.	KXRE115
Maintained *[2]*	On (Blue) *[3]*	Off (Blue) *[3]*	3 N.O., 3 N.C.	KXRELLH3
Maintained *[2]*	On (Blue) *[3]*	Off (Blue) *[3]*	3 N.O., 3 N.C.	KXRELLH3
Maintained *[2]*	On (Blue) *[3]*	Off (Blue) *[3]*	2 N.O., 2 N.C.	KXRELLH2

Table 19.307: Push Buttons—Dual with One Pilot Light and Contacts

Description	Top Button (#1)	Middle Lens (#2)	Lower Button (#3)	Contacts	Voltage	Type *[1]*
Momentary	Start (Green)	On (Red)	Stop (Red)	2 N.O., 2 N.C.	110/120	KXRG117
Momentary	Start (Green)	On (Red)	Stop (Red)	1 N.O., 1 N.C.	110/120	KXRG137
Maintained *[2]*	Start (Green)	On (Red)	Stop (Red)	1 N.O., 1 N.C	110/120	KXRJ119

Table 19.308: Push Buttons—Dual with Two Pilot Lights and Contacts

Description	Top Button (#1)	Left Lens (#2)	Right Lens (#3)	Lower Button (#4)	Contacts	Voltage	Type *[1]*
Momentary	Start (Green)	On (Red)	Off (Green)	Stop (Red)	2 N.C., 2 N.C	110/120	KXRL121
Momentary	Start (Green)	On (Red)	Off (Green)	Stop (Red)	1 N.O., 1 N.C.	110/120	KXRL138
Momentary	Start (Green)	On (Red)	Off (Green)	Stop (Red)	2 N.C., 2 N.C	24	KXRL34GRGRH2
Momentary	Start (Green)	On (Red)	Off (Green)	Stop (Red)	1 N.O., 1 N.C.	24	KXRL34GRGRH37

KX Square Selector Switches with Contacts

Table 19.309: Selector Switches—with Contacts

Description	Legend	Knob	Contacts			Type *[1]*
2-position, maintained	Off-On	Black	1	0		KXSA125
			0	1		
2-position, maintained	Off-On	Black	1	0		KXSA139
3-position, maintained	Hand-Off-Auto	Black	1	0	0	KXSD126
			0	0	1	

KX Square Potentiometers

Table 19.310: Potentiometers

Description	Power	Resistance	Type *[1]*
Single	2 W	3.2 kW	KXBB06
Single	2 W	5 kW	KXBB07
Single	2 W	10 kW	KXBB08
Tandem	2 W	5 kW / 5 kW	KXBD83

[1] When ordering, add prefix 9001 to the catalog number.
[2] Maintained operators are mechanically interlocked
[3] Text is vertical

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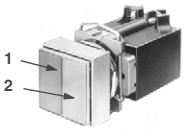
110–120 V, 50–60 Hz Transformer

110–120 V, 50–60 Hz Transformer
110–120 V, 50–60 Hz Transformer



110–120 V, 50–60 Hz. Transformer

KX Square Pilot Lights

Table 19.311: Pilot Lights *[4]*

Description	Voltage	Lens 1	Lens 2	Lens 3	Lens 4	Type *[5]*
Single	24	Amber				KXPA35A
Single	24	Red				KXPA35R
Single	24	Green				KXPA35G
Single	24	White				KXPA35W
Single	110/120	Amber				KXPA1A
Single	110/120	Red				KXPA1R
Single	110/120	Green				KXPA1G
Single	110/120	White				KXPA1W
Dual	24	Amber	Amber			KXPB34AA
Dual	24	Red	Red			KXPB34RR
Dual	24	Green	Green			KXPB34GG
Dual	24	White	White			KXPB34WW
Dual	24	Red	Green			KXPB34RG
Dual	110/120	Amber	Amber			KXPB1AA
Dual	110/120	Red	Red			KXPB1RR
Dual	110/120	Green	Green			KXPB1GG
Dual	110/120	White	White			KXPB1WW
Dual	110/120	Red	Green			KXPB1RG
Quad	24	White	Amber	Green	Red	KXPC34WAGR
Quad	110/120	White	Amber	Green	Red	KXPC1WAGR
Quad	110/120	White	Blue	Green	Red	KXPC1WLGR

KX Square Push Buttons without Contacts

Table 19.312: Push Buttons—without Contacts *[6]*

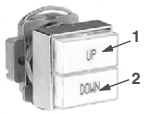
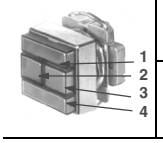
Push Button		Action	Lens Color (1)	Lens Color (2)	Type *[5]*
Single Push Button					
	Non-Illuminated	Momentary	Amber	—	KXRAA
			Green	—	KXRAG
			Blue	—	KXRAL
			Red	—	KXRAR
			White	—	KXRAW
	Illuminated 24 V	Momentary	Amber	—	KXRB35A
			Green	—	KXRB35G
			Blue	—	KXRB35L
			Red	—	KXRB35R
			White	—	KXRB35W
	Illuminated 110/120 V	Momentary	Amber	—	KXRB38A
			Green	—	KXRB38G
			Blue	—	KXRB38L
			Red	—	KXRB38R
			White	—	KXRB38W
Dual Push Button					
	Non-Illuminated	Momentary + Interlock	Green	Red	KXRCGR
			White	White	KXRCWW
			Green	Green	KXRCGG
		Maintained + Interlock	Green	Red	KXREGR
			White	White	KXREWW
			Green	Green	KXREGG

Table 19.313: Dual Push Button with Pilot Light—without Contacts *[6]*

	Action	Voltage	Lens Color (1)	Lens Color (2)	Lens Color (3)	Lens Color (4)	Type *[5]*
With One Pilot Light							
	Momentary	24 Vac/dc	Red	White	Green	—	KXRG35RWG
		24 Vac/dc	Green	White	Green	—	KXRG35GWG
		110/120 Vac/dc	Red	White	Green	—	KXRG38RWG
		110/120 Vac/dc	Green	White	Green	—	KXRG38GWG
	Momentary + Interlock	24 Vac/dc	Red	White	Green	—	KXRH35RWG
		24 Vac/dc	Green	White	Green	—	KXRH354GWG
		110/120 Vac/dc	Red	White	Green	—	KXRH38RWG
		110/120 Vac/dc	Green	White	Green	—	KXRH38GWG
	Maintained + Interlock	24 Vac/dc	Red	White	Green	—	KXRJ35RWG
		24 Vac/dc	Green	White	Green	—	KXRJ35GWG
		110/120 Vac/dc	Red	White	Green	—	KXRJ38RWG
		110/120 Vac/dc	Green	White	Green	—	KXRJ38GWG
With Two Pilot Lights							
	Momentary	24 Vac/dc	Red	White	White	Green	KXRL35RWWG
		24 Vac/dc	Red	Red	Green	Green	KXRL35GGRR
		110/120 Vac/dc	Red	White	White	Green	KXRL38RWWG
		110/120 Vac/dc	Red	Red	Green	Green	KXRL38GGRR
	Momentary + Interlock	24 Vac/dc	Red	White	White	Green	KXRM35RWWG
		24 Vac/dc	Red	Red	Green	Green	KXRM35RRGG
		110/120 Vac/dc	Red	White	White	Green	KXRM38RWWG
		110/120 Vac/dc	Red	Red	Green	Green	KXRM38RRGG

Also see KX Accessories, page 19-105.

[4] Lenses are blank (no markings)
[5] When ordering, add prefix 9001 to the catalog number.
[6] Order contact blocks separately (See Table 19.315 Contact Blocks, page 19-104.)

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KX Square Selectors without Contacts

Table 19.314: Selectors—without Contacts *[7]*

Description		Voltage	Knob Color	Type *[8]*
2-Position, Maintained	Non-Illuminated	—	Black	KXSAEB
	Illuminated	24 Vac/dc	Red	KXSJE35R
	Illuminated	24 Vac/dc	Green	KXSJE35G
	Illuminated	24 Vac/dc	White	KXSJE35W
	Illuminated	120 Vac/dc	Red	KXSJE38R
	Illuminated	120 Vac/dc	Green	KXSJE38G
	Illuminated	120 Vac/dc	White	KXSJE38W
	Key (Withdraw L)	—	N/A	KXSRE1
	Key (Withdraw R)	—	N/A	KXSRE2
	Key (Withdraw Both)	—	N/A	KXSRE3
3-Position, Maintained	Non-Illuminated	—	Black	KXSDCB
	Key (Withdraw C)	—	N/A	KXSVC5
	Key (Withdraw All)	—	N/A	KXSVC10
4-Position, Maintained	Non-Illuminated	—	Black	KXSHHB

Contact Blocks

Table 19.315: Contact Blocks—Purchase Separately

	Description	Type *[8]*
(Clear Cover)	1 N.O., 1 N.C.	KA1
(Green Cover)	1 N.O.	KA2
(Red Cover)	1 N.C.	KA3
(Clear Cover)	1 N.C., 1 N.O. (Early Make)	KA4
(Red Cover)	1 N.C. (Late Break)	KA5
(Green Cover)	1 N.O. (Early Make)	KA6

[7] Order contacts separately (See Table 19.315 Contact Blocks, page 19-104)
[8] When ordering, add prefix 9001 to the catalog number.

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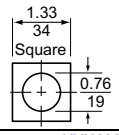
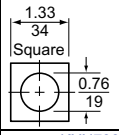
Table 19.316: Legend Plates for Selector Switches

Marking	Used On *[9]*	
	KXSA, KXSB, KXSC, KXSD, KXSE, KXSF, KXSG, KXSH, KXSJ, KXSK, KXSL, KXSM, KXSN, KXSO, KXSP, KXSQ	KXSR, KXSS, KXST, KXSV, KXSW, KXSX, KXSY, KXSZ
		
Blank	KXN600	KXN700
For.-Rev.	KXN639	KXN739
Hand-Auto	KXN640	KXN740
Man-Auto	KXN643	KXN743
Off-On	KXN644	KXN744
On-Off	KXN645	KXN745
Open-Close	KXN646	KXN746
Start-Stop	KXN651	KXN751
Auto-Off-Hand	KXN658	KXN758
Hand-Off-Auto	KXN660	KXN760
Man-Off-Auto	KXN662	KXN762
Special Marking	KXN699	KXN799

Type KX Legend Plates

Table 19.317: Legend Plates for Push Buttons or Pilot Lights

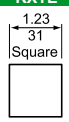
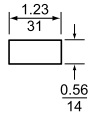
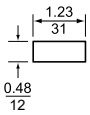
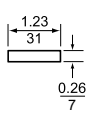
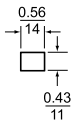
Marking	Used On *[9]*					
	A	B	C	D	E	F
	KXRA, KXRB KXRN, KXRP KXPA, KXPC KXTA, KXTB KXTE	KXRC, KXRD KXRE, KXRF	KXPB KXTD *[10]*	KXRG, KXRH KXRJ, KXRK *[11]*	KXRG, KXRH KXRJ, KXRK KXRL, KXRM KXTC *[12]*	KXRL, KXRM KXTC *[11]*
	 A	 B C (vertical)		 D	 E	 F
Blank	KXN100	KXN200	KXN200	KXN300	KXN400	KXN500
Start	KXN101	KXN201	KXN201V	KXN301	KXN401	KXN501
Stop	KXN102	KXN202	KXN202V	KXN302	KXN402	KXN502
On	KXN103	KXN203	KXN203V	KXN303	KXN403	KXN503
Off	KXN104	KXN204	KXN204V	KXN304	KXN404	KXN504
Emerg. Stop	KXN105	KXN205	KXN205V	KXN305	KXN405	KXN505
Forward	KXN106	KXN206	KXN206V	KXN306	KXN406	KXN506
Reverse	KXN107	KXN207	KXN207V	KXN307	KXN407	KXN507
Close	KXN108	KXN208	KXN208V	KXN308	KXN408	KXN508
Open	KXN109	KXN209	KXN209V	KXN309	KXN409	KXN509
Down	KXN110	KXN210	KXN210V	KXN310	KXN410	KXN510
Up	KXN111	KXN211	KXN211V	KXN311	KXN411	KXN511
Jog	KXN118	KXN218	KXN218V	KXN318	KXN418	KXN518
Reset	KXN123	KXN223	KXN223V	KXN323	KXN423	KXN523
Run	KXN124	KXN224	KXN224V	KXN324	KXN424	KXN524
Cycle Start	KXN132	KXN232	KXN232V	KXN332	KXN432	KXN532
Motor Run	KXN136	KXN236	KXN236V	KXN336	KXN436	KXN536
Power On	KXN138	KXN238	KXN238V	KXN338	KXN438	KXN538
Special-Marking	KXN199	KXN299	KXN299V	KXN399	KXN499	KXN599

Table 19.318: Letter Height For Standard Legends

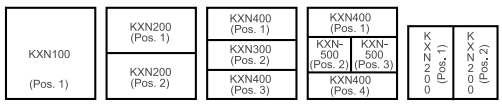
	in.	mm
KXN100	1⁄4	6
KXN200	3⁄16	4.75
KXN300	3⁄16	4.75
KXN400	3⁄16	4.75
KXN500	3⁄16	4.75
KXN600	1⁄8	3
KXN700	1⁄8	3

Table 19.319: Maximum Number of Lines and Characters For Type KXN Legend Inserts

Letter Height		Number of …	KXN199	KXN299 Horizontal	KXN299 Vertical	KXN399	KXN499	KXN599
in.	mm							
1⁄4	6	Characters per Line	7	7	3	7	7	3
		Lines per Legend Insert	4	2	4	1	1	1
3⁄16	4.75	Characters per Line	9	9	4	9	9	4
		Lines per Legend Insert	5	2	6	2	1	2
1⁄8	3	Characters per Line	14	14	5	14	14	6
		Lines per Legend Insert	8	4	9	3	2	3

Table 19.320: Maximum Number of Lines and Characters for Type KXN699 and KXN799 Legend Plates

Position	Letter Height		Characters Per Marking Area	
	in.	mm	A and C	B
	3⁄16	4.75	6	6
	1⁄8	3	8	9
	3⁄16	4.75	10	5
	1⁄8	3	13	7



KXRA, KXRB KXRN, KXRP KXPA, KXPC KXTA, KXTB | KXRC, KXRD KXRE, KXRF | KXRG, KXRH KXRJ, KXRK | KXRL, KXRM KXTC | KXPB, KXTD

All Type KX push buttons and pilot lights have a blank insert as standard. These blank inserts can be custom marked using a marking pen, a mechanical lettering set, press letters, or a tape lettering machine that marks a tape which can then be transferred to the blank insert.

To have legend inserts installed into the operators, order the operator as normal and then indicate where to install the legend inserts using the numbered positions shown on the operator ordered.

Example: 9001KXRL1GRGRH2 with a
9001KXN 401 in position 1
9001KXN 503 in position 2
9001KXN 504 in position 3
9001KXN 402 in position 4

[9] When ordering, add prefix 9001 to the catalog number.
[10] These legend inserts have vertical printing.
[11] These legend inserts are for the pilot lights in the center of the operator.
[12] These legend inserts are for the push button portion of the operator.

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Table 19.321: Closing Plate

Description	Type
UL Types 4, 13/NEMA 4, 13 Square Closing Plate (Chrome Plated) Same size as KX bezel	KXAK52

Table 19.322: Boots

Description	For Use On	Type
	All KX** push buttons and pilot lights	KXAKU7
	All KX** selector switches and potentiometers	KXAKU17B

Table 19.323: Shrouds

Description		For Use On	Color	Type
	Full Shroud	All push buttons and pilot lights	Red	KXAK41R
			Black	KXAK41B
	Short Shroud	Any KX operator	Red	KXAK40R
			Black	KXAK40B

Table 19.324: Lamp and Lens Removal Kit

Description	Type
Used to remove lamp and lens on all illuminated operators and pilot lights.	KXALLRT

Additional Accessories for Type KX Operators

Table 19.325: Button Covers

Description	For Use On	Color	Type	Code
Includes 2-KXN200	KXPB KXTD	Red Green Amber Blue White	KXAC28 *[13]* KXAC28 *[13]* KXAC28 *[13]* KXAC28 *[13]* KXAC28 *[13]*	R *[14]* G *[14]* A *[14]* L *[14]* W *[14]*
Includes KXN400	KXTC (Position 1 & 4)	Red Green Amber Blue White	KXAR4 KXAG4 KXAA4 KXAL4 KXAW4	R G A L W
Includes KXN500	KXTC (Position 2 & 3)	Red Green Amber Blue White	KXAR5 KXAG5 KXAA5 KXAL5 KXAW5	R G A L W
Includes 1–KXN100	KXPC	Red Green Amber Blue White	KXAC48 *[15]* KXAC48 *[15]* KXAC48 *[15]* KXAC48 *[15]* KXAC48 *[15]*	R *[16]* G *[16]* A *[16]* L *[16]* W *[16]*
Includes KXN100	KXRA KXRB	Red Green Amber Blue White	KXAR1 KXAG1 KXAA1 KXAL1 KXAW1	R G A L W
Includes KXN100	KXRN KXRP	Red Green Amber Blue White	KXARM1 KXAGM1 KXAAM1 KXALM1 KXAWM1	R G A L W
Includes KXN200 *[17]*	KXRC KXRD KXRE KXRF	Red Green Amber Blue White	KXAR2 KXAG2 KXAA2 KXAL2 KXAW2	R G A L W
Includes KXN300	KXRG (Position 2) KXRH (Position 2) KXRJ (Position 2) KXRK (Position 2)	Red Green Amber Blue White	KXAR3 KXAG3 KXAA3 KXAL3 KXAW3	R G A L W
Includes KXN400	KXRG (Position 1 & 3) KXRH (Position 1 & 3) KXRJ (Position 1 & 3) KXRK (Position 1 & 3) KXRL (Position 1 & 4) KXRM (Position 1 & 4)	Red Green Amber Blue White	KXAR4 KXAG4 KXAA4 KXAL4 KXAW4	R G A L W
Includes KXN500	KXRL (Position 2 & 3) KXRM (Position 2 & 3)	Red Green Amber Blue White	KXAR5 KXAG5 KXAA5 KXAL5 KXAW5	R G A L W
Includes KXN100	KXPA	Red Green Amber Blue White	KXAR8 KXAG8 KXAA8 KXAL8 KXAW8	R G A L W
Includes KXN100	KXTA KXTB	Red Green Amber Blue White	KXAR1 KXAG1 KXAA1 KXAL1 KXAW1	R G A L W

[13] Each KXAC28 includes a clear cover and 1 each of all colors. If the same color is required for position #1and #2 of the KXPB operator, order 2 of Type KXAC28.
[14] When specifying color codes—the first will be installed in #1 and the second in #2.
[15] Each KXAC48 includes a clear cover and 1 each of all colors. If the same color is required for position #1and #2 of the KXPC operator, order 2 of Type KXAC48.
[16] When specifying color codes—the first will be installed in #1, the second in #2, the third in #3 and the fourth in #4.
[17] Two required per operator. When ordering an assembled operator—specify two code numbers.The first code will be assembled into #1 and the second code will be assembled into #2

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XALD101H29H7

XALK174H7

XALD211H29H7

XALD321H29H7

XAL Control Stations, Enclosures, and Accessories

Table 19.326: Start or Stop Function Polycarbonate; Light gray base, RAL7035; Dark gray lid, RAL7016

Description	Type of Push	Type of Contact		Marking	Catalog Number
		N.O.	N.C.		
Marking on Legend Holder					
1 momentary push button	Flush black	1	—	Start	XALD101H29H7
	Flush red	—	1	Stop	XALD111H29H7
Marking on Legend Holder					
1 mushroom head push button Ø 40 mm, momentary	Red	—	1	Stop on red legend	XALD164H29H7

Table 19.327: Trigger Action Emergency Stop Polycarbonate; Light gray base, RAL7035; Yellow lid, RAL1012

Description	Type	Type of Contact		Catalog Number
		N.O.	N.C.	
1 mushroom head push button Ø 40 mm, red Turn-to-release	Trigger action *[1]*	—	1	XALK178H7
1 mushroom head push button Ø 40 mm, red Key release (Key No. 455)	Trigger action *[1]*	—	1	XALK188H7
1 mushroom head push button Ø 40 mm, red Push-pull	Trigger action *[2]*	—	1	XALK198H7

Table 19.328: Start-Stop Function Polycarbonate; Light gray base, RAL7035; Dark gray lid, RAL7016

Description	Type of Push	Type of Contact		Text	Catalog Number
		N.O.	N.C.		
2 momentary push buttons	1 flush black 1 flush red	1 —	— 1	Start Stop	XALD211H29H7
	1 flush black 1 flush black	1 1	— —	Forward Reverse	XALD251H29H7

Table 19.329: Three Function Polycarbonate; Light gray base, RAL7035; Dark gray lid, RAL7016

Description	Type of Push	Type of Contact		Text	Catalog Number
		N.O.	N.C.		
3 momentary push buttons (no markings)	1 flush black 1 flush red 1 flush black	1 — 1	— 1 —	Open Stop Close	XALD351H29H7
		1 — 1	— 1 —	Forward Stop Reverse	XALD311H29H7
		1 — 1	— 1 —	Up Stop Down	XALD321H29H7

[1] Emergency Stop (EN / IEC 13850)
[2] Emergency Off (IEC 60364-5-53)

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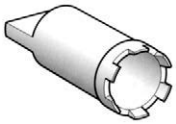
ZENL1111

ZALV••

ZB5SZ3



ZB5AZ905

XAPA1100

XAPA1104

XAPG39400

Table 19.330: Empty Enclosures *[3]*

Description	Number of Holes	Catalog Number
For normal environments, CSA approved and UL Listed (with stainless steel lid mounting screws)		
Light gray base RAL7035 Dark gray lid RAL7016	1 2 3 4 5	XALD01H7 XALD02H7 XALD03H7 XALD04H7 XALD05H7
Light gray base RAL7035 Yellow lid RAL1012	1	XALK01H7

Table 19.331: Electrical Block and Accessories (for mounting on metal plate at back of enclosure) *[3]*

Description	Type	Color	Catalog Number
Electrical blocks with screw clamp terminal connections			
Metal-plate-mounting contact blocks	N.O. contact	—	ZENL1111
	N.C. contact	—	ZENL1121
Light blocks with Protected LED	24 Vac/Vdc	White Green Red Yellow Blue	ZALVB1 ZALVB3 ZALVB4 ZALVB5 ZALVB6
	120 Vac	White Green Red Yellow Blue	ZALVG1 ZALVG3 ZALVG4 ZALVG5 ZALVG6
	230 Vac	White Green Red Yellow Blue	ZALVM1 ZALVM3 ZALVM4 ZALVM5 ZALVM6

Table 19.332: Accessories for electrical blocks

Description	Application	Catalog Number
Blanking plug	Ø 22 mm units	ZB5SZ3
Nut	Head mounting	ZB5AZ901
Grounding terminal	Grounding	XALZ09
Key	For tightening nut	ZB5AZ905

XAP Enclosures and Accessories

Table 19.333: Undrilled Enclosures, Glass-Reinforced Polyester

Type		H x W Dimensions IN	H x W Dimensions mm	Catalog Number
NEMA 4, 4X, 13 Usable depth 3.27 in. (83 mm)	Without hinges	3.34 x 5.75	85 x 146	XAPA1100
		3.34 x 8.90	85 x 226	XAPA2100
		5.95 x 9.49	151 x 241	XAPA3100
	With hinges	5.95 x 9.49	151 x 241	XAPA4100
Undrilled Grounding Plate	Sheet steel with ground screw	For XAPA1100		XAPZ100
		For XAPA2100		XAPZ200
		For XAPA3100 and 4100		XAPZ300

Table 19.334: Drilled Insulated Enclosures, Glass-Reinforced Polyester *[4]*

Type	Number of Knockouts 22 mm	Number of Rows Vertical	Number of Rows Horizontal	H x W Dimensions IN	H x W Dimensions mm	Catalog Number
NEMA 4, 4X, 13 Usable depth 3.27 in. (83 mm) 1.58 in. (40 mm) centerline spacing of holes	1	1	1	3.35 X 5.75	85 X 146	XAPA1110
	2	1	2	3.35 X 5.75	85 X 146	XAPA1120
	4	2	2	3.35 X 5.75	85 X 146	XAPA1104
	8	2	4	3.35 X 8.90	85 X 226	XAPA2108
	16	4	4	5.94 X 9.49	151 X 241	XAPA3116
Drilled Grounding Plate		Sheet steel with ground screw		For XAPA1110		XAPZ110
				For XAPA1120		XAPZ120
				For XAPA1104		XAPZ104
				For XAPA2108		XAPZ208
				For XAPA3116		XAPZ316

Table 19.335: Undrilled Die Cast Enclosures (Painted Gray RAL7032)

Type	Material	Usable Depth IN	Usable Depth mm	H x W x D Dimensions IN	H x W x D Dimensions mm	Catalog Number
NEMA 4, 13	Zinc	1.93	49	3.15 x 3.15 x 2.03	80 x 80 x 51.5	XAPG19100
				5.12 x 3.15 x 2.03	130 x 80 x 51.5	XAPG29100
				6.89 x 3.15 x 2.03	175 x 80 x 51.5	XAPG39100
		2.93	74.5	3.15 x 3.15 x 3.03	80 x 80 x 77	XAPG19400
				5.12 x 3.15 x 3.03	130 x 80 x 77	XAPG29400
				6.89 x 3.15 x 3.03	175 x 80 x 77	XAPG39400
				8.66 x 3.15 x 3.03	220 x 80 x 77	XAPG49400
	Aluminum	2.93	2.93	12.20 x 3.35 x 3.03	310 x 85 x 77	XAPG59400

[3] For customer assembly using XB5 operators and standard screw-terminal contact blocks, see XB5 Non-Illuminated Operators, page 19-46.
Either mounting method can be used: contact block ZENL mounting on metal plate, or contact block ZBE mounting on operator with mounting collar.

[4] Uses standard XB5 products from XB5 Complete Devices, page 19-43 through XB5 Accessories, page 19-60. Do not use ZENL style contact blocks.

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Table 19.336: Drilled Die Cast Enclosures (Painted Gray RAL7032) *[5]*

	Type	Material	Usable Depth		Number of 22 mm holes	H x W x D Dimensions		Catalog Number
			IN	mm		IN	mm	
XAPG29703	NEMA 4, 13 1.18 in. (30 mm) centerline spacing of holes for horizontal mount	Zinc	1.93	49	2	3.15 x 3.15 x 2.03	80 x 80 x 51.5	XAPG19702
					3	5.12 x 3.15 x 2.03	130 x 80 x 51.5	XAPG29703
					4	6.90 x 3.15 x 2.03	175 x 80 x 51.5	XAPG39704
			2.93	74.5	2	3.15 x 3.15 x 3.03	80 x 80 x 77	XAPG19802
					3	5.12 x 3.15 x 3.03	130 x 80 x 77	XAPG29803
					4	6.90 x 3.15 x 3.03	175 x 80 x 77	XAPG39804
	NEMA 4, 13 1.58 in. (40 mm) centerline spacing of holes for vertical mount	Zinc	1.93	1.93	1	3.15 x 3.15 x 2.03	80 x 80 x 51.5	XAPG19201
					2	5.12 x 3.15 x 2.03	130 x 80 x 51.5	XAPG29202
					3	6.90 x 3.15 x 2.03	175 x 80 x 51.5	XAPG39203
			2.93	74.5	1	3.15 x 3.15 x 3.03	80 x 80 x 77	XAPG19501
					2	5.12 x 3.15 x 3.03	130 x 80 x 77	XAPG29502
					3	6.90 x 3.15 x 3.03	175 x 80 x 77	XAPG39503
					4	8.66 x 3.15 x 3.03	220 x 80 x 77	XAPG49504
		Aluminum	2.93	74.5	5	12.20 x 3.35 x 3.03	310 x 85 x 77	XAPG59505

XAPE302

XAPE303

Table 19.337: Drilled Flush Plates *[5]*

Type	Material	Number of 22 mm holes	H x W x D Dimensions		Catalog Number
			IN	mm	
NEMA 4, 13 1.18 in. (30 mm) centerline spacing of holes	Anodized Aluminum	1	2.83 x 2.83	72 x 72	XAPE301
		2	4.13 x 2.83	105 x 72	XAPE302
		3	5.43 x 2.83	138 x 72	XAPE303
		4	6.73 x 2.83	171 x 72	XAPE304
		5	8.03 x 2.83	204 x 72	XAPE305

Table 19.338: Optional Back Box (for finger protection, if required)

Type	Material	For Use With	Catalog Number
Protective rear covers	Insulating Fiberglass	Flush plate XAPE301	XAPE901
		Flush plate XAPE302	XAPE902
		Flush plate XAPE303	XAPE903
		Flush plate XAPE304	XAPE904
		Flush plate XAPE305	XAPE905

[5] Can use either XB4 or XB5 products.

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NEMA 1 Surface Mounting Type BG201

NEMA 1 Flush Mounting (w/o pullbox) Type BF201

NEMA 4 Type BW243

NEMA 7 and 9 Type BR103

9001B Standard Duty Control Stations

Table 19.339: Control Stations

No. of Buttons	Nameplate Markings and Features	Contact Symbol [6]	Surface Mounting NEMA1	Stainless Steel Flush Plate [7]	Watertight and Dusttight NEMA4	For Hazardous Locations NEMA 7 & 9 [8]
			Type [9]	Type [9]	Type [9]	Type [9]
1	Start	1	BG101	BF101	BW146	BR101
	Stop	3	BG102	BF102	BW147	—
	Stop (Mushroom Button)	3	BG103	—	BW151	BR103
	Stop (Lockout)	3	BG104	—	BW148	BR104
	Universal (w/o legend insert)	16	BG107	BF107	BW159	BR107
	Off-On (Selector Switch)	19	BG111	—	—	—
	Hand-Off-Auto (Selector Switch)	17	BG112	—	—	—
	Universal Selector Switch (w/o legend insert)	19 or 17	BG114	—	—	—
2	Start-Stop	145	BG201	BF201	BW240	BR204
	Start-Stop (for latching Applications)	146	BG202	—	BW252	BR202
	Start-Stop (Mushroom on Stop)	145	BG203	—	BW250	BR203
	Start-Stop (Lockout on Stop)	145	BG204	—	BW241	BR204
	Start-Stop (Mushroom on both)	145	BG205	—	BW246	BR205
	Forward-Reverse	146	BG206	—	BW242	—
	Open-Close	146	BG207	—	BW244	—
	Up-Down	146	BG208	BF208	BW243	BR208
	Raise-Lower	146	BG209	—	BW253	—
	On-Off	145	BG210	BF210	BW245	—
	On-Off	146	BG211	BF211	BW254	—
	Universal (w/o legend inserts)	25	BG214	—	BW260	BR214
	Start-Stop (Maintained Contact)	10	BG215	BF215	BW255	BR215
	On -Off (Maintained Contact)	10	BG216	BF216	BW256	BR216
	Universal (Maintained contact w/o legend inserts)	10	BG218	—	—	BR218
3	Fast-Slow-Stop	109	BG301	—	—	—
	Forward-Reverse-Stop	109	BG302	—	—	—
	Opn-Close-Stop	109	BG303	BF303	—	—
	Raise-Lower-Stop	109	BG304	—	—	—
	Up-Down-Stop	109	BG305	BF305	—	—
	Start-Jog-Stop	109	BG316	—	—	—
	Universal (w/o legend inserts)	8	BG307	—	—	—
	Start-Stop, Red Pilot Light: 120Vac/dc	145 & 121	BG308	BF308	—	—

Table 19.340: Accessories

Description	Color	Type [9]
Mushroom Caps for NEMA 1	Red	B301
Mushroom Caps for NEMA 4	Red	B303
Lockout Kit for NEMA 1	—	B321
Pilot Light Lenses, NEMA 1 Surface Mount	Red	B331
Pilot Light Lenses, NEMA 1 Surface Mount	Green	B332
Pilot Light Lenses, NEMA 1 Flush Mount	Red	B341
Pilot Light Lenses, NEMA 1 Flush Mount	Green	B342
Replacement Covers for BW240 [10]	—	BWD219
Replacement Covers for BW241 [11][10]	—	BWD220
Replacement Covers for BW242-BW260 [10]	—	BWD219

Table 19.341: Interchangeable Push Button Legend Inserts

Marking	For NEMA 1 Surface Mount [9]	For NEMA 4 or 7/9 Lever Type [9]	For NEMA 4 Round Button [9]	For NEMA4 Mushroom Button [9]
Start	B101	B161	B259	B282
Stop	B102	B162	B260	B283
Fast	B103	—	—	—
Slow	B104	—	—	—
Forward	B105	—	B255	—
Reverse	B106	—	B256	—
Open	B107	—	B263	—
Close	B108	—	B264	—
Raise	B109	—	B261	—
Lower	B110	—	B262	
Up	B111	—	B253	B276
Down	B112	—	B254	B277
On	B115	B175	B257	—
Off	B116	B176	B258	—
Hand	B117	—	B265	—
Auto	B118	—	B266	—
Jog	B119	—	—	—
Blank (Black)	B129	B189	B251	B251
Blank (Red)	B129R	B189R	B252	B252

For Replacement Interiors, see Replacement Interiors for Type B Standard Duty Push Button Stations, page 19-111.

For Ratings, see Electrical Contact Ratings, page 19-111.

[6] See Table 19.342 Replacement Interiors For Type B Standard Duty Push Button Stations , page 19-111.
[7] Uses standard 2.0 or 2.13 in. deep wall boxes, single gang for Types BF1 and BF2, two gang for Type BF3
[8] Also rated for Class I, Division I and II, Groups B, C, or D; Class II, Division I and II, Groups E, F, or G
[9] When ordering, add prefix 9001 to the catalog number.
[10] Replacement case/covers are not avaiulable for Type BR devices.
[11] Includes factory installed lockout on the cover.

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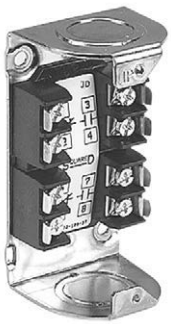
Type BGC214
(Type BGC contact block assemblies include cover.)



Type BGB214

BOC361

Replacement Parts for Type B Standard Duty Control Stations

Table 19.342: Replacement Interiors For Type B Standard Duty Push Button Stations

For Control Station	Contact Symbol	Contact Block Assembly *[1]*	Terminal Block Wiring Receptacle
Type		Type	Type
BF101–BF107	16	BOC107	BFB107
BF111–BF114	19 or 17	BOC114	BFB114
BF121–BF123	121	BOC123	BFB123
BF201–BF214	25	BOC214	BFB214
BF215–BF218	10	BOC218	BFB214
BF221–BF224	7 or 19 & 121	BOC224	BFB224
BF225–BF226	17 or 19 & 16	BOC226	BFB226
BF301–BF307	8	BOC214 & BOC107	BFB214 & BFB107
BF308–BF309	25 & 121	BOC214 & BOC123	BFB214 & BFB123
BF310–BF313	10 & 121	BOC218 & BOC123	BFB214 & BFB123
BF314–BF315	17 or 19 & 25	BOC214 & BOC114	BFB214 & BFB114
BG101–BG107	16	BGC107	BGB107
BG111–BG114	17 or 19	BGC114	BGB114
BG121–BG123	121	BGC123	BGB123
BG201–BG214	25	BGC214	BGB214
BG215–BG218	10	BGC218	BGB214
BG221–BG224	17 or 19 & 121	BGC224	BGB224
BG225–BG226	17 or 19 & 16	BGC226	BGB226
BG301–BG307 BG316–BG326	8	BGC307	BGB307
BG308–BG309	25 & 121	BGC309	BGB309
BG310–BG313	10 & 121	BGC313	BGB309
BG314–BG315	17 or 19 & 25	BGC315	BGB315
BR101–BR107	16	BOC107	BFB107
BR202–BR214	25	BOC214	BFB214
BR215–BR219	10	BOC218	BFB214
BW101–BW107	16	BOC107	BFB107
BW202–BW214	25	BOC214	BFB214
BW215–BW218	10	BOC218	BFB214
BW146–BW159	16	BOC360	
BW240–BW260	25	BOC361	
BW255–BW258	10	BOC362	

NOTE: Contact block assemblies for all Type BG stations include cover and contact block. Replacement contact block assemblies and terminal block wiring receptacles for push buttons have provision for 1 N.O. & 1 N.C. circuit on each button. Unneeded circuits need not be wired.

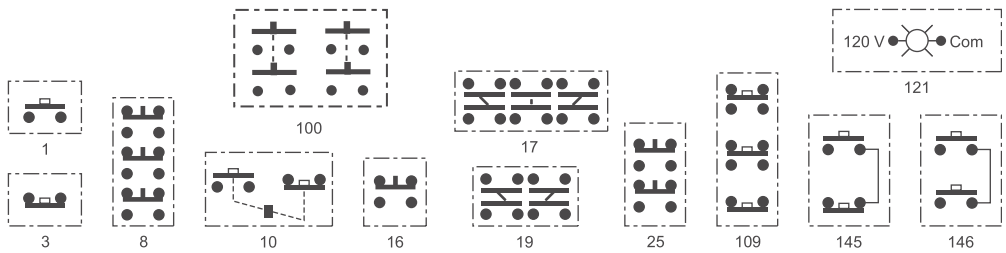
Table 19.343: Mounting Bracket

Description	Catalog Number
C-Shaped Mounting Bracket for 9001BR Interior	3110112001

Table 19.344: Electrical Contact Ratings *[2]*

AC—NEMA B600							DC—NEMA P600		
Volts	Inductive 35% Power Factor				Continuous Carrying Amperes	Resistive 75% Power Factor	Volts	Inductive and Resistive	
	Make		Break			Make, Break and Continuous Carrying Amperes		Make and Break Amperes	Continuous Carrying Amperes
	A	VA	A	VA					
120	30.5	3600	3.75	360	5	5	120	1.1	5
240	15	3600	1.5	360	5	5	240	0.55	5
480	7.5	3600	.75	360	5	5	600	0.2	5
600	6	3600	.6	360	5	5			

Contact Symbols



[1] Order separate legend plates, if required, from Table 19.341 Interchangeable Push Button Legend Inserts, page 19-110.
[2] OSHA Regulation, Section 1910.70, Overhead and Gantry Cranes, limits the voltage of pendant push buttons to 150 Vac or 300 Vdc.

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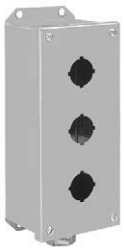
9001KY and 9001SKY Control Stations

Table 19.345: Empty Enclosures (for Customer Assembly) *[1]*

	UL Types 1, 3 and 13/ NEMA 1, 3, and 13	UL Types 1, 3, 4 and 13/ NEMA 1, 3, 4 and 13	UL Types 1, 3, 4, 4X and 13/ NEMA 1, 3, 4, 4X and 13	
				
No of Holes	**Sheet Steel**	**Die Cast Zinc**	**Stainless Steel (304)**	**Polymeric (Plastic)**
	Type	**Type**	**Type**	**Type**
1	KYAF1	KY1	KYSS1	SKY1
2	KYAF2	KY2 *[2]*	KYSS2	SKY2
3	KYAF3	KY3 *[2]*	KYSS3	SKY3
4	KYAF4	KY4 *[2]*	KYSS4	SKY4
6	KYAF6	KY6	KYSS6	SKY6

NOTE: See Table 19.348 Assembled Control Stations, page 19-113

KYG1Y
(mushroom head not included)

Table 19.346: Guarded Enclosures

	UL Types 1, 3, 4 and 13/ NEMA 1, 3, 4 and 13		
No of Holes	**Die Cast Zinc**		
	Cover Color	**Box Color**	**Type**
1	Gray	Gray	KYG1 *[3]*
1	Yellow	Gray	KYG1Y *[3]*

NOTE: See Table 19.348 Assembled Control Stations, page 19-113

K26

Table 19.347: Stainless Steel (302) NEMA 1 Flush Plates *[4]*

No of Holes	Description	Type
1	1 Hole flush plate, cover screws, insulating liners	K25
2	2 Hole flush plate, cover screws, insulating liners	K26
3	3 Hole flush plate, cover screws, insulating liners	K27
4	4 Hole flush plate, cover screws, insulating liners	K28

[1] When ordering, add prefix 9001 to the catalog number.
[2] Only KN200 series legend plates will fit upright on these enclosures with their long axis vertical.
[3] Includes 1" NPT threaded conduit opening.
[4] To be used with a standard 2 x 3 in. general purpose switch box. A 2.5 in. deep switch box should be used if two Type KA contact blocks are mounted side by side. If two Type KA contact blocks are mounted in tandem, a 3.5 in. deep box should be used.

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Assembled 9001KY/SKY Control Stations

Table 19.348: Assembled Control Stations

	No of Holes	Operator Style and Features	Type	Consists of			
				Enclosure	Operators	Contact Blocks	Legend Plates
		UL Types 1, 3, 4 and 13/NEMA 1, 3, 4 and 13 Die Cast Zinc Enclosure *[5]*					
Type KYK31	1	Selector Switch (3 Pos Maintained)	KYK111	KY1	KS43B	KA1	Hand-Off-Auto
		Selector Switch (2 Pos Maintained)	KYK110	KY1	KS11B	KA1	Off-On
		Push Button (Momentary)	KYK11	KY1	KR1B	KA1	Start
		Push Button (Momentary)	KYK13	KY1	KR1R	KA1	Stop
		Mushroom Button (Momentary)	KYK14	KY1	KR4R	KA1	Stop
		Push Button (with Lockout)	KYK15	KY1	KR3R, K4	KA1	Stop
		Break Glass Operator	KYK116	KY1	K15	KA1	To Stop—Break Glass
		Break Glass Operator (Red Enclosure)	KYK117	KY1S1	K15	KA1	To Stop—Break Glass
	2	2 Push Buttons (Lockout on Stop)	KYK224	KY2	KR1B, KR3R, K4	KA1, KA1	Jog-Stop
		2 Push Buttons	KYK218	KY2	KR1B, KR3R	KA1, KA1	On-Off
		2 Push Buttons	KYK26	KY2	KR1B, KR1B	KA1, KA1	Open-Close
		2 Push Buttons	KYK25	KY2	KR1B, KR1B	KA1, KA1	Up-Down
		2 Push Buttons	KYK21	KY2	KR1B, KR3R	KA1, KA1	Start-Stop
		2 Push Buttons (with Sealed Contacts) *[6]*	KYK223	KY2	KR1B, KR3R	KA51, KA51	Start-Stop
		2 Push Buttons (Lockout on Stop)	KYK23	KY2	KR1B, KR3R, K4	KA1, KA1	Start-Stop
		2 Push Buttons (Maintained/Interlocked)	KYK27	KY2	KR11GR	KA1	Start-Stop
		1 Push Button, 1 Mushroom Button	KYK22	KY2	KR1B, KR4R	KA1, KA1	Start-Stop
	3	3 Push Buttons	KYK31	KY3	KR1B, KR1B, KR3R	KA1, KA1, KA1	Forward; Reverse; Stop
		3 Push Buttons (Lockout on Stop)	KYK326	KY3	KR1B, KR1B, KR3R, K4	KA1, KA1, KA1	Forward; Reverse; Stop
Type KYSS300		3 Push Buttons (With Sealed Contacts & Lockout on Stop) *[6]*	KYK322	KY3	KR1B, KR1B, KR3R, K4	KA51, KA51, KA51	Forward; Reverse; Stop
		3 Push Buttons	KYK33	KY3	KR1B, KR1B, KR3R	KA1, KA1, KA1	Open; Close; Stop
		Red 120v Pilot Light, 2 Push Buttons	KYK317	KY3	KP1R31, KR1B, KR3R	KA2, KA3	Start; Stop
		3 Push Buttons	KYK32	KY3	KR1B, KR1B, KR3R	KA1, KA1, KA1	Up; Down; Stop
		3 Push Buttons (Lockout on Stop)	KYK325	KY3	KR1B, KR1B, KR3R, K4	KA1, KA1, KA1	Up ; Down; Stop
		UL Types 1, 3, 4 and 13/NEMA 1, 3, 4 and 13—Stainless Steel (304) *[7]*					
	1	Push Button (Momentary)	KYSS101	KYSS1	KR1B	KA1	Start
		Push Button (Momentary)	KYSS103	KYSS1	KR1B	KA3	Stop
		Selector Switch (2 Pos Maintained)	KYSS110	KYSS1	KS11B	KA1	Off-On
		Selector Switch (3 Pos Maintained)	KYSS111	KYSS1	KS43B	KA1	Hand-Off-Auto
	2	2 Push Buttons	KYSS201	KYSS2	KR1B, KR3R	KA1, KA3	Start; Stop
		2 Push Buttons (Lockout on Stop)	KYSS203	KYSS2	KR1B, KR3R, K5	KA1, KA3	Start; Stop
		2 Push Buttons (Maintained with Interlock)	KYSS210	KYSS2	KR11U	KA1, KA1	Start; Stop
		2 Push Buttons	KYSS205	KYSS2	KR1B, KR1B	KA1, KA1	Up; Down
		UL Types 1, 3, 4. 4X and 13/NEMA 1, 3, 4, 4X and 13—Stainless Steel (304) *[8]*					
	1	Push Button (Momentary)	KYSK101	KYSS1	SKR1B	KA1	Start
		Push Button (Momentary)	KYSK103	KYSS1	SKR3R	KA3	Stop
		Selector Switch (2 Pos Maintained)	KYSK110	KYSS1	SKS11B	KA1	Off-On
Type SKY201		Selector Switch (3 Pos Maintained)	KYSK111	KYSS1	SKS43B	KA1	Hand-Off-Auto
	2	2 Push Buttons	KYSK201	KYSS2	SKR1B, SKR3R	KA1, KA3	Start; Stop
		2 Push Buttons (Lockout on Stop)	KYSK203	KYSS2	SKR1B, SKR3R, K5	KA1, KA3	Start; Stop
		2 Push Buttons (Maintained with Interlock)	KYSK210	KYSS2	SKR11U	KA1, KA1	Start; Stop
		2 Push Buttons	KYSK205	KYSS2	SKR1B, SKR1B	KA1, KA1	Up; Down
		UL Types 1, 3, 4. 4X and 13/NEMA 1, 3, 4, 4X and 13—Polymeric (Plastic) *[8]*					
	1	Selector Switch (3 Pos Maintained)	SKY111	SKY1	SKS43B	KA1	Hand-Off-Auto
		Selector Switch (2 Pos Maintained)	SKY110	SKY1	SKS11B	KA1	Off-On
		Selector Switch (2 Pos Maintained with Sealed Contacts) *[6]*	SKY122	SKY1	SKS11B	KA51	Off-On
		Push Button (with Lockout)	SKY105	SKY1	SKR3R, K5	KA3	Stop
	2	2 Push Buttons	SKY201	SKY2	SKR1B, SKR3R	KA1, KA3	Start-Stop
		2 Push Buttons (Lockout on Stop)	SKY203	SKY2	SKR1B, SKR1R, K5	KA1, KA3	Start-Stop
		2 Push Buttons (With Sealed Contacts) *[6]*	SKY223	SKY2	SKR1B, SKR3R	KA51, KA51	Start-Stop
		2 Push Buttons (With Sealed Contacts) *[6]*	SKY222	SKY2	SKR1B, SKR3R	KA51, KA51	On-Off
		2 Push Buttons	SKY205	SKY2	SKR1B, SKR1B	KA1, KA1	Up-Down
	3	3 Push Buttons	SKY302	SKY3	SKR1B, SKR1B, SKR3R	KA1, KA1, KA3	Up-Down-Stop
		3 Push Buttons	SKY303	SKY3	SKR1B, SKR1B, SKR3R	KA1, KA1, KA3	Open-Close-Stop
		Red 120v Pilot Light, 2 Push Buttons	SKY315A	SKY3	SKP1R31, SKR1B, SKR3R	KA1, KA3	Start-Stop
		UL Types 1, 3, 4 and 13/NEMA 1, 3, 4 and 13 Die Cast Zinc Enclosures with Integral Guard					
Type KYG1Y2	1	Guarded Enclosure (grey) with 120V Red LED Pilot Light	KYG11 *[9]*	KYG1	KP38LRR9	—	order separately
		Guarded Enclosure (grey) with 120V Green LED Pilot Light	KYG12 *[9]*	KYG1	KP38LGG9	—	order separately
		Guarded Enclosure (Yellow Cover) with Red Push-Pull Mushroom	KYG1Y1 *[9]*	KYG1Y	KR9R	KA3	Push to Stop/ Pull to Start
		Guarded Enclosure (Yellow Cover) with Red Turn-To Release Mushroom	KYG1Y2 *[9]*	KYG1Y	KR16	KA3	Emergency Stop

[5] Uses 9001K metal operators and metal legend plates.
[6] Control Station consists of components that are UL listed for use in Class 1, Division 2, Groups A, B, C, or D.
[7] Uses 9001K metal operators and plastic legend plates.
[8] Uses 9001SK plastic operators and plastic legend plates.
[9] Includes 1" NPT threaded conduit opening.

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New!

Point of Purchase—PoP Products

Schneider Electric has recently expanded its line of Point of Purchase Blister Packs, comprised of 36 popular products, including: push-buttons, pendants, signaling and relay devices. These blister packs are conveniently packaged with all the associated components and accessories that you'll need to complete your installation. Point-of-Purchase packaging makes it easy for you, so you can just grab what you need and go!

9001AB1

9001AE3

XB4AB1

XALACS2

XVCTL1

Table 19.349: 30 mm Push Buttons

Description	Package Includes	Catalog Number
30 mm Push Button with contact block and multi colors	9001KR1U + 9001KA1+ 9001KN201 + 9001KN202	9001AB1
30 mm Push Pull Mushroom	9001KR9R + 9001KA1	9001AB2
30 mm Mushroom with Legend	9001KR5R + 9001KA1 + 9001KN205	9001AB3
30 mm 2 Position Selector Switch with contact and legend	9001KS11B + 9001KA1 + 9001KN244	9001AS1
30 mm 3 Position Selector Switch with contact and legend	9001KS43B + 9001KA1 + 9001KN260	9001AS2
Pilot Light (KP)	9001KP1 + 9001R9 + 9001G9	9001AL1
30 mm Control Station	9001BG201	9001AE3

Table 19.350: 22 mm Push Buttons

Description	Package Includes	Catalog Number
22 mm PB with contact block + 6 colors	ZB4BZ101 + ZB4BA9	XB4AB1
22 mm Mushroom with contact	XB4BS542	XB4AB2
22 mm 2 Position Selector Switch	XB4BD21	XB4AS1
22 mm 3 Position Selector Switch	XB4BJ33	XB4AS2
22 mm control station - Mushroom	XALK178	XALACS1
22 mm control station - 2 button	XALD211	XALACS2

Table 19.351: Pendants

Description	Package Includes	Catalog Number
BW Pendant	9001BW92Y	9001BWP1

Table 19.352: Tower Lights

Description	Package Includes	Catalog Number
40 mm tower light (3) 24V AC/DC	XVC4B3K	XVCTL1

Table 19.353: Power Relays

Description	Package Includes	Catalog Number
Open Power Relay 120VAC, DPDT	8501CO16V20	8501CDPDT
Open Power Relay 120VAC, DPST-N.O.	8501CO7V20	8501CDPST
Open Power Relay 120VAC, SPST-N.O.	8501CO6V20	8501CSPST

Table 19.354: Slim and Interface Relays

Description	Package Includes	Catalog Number
RSL pre-assembled (24V screw conn)	RSL1PVBU + RSLZ5	ASLSCR24
RSL pre-assembled (24V spring conn)	RSL1PRBU + RSLZ5	ASLSPR24
RSL pre-assembled (120 V screw conn)	RSL1PVFU + RSLZ5	ASLSCR120
RSL pre-assembled (120 V spring conn)	RSL1PRFU + RSLZ5	ASLSPR120
RSB1 pre-assembled 24VDC	RSB1A120BD + RSZE1S35M + RZM031RB + RSZR215 + RSZL300	RSB1SOC24D
RSB2 pre-assembled 24VDC	RSB2A080BD + RSZE1S48M + RZM031RB + RSZR215 + RSZL300	RSB2SOC24D

Table 19.355: Plug-In Relays

Description	Package Includes	Catalog Number
RPM1 24 VDC pre-assembled	RPM12BD + RPZF1 + RPZR235 + RXM040W + RXZL520	RPM1SOC24D
RPM1 120 VAC pre-assembled	RPM12F7 + RPZF1 + RPZR235 + RXM021FP + RXZL520	RPM1SOC120A
RXM4 24 VDC pre-assembled	RXM4AB2BD + RXZE2M114 + RXM040W + RXZR335 + RXZL520	RXM4SOC24D
RXM4 120 VAC pre-assembled	RXM4AB2F7 + RXZE2M114 + RXM021FP + RXZR335 + RXZL520	RXM4SOC120A

Table 19.356: Solid State Relays

Description	Package Includes	Catalog Number
10A DIN SSR AC Control	SSRDP8S10A1	SSRDAC10
10A DIN SSR DC Control	SSRDCDS10A1	SSRDDC10
20A DIN SSR AC Control	SSRDP8S20A1	SSRDAC20
20A DIN SSR DC Control	SSRDCDS20A1	SSRDDC20
10A Panel SSR AC Control + TP	SSRPP8S10A1 + SSRAT1 (1 pc)	SSRPTPAC10
10A Panel SSR DC Control + TP	SSRPCDS10A1 + SSRAT1 (1 pc)	SSRPTPDC10
25A Panel SSR AC Control + TP	SSRPP8S25A1 + SSRAT1 (1 pc)	SSRPTPAC25
25A Panel SSR DC Control + TP	SSRPCDS25A1 + SSRAT1 (1 pc)	SSRPTPDC25

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XVBL3•

XVBL4B•

XVBL6B•
5 Joule

XVBL8B•
10 Joule

XVB 70 mm Diameter Beacons

Table 19.357: XVB Beacons with Steady Light

Description	Light Source and Voltage	Color	Catalog Number
Complete unit, includes: 1 lens unit 1 base unit (direct or tube mounting)	Bulb (10 W max) not included 250 V max (must order bulb separately *[1]*)	Green	XVBL33
		Red	XVBL34
		Amber	XVBL35
		Blue	XVBL36
		Clear	XVBL37
		Yellow	XVBL38

Table 19.358: XVB Beacons with Flashing Light (one flash per second)

Description	Light Source and Voltage	Color	Catalog Number
Complete unit, includes: 1 lens unit 1 base unit (direct or tube mounting)	Bulb (10 W max) not included 24 Vac 24–48 Vdc (must order bulb separately *[1]*)	Green	XVBL4B3
		Red	XVBL4B4
		Amber	XVBL4B5
		Blue	XVBL4B6
		Clear	XVBL4B7
		Yellow	XVBL4B8
	Bulb (10 W max) not included 48–230 Vac (must order bulb separately *[1]*)	Green	XVBL4M3
		Red	XVBL4M4
		Amber	XVBL4M5
		Blue	XVBL4M6
		Clear	XVBL4M7
		Yellow	XVBL4M8

Table 19.359: XVB Beacons with 10 Joule Strobe (2.75 in./70 mm diameter) *[2]*

Description	Light Source and Voltage	Color	Catalog Number *[3]*
Complete unit, includes: 1 lens unit 1 base unit (direct or tube mounting)	Strobe 24 Vac/Vdc (includes bulb)	Green	XVBL8B3
		Red	XVBL8B4
		Amber	XVBL8B5
		Blue	XVBL8B6
		Clear	XVBL8B7
		Yellow	XVBL8B8
	Strobe 120 Vac (includes bulb)	Green	XVBL8G3
		Red	XVBL8G4
		Amber	XVBL8G5
		Blue	XVBL8G6
		Clear	XVBL8G7
		Yellow	XVBL8G8

NOTE: There are no replacement lenses for strobes.

[1] For bulbs, see Table 19.365 XVB Accessories, page 19-117.
[2] **Important:** Discharge tube elements are not suitable for continuous-operation signaling due to temperature rise caused by the discharge tube.
[3] For 5 Joule units, specify XVBL6••, instead of XVBL8••.

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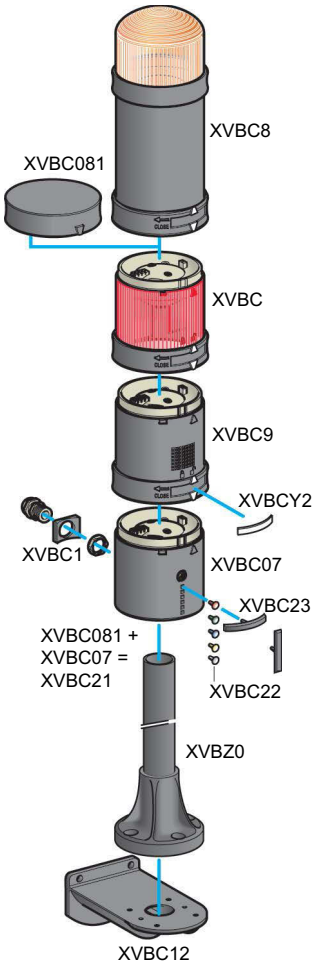

XVB 70 mm Components

Table 19.360: XVB Lens Units for Steady Light

Description	Light Source and Voltage	Color	Catalog Number
Illuminated lens unit	Bulb (10 W max) not included 250 Vac/Vdc max (must order bulb separately *[4]*)	Green	XVBC33
		Red	XVBC34
		Orange	XVBC35
		Blue	XVBC36
		Clear	XVBC37
		Yellow	XVBC38

Table 19.361: XVB Lens Unit for Flashing Light

Description	Light Source and Voltage	Color	Catalog Number
Illuminated lens unit	Bulb (10 W max) not included 24 Vac 24–48 Vdc (must order bulb separately *[4]*)	Green	XVBC4B3
		Red	XVBC4B4
		Orange	XVBC4B5
		Blue	XVBC4B6
		Clear	XVBC4B7
		Yellow	XVBC4B8
	Bulb (10 W max) not included 48–230 Vac (must order bulb separately *[4]*)	Green	XVBC4M3
		Red	XVBC4M4
		Orange	XVBC4M5
		Blue	XVBC4M6
		Clear	XVBC4M7
		Yellow	XVBC4M8

NOTE: There are no replacement lenses units for the XVBC8•• strobes.

Table 19.362: XVB Lens Units with 10 Joule Strobe

Description	Light Source and Voltage	Color	Catalog Number *[5]*
Lens unti with integral 10 Joule strobe	Strobe 24 Vac/Vdc (includes bulb)	Green	XVBC8B3
		Red	XVBC8B4
		Orange	XVBC8B5
		Blue	XVBC8B6
		Clear	XVBC8B7
		Yellow	XVBC8B8
	Strobe 120 Vac (includes bulb)	Green	XVBC8G3
		Red	XVBC8G4
		Orange	XVBC8G5
		Blue	XVBC8G6
		Clear	XVBC8G7
		Yellow	XVBC8G8

Table 19.363: Audible Sounder Units

Description	Supply Voltage	Catalog Number
Sounder unit 90 dB at 1 m	12–48 Vac/Vdc	XVBC9B
Adjustable from 75–90 dB Continuous or intermittent modes	120–230 Vac	XVBC9M

Table 19.364: Base Units + Cover

Description	Catalog Number
Base unit + cover for direct or tube mounting, bottom or side cable entry (includes gasket)	XVBC21

[4] For bulbs, see Table 19.365 XVB Accessories, page 19-117.
[5] For 5 Joule units, specify XVBC6••, instead of XVBC8••

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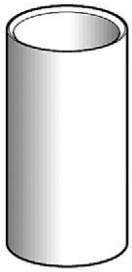
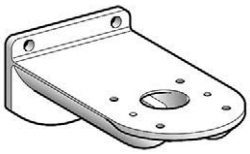
XVBZ0•



XVBC020



XVBC12

XVB 70 mm Accessories

Table 19.365: XVB Accessories

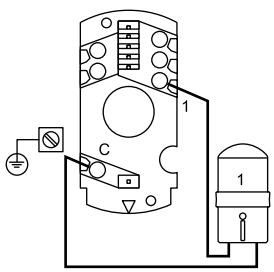
Description	Characteristics		Catalog Number	
	in.	mm		
Black tube with integral black plastic mounting base (includes gasket)	4.72	120	XVBZ02	XVBZ02A *[6]*
	15.75	400	XVBZ03	XVBZ03A *[6]*
	31.50	800	XVBZ04	XVBZ04A *[6]*
Support tube concealment cover	3.94	100	XVBC020	
	15.75	400	XVBC030	
	31.50	800	XVBC040	
Wall mount bracket (metal)	For direct mounting on base unit or with tulip XVBC11 + tube XVBC0•		XVBC12	
Incandescent bulbs bayonet type BA 15d, 10 Watts	12 Vac/Vdc		DL1BLJ	
	24 Vac/Vdc		DL1BLB	
	48 Vac/Vdc		DL1BLE	
	120 Vac/Vdc		DL1BLG	
	230 Vac/Vdc		DL1BLM	
Incandescent bulbs bayonet type BA 15d, 7 Watts	12 Vac/Vdc		DL1BEJ	
	24 Vac/Vdc		DL1BEB	
	48 Vac/Vdc		DL1BEE	
	120 Vac/Vdc		DL1BEG	
	230 Vac/Vdc		DL1BEM	
Steady-On LED bulbs bayonet type BA 15d (sold as single) *[7]*	24 Vac/Vdc	White	DL1BDB1	
		Green	DL1BDB3	
		Red	DL1BDB4	
		Blue	DL1BDB6	
		Yellow	DL1BDB8	
		Amber	DL1BDB5	
	120 Vac	White	DL1BDG1	
		Green	DL1BDG3	
		Red	DL1BDG4	
		Blue	DL1BDG6	
		Yellow	DL1BDG8	
		Amber	DL1BDG5	
Flashing LED bulbs	24 Vac/Vdc	White	DL1BKB1	
		Green	DL1BKB3	
		Red	DL1BKB4	
		Amber	DL1BKB5	
		Blue	DL1BKB6	
		Yellow	DL1BKB8	
	120 Vac	White	DL1BKG1	
		Green	DL1BKG3	
		Red	DL1BKG4	
		Amber	DL1BKG5	
		Blue	DL1BKG6	
		Yellow	DL1BKG8	
Adapter for side entry through base unit	With CM12 (p. 13.5) cable gland, for cable size of 0.4 to 0.55 in. (10 to 14 mm) diameter		XVBC14	
Conduit adapter	1/2 in. NPT (for customer supplied tubing)		XVBC00	

Table 19.366: XVB Markers and Legend Holders

Description	Characteristics	Catalog Number
Set of colored markers	6 colors	XVBC22
Set of 5 legend holders	Identification of stacked units on base	XVBC23

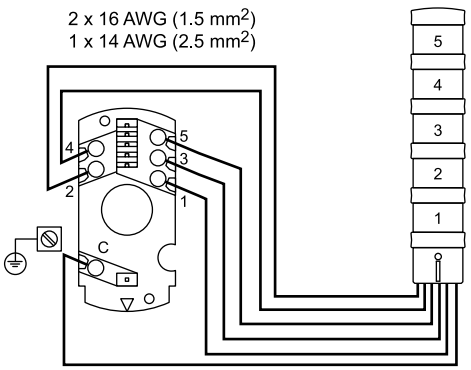
Wiring Diagrams, Base Units

Screw terminals
Torque to 4.4 in-lb (0.5 N•m)



XVBL

2 x 16 AWG (1.5 mm^2)
1 x 14 AWG (2.5 mm^2)



XVBC

[6] Aluminum tube.
[7] For 240 Vac, replace the B or G in the catalog number with M—for example, DL1BD**M**1. For flashing LEDs, refer to catalog 9001CT0001.

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XVC 4B5

XVC 4B35S

XVC Z11

XVC Z01

XVC 1B5K
XVC 1B5SK

XVC Z13

XVC Z23

XVC Tower Lights and Accessories

Table 19.367: XVC4 Tower Lights — 40 mm diameter (1.5 inches)

Description	Light source (included)	Voltage	Signaling colors [8]		Catalog Number
			Steady	Flashing	
With support tube mounting					
Without buzzer	LED for steady light only	24 Vdc	R	–	XVC4B1
			R, O	–	XVC4B2
			R, O, G	–	XVC4B3
			R, O, G, B	–	XVC4B4
			R, O, G, B, C	–	XVC4B5
		100-240 Vac	R	–	XVC4M1
			R, O	–	XVC4M2
			R, O, G	–	XVC4M3
			R, O, G, B	–	XVC4M4
			R, O, G, B, C	–	XVC4M5
With buzzer + flashing light	LED for steady or flashing light [9]	24 Vdc	R	R	XVC4B15S
			R, O	R, O	XVC4B25S
			R, O, G	R, O, G	XVC4B35S
			R, O, G, B	R, O, G, B	XVC4B45S
			R, O, G, B, C	R, O, G, B, C	XVC4B55S
		100-240 Vac	R	R	XVC4M15S
			R, O	R, O	XVC4M25S
			R, O, G	R, O, G	XVC4M35S
			R, O, G, B	R, O, G, B	XVC4M45S
			R, O, G, B, C	R, O, G, B, C	XVC4M55S
For base mounting					
Without buzzer	LED for steady light only	24 Vdc	R	–	XVC4B1K
			R, O	–	XVC4B2K
			R, O, G	–	XVC4B3K
			R, O, G, B	–	XVC4B4K
			R, O, G, B, C	–	XVC4B5K

Table 19.368: Accessories for XVC4

Description	Diameter mm	Minimum height to be added mm	Catalog Number
Die-cast metal mounting base (for use with XVC4•• and XVC4••5S with support tube)	90	32	XVCZ11
Plastic mounting base (for use with XVC4, XVC4•• and XVC4••5S — customer must discard the support tube)	84	24.5	XVCZ01

Table 19.369: XVC Tower Lights — 100 mm diameter (4 inches)

Description	Light source (included)	Voltage Vdc	Signaling colors [8]		Catalog Number
			Steady	Flashing	
For base mounting					
Without buzzer With flashing light	LED for steady or flashing light [9]	24	R	R	XVC1B1K
			R, O	R, O	XVC1B2K
			R, O, G	R, O, G	XVC1B3K
			R, O, G, B	R, O, G, B	XVC1B4K
			R, O, G, B, C	R, O, G, B, C	XVC1B5K
		100-240 Vac	R	R	XVC1M1K
			R, O	R, O	XVC1M2K
			R, O, G	R, O, G	XVC1M3K
			R, O, G, B	R, O, G, B	XVC1M4K
			R, O, G, B, C	R, O, G, B, C	XVC1M5K
With buzzer + flashing light	LED for steady or flashing light [9]	24	R	R	XVC1B1SK
			R, O	R, O	XVC1B2SK
			R, O, G	R, O, G	XVC1B3SK
			R, O, G, B	R, O, G, B	XVC1B4SK
			R, O, G, B, C	R, O, G, B, C	XVC1B5SK
		100-240 Vac	R	R	XVC1M1SK
			R, O	R, O	XVC1M2SK
			R, O, G	R, O, G	XVC1M3SK
			R, O, G, B	R, O, G, B	XVC1M4SK
			R, O, G, B, C	R, O, G, B, C	XVC1M5SK

Table 19.370: Accessories for XVC1

Description	Diameter mm	Height mm	Catalog Number
Mount tube and base	140	300	XVCZ13
L-shape mount bracket	—	—	XVCZ23

[8] Signaling colors: R = Red, G = Green, O = Orange, B = Blue, C = Clear. The colors are listed in the mounting order of the illuminated units from top to bottom.
[9] Flashing light function selected by wiring or programming.

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XVC 6B5K

XVC 6B55SK

Table 19.371: XVC6 Tower Lights, 60 mm diameter (2.375 inches)

Description	Light source (included)	Voltage	Signaling colors *[10]*		Catalog Number
			Steady	Flashing	
With support tube mounting					
Without buzzer	LED for steady light only	24 Vdc	R	–	XVC6B1
			R, O	–	XVC6B2
			R, O, G	–	XVC6B3
			R, O, G, B	–	XVC6B4
			R, O, G, B, C	–	XVC6B5
		100-240 Vac	R	–	XVC6M1
			R, O	–	XVC6M2
			R, O, G	–	XVC6M3
			R, O, G, B	–	XVC6M4
			R, O, G, B, C	–	XVC6M5
With buzzer + flashing light	LED for steady or flashing light *[11]*	24 Vdc	R	R	XVC6B15S
			R, O	R, O	XVC6B25S
			R, O, G	R, O, G	XVC6B35S
			R, O, G, B	R, O, G, B	XVC6B45S
			R, O, G, B, C	R, O, G, B, C	XVC6B55S
		100-240 Vac	R	R	XVC6M15S
			R, O	R, O	XVC6M25S
			R, O, G	R, O, G	XVC6M35S
			R, O, G, B	R, O, G, B	XVC 6M45S
			R, O, G, B, C	R, O, G, B, C	XVC6M55S
For base mounting					
Without buzzer	LED for steady light only	24 Vdc	R	–	XVC6B1K
			R, O	–	XVC6B2K
			R, O, G	–	XVC6B3K
			R, O, G, B	–	XVC6B4K
			R, O, G, B, C	–	XVC6B5K
		100-240 Vac	R	–	XVC6M1K
			R, O	–	XVC6M2K
			R, O, G	–	XVC6M3K
			R, O, G, B	–	XVC6M4K
			R, O, G, B, C	–	XVC6M5K
With buzzer + flashing light	LED for steady or flashing light *[11]*	24 Vdc	R	R	XVC6B15SK
			R, O	R, O	XVC6B25SK
			R, O, G	R, O, G	XVC 6B35SK
			R, O, G, B	R, O, G, B	XVC6B45SK
			R, O, G, B, C	R, O, G, B, C	XVC6B55SK
		100-240 Vac	R	R	XVC6M15SK
			R, O	R, O	XVC6M25SK
			R, O, G	R, O, G	XVC6M35SK
			R, O, G, B	R, O, G, B	XVC6M45SK
			R, O, G, B, C	R, O, G, B, C	XVC6M55SK

XVC Z02

XVC Z12

Table 19.372: Accessories for XVC6

Description	Diameter mm	Minimum height to be added mm	Catalog Number
Die-cast metal mounting base for XVC6B• and XVC6B•5S with support tube.	100	30	XVCZ02
Stamped metal mounting base for XVC6B• K and XVC6B•5SK	84	21.6	XVCZ12

[10] Signaling colors: R = Red, G = Green, O = Orange, B = Blue, C = Clear. The colors are listed in the mounting order of the illuminated units from top to bottom.
[11] Flashing light function selected by wiring or programming.

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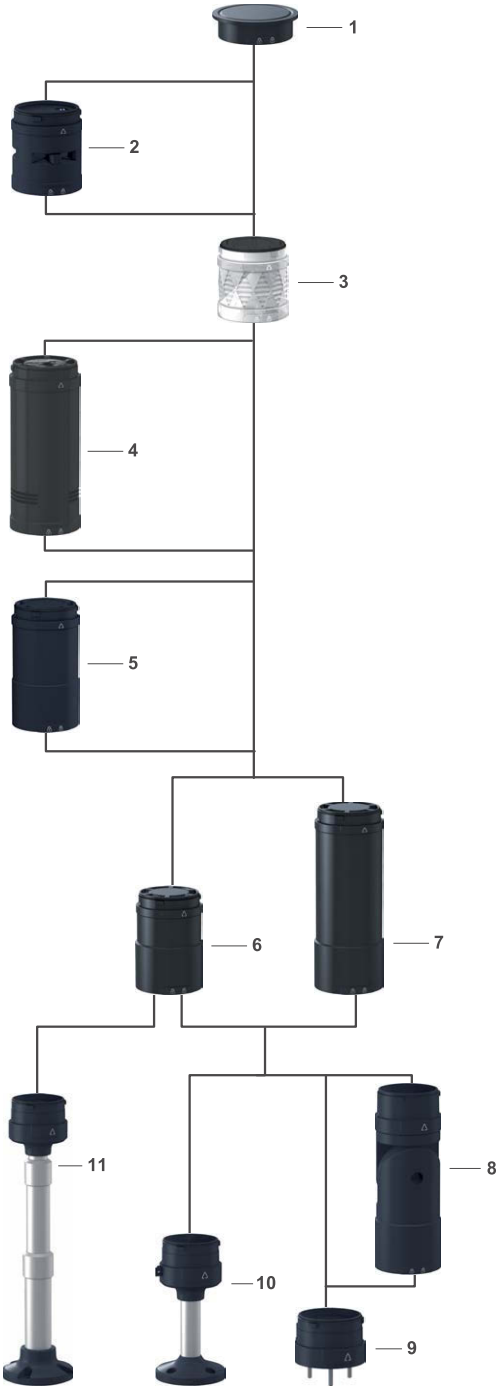

New!

XVU 60 mm Diameter Tower Lights Description

The XVU tower lights are customer assembled products comprising:

1. Top cover (Black or Silver)
2. Buzzer unit (Black or Silver) *[12]*
3. Illuminated units: *[13]*
   a. LED illuminated units (Colors: Green, Red, Orange, Blue, White or Yellow)
   b. Multi-color LED unit (Colors: Green, Red, Orange, Blue, White or Yellow. Patterns: steady, blinking, flashing, or rotating)
4. Sound unit *[14]*
5. Body extender (Black or Silver)
6. DC body unit (Black or Silver)
7. AC body unit (Black or Silver)
8. Flexible mounting module
9. Direct mounting plate (Black or Silver)
10. 100 mm/3.937 in. pole with fixing plate (Black or Silver)
11. Height adjustment pole from 210 to 385 mm/8.268 to 15.157 in. *[15]*

Composition

- XVU tower lights are customer assembled signaling units that are mounted on the body of the unit with a mounting accessory.
- Maximum of 5 illuminated units or 4 illuminated units with 1 audible unit can be assembled. The illuminated or audible unit *[16]*, stack vertically.
- With the indicator marks on these units they can be easily assembled.
- Electrical connections between each unit are made automatically as they are mechanically assembled.
- The signaling units are identical in size and their positioning is unrestricted.

Mounting

Fixed into support panel using direct mounting plate, 100mm/3.937 in. pole with mounting plate or adjustment pole.

Cabling

By means of spring cage connection terminal block incorporated in mounting unit (Direct mounting plate, pole with plate, adjustment pole)

[12] Always mounted on the top
[13] Up to 5 LED illuminated units without sound module; Up to 4 LED illuminated units with sound module
[14] (3)Sound module can work without LED unit
[15] Only for DC body unit
[16] Sound module cannot be combined with buzzer unit at the same time.(5)

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XVU Illuminated LED Units: IP 65

Table 19.373: Illuminated LED Units: IP 65

Description	Signaling Type	Characteristics		Color	Catalog Number
		Voltage	Power		
High brightness LED units	Steady	24 V	2.5 W	Green	XVUC23
		24 V	2.0 W	Red	XVUC24
		24 V	2.0 W	Orange	XVUC25
		24 V	2.5 W	Blue	XVUC26
		24 V	2.5 W	White	XVUC27
		24 V	2.5 W	Yellow	XVUC28
	Steady/blinking/ flashing/rotating	24 V	1.5 W	Multi-color (Green, Red, Orange, Blue, White and Yellow)	XVUC29

XVUC23

XVUC26

XVUC28

XVUC29

XVU Audible Units: IP 54

Table 19.374: Audible units: IP 54

Description	Characteristics		Color	Catalog Number
	Voltage	Power		
Buzzer, adjustable 70–85 dB at 1 m/ 3.281 ft (4 configurations of audible signal)	24 V	1.7 W	Black	XVUC9S
			Silver	XVUC9SQ
Sound, adjustable 0–86 dB at 1m/ 3.281 ft (4 channels)	24 V	1.7 W	Black	XVUC9V

XVUC9S

XVUC9SQ

XVUC9V

XVU Body Units: IP 65

Table 19.375: Body units: IP 65

Description	Voltage	Color	Catalog Number
Body unit with top cover *[17]*	∼/⎓ 24 V	Black	XVUC21B
		Silver	XVUC21BQ
	∼ 100 to 240 V	Black	XVUC21M *[18]*
		Black	XVUC21MP *[19]*
		Silver	XVUC21MQP *[19]*

XVUC21BQ

XVUC21M

XVUC020

XVU Accessories

Description	Voltage	Color	Catalog Number
Body extender	∼/⎓ 24 V	Black	XVUC020
		Silver	XVUC020Q
Direct mounting plate		Black	XVUZ01
			XVUZ03 *[20]*
			XVUZ04 *[21]*
		Silver	XVUZ01Q
Aluminium mounting plate with 100 mm/3.937 in. pole		Black	XVUZ02
		Silver	XVUZ02Q
Aluminium adjustment pole and mounting plate for height adjustment *[22]*		Black	XVUZ05
Flexible mounting element for use on horizontal or vertical support, IP 55		Black	XVUZ06

XVUZ01Q

XVUZ02

XVUZ05

XVUZ06

[17] Direct mounting plate XVUZ01● needed for direct mounting
[18] NPN type
[19] PNP type
[20] Two-foot mounting
[21] Four-foot mounting
[22] (6)Only for use with DC body unit.

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New!

XVGU Multi-color USB Tower Lights

The monolithic USB tower lights of the Harmony® XVGU range supports Magelis HMIs *[23]*. These tower lights with multi-color LEDs are unique and simple-to use as the states and patterns are directly set and modified in the HMI application.

The XVGU tower lights provide long distance indication of the operating status or sequences of a machine or installation, both visually by illuminated signaling units with 360° visibility, and audibly by a buzzer.

- The tower light comes with a pre-assembled USB cable for simple wiring and easy integration with the Magelis HMIs *[23] [24]*
- The tower light settings are selected from the Set screen of the HMI application at the time of integration.
  - The multi-color LEDs on the three levels can be set to numerous color combinations (red, orange, green or blue) for sophisticated signaling.
  - The 2-tone buzzer volume and alarm type (4 pre-recorded types) can be set easily.
- The tower lights allow to optimize your equipment: many customized configurations can be made from a sole product.
- The range involves Ø 60 mm/2.36 in. products and is therefore ideal for use in many activity sectors (textiles, packaging, baggage handling). It is also ideal for use with metal tools, plastic extrusion machines and assembly lines. This range is only for indoor applications

NOTE: Signaling colors correspond to a combination of 4 colors (red, orange, green, and blue) which can be set easily in the HMI application.

Magelis HMIs *[23]*

XVGU3SHAV

XVGU3SWV

Table 19.376: Pre-assembled tower lights ⎓ 5 V, 60 mm/2.36 in. Dia.

Description	Light Source (included)	Compatible with terminals *[25]*	Catalog Number
Tower light composed of 100 mm/3.94 in. aluminium tube mounting, fixing plate and buzzer	Multi-color LED for various states and patterns (red, orange, green, or blue)	XBTGT (except GT1000 series) XBTGC (with SoMachine platform) XBTGK HMIGTO HMIGXO HMISCU	XVGU3SHAV
Tower light composed of direct base mounting and buzzer	Multi-color LED for various states and patterns (red, orange, green, or blue)	XBTGT (except GT1000 series) XBTGC (with SoMachine platform) XBTGK HMIGTO HMIGXO HMISCU	XVGU3SWV

BMXXCAUSBH018

Table 19.377: Accessories

Description	Function	Length	Catalog Number
Connection cable from PC to the terminal (USB Type A/mini B)	Cable for transferring screen data from a PC (USB Type A) to a HMI (USB Type mini B)	1.8 m/5.91 ft	BMXXCAUSBH018

[23] Compatible with XBTGT (except GT1000 series), XBTGC (with SoMachine platform), XBTGK and HMIGTO terminals.
[24] For extension, use either the Schneider Electric USB cable (BMXXCAUSBH018) or a third-party USB Type A/mini B cable of maximum length 4 m/13.12 ft.
[25] Compatible with Vijeo Designer HMI configuration software V6.1, Service pack 1.

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XVR 08•••

XVR 10•••

XVR 12•••

XVR 13•••

XVR Pre-Wired Beacons and Accessories

Table 19.378: XVR Pre-Wired Rotating Mirror Beacons

Diameter (mm)	Sound Option	Enclosure Rating	Voltage	Color	Catalog Number
Ø 84	Without buzzer	IP 23 (IP 65 with accessories)	12 Vac/Vdc	Red	XVR08J04
				Orange	XVR08J05
				Green	XVR08J03
				Blue	XVR08J06
			24 Vac/Vdc	Red	XVR08B04
				Orange	XVR08B05
				Green	XVR08B03
				Blue	XVR08B06
Ø 106	Without buzzer	IP 23 (IP 55 with accessories)	12 Vac/Vdc	Red	XVR10J04
				Orange	XVR10J05
				Green	XVR10J03
				Blue	XVR10J06
			24 Vac/Vdc	Red	XVR10B04
				Orange	XVR10B05
				Green	XVR10B03
				Blue	XVR10B06
Ø 120	Without buzzer	IP 23	12 Vac/Vdc	Red	XVR12J04
				Orange	XVR12J05
				Green	XVR12J03
				Blue	XVR12J06
			24 Vac/Vdc	Red	XVR12B04
				Orange	XVR12B05
				Green	XVR12B03
				Blue	XVR12B06
Ø 120	With buzzer	IP 23	12 Vac/Vdc	Red	XVR12J04S
				Orange	XVR12J05S
				Green	XVR12J03S
				Blue	XVR12J06S
			24 Vac/Vdc	Red	XVR12B04S
				Orange	XVR12B05S
				Green	XVR12B03S
				Blue	XVR12B06S
Ø 130	Without buzzer	IP 23 Resistant to vibration	12 Vdc	Red	XVR13J04
				Orange	XVR13J05
			24 Vdc	Red	XVR13B04
				Orange	XVR13B05

XVR ZR1

XVR Z081

XVC Z13

XVC Z23

Table 19.379: XVR Accessories

Description	Diameter (mm)	Height (mm)	Catalog Number
Reflecting prism	84	—	XVRZR1
	106	—	XVRZR2
	120/130	—	XVRZR3
Rubber base to increase the IP degree of protection	84	—	XVRZ081
	106	—	XVRZ082
Mount tube and base	106, 120 and 130	300	XVCZ13
L-shape mounting bracket	84, 106 and 120	—	XVCZ23

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XVS14BMW

XVS72BM

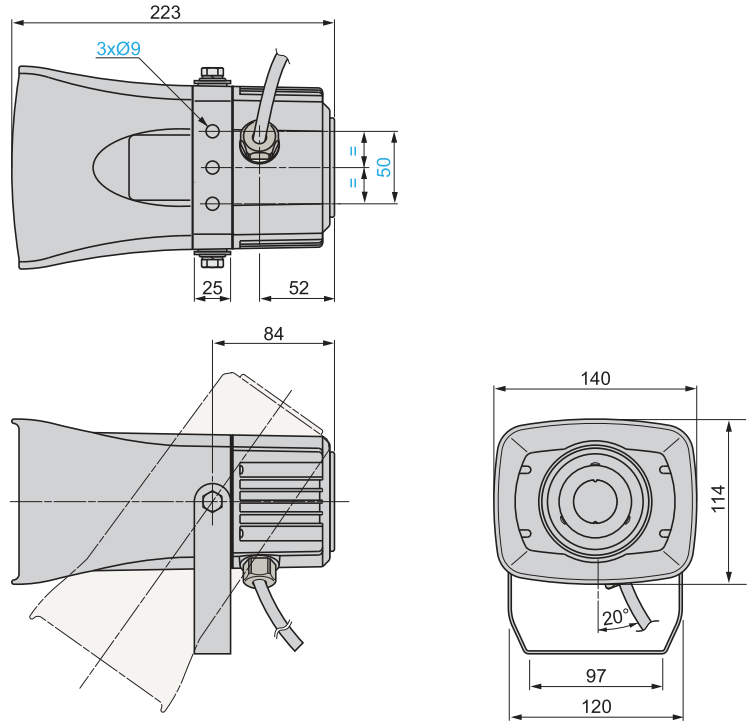
XVS Sirens and Electronic Alarms

Table 19.380: XVS Sirens and Electronic Alarms

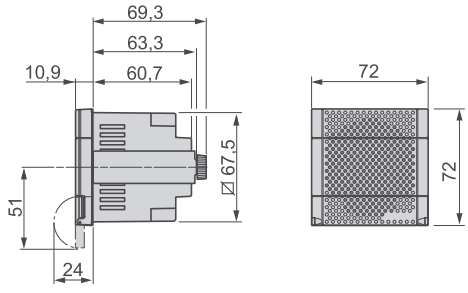
Description	Voltage	Color	Catalog Number
Multisound siren 105 dB, 43 tones	12/24 Vdc	White	XVS14BMW
Electronic alarms 90 dB, 16 tones Panel Mount DIN72	12/24 Vac/Vdc	PNP, Black	XVS72BMBP
		PNP, White	XVS72BMWP
		NPN, Black	XVS72BMBN
		NPN, White	XVS72BMWN

Table 19.381: XVS Dimensions (mm)

XVS 14BMW



XVS 72BM●●



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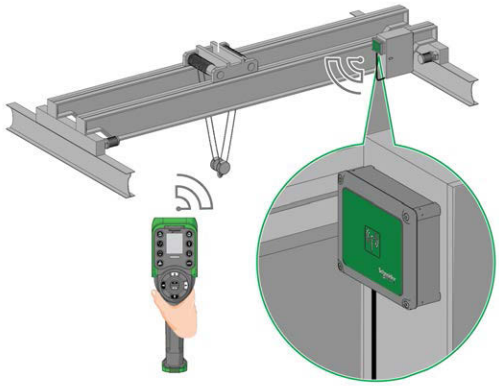
New!



ZART8L

ZART8D

ZARB12H

ZARB18W

XARS12D18H

Harmony eXLhoist Operator Control Stations

The Harmony® eXLhoist range of wireless remote control systems provide complete and innovative crane operator control solutions to: improve the machine and crane operator efficiency, enhance safety for people and equipment, and to reduce installation and maintenance downtime.

The remote control system XARS is a combination of remote control device (or transmitter: XART) and base station (or receiver: XARB), which transmits commands and information from the operator to the machine and vice versa by a wireless transmission means.

The XARS system offers movement in 3 directions (for example: hoist, bridge, and trolley) at 2 speed levels (low and high) for each movement.

The 2 modes available in the system are:

- Single mode: the remote control device controls one base station
- Tandem mode: the remote control device controls 2 base stations simultaneously.

Table 19.382: Remote Control Devices

Description	Characteristics		Catalog Numbers
	Motion push buttons	Auxiliary push buttons	
With LEDs	6	2	ZART8L
With display	6	2	ZART8D
With display	6	6	ZART12D

Table 19.383: Base Station

Description	Characteristics		Power Supply (V)	Catalog Number
	Outputs	Inputs		
Wired connection cable gland	12 relays + 2 safety relays	—	~/⎓ 24–240	ZARB12W
Industrial plug connection	12 relays + 2 safety relays	—	~/⎓ 24–48	ZARB12H
Wired connection cable gland	18 relays + 2 safety relays	18 digital (12 limiters + 6 alarms)	~/⎓ 24–240	ZARB18W
Industrial plug connection	18 relays + 2 safety relays	18 digital (12 limiters + 6 alarms)	~/⎓ 24–48	ZARB18H

Table 19.384: Wireless Remote Control

Description	Characteristics		Catalog Number
	Speical Functions	Connection	
Complete unit without charger device	—	Wiring	XARS8L12W (ZART8L + ZARB12W)
	—	Industrial plug	XARS8L12H (ZART8L + ZARB12H)
	Limiter protection Movement monitoring	Wiring	XARS8D18W (ZART8D + ZARB18W)
		Industrial plug	XARS8D18H (ZART8D + ZARB18H)
		Wiring	XARS12D18W (ZART12D + ZARB18W)
		Industrial plug	XARS12D18H (ZART12D + ZARB18H)

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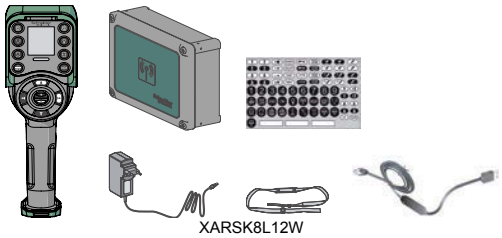


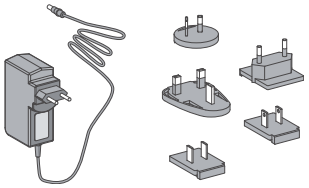
XARSK8L12W

Table 19.385: Kits

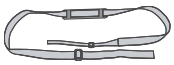
Description	Components	Catalog Numbers
Starting kit comprising of Remote control system + accessories + USB/RJ45 cable + Configuration software	ZART8L + ZARB12W + ZARC01 + ZARC02 + TCSMCNAM3M002P	XARSK8L12W
	ZART8L + ZARB12H + ZARC01 + ZARC02 + TCSMCNAM3M002P	XARSK8L12H
	ZART8D + ZARB18W + ZARC01 + ZARC02 + TCSMCNAM3M002P	XARSK8D18W
	ZART8D + ZARB18H + ZARC01 + ZARC02 + TCSMCNAM3M002P	XARSK8D18H
	ZART12D + ZARB18W + ZARC01 + ZARC02 + TCSMCNAM3M002P	XARSK12D18W
	ZART12D + ZARB18H + ZARC01 + ZARC02 + TCSMCNAM3M002P	XARSK12D18H

Table 19.386: Accessories

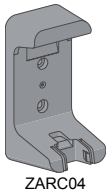
Description	Characteristics	Catalog Number
Charger for remote device	∿100–240 V power supply	ZARC01
Shoulder belt for remote device	2 m / 6.56 ft length	ZARC02
External antenna for Base station *[1]*	with 2 m / 6.56 ft cable and bracket included	ZARC03
Holder for remote device	104 x 239 mm / 4.09 x 9.41 in.	ZARC04
Connector plug female	with cable 1.5 m / 4.92 ft	ZARC05
Cable gland kit with wire grommets	1 x M25 + 1 x M20	ZARC06
Kit for adhesive labels for remote device	in Black and White	ZARC07
Kit for adhesive labels for remote device and crane equipment	Multi color	ZARC08
Mounting kit	Silent block + magnet and metal support	ZARC09
Connector plug (female)	with cable 3 m / 9.84 ft	ZARC12
Connector plug (female)	with cable 5 m /16.40 ft	ZARC18
Connector cable	USB to RJ45	TCSMCNAM3M002P



ZARC01



ZARC02



ZARC04

ZARC07

TCSMCNAM3M002P

[1] Use of this accessory allows to increase radio range in severe environment conditions.

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Type BW Pendant Stations and Accessories

This pre-assembled, two-button station now comes complete with internal and external strain relief. Oversized finger grips on the rear of the enclosure make it easy to grip and operate.

- Well suited for standard hoist applications
- Push button legend inserts
- Field-installable mushroom button
- Full cover gasket, to exclude harmful contaminants

Table 19.387: BW90 and BW100 Pendant Stations – with cord connector and strain relief

Description		Legend Insert Markings	Mechanical Interlock	Enclosure Color			Contact Symbol	Replacement Interior [2]	
				Yellow	Black	Red		9001 Type	Contact Symbol
BW90 / BW100	Single Speed	Up-Down	Yes	BW92Y	BW92B	BW92R	146	BOC368	146
		Forward-Reverse	Yes	BW93Y	BW93B	BW93R	146	BOC368	146
		On-Off [3]	Yes	BW94Y	BW94B	BW94R	10	BOC358	147
		Start-Stop	No	BW95Y	BW95B	BW95R	145	BOC359	25
		Start-Stop [3]	Yes	BW96Y	BW96B	BW96R	10	BOC358	147
		On-Off [3]	No	BW97Y	BW97B	BW97R	146	BOC359	25
		Up-Down	Yes	BW98Y	BW98B	—	100	—	—
		without Inserts	Yes	BW90YU	BW90BU	BW90RU	147	BOC366	25
		without Inserts	No	BW91YU	BW91BU	BW91RU	25	BOC359	25
		without Inserts [3]	Yes	BW94YU	BW94BU	BW94RU	147	BOC358	147
	Two Speed	without Inserts	Yes	BW100YU	BW100BU	BW100RU	150	BOC367	150
		Up-Down	Yes	BW102Y	BW102B	BW102R	150	BOC367	150

Table 19.388: Hanger Brackets

Description	Form
Y236 — External Bracket (cannot be field installed)	Y236
Bracket and Seal Kit	B350

Table 19.389: Strain Relief Replacement

Description	Type
BWSR — Strain Relief Replacement	BWSR

Table 19.390: Interchangeable Legend Inserts for Type BW Pendant Stations [4]

Marking	Type
Start	B259
Stop	B260
Forward	B255
Reverse	B256
Open	B263
Close	B264
Raise	B261
Lower	B262
Up	B253
Down	B254
On	B257
Off	B258
Blank - black	B251
Blank - red	B252

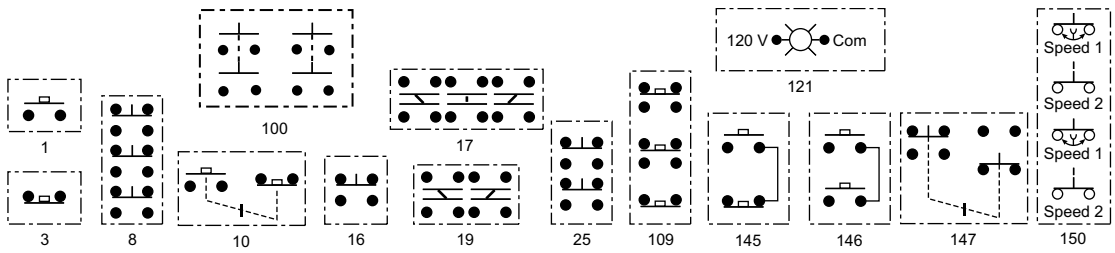
Table 19.391: Replacement Enclosures

Description	Color	Type
Box & Cover with 4 screws	Yellow	BWRY
	Red	BWRR
	Black	BWRB

Table 19.392: Electrical Contact Ratings [5]

AC—NEMA B600							DC—NEMA P600		
Volts	Inductive 35% Power Factor				Continuous Carrying Amperes	Resistive 75% Power Factor	Volts	Inductive and Resistive	
	Make		Break			Make, Break and Continuous Carrying Amperes		Make and Break Amperes	Continuous Carrying Amperes
	A	VA	A	VA					
120	30.5	3600	3.75	360	5	5	120	1.1	5
240	15	3600	1.5	360	5	5	240	0.55	5
480	7.5	3600	.75	360	5	5	600	0.2	5
600	6	3600	.6	360	5	5			

Contact Symbols (Type BW Pendant Staions)



[2] Includes gasket
[3] Maintained Contact
[4] Order must specify a quantity of 10 or multiples of 10.
[5] OSHA Regulation, Section 1910.70, Overhead and Gantry Cranes, limits the voltage of pendant push buttons to 150 Vac or 300 Vdc.

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XAC Pistol Grip Stations and General Purpose Pendants

XAC pendant stations are designed for standard- or medium-duty control circuit applications.

- Single- or two-speed versions
- Double insulated
- Shock and corrosion resistant
- 2, 4, 6, 8, 12 element versions
- Ease of operation

XACA201

XACA06

XACA03 with operators

Table 19.393: Pistol Grip Stations

Description	Speeds	Function		Catalog Number
		1 speed	2 speed	
1 N.O. contact per operator 2 Mechanically interlocked operators	1	↕		XACA201 *[6]*
2 N.O. (staggered) contacts per operator 2 Mechanically interlocked operators	2		↕	XACA207 *[6]*
1 N.O. + 1 N.C. 2 Mechanically interlocked operators	1	↕		XACA205 *[6]*
1 N.O. contact per direction 1 Mechanically interlocked 2 way toggle	1	↕		XACD21A0101 *[7]*
1 N.O. + 1 N.O. staggered 1 Mechanically interlocked 2 way toggle	2		↕	XACD21A1231 *[7]*
1 N.O. & 1 N.C. contact per direction 1 Mechanically interlocked 2 way toggle	1	↕		XACD21A0105 *[7]*
1 N.C. + 1 N.O. + 1 N.O. staggered 1 Mechanically interlocked 2 way toggle	2		↕	XACD21A1241 *[7]*

NOTE: Legends are required to achieve NEMA4 rating.

Table 19.394: General Purpose Pendants *[8][9]*

Enclosures	Catalog Number
2 hole enclosure	XACA02H7
3 hole enclosure	XACA03H7
4 hole enclosure	XACA04H7
6 hole enclosure	XACA06H7
8 hole enclosure	XACA08H7
12 hole enclosure	XACA12H7

To place a custom pendant order, use the worksheet Type XACA Worksheet, page 19-131 as a guide. Orders must be placed through the Product Selector in Quote to Cash. There is a 10% charge for assembly.

XAC Contact Blocks

Table 19.395: Contact Blocks for Operators in Cover

Description	Wiring Diagram	Catalog Number
1 N.O./spring return/1 speed	—	ZB2BE101
1 N.C./spring return/1 speed	—	ZB2BE102
1 N.O. early close & 1 N.C. & 1 N.O./spring return/2 speed	Figure 1	XENG1191
1 N.C. & 2 N.O./spring return/1 speed	Figure 2	XENG1491
1 N.O. & 1 N.O. latching/1 speed/interlocked	Figure 3	XENG3781
1 N.O. & 1 N.C. latching/1 speed/interlocked	Figure 4	XENG3791
3 N.C.—all direct acting	Figure 5	XENT1192

ZB2BE10

XENG37

XENG1191

XACS10

Table 19.396: Contact Blocks for Operators in Base of Enclosure *[10]*

Description	Catalog Number
1 N.O./1 speed	XACS101
1 N.C./1 speed	XACS102
2 N.O./1 speed	XACS103
2 N.C./1 speed	XACS104
1 N.O. & 1 N.C./1 speed	XACS105

Wiring Diagrams

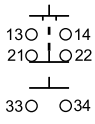

Figure 1

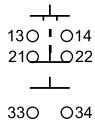

Figure 2

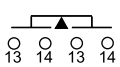

Figure 3

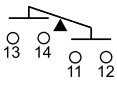

Figure 4

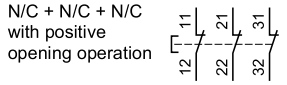

Figure 5

[6] These units are available with factory installed E-stops. Add a "3" to the end of the catalog number for standard E-stop or add a "4" for a trigger action E-stop.
[7] These units are available with a factory installed E-stop. Use XACD22 ••• for a standard E-stop or XACD24••• for a trigger action E-stop.
[8] Standard enclosures include internal mounting plate, cable sleeve for 8 to 26 mm, internal cable clamp, suspension ring and cable tie.
[9] For ordering information on custom built XACA pendants, visit our website at www.Schneider-Electric.us.
[10] Cannot be used with **XACA03** pendant.

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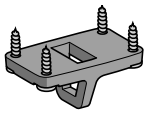
Booted Push Button

Mushroom Head

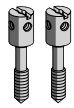
Selector Switch

Selector Switch (key operated)

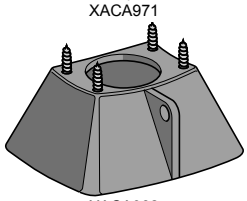
Wobble Stick



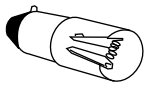
XACA971



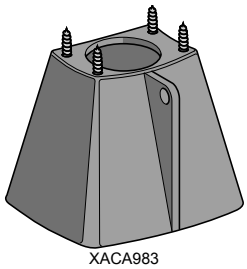
XACB961



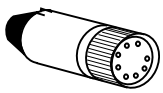
XACA982



DL1CE0••
(Incandescent)



XACA983



DL1CJUS••••
(LED)

XAC Operators and Accessories

Table 19.397: Operators *[11]*

Description	Color	Catalog Number
Booted push button	White	XACA9411
	Black	XACA9412
	Green	XACA9413
	Red	XACA9414
	Yellow	XACA9415
	Blue	XACA9416
	Brown	XACA9419

Table 19.398: Mushroom Operators

Description	Mushroom Size	Color	Catalog Number
Mushroom head, push to maintain/turn-to-release (trigger action)*[12]*	30 mm	Red	ZA2BS834
	40 mm	Red	ZA2BS844
Mushroom head, push to maintain/key turn-to-release (trigger action)*[12]*	40 mm	Red	ZA2BS944

Table 19.399: Selector Switches and Wobble Stick

Description	Color	Catalog Number
Selector switch/2 position—maintained*[13]*	Black	ZA2BD2
Selector switch/3 position—maintained*[13]*	Black	ZA2BD3
Selector switch/2 position—maintained key operated—key removal from LT or RT position*[13]*	NA	ZA2BG4
Selector switch/3 position—maintained key operated—key removal from LT or RT position*[13]*	NA	ZA2BG5
Wobble stick (bottom mounting recommended)	Black	ZA2BB2

Table 19.400: Pilot Light Components

Description	Color	Catalog Number
Direct supply base/without lamp (for 6 to 120 V applications) (AC/DC) *[14]*	—	ZB2BV006

Table 19.401: Enclosure Accessories

Description	Catalog Number
Blank hole plug	ZB2SZ3
Mechanical interlock (momentary). For use with XAC booted operators only	XACA009
Screw adapter for self-supporting cable	XACB961
Low suspension ring for single row station	XACA971
Protective guard for bottom mounted mushroom head	XACA982
Protective guard for bottom mounted selector switch or key switch	XACA983

Table 19.402: Lamps, BA9s Base

Type	Voltage	Watts	Catalog Number
Replacement bulbs (Type BA9s) Incandescent	6 Vac/Vdc	1.2	DL1CB006
	12 Vac/Vdc	2.0	DL1CE012
	24 Vac/Vdc	2.0	DL1CE024
	48 Vac/Vdc	2.4	DL1CE048
	130 Vac/Vdc	2.6	DL1CE130

Table 19.403: LED, BA9s Base

Type	Color	Voltage	Catalog Number
LED, BA9s base for Direct Supply blocks	Green	6 Vac/Vdc	DL1CJUS0063
	Red	6 Vac/Vdc	DL1CJUS0064
	Amber	6 Vac/Vdc	DL1CJUS0065
	Green	24 Vac/Vdc	DL1CJUS0243
	Red	24 Vac/Vdc	DL1CJUS0244
	Amber	24 Vac/Vdc	DL1CJUS0245
	White	24 Vac/Vdc	DL1CJUS0241
	Blue	24 Vac/Vdc	DL1CJUS0246
	Green	120 Vac/Vdc	DL1CJUS1203
	Red	120 Vac/Vdc	DL1CJUS1204
	Amber	120 Vac/Vdc	DL1CJUS1205

[11] Booted push buttons are for cover mounting only. All other operators can be mounted on cover or bottom.
[12] Trigger action mushroom heads are tamper proof in that a change of contact state is not possible by teasing or floating the operator.
[13] Not for use with XENG contact blocks.
[14] see Table 19.402 Lamps, BA9s Base, page 19-129 and Table 19.403 LED, BA9s Base, page 19-129.

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Table 19.404: PVC Standard Legend Plates 30 x 40 mm

Text[15]	Catalog Number	Text[15]	Catalog Number	Text[15]	Catalog Number
Bridge Forward	ZB2BY2343	Left	ZB2BY2310	Stop	ZB2BY2304
Bridge Reverse	ZB2BY2344	Low	ZB2BY2336	Stop Start	ZB2BY2366
Close	ZB2BY2314	Lower	ZB2BY2337	Trolley Right	ZB2BY2345
Down	ZB2BY2308	Man Auto	ZB2BY2372	Trolley Left	ZB2BY2346
Emergency Stop	ZB2BY2330	Off	ZB2BY2312	Up	ZB2BY2307
Fast	ZB2BY2328	On	ZB2BY2311	Up Down	ZB2BY2370
Forward	ZB2BY2305	Off On	ZB2BY2367	Up-O-Down	ZB2BY2389
For Rev	ZB2BY2371	Open	ZB2BY2313	North	6516002379
For-O-Rev	ZB2BY2384	Open Close	ZB2BY2376	South	6516002380
Hand Off Auto	ZB2BY2387	Open-O-Close	ZB2BY2388	East	6516002381
High	ZB2BY2338	Out	ZB2BY2339	West	6516002382
High Low	ZB2BY2369	Power On	ZB2BY2326		
Hoist Down	ZB2BY2342	Raise	ZB2BY2335		
Hoist Up	ZB2BY2341	Reset[15]	ZB2BY2323		
In	ZB2BY2503	Reverse	ZB2BY2306		
Inch	ZB2BY2321	Right	ZB2BY2309		
Jog For	ZB2BY2381	Run	ZB2BY2334		
Jog Rev	ZB2BY2380	Slow	ZB2BY2327		
Jog Run	ZB2BY2365	Start	ZB2BY2303		

Type	Description	Background Color	Catalog Number
PVC blank legend	Blank	Black or red background—30 mm x 40 mm	ZB2BY2101
	Blank	Yellow or white background—30 mm x 40 mm	ZB2BY4101
PVC custom engraved	Special engraving[16] Special engraving[16]	Black background, white letters—30 mm x 40 mm White background, black letters—30 mm x 40 mm	ZB2BY2002 ZB2BY4001

[15] All nameplates are black with white lettering except “Stop”, “Emergency Stop” and “Reset” which are red with white lettering. For black “Reset” change final digit of catalog number to 2.
[16] Please specify lettering when ordering. Two lines with 11 characters (including spaces) maximum on each plate.

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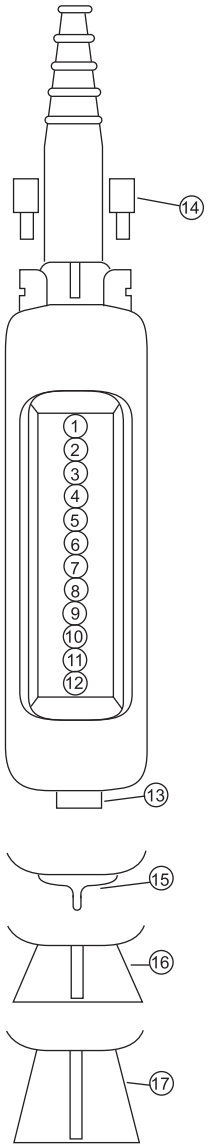
Type XACA Worksheet



Use this worksheet to assist in component selection. Custom orders for XACA pendant stations must be placed through the Product Selector in Quote to Cash. There is a 10% charge for assembly.

XACA Order Guide Instructions

Custom built pendant stations

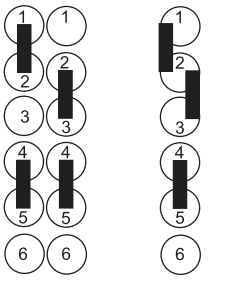
1. Determine the number of operators needed, then choose an enclosure with a corresponding number of holes.
2. Select the type of operator, contact block, and appropriate nameplate for each function required.
3. Check for special functions that may be required. These items could include mechanical interlocks, adapters for self-supporting cable, lower support rings, protective guards, etc.

Catalog number of enclosure **XACA** ☐ ☐ ☐ ☐

Functions (optional)	Mechanical interlock (draw a vertical line between the 2 units to be interlocked ▲)	Legends	Contact blocks and pilot light bodies	Push button Pilot light or Blanking plug
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			

▲ Mechanical interlock XACA009 — Number of XACA009 required

Mechanical Interlock (XACA009)



Unit mounted in base of station (facing downwards)

	13			

Attachments

Position	Type	Catalog No.
14	Adapters for self-supporting cable type BBAP (available only with cable sleeve Ø8–26 mm)	**XACB961**
15	Lower support ring	**XACA971**
16	Protective guard for base mounted selector switch or 40 mm emergency-stop push button	**XACA982**
17	Protective guard for key switch	**XACA983**

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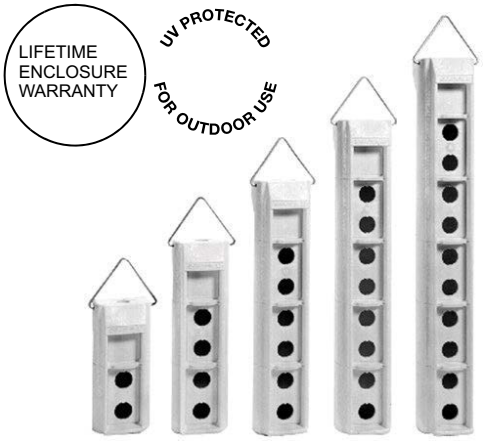

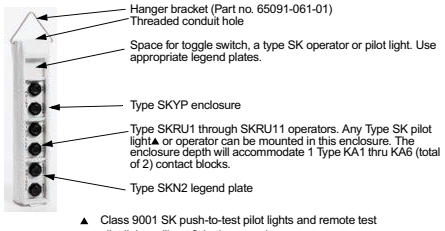

▲ Class 9001 SK push-to-test pilot lights and remote test pilot lights will not fit in these enclosures.

Pendant Station Application and Ordering Information

This line of pendant stations consists of polymeric enclosures (2 through 10 units), push button units (1 through 5 speed) and laminated legend plates. All enclosures have an extra single unit space near the top which permits the installation of a toggle switch, a Type SK operator or pilot light, or a warning label. All enclosures come with a stainless steel hanger bracket and internal strain relief post. Enclosures are yellow and have a threaded opening in the top.

Table 19.405: Enclosure Catalog Numbers

Number of Buttons	Conduit Entrance Size	Enclosure Only *[17]*	Enclosure for Assembled Station *[18]*
		Catalog Number	Catalog Number
2	3/4"-14 NPT	SKYP2	SKYP20
4	3/4"-14 NPT	SKYP4	SKYP40
6	1"-11 1/2 NPT	SKYP6	SKYP60
8	1 1/4"-11 1/2 NPT	SKYP8	SKYP80
10	1 1/4"-11 1/2 NPT	SKYP10	SKYP100

Table 19.406: Push Button Units

Number of Buttons per Unit	Description	Contact Symbol	Catalog Number *[19]*
2	Single Speed – Momentary Interlocked	7	SKRU1*[20]*
2	Single Speed – Momentary Non-Interlocked	5	SKRU10*[20]*
2	Single Speed – Maintained Interlock	10	SKRU11*[20]*
2	Two Speed –Momentary Interlocked	87	SKRU2*[21]*
2	Three Speed – Momentary Interlocked	88	SKRU3*[21]*
2	Four Speed – Momentary Interlocked	89	SKRU4*[21]*
2	Five Speed –Momentary Interlocked	90	SKRU5*[21]*

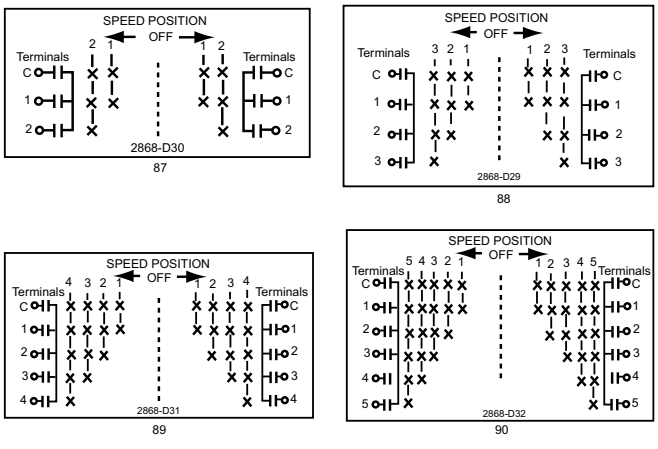

Figure 19.1: Multispeed Contact Symbols (X = Contact Closed)

Table 19.407: Legend Plate Catalog Numbers

	Where Used	Marketing	Catalog Number
	For SKRU1 through SKRU11	Blank-Blank Hoist: Up-Down Trolley: East-West Trolley: Fwd.-Rev. Trolley: North-South Bridge: Fwd.-Rev. Bridge: East-West Bridge: North-South Start-Stop Reset-Stop Aux Hoist: Up-Down Power: On-Off	SKN200*[22]* SKN201 SKN202 SKN203 SKN204 SKN205 SKN206 SKN207 SKN208 SKN209 SKN210 SKN211
		Specify Marking	SKN299*[22]*
	With toggle switch *[23]* in top space of enclosure	Blank Off-On On-Off	SKN500 *[24]* SKN544 *[24]* SKN545 *[24]*
		Specify Marking	SKN599 *[24]*
	With 9001SK *[25]* operator or pilot light in top space of enclosure	Blank On Off Emerg. Stop Run Power On Off-On	SKN100 *[26]* SKN103 SKN104 SKN105 SKN124 SKN138 SKN144
		Specify Marking	SKN199 *[26]*

Table 19.408: Closing Plate Catalog Number

	Catalog Number
	SK52

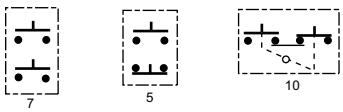

Figure 19.2: Single Speed Contact Symbols

[17] Class 9001 SK push-to-test pilot lights and remote test pilot lights will not fit in these enclosures.
[18] Assembled pendant stations consist of an enclosure, operators and legend plates. All custom orders must include the pendant key sheet. See Type XACA Worksheet, page 19-131.
[19] Types SKRU 1, 10 and 11 use Type KA contact blocks. Types SKRU 2 thru 5 are factory enclosed contact blocks.
[20] Boot part number is 9001KU1.
[21] Boot part number is 9001KU37.
[22] 19 characters each side max.
[23] Can be supplied by Square D as Class 9001 Type SKSTS1- includes boot for NEMA Type 4X.
[24] Includes legend plate, gasket and ground plate to be used with toggle switch.
[25] See 9001SK, page 19-82through page 19-89
[26] Tri-laminated legend plate having a yellow or red background on a black core.

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Type SKYP Worksheet

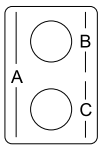
Control Products

Use this worksheet to assist in component selection. SKYP Custom Pendant orders must be placed through the Product Selector in Quote to Cash. There is a 10% charge for assembly.

Class **9001** Type **SKYP -_____**

1. Operator or Closing Plate. Example - SKRU1
2. Legend Plate Type Number Example - SKN201
3. Legend Plate Marking ▲ – Used Only if Special Marking is Required Example:
   Line 2 - SKN299
   Line 3 - A.) Hoist
   B.) FWD
   C.) REV

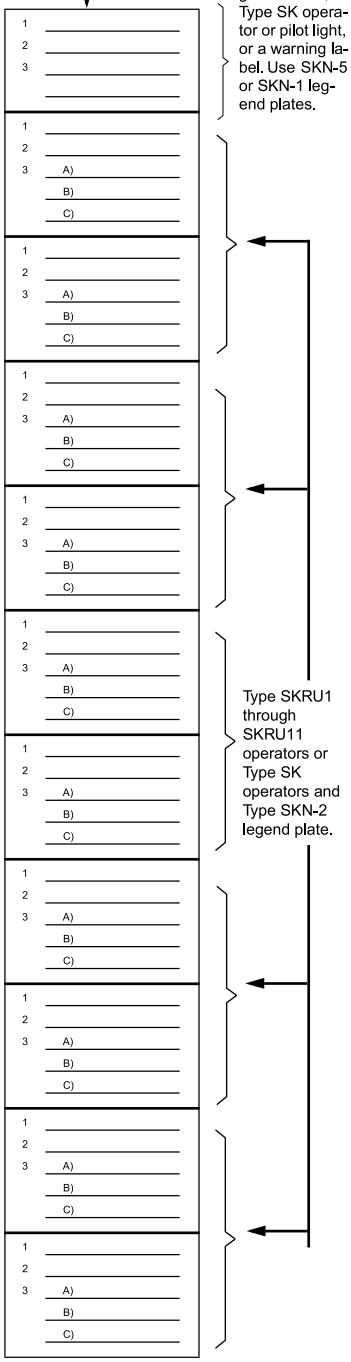
When operator and legend plate use 2 adjacent holes - specify same in both locations. Example:



1	SKRU1
2	SKN201
3	

1	SKRU1
2	SKN201
3	

TYPE NUMBER KEY



ENCLOSURES – NEMA 4X, 13

Size	Conduit Entrance Size	Enclosure for Assembled Station ▲ Catalog Number
2 Button	3/4" -14 NPT	SKYP20
4 Button	3/4" -14 NPT	SKYP40
6 Button	1" -14 NPT	SKYP60
8 Button	1 1/4" -11 1/2	SKYP80
10 Button	1 1/4" -11 1/2	SKYP100

▲ Assembled pendant stations consist of an enclosure, operators, and legend plates.

PUSH BUTTON UNITS – NEMA / UL 4X, 13

Number of Buttons per Unit	Description	Contact Symbol	Type
2	Single Speed - Momentary Interlocked	7	SKRU1
2	Single Speed - Momentary Non-Interlocked	5	SKRU10
2	Single Speed - Maintained Interlocked	10	SKRU11
2	Two Speed - Momentary Interlocked	87	SKRU2
2	Three Speed - Momentary Interlocked	88	SKRU3
2	Four Speed - Momentary Interlocked	89	SKRU4
2	Five Speed - Momentary Interlocked	90	SKRU5

LEGEND PLATES – NEMA / UL 4X, 13

Where Used	Marking	Catalog Number
For SKRU1 through SKRU11	Blank-Blank Hoist: Up-Down Trolley: East-West Trolley: Fwd.-Rev. Trolley: North-South Bridge: Fwd.-Rev. Bridge: East-West Bridge: North-South Start-Stop Reset-Stop Specify Marking	SKN200④ SKN201 SKN202 SKN203 SKN204 SKN205 SKN206 SKN207 SKN208 SKN209 SKN299④
With Toggle Switch ① in Top Space of Enclosure	Blank Off-On On-Off Specify Marking	SKN500 ② SKN544 ② SKN545 ② SKN599 ②
With Type SK Operator ▲ or Pilot Light in Top Space of Enclosure	Blank On Off Emerg. Stop Run Power On Off-On Specify Marking Specify Marking (Red Background)	SKN100 ③ SKN103 SKN104 SKN105 SKN124 SKN138 SKN144 SKN199 ③ SKN199R ③

① Available as 9001SKSTS1
② Includes legend plate, gasket and ground plate to be used with toggle switch.
③ Tri-laminated legend plate having a yellow or red background on a black core.
④ 19 characters each side.
▲ Class 9001 Type SK Push-To-Test Pilot lights and Remote Test Pilot lights will not fit in these enclosures.

CLOSING PLATE

Type
SK52

The price of the total station consists of the price of each individual component plus a 10% charge for assembly.

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Heavy Duty Industrial Foot Switches—Oiltight, Watertight, Dusttight and Driptight Enclosure, NEMA 2, 4 and 13

AW2
Type AW Foot Switch with Top Pedal Shield and Side Shields

AW132
Type AW with Oversized Pedal Shield and Side Shields

AW117
Type AW with Oversized Pedal Shield,
Side Shields and Safety Door

AW1
Type AW Foot Switch without Pedal Shield

AW124

Type AW Fully Shielded Foot Switch with Oversized Pedal Shield, Side Shields and Safety Door. The Safety Door is interlocked with the pedal to prevent operation due to shock or vibration. It prevents accidental pedal operation by requiring a simple but intentional motion to lift the door before inserting the foot.

Operating Temperature:
–30 to +60 °C (–22 to +140 °F)

⚠ DANGER

HAZARDOUS APPLICATIONS

Do not use foot switches on machines without point-of-operation protection.

Failure to follow these instructions will result in death, serious injury, or equipment damage.

Foot Switch Selection

Foot switches are used to control many industrial processes, while leaving the operator's hands free to perform other functions. The type or model of foot switch suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications more than one foot switch may be required, as when two or more persons are operating a machine. In these cases, safe practice and regulations require that the foot switches be wired in series making it necessary that each operator's foot switch be actuated before the machine will cycle.

Only the user can be aware of all the conditions and factors present during setup, operation and maintenance of the machine; therefore, only the user can determine which foot switch(es) can be properly used. When selecting a foot switch for a particular application, the user should refer to the applicable ANSI standards and OSHA regulations. The National Safety Council's Accident Prevention Manual also provides much useful information.

In some applications, such as power presses, additional operator protection such as point-of-operation guarding must be provided when a foot switch is used as an actuator. This is necessary since the operator's hands and other parts of the body are free to enter the pinch point area and serious injury can occur. The shielding provided on foot switches cannot protect an operator from injury. For this reason the foot switch cannot be substituted for or take the place of point-of-operation protection.

A Trilingual Danger Sign regarding the need for point-of-operation protection is supplied with each foot switch. The sign incorporates three languages: English, Spanish and French. Additional copies of the sign are available by contacting your Square D sales office.

Table 19.409: Foot Switch Catalog Numbers *[1]*

Description	Features	Fully Shielded with Oversized Pedal Shield, Side Shields and Safety Door	With Oversized Pedal Shield and Side Shields	With Pedal Shield and Side Shields	UNSHIELDED (See Warning note *[2]*)
		Catalog Number	Catalog Number	Catalog Number	Catalog Number
Single Pole *[3]* Double Throw	Spring Return With Mechanical Latch	AW117 —	AW132 —	AW2 AW7	AW1 —
Two Pole *[3]* Double Throw	Spring Return With Mechanical Latch	AW124 *[4]* —	AW133 —	AW14 AW15	AW13 —
Two Stage *[3]* (One Pole Each Stage) Table 1	Spring Return With Mechanical Latch in 1st Stage With Mechanical Latch in 2nd Stage	AW119 — —	AW134 — —	AW6 AW9 AW10	AW5 — —
Four Stage *[3]* (One Pole Each Stage) Table 2	Spring Return	AW123	—	AW22	AW21
Single Pole Single Throw	Maintained Contact—Push On/Push Off	—	—	AW12	AW11
Replacement Cover Assembly	—	AC5	AC7	AC8 *[5]*	AC1

File: E42259
CCN: NKCR

File: LR25490
Class: 184 N 13.1U

For **replacement parts** for Class 9002 Type AW: See instruction bulletin 65013-010-31.
Also see Table 19.411 Contact Symbol—Two Stage, page 19-135 and Table 19.412 Contact Symbol—Four Stage, page 19-135.

[1] When ordering, add prefix “9002” to the catalog number.
[2] WARNING: These foot switches must not be used to operate machines or equipment where the possibility of operator injury exists. Typical uses include Emergency Stop functions, “Dead Man” controls, signal functions (lights, bells, etc.).
[3] A single pole snap switch that contains two double break contact elements (1 N.O. and 1 N.C.) must be used on circuits of same polarity. A double pole snap switch contains two electrically separated sets of contact elements allowing use on circuits of opposite polarity. Each set that contains two double break contact elements (1 N.O. and 1 N.C.) must be used on circuits of same polarity.
[4] 2 N.O. and 2 N.C. isolated, direct acting contacts.
[5] For replacement cover drilled to accept latch. For Series C foot switches order AC9. No replacement cover available for Series A or B devices drilled to accept latch. AC8 is spring return only.

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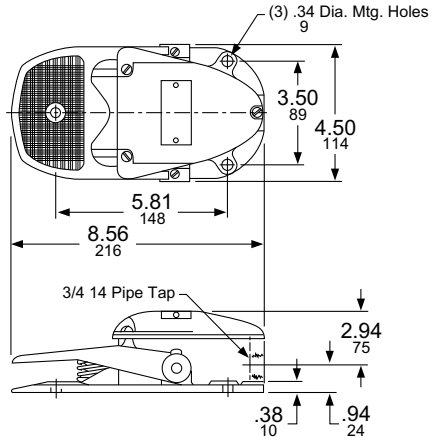
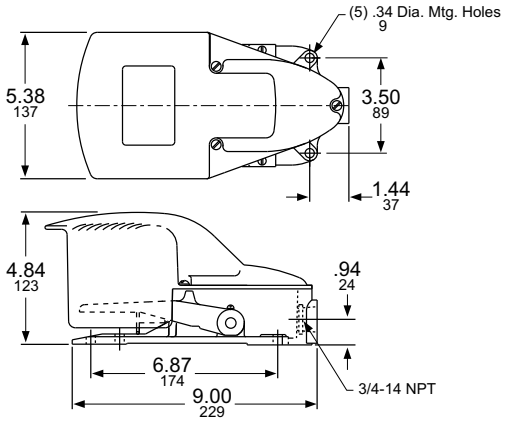
Approximate Dimensions

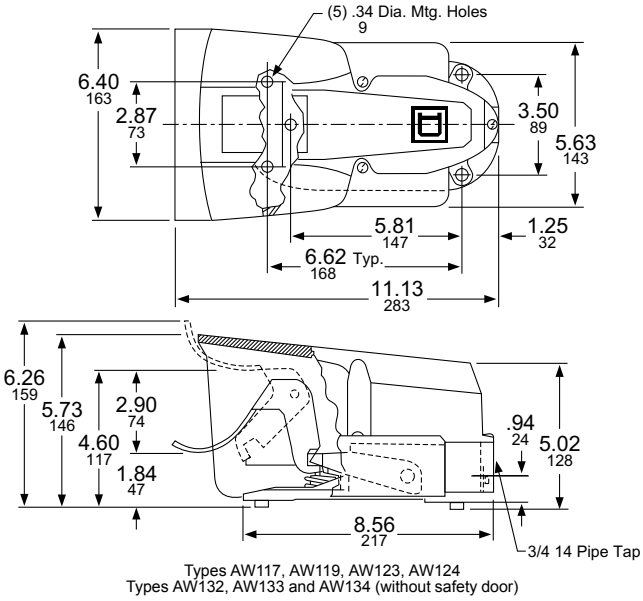


Types AW1, AW5, AW11, AW13 and AW21



Types AW2, AW6, AW12, AW14 and AW22

Dual Dimensions: **INCHES**
Millimeters



Types AW117, AW119, AW123, AW124
Types AW132, AW133 and AW134 (without safety door)

Table 19.410: Maximum Current Ratings For Control Circuit Contacts

Type	Volts	AC Amperes			Volts	DC Amperes		
		Inductive 35% Power Factor		Resistive 75% Power Factor		Inductive and Resistive		
						Make and Break		
		Make	Break	Make, Break and Continuous		Single Throw	Double Throw	Continuous
AW1 through AW10, AW117, AW119, AW132	120 240 480 600	40 20 10 8	15 10 6 5	15 10 6 5	125 250 600	2.0 0.5 0.1	0.5 0.2 0.02	15 15 15
AW13, AW14, AW15, AW133	120 240 480 600	30 15 7.5 6	3 1.5 0.75 0.6	3 1.5 0.75 0.6	125 250 600 —	1.0 0.3 0.1 —	0.2 0.1 — —	10 10 10 —
AW11, AW12	115 230	36 18	6 3	— —	125 250	2.2 1.1	— —	— —
AW21, AW22, AW123	120 240 480 600	15.0 7.5 3.75 3.0	1.5 0.75 0.375 0.3	10 10 10 10	— — — —	— — — —	— — — —	— — — —
AW124	120 240 480 600	60 30 15 12	6 3 1.5 1.2	10 10 10 10	120 240 600	1.1 0.55 0.2	— — —	10 10 10

NOTE: Double throw switches are rated 250 Vdc maximum.

Table 19.411: Contact Symbol—Two Stage

Snap Switch		Pedal		
Unit	Circuit	Up	Half Down	Full Down
1	A1	0	1	1
	B1	1	0	0
2	A2	1	1	0
	B2	0	0	1

NOTE: 0 = Open 1 = Closed

Table 19.412: Contact Symbol—Four Stage

Snap Switch		Pedal Position				
Unit	Circuit	Up → Down				
1	1A1	0	0	1	1	1
	1B1	1	1	0	0	0
	2A1	0	1	1	1	1
	2B1	1	0	0	0	0
2	1A2	1	1	1	0	0
	1B2	0	0	0	1	1
	2A2	1	1	1	1	0
	2B2	0	0	0	0	1

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Type K Rotary Cam Switches

Applications		Used in building control panels and consoles, Type K cam switches allow control of processes and utilities in industry and buildings, and direct control for simple machines.					
Functions	Off-On/On-Off switches	1 to 6-pole	1 to 6-pole				
	Stepping switches	2 to 12-position, 1 to 4-pole	—				
	Changeover switches	1 to 5-pole	1 to 4-pole				
	Measurement switches	Voltmeter and ammeter	—				
	Reversing switches	2 and 3-pole	2 and 3-pole				
	Reversing star-delta switches	Star-delta	Star-delta				
	Pole change switches	2 and 3-speed	2-speed				
Conventional rated thermal current (Ith)		20 A	32 A	50 A	63 A	115 A	150 A
Electrical operating characteristics		690 V	690 V	690 V	690 V	690 V	690 V
		AC-3 - 3-phase	AC-3 - 3-phase	AC-3 - 3-phase	AC-3 - 3-phase	AC-3 - 3-phase	AC-3 - 3-phase
		230 V - 2.2 kW - 8.3 A	230 V - 5.5 kW	230 V - 7.5 kW	230 V - kW	230 V - 5 kW	230 V - 22 kW
		AC - 15	AC - 15	AC - 15	–	–	–
		230 V - 4 A	230 V - 14 A	230 V - 6 A			
Front plate degree of protection		IP 40	IP 40				
		IP 65 (with seal)					
Product Composition		Complete switches and custom	Complete switches				
		Adaptable sub-assemblies					
Compatibility		Ø 22 control and signalling units	–				
Mounting	Front Mounting	Multi-fixing	By 4 holes on 48 mm centers			By 4 holes on 68 mm centers	
		Single Ø 22 hole					
	Rear Mounting	Screw fixing, 4 holes on 36 mm centers	Screw fixing, 4 holes on 48 mm centers			Screw fixing, 4 holes on 68 mm centers	
Front plate dimensions (mm)		45 x 45	64 x 64			88 x 88	
		60 x 60 (adaptable sub-assemblies)					
Operating heads		Black and red standard and long handles	Black standard handle Metallic legend, black marking				
		Key operator					
		Metallic head					
		Metallic legend with black marking or					
		black legend with white marking					
Approvals		UL-CSA	cULus EN/IEC 60947-3				
		EN/IEC 60947-3					
		EN/IEC 60947-5-1					
Type		Type K2	Type K30–K150				
Cam switch model *[1]*		**Class 9003, K2**	**K30**	**K50**	**K63**	**K115**	**K150**

Instructions for 9003K2 Key Sheet

The Key Sheet for ordering a 9003K2 cam switch is on page 19-137, and an example of a completed key sheet is on page 19-138. The instructions below are for filling out the key sheet on page 19-137.

1. Select the box for K2 (20 A).
2. Identify the Product quantity in the box provided.
3. Verify front mounting by selecting the box: Front Mounting.
4. If ordering a base/contact block only, select 22 mm plastic or 22 mm metal mounting. Then complete the following:
   a. ③ Switching Angle (positions)
   b. ④ Contact scheme and jumpers (pre-wired)
5. If ordering a complete switch (base/contact block, head, legend), check the box. Then complete the following:
   a. ① Operating head preference
   b. ② Legend preference
   c. ③ Switching angle (positions)
   d. ④ Contact scheme and jumpers (pre-wired)
6. Operating head preference ① (identify the operating head preferred)
7. Legend preference ② (identify the legend preference)
8. Switching angle (positions) ③ and special legend marking
   a. Identify whether the switch need is 30° or 60°, or 45° or 90° switching angle.
   b. Fill in the legend markings desired at the positions indicated. Zero degrees is always straight up.
9. The rotation of the operator stops clockwise at the top or 0° position. If full rotation through 360° is desired, the Full rotation through 360° box must be checked.
10. Contact scheme and jumpers (pre-wired) ④
    a. If jumpers are desired to be pre-wired, draw a horizontal line between the terminals to be jumpered per the example on page 19-138.
    b. Refer to the Legend at the bottom of page 19-137 for contact sequences, i.e.: X indicates contact closure. See page 19-138 for examples of filling in this portion of the key sheet.

[1] Incomplete part numbers. Contact your local supplier for assistance.

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9003K2 Cam Switch Order Form

Order No. _____ **Date :** _____

Agency: _____
Branch: _____
Customer: _____
Address: _____

Delivery instructions:

9003K2 (20 A): ☐

Product quantity: ☐ **Front mounting** ☐

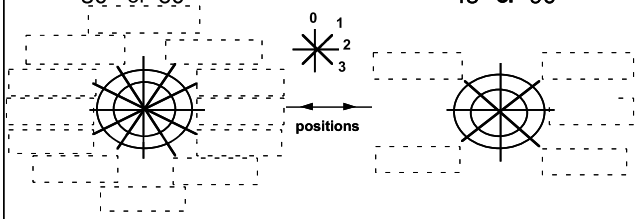
Base/contact block only (no operating head):
∅22 plastic: ☐ ∅22 metal: ☐
Complete: ③ ④

Complete switch (base/contact block, head, legend) ☐
Complete: ① ② ③ ④
For 22 mm plastic mounting:
① Operating head reference: **9003K**
② Legend reference: **9003KZ.....**
or for mounting with metal base:
① Operating head reference: **KAX Z.....**
② Legend reference: **XBC Y .....**
Special legend marking:
As per diagram on left: ☐ As per form: ☐ **FAX**

Accessories / comments: .....
.....

Product reference:
Type : **K.....**

③ Switching angle (positions)
30° or 60° 45° or 90°



Full rotation through 360°: ☐

④ **Contact scheme and jumpers (pre-wired):**

			1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
✳	x	↖	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40

(x) Key withdrawal position for key operators; by default, withdrawal in all positions.

Conditions for provision of spring return function:
R , Spring return to 30° from 0° position or to last position after a 90° angle (for maximum of 3 contacts simultaneously)

Contact closed in 1 position.	Contact closed with break between the 2 positions (for angle >= 45°)	Contact closed and maintained between several successive positions	Contact closed and maintained between two positions	**Overlap of two contacts between two positions**	**Contact overlapping on previous and next positions**

☐ Check the box to confirm selection ..... Fill in with text

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9003K2 Cam Switch Order Form—Example

Order No. _____ **Date :** _____

Agency: _____

Branch: _____

Customer: _____

Address: _____

Delivery instructions:

9003K2 (20 A): X

Product quantity: 1

Front mounting X

Base/contact block only (no operating head):

∅22 plastic: ☐ ∅22 metal: ☐

Complete: ③ ④

Complete switch (base/contact block, head, legend) X

Complete: ① ② ③ ④

Product reference:

Type : K . . . . . .

For 22 mm plastic mounting:

① Operating head reference: **9003K AC1B**

② Legend reference: **9003KZ18**

or for mounting with metal base:

① Operating head reference: **KAX Z . . . . . .**

② Legend reference: **XBC Y . . . . .**

Special legend marking:

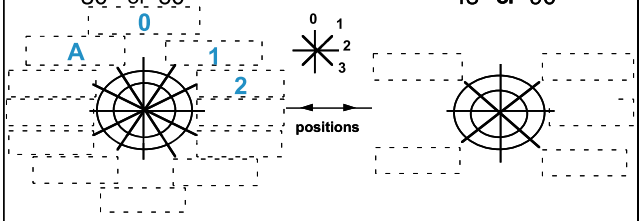
As per diagram on left: ☐ As per form: ☐ FAX

Accessories / comments: KZ 36 . . . . . .

. . . . . .

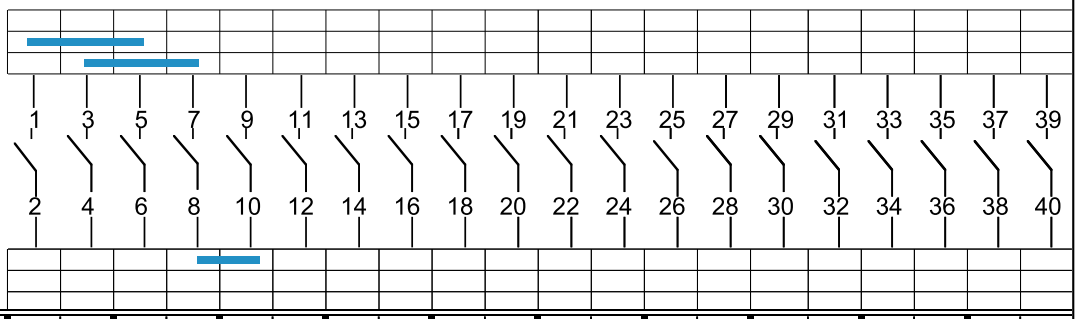
③ Switching angle (positions)

30° or 60° 45° or 90°



Full rotation through 360°: ☐

④ **Contact scheme and jumpers (pre-wired):**



✳	x	↙	1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39
			2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
A		330°	× ×
0		0°	× ×
1		30°	× ×
2		60°	× ×

(x) Key withdrawal position for key operators; by default, withdrawal in all positions.

Conditions for provision of spring return function:

R , Spring return to 30° from 0° position or to last position after a 90° angle (for maximum of 3 contacts simultaneously)

×	Contact closed in 1 position.	× ×	Contact closed with break between the 2 positions (for angle >= 45°)	× ×	Contact closed and maintained between several successive positions	× ×	Contact closed and maintained between two positions
×	**Overlap of two contacts between two positions**	✳	**Contact overlapping on previous and next positions**				

☐ Check the box to confirm selection . . . . . Fill in with text

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Section 20

Electronic Sensors and Machine Cabling

Photoelectric Sensors

Proximity Sensors

Ultrasonic Sensors

Osisense Photoelectric Sensors 20-2

XUB Tubular Sensors 20-2
XUVR and XUVA Sensors 20-3
XUM Miniature, XUK and XUX Compact Sensors 20-4

Osisense InductiveProximity Sensors 20-5

XS Plastic Rectangular 20-5
XS Plastic Rectangular Sensors 20-5
General Purpose, Plastic Case, Limit Switch Style, 5-Position Turret Head 20-5
DC Supply 20-5
Plug-in, AC or DC supply 20-5
XS General Purpose Tubular 20-6
3-Wire, 12–48 Vdc, Long Case Sensors and Accessories 20-6
3-wire 12–24 Vdc, Short Case Sensors 20-7
XS Basic and Basic Plus 20-8

Osisense Proximity Sensors 20-9

Inductive and Capacitive Proximity 20-9
2-Wire AC or DC, Long Case Sensors 20-9

Ultrasonic Sensors 20-10

XUV and XXV Sensors 20-10
VM Sensors 20-11
30 MM Ultrasonic Sensors 20-12

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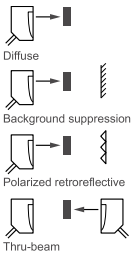
XUB Tubular Sensors



A single product that adapts to most environments.

For multi-mode models (XUB0, XUM0, XUK0, and XUX0) that are programmable to function as Diffuse, Diffuse/Background Suppression, Polarized Retroreflective, or Thru-Beam Receivers, consult the factory.

Table 20.1: XUB Tubular Sensors

XUB Tubular Sensors		XUB•A 18 mm plastic	XUB•B 18 mm metal
Usable sensing distance	Proximity diffuse (adjustable)	0.6 m (2.0 ft)	0.6 m (2.0 ft)
	Polarized retroreflective	2 m (6.6 ft)	2 m (6.6 ft)
	Retroreflective	4 m (13.1 ft)	4 m (13.1 ft)
	Thru-beam	15 m (49 ft)	15 m (49 ft)
Mounting (mm)		M 18 x 1	M 18 x 1
Enclosure: M (metal), P (plastic) / Dimensions (mm) Ø x L or W x H x D		P / M 18 x 46	P / M 18 x 46
Setup LEDs		—	—
Temperature range		–25 to +55 °C (–13 to +131 °F)	
Degree of protection (conforming to IEC 60529):		IP65, IP67 (XUK: IP65)	

Table 20.2: Sensors for DC Applications (Solid State Output: Transistor)

Connection			Precabled, PvR, 2 m *[1]* Catalog No.	M12 connector Catalog No.	Precabled, PvR, 2 m *[1]* Catalog No.	M12 connector Catalog No.
Receiver or Transmitter/Receiver, 3-wire PNP *[2]*	Proximity diffuse, adjustable	N.O.	XUB5APANL2	XUB5APANM12	XUB5BPANL2	XUB5BPANM12
		N.C.	XUB5APBNL2	XUB5APBNM12	XUB5BPBNL2	XUB5BPBNM12
	Polarized retroreflective	N.O.	XUB9APANL2	XUB9APANM12	XUB9BPANL2	XUB9BPANM12
		N.C.	XUB9APBNL2	XUB9APBNM12	XUB9BPBNL2	XUB9BPBNM12
	Retroreflective	N.O.	XUB1APANL2	XUB1APANM12	XUB1BPANL2	XUB1BPANM12
		N.C.	XUB1APBNL2	XUB1APBNM12	XUB1BPBNL2	XUB1BPBNM12
	Thru-beam	N.O.	XUB2APANL2R	XUB2APANM12R	XUB2BPANL2R	XUB2BPANM12R
		N.C.	XUB2APBNL2R	XUB2APBNM12R	XUB2BPBNL2R	XUB2BPBNM12R
Transmitter			XUB2AKSNL2T	XUB2AKSNM12T	XUB2AKSNL2T	XUB2AKSNM12T
Supply voltage limits, min/max (V) including ripple			10–36	10–36	10–36	10–36
Switching frequency (Hz)			500	500	500	500
Common characteristics for DC versions			Switching capacity, max (mA): 100 / Overload and short-circuit protection / LED output state			

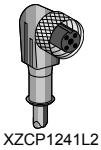
XUZC24

XUZC50

XUZC80

XUZA118

XUZA218


XZCP1241L2

XZCP1141L2

Table 20.3: Metal Body Sensors for Two-Wire AC *[3]* or DC Applications (Solid-State Output: Transistor)

Connection			Precabled, PvR, 2 m *[1]* Catalog No.	1/2"-20UNF Connector Catalog No.
System	Diffuse with adjustable background suppression	NO	XU8M18MA230	XU8M18MA230K
		NC	XU8M18MB230	XU8M18MB230K
	Diffuse	NO	XU5M18MA230	XU5M18MA230K
		NC	XU5M18MB230	XU5M18MB230K
	Polarized retrofeflective *[4]*	NO	XU9M18MA230	XU9M18MA230K
		NC	XU9M18MB230	XU9M18MB230K
	Thru-beam*[5]*	NO	XU2M18MA230	XU2M18MA230K
		NC	XU2M18MB230	XU2M18MB230K
Rated supply voltage (Vac/Vdc)			24–240	24–240
Switching frequency (Hz)			25	25
Switching capacity (mA) *[3]*			10–200	10–200

Table 20.4: Accessories

		mm	Catalog No.
Reflectors		24 x 21	XUZC24
		Ø 80	XUZC80
		50 x 50	XUZC50
		Material	Catalog No.
Mounting brackets for XUB		Die Cast Zinc	XUZA118
		Plastic	XUZA218
		90°	Straight
		Catalog No.	Catalog No.
Cables, 2 m, without LED *[6]* Suitable plug-in female connectors, including pre-wired versions	M8 (4-Pin)	XZCP1041L2	XZCP0941L2
	M12 (4-pin)	XZCP1241L2	XZCP1141L2
	1/2"-20UNF	XZCP1965L2	XZCP1865L2

[1] For a 5 m cable, change L2 to L5. For example, XUMB5APAN**L2** becomes XUMB5APAN**L5**.
[2] For version with NPN output, change "P" to "N". For example: XUB1A**P**ANL2 would become XUB1A**N**ANL2.
[3] These sensors do not incorporate overload or short-circuit protection. A 0.4 A fast-acting fuse must be connected in series with the load.
[4] A 50 x 50 mm reflector XUZC50 is included with a polarized retroreflective system.
[5] Includes a thru-beam transmitter and receiver.
[6] For 5 or 10 meter lengths, replace 2 in the cable catalog number with 5 or 10.

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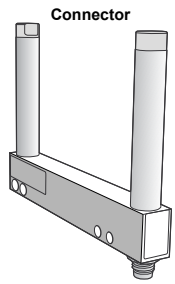
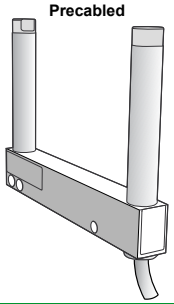
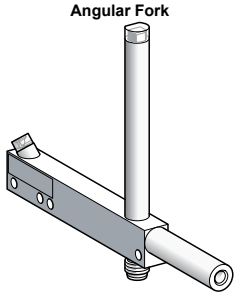
XUVR / XUVA

Table 20.5: XUVR / XUVA Optical fork without adjustment



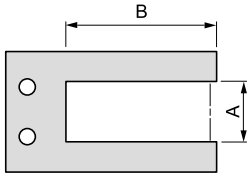




Sensing Characteristics		Thru-beam	
Sensing range, mm (in.)		2–180 (0.08 –7.09)	
Sensing frequency		4000 Hz	
Minimum size of object detected, mm (in.)	Passageway 2–120 mm	0.8 (0.03)	1.2 (0.05)
	Passageway u 150 mm	1 (0.04)	1.5 (0.06)
Fork type		XUVR•	XUVA•
Power Requirements			
Supply voltage		12–24 Vdc	
Max. load		100 mA with overload and short-circuit protection	
Environmental			
Operating temperature range		–10 to +60 °C (+14 to +140 °F)	
Environmental protection ratings		IP65 and IP67	
Construction			
Materials Case		Painted aluminum and polyamide	

Catalog numbers of forks type XUVR•

3-Wire
NO or NC function
PNP or NPN ouput



A = Passageway
B = Depth

Connection—Precabled, length 2 m. Depth (B): 40 mm (1.18 in.)

Passageway (A)	Function	Output	Catalog Number
30 mm (1.18 in.)	NO	PNP	XUVR0303PANL2

Connection—M8, 3-Pin. Depth (B): 60 mm (2.36 in.)

Passageway (A)	Function	Output	Catalog Number
50 mm (1.97 in.)	NO	PNP	XUVR0605PANM8
		NPN	XUVR0605NANM8
	NC	PNP	XUVR0605PBNM8
		NPN	XUVR0605NBNM8
80 mm (3.15 in.)	NO	PNP	XUVR0608PANM8
		NPN	XUVR0608NANM8
	NC	PNP	XUVR0608PBNM8
		NPN	XUVR0608NBNM8

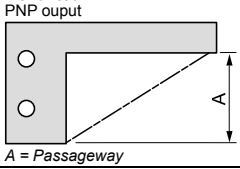
Connection—M8, 3-Pin. Depth (B): 120 mm (4.72 in.)

Passageway (A)	Function	Output	Catalog Number
120 mm (4.72 in.)	NO	PNP	XUVR1212PANM8
		NPN	XUVR1212NANM8
	NC	PNP	XUVR1212PBNM8
		NPN	XUVR1212NBNM8
180 mm (7.09 in.)	NO	PNP	XUVR1218PANM8
		NPN	XUVR1218NANM8
	NC	PNP	XUVR1218PBNM8
		NPN	XUVR1218NBNM8

Catalog numbers of forks type XUVA•

Connection—M8 connector, 3-Pin

3-wire
NO function
PNP ouput



A = Passageway

Passageway (A)	Function	Output	Catalog Number
50 mm (1.97 in.)	NO	PNP	XUVA0505PANM8
80 mm (3.15 in.)	NO	PNP	XUVA0808PANM8
120 mm (4.72 in.)	NO	PNP	XUVA1212PANM8
150 mm (5.91 in.)	NO	PNP	XUVA1515PANM8

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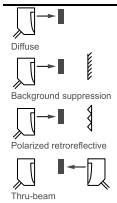
XUM Miniature, XUK and XUX Compact Sensors

Table 20.6: XUM Miniature, XUK and XUX Compact



A single product that adapts to most environments.

For multi-mode models (XUB0, XUM0, XUK0, and XUX0) that are programmable to function as Diffuse, Diffuse/Background Suppression, Polarized Retroreflective, or Thru-Beam Receivers, consult the factory.

Sensors		XUM Miniature Design	XUK Compact Design 50 x 50	XUX Compact Design
Usable sensing distance	Proximity diffuse (adjustable sensitivity)	1 m (3.28 ft)	1 m (3.2 ft) *[7]*	2.1 m (6.8 ft)
	Polarized retroreflective	5 m (16.40 ft)*[8]*	5 m (16.4 ft) *[7]*	11 m (36 ft)
	Retroreflective	—	7 m (23.0 ft) *[7]*	14 m (46 ft)
	Thru-beam	15 m (49.21 ft)	30 m (98 ft) *[7]*	40 m (131.2 ft)
Mounting (mm)		direct: mounting centers 25.5, M3 screws	direct: mounting centers 40 x 40, M4 screws	direct: mounting centers 30/36 to 40/50/74, M5 screws
Enclosure: M (metal) P (plastic) / Dimensions (mm) Ø x L or W x H x D		P / 10.8 x 34 x 20	P / 18 x 50 x 50	P / 30 x 92 x 71
Setup LEDs		⊗	⊗	⊗
Common characteristics		⊗ LED output state indicator and power on LED (⊗): yes		

Sensors for DC Applications (Solid State Output: Transistor)			Catalog No.					
Connection			Precabled, PVC, 2 m	M8 connector	Precabled, PVC, 2 m	M12 connector	Screw terminals, ISO 16 cable gland	M12 connector
Transmitter			XUM2AKCNL2T	XUM2AKCNM8T	XUK2AKSNL2T	XUK2AKSNM12T	XUX0AKSAT16T	XUX0AKSAM12T
Receiver or Transmitter/ Receiver, 3-wire PNP *[9]*	Proximity diffuse, adjustable	N.O.	—	—	XUK5APANL2	XUK5APANM12	XUX5APANT16	XUX5APANM12
		N.C.	—	—	XUK5APBNL2	XUK5APBNM12	XUX5APBNT16	XUX5APBNM12
		N.O./N.C. convertible	XUM5APCNL2	XUM5APCNM8	—	—	—	—
	Polarized retroreflective	N.O.	—	—	XUK9APANL2	XUK9APANM12	XUX9APANT16	XUX9APANM12
		N.C.	—	—	XUK9APBNL2	XUK9APBNM12	XUX9APBNT16	XUX9APBNM12
		N.O./N.C. convertible	XUM9APCNL2	XUM9APCNM8	—	—	—	—
	Retroreflective	N.O.	—	—	XUK1APANL2	XUK1APANM12	XUX1APANT16	XUX1APANM12
		N.C.	—	—	XUK1APBNL2	XUK1APBNM12	XUX1APBNT16	XUX1APBNM12
	Thru-beam	N.O.	—	—	XUK2APANL2R	XUK2APANM12R	XUX2APANT16R	XUX2APANM12R
		N.C.	—	—	XUK2APBNL2R	XUK2APBNM12R	XUX2APBNT16R	XUX2APBNM12R
		N.O./N.C. convertible	XUM2APCNL2R	XUM2APCNM8R	—	—	—	—
Supply voltage limits, min/max (V) including ripple			10–30	10–30	10–30	10–30	10–36	10–36
Switching frequency (Hz)			1000	1000	250	250	250	250
Common characteristics for DC versions			indicator (⊗): yes / power on LED (⊗): yes					
Multi-current/multi-voltage sensors for AC/DC applications, 20–264 Vac/Vdc, including ripple (relay output, 1 C/O, 3 A)								
Connection			—	—	Precabled, 2 m	—	Screw terminals ISO 16 cable gland	—
Transmitter			—	—	XUK2ARCNL2T	—	XUX0ARCTT16T	—
Receiver or Transmitter/ Receiver	Diffuse	N.O. + N.C.	—	—	XUK5ARCNL2	—	XUX5ARCNT16	—
	Polarized retroreflective	N.O. + N.C.	—	—	XUK9ARCNL2	—	XUX9ARCNT16	—
	Retroreflective	N.O. + N.C.	—	—	XUK1ARCNL2	—	XUX1ARCNT16	—
	Thru-beam	N.O. + N.C.	—	—	XUK2ARCNL2R	—	XUX2ARCNT16R	—
Switching frequency (Hz)			—	—	20	—	20	—
LED output state indicator(⊗) / power on LED (⊗)			—	—	⊗ / ⊗	—	⊗ / ⊗	—

NOTE: M8 is not Snap-C compatible.
See page 20-2 for suitable plug-in cables with female connectors.

[7] Excess gain of 2.
[8] With XUZC50 reflector.
[9] For version with NPN output, change "P" to "N". For example, XUM5A**P**CNL2 would become XUM5A**N**CNL2.

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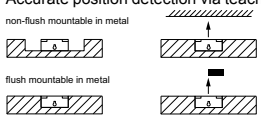
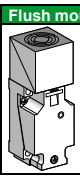
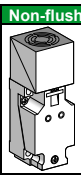
XS Plastic Rectangular Sensors

Sensor	Flush mountable in metal	Non-flush mountable in metal
A single product that automatically adapts to most environments. Accurate position detection via teach mode. 		

General Purpose, Plastic Case, Limit Switch Style, 5-Position Turret Head

Table 20.7: General Specifications

Product certifications	UL, CSA, e
Degree of protection conforming to IEC 60529	IP67
Operating temperature	–25 to +70 °C (–13 to +158 °F)

DC Supply

Table 20.8: Catalog Numbers

Nominal sensing distance Sn, mm (in.)		Increased range 20 (0.79)	15 (0.59)	Increased range 40 (1.57)
4-wire DC (complementary outputs)	PNP, NO + NC	XS8C4A1PCN12	—	XS8C4A4PCN12
	NPN, NO + NC	XS8C4A1NCN12	—	XS8C4A4NCN12
2-wire DC (non-polarized)	NO	XS8C4A1DPN12	XS7C4A1DPN12	—
	NO or NC programmable	—	XS7C4A1DPN12	XS8C4A4DPN12
Weight, kg (lb)		0.220 (0.49)	0.220 (0.49)	0.220 (0.49)

Table 20.9: Supplemental Specifications

Connection *[1]*		Screw terminals, clamping capacity: 2 or 4 x 1.5 mm² (16 AWG)				
Operating zone, mm (in.)		**0–12 (0–0.47)**	**0–16 (0–0.63)**	**0–12 (0–0.47)**	**0–16 (0–0.63)**	**0–32 (0–1.26)**	**0–16 (0–0.63)**
Repeat accuracy		≤ 3% of effective sensing distance (Sr)				
Differential travel		3–20% of effective sensing distance (Sr)				
Status indication	Output	Yellow LED		Yellow LED	Yellow LED		Yellow LED
	Supply on	Green LED		—	Green LED		—
Rated supply voltage		12–48 Vdc with protection against reverse polarity				
Voltage limits (including ripple)		10–58 Vdc				
Current consumption, no-load		≤ 10 mA		—	≤ 10 mA		—
Switching capacity with overload + short-circuit protection		0–200 mA		1.5–100 mA	0–200 mA		1.5–100 mA
Residual current, open state		—		≤ 0.5 mA	—		≤ 0.5 mA
Voltage drop, closed state		≤ 2 V		≤ 4 V	≤ 2 V		≤ 4 V
Maximum switching frequency		1000 Hz		1500 Hz	1000 Hz	500 Hz	800 Hz
Delays	First-up	≤ 5 ms		≤ 5 ms	≤ 5 ms	≤ 5 ms	≤ 5 ms
	Response	≤ 0.3 ms		≤ 2 ms	≤ 0.3 ms	< 1 ms	≤ 2 ms
	Recovery	≤ 0.7 ms		≤ 5 ms	≤ 0.7 ms	< 1 ms	≤ 7 ms

Plug-in, AC or DC supply

Table 20.10: Catalog Numbers

		AC	AC/DC	AC/DC
Nominal sensing distance Sn, mm (in.)		15 (0.59)		40 (1.57)
2–wire AC	NO or NC programmable	XS7C4A1DPN12	XS8C4A1DPN12	XS8C4A4DPN12
2–wire AC or DC universal model	NO or NC programmable	XS7C4A1MPN12	XS8C4A1MPN12	XS8C4A4MPN12
Weight, kg (lb)		0.220 (0.49)	0.220 (0.49)	0.220 (0.49)

Table 20.11: Supplemental Specifications

Connection *[2]*		Screw terminals, clamping capacity 2 x 1.5 mm² (16 AWG)		
Operating zone, mm (in.)		0–12 (0–0.47)		0–16 (0–0.63)
Repeat accuracy		≤ 3% of effective sensing distance (Sr)		
Differential travel		3–20% of effective sensing distance (Sr)		
Output state indication		Yellow LED		
Rated supply voltage (with reverse polarity protection)		24–240 Vac, 50/60 Hz	24–240 Vac, 50/60 Hz / 24–210 Vdc	24–240 Vac, 50/60 Hz / 24–210 Vdc
Voltage limits (including ripple)		20–264 Vac	20–264 Vac or Vdc	20–264 Vac or Vdc
Current consumption, no-load		—		
Switching capacity *[3]*		5–300 mA (2 A inrush) *[3]*	5–300 mA AC or 5–200 mA DC *[3]*	5–300 mA AC or 5–200 mA DC *[3]*
Residual current, open state		≤ 1.5 mA	0.8 mA on 24 V 1.5 mA on 120 V	0.8 mA on 24 V 1.5 mA on 120 V
Voltage drop, closed state		≤ 5.5 V		
Maximum switching frequency		25 Hz	**AC**: 25 Hz; **DC**: 50 Hz	**AC**: 25 Hz; **DC**: 50 Hz
Delays	First-up	≤ 120 ms		
	Response	≤ 30 ms		
	Recovery	≤ 20 ms		

[1] 1/2" NPT conduit Entry. For PC13, change N12 to G13. For M20, change N12 to P20.
[2] 1/2" NPT conduit Entry. For PC13, change N12 to G13. For M20, change N12 to P20.
[3] These sensors do not incorporate overload or short-circuit protection. A 0.4 mA fast-acting fuse (XUZE04) must be connected in series with the load.

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3-Wire, 12–48 Vdc, Long Case Sensors and Accessories

Table 20.12: General Purpose, Long Case, Increased Range, Flush Mountable, 3-Wire DC, Solid-State Output

Sensors, 3-wire 12–48 Vdc, long case model						
Sensing Distance Sn, mm (in.)	Function	Output	Connection	Weight kg	Weight (lb)	Catalog No.
Ø 8, threaded M8 x 1						
2.5 (0.10)	NO	PNP	Precabled (2 m) [4]	0.035	(0.08)	XS608B1PAL2
			M12 connector	0.015	(0.03)	XS608B1PAM12
		NPN	Precabled (2 m) [4]	0.035	(0.08)	XS608B1NAL2
			M12 connector	0.015	(0.03)	XS608B1NAM12
	NC	PNP	Precabled (2 m) [4]	0.035	(0.08)	XS608B1PBL2
			M12 connector	0.015	(0.03)	XS608B1PBM12
		NPN	Precabled (2 m) [4]	0.035	(0.08)	XS608B1NBL2
			M12 connector	0.015	(0.03)	XS608B1NBM12
Ø 12, threaded M12 x 1						
4 (0.16)	NO	PNP	Precabled (2 m) [4]	0.075	(0.17)	XS612B1PAL2
			M12 connector	0.020	(0.04)	XS612B1PAM12
		NPN	Precabled (2 m) [4]	0.075	(0.17)	XS612B1NAL2
			M12 connector	0.020	(0.04)	XS612B1NAM12
	NC	PNP	Precabled (2 m) [4]	0.075	(0.17)	XS612B1PBL2
			M12 connector	0.020	(0.04)	XS612B1PBM12
		NPN	Precabled (2 m) [4]	0.075	(0.17)	XS612B1NBL2
			M12 connector	0.020	(0.04)	XS612B1NBM12
Ø 18, threaded M18 x 1						
8 (0.31)	NO	PNP	Precabled (2 m) [4]	0.100	(0.22)	XS618B1PAL2
			M12 connector	0.040	(0.09)	XS618B1PAM12
			Remote screw term. connector	0.100	(0.22)	XS618B1PAL01B [5]
			Remote DIN 43650 connector	0.100	(0.22)	XS618B1PAL01C
			Remote M18 connector	0.100	(0.22)	XS618B1PAL01G
		NPN	Precabled (2 m) [4]	0.100	(0.22)	XS618B1NAL2
			M12 connector	0.040	(0.09)	XS618B1NAM12
			Remote screw term. connector	0.100	(0.22)	XS618B1NAL01B [5]
			Remote DIN 43650 connector	0.100	(0.22)	XS618B1NAL01C
	NC	PNP	Precabled (2 m) [4]	0.100	(0.22)	XS618B1PBL2
			M12 connector	0.040	(0.09)	XS618B1PBM12
			Remote screw term. connector	0.100	(0.22)	XS618B1PBL01B [5]
			Remote DIN 43650 connector	0.100	(0.22)	XS618B1PBL01C
		NPN	Precabled (2 m) [4]	0.100	(0.22)	XS618B1NBL2
			M12 connector	0.040	(0.09)	XS618B1NBM12
			Remote screw term. connector	0.100	(0.22)	XS618B1NBL01B [5]
			Remote DIN 43650 connector	0.100	(0.22)	XS618B1NBL01C
Ø 30, threaded M30 x 1.5						
15 (0.59)	NO	PNP	Precabled (2 m) [4]	0.205	(0.45)	XS630B1PAL2
			M12 connector	0.145	(0.32)	XS630B1PAM12
			Remote screw term. connector	0.205	(0.45)	XS630B1PAL01B [5]
			Remote DIN 43650 connector	0.205	(0.45)	XS630B1PAL01C
			Remote M18 connector	0.205	(0.45)	XS630B1PAL01G
		NPN	Precabled (2 m) [4]	0.205	(0.45)	XS630B1NAL2
			M12 connector	0.145	(0.32)	XS630B1NAM12
			Remote screw term. connector	0.205	(0.45)	XS630B1NAL01B [5]
			Remote DIN 43650 connector	0.205	(0.45)	XS630B1NAL01C
	NC	PNP	Precabled (2 m) [4]	0.205	(0.45)	XS630B1PBL2
			M12 connector	0.145	(0.32)	XS630B1PBM12
			Remote screw term. connector	0.205	(0.45)	XS630B1PBL01B [5]
			Remote DIN 43650 connector	0.205	(0.45)	XS630B1PBL01C
			Remote M18 connector	0.205	(0.45)	XS630B1PBL01G
		NPN	Precabled (2 m) [4]	0.205	(0.45)	XS630B1NBL2
			M12 connector	0.145	(0.32)	XS630B1NBM12
			Remote screw term.connector	0.205	(0.45)	XS630B1NBL01B [5]
			Remote DIN 43650 connector	0.205	(0.45)	XS630B1NBL01C

Table 20.13: Accessories

Description	For use with sensors	Weight kg	Weight (lb)	Catalog No.
90° metal mounting brackets	Ø 8	0.006	(0.01)	9006PA08
	Ø 12	0.006	(0.01)	9006PA12
	Ø 18	0.010	(0.02)	9006PA18
	Ø 30	0.020	(0.02)	9006PA30

[4] For a 5 m cable replace L2 with **L5**; for a 10 m cable replace L2 with **L10**. For example, XS608B1PA**L2** becomes XS608B1PA**L5** with a 5 m cable.
[5] Protective cable gland included with remote screw terminal connector.

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Cables			Mounting Bracket	
Description	**90°**	**Straight**	**with Indexing Pin for Tubular Sensors**	
Plug-in female connectors, including pre-wired versions (2 m, without LED)				
	Catalog No.	Catalog No.		Catalog No.
M8	XZCP0666L2	XZCP0566L2	M12	XSZB112
M12	XZCP1241L2	XZCP1141L2	M18	XSZB118
U20	XZCP1965L2	XZCP1865L2	M30	XSZB130

3-wire 12–24 Vdc, Short Case Sensors

Table 20.14: Sensors, 3-wire 12–24 Vdc, Short Case Model

	Sensing Distance Sn, mm (in.)	Function	Output	Connection	Weight kg	Weight (lb)	Catalog Number
	Ø 6.5, plain						
	1.5 (0.06)	NO	PNP	Precabled (2 m) *[6]*	0.035	(0.08)	XS506B1PAL2
				M8 connector	0.025	(0.06)	XS506B1PAM8
				M12 connector	0.025	(0.06)	XS506B1PAM12
			NPN	Precabled (2 m)*[7]*	0.035	(0.08)	XS506B1NAL2
				M8 connector	0.025	(0.06)	XS506B1NAM8
		NC	PNP	Precabled (2 m)*[7]*	0.035	(0.08)	XS506B1PBL2
				M8 connector	0.025	(0.06)	XS506B1PBM8
			NPN	Precabled (2 m)*[7]*	0.035	(0.08)	XS506B1NBL2
				M8 connector	0.025	(0.06)	XS506B1NBM8
	Ø 8, threaded M8 x 1						
XS506B1••L2	1.5 (0.06)	NO	PNP	Precabled (2 m)*[7]*	0.035	(0.08)	XS508B1PAL2
				M8 connector	0.025	(0.06)	XS508B1PAM8
				M12 connector	0.025	(0.06)	XS508B1PAM12
			NPN	Precabled (2 m)*[7]*	0.035	(0.08)	XS508B1NAL2
				M8 connector	0.025	(0.06)	XS508B1NAM8
				M12 connector	0.025	(0.06)	XS508B1NAM12
XS508B1••L2		NC	PNP	Precabled (2 m)*[7]*	0.035	(0.08)	XS508B1PBL2
				M8 connector	0.025	(0.06)	XS508B1PBM8
				M12 connector	0.025	(0.06)	XS508B1PBM12
			NPN	Precabled (2 m)*[7]*	0.035	(0.08)	XS508B1NBL2
				M8 connector	0.025	(0.06)	XS508B1NBM8
XS512B1••M12				M12 connector	0.025	(0.06)	XS508B1NBM12
	Ø 12, threaded M12 x 1						
XS518B1••M12	2 (0.08)	NO	PNP	Precabled (2 m)*[7]*	0.075	(0.17)	XS512B1PAL2
				M12 connector	0.035	(0.08)	XS512B1PAM12
			NPN	Precabled (2 m)*[7]*	0.075	(0.17)	XS512B1NAL2
				M12 connector	0.035	(0.08)	XS512B1NAM12
		NC	PNP	Precabled (2 m)*[7]*	0.075	(0.17)	XS512B1PBL2
				M12 connector	0.035	(0.08)	XS512B1PBM12
			NPN	Precabled (2 m)*[7]*	0.075	(0.17)	XS512B1NBL2
				M12 connector	0.035	(0.08)	XS512B1NBM12
XS518B1••L2	Ø 18, threaded M18 x 1						
	5 (0.20)	NO	PNP	Precabled (2 m)*[7]*	0.120	(0.26)	XS518B1PAL2
				M12 connector	0.060	(0.13)	XS518B1PAM12
			NPN	Precabled (2 m)*[7]*	0.120	(0.26)	XS518B1NAL2
				M12 connector	0.060	(0.13)	XS518B1NAM12
		NC	PNP	Precabled (2 m)*[7]*	0.120	(0.26)	XS518B1PBL2
				M12 connector	0.060	(0.13)	XS518B1PBM12
			NPN	Precabled (2 m)*[7]*	0.120	(0.26)	XS518B1NBL2
XS530B1••L2				M12 connector	0.060	(0.13)	XS518B1NBM12
	Ø 30, threaded M30 x 1.5						
	10 (0.39)	NO	PNP	Precabled (2 m)*[7]*	0.205	(0.45)	XS530B1PAL2
				M12 connector	0.145	(0.32)	XS530B1PAM12
			NPN	Precabled (2 m)*[7]*	0.205	(0.45)	XS530B1NAL2
				M12 connector	0.145	(0.32)	XS530B1NAM12
		NC	PNP	Precabled (2 m)*[7]*	0.205	(0.45)	XS530B1PBL2
				M12 connector	0.145	(0.32)	XS530B1PBM12
			NPN	Precabled (2 m)*[7]*	0.205	(0.45)	XS530B1NBL2
				M12 connector	0.145	(0.32)	XS530B1NBM12

Table 20.15: Accessories

Description	For use with sensors	Weight kg	Weight (lb)	Catalog Number
Mounting brackets	Ø 6.5 (plain)	0.005	(0.01)	XSZB165
	Ø 8	0.006	(0.01)	XSZB108
	Ø 12	0.006	(0.01)	XSZB112
	Ø 18	0.010	(0.02)	XSZB118
	Ø 30	0.020	(0.02)	XSZB130

[6] For a 5 m cable replace L2 with L5; for a 10 m cable replace L2 with L10. Example: XS106B3PA**L2** becomes XS106B3PA**L5** with a 5 m cable.
[7] For a 5 m cable replace L2 with **L5**; for a 10 m cable replace L2 with **L10**.
Example: XS508B1PAL2 becomes **XS508B1PAL5** with a 5 m cable.

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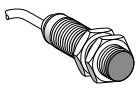
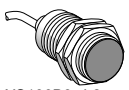
XS•••B3 Basic Plus Sensors

Table 20.16: Basic Plus, XS•••B3

Sensing Characteristics	Ø 6.5 Plain Flush Mountable	Ø M8 Flush Mountable	Ø M12 Flush Mountable	Ø M18 Flush Mountable	Ø M30 Flush Mountable
Basic, Tubular, Flush-Mountable, Increased Range, 3-Wire DC, Solid-State Output					
Sensing range	2 mm (0–0.08 in.)	2 mm (0–0.08 in.)	4.0 mm (0–0.15 in.)	8.0 mm (0.31 in.)	15.0 mm (0.59 in.)
Switching frequency	2500 Hz	2500 Hz	2500 Hz	1000 Hz	500 Hz
Shock resistance	50 gn, duration 11 ms	50 gn, duration 11 ms	50 gn, duration 11 ms	50 gn, duration 11 ms	50 gn, duration 11 ms
Vibration resistance (10–55 Hz)	25 gn, amplitude ± 2 mm	25 gn, amplitude ± 2 mm	25 gn, amplitude ± 2 mm	25 gn, amplitude ± 2 mm	25 gn, amplitude ± 2 mm
Power Requirements					
Supply voltage	12–24 (10–36 max) Vdc with protection against reverse polarity, overload, and short circuit				
Switching capacity	50 mA	50 mA	100 mA		
Specifications		XS1ppB3ppM8, XS1ppB3ppM12, XS1ppB3ppL2			
Operating zone	Ø 6.5 and Ø 8	0–2.0 mm (0–0.07 in.)			
	Ø 12	0–4.0 mm (0–0.15 in.)			
	Ø 18	0–8.0 mm (0–0.31 in.)			
	Ø 30	0–15 mm (0–0.59 in.)			
Degree of protection	Conforming to IEC 60529	IP65 and IP67			
Operating temperature		–25 to +70 °C (–13 to +158 °F)			
Materials	Case	Nickel-plated brass			
	Cable (XS1ppB3ppLp only)	PvR 3 x 0.34 mm² (22 AWG), except Ø 6.5 and Ø 8: 3 x 0.11 mm² (27 AWG)			
Vibration resistance	Conforming to IEC 60068-2-6	25 gn, amplitude ± 2 mm (10 to 55 Hz)			
Shock resistance	Conforming to IEC 60068-2-27	50 gn, duration 11 ms			
Rated supply voltage		12–24 Vdc with protection against reverse polarity			
Switching capacity		y 200 mA with overload and short-circuit protection			
Maximum switching frequency	Ø 6.5, Ø 8, and Ø 12	2500 Hz			
	Ø 18	1000 Hz			
	Ø 30	500 Hz			

	Sensing Distance Sn, mm (in.)	Function	Output	Connection	Sold in lots of	Weight kg	Weight (lb)	Catalog Number
	Ø 8, threaded M8 x 1							
	Three-wire 12–24 Vdc, flush mountable							
XS108B3••M8	2 (0.07)	NO	PNP	Precabled (2 m) *[8]*	1	0.070	(0.15)	XS108B3PAL2
				M8 connector	1	0.030	(0.06)	XS108B3PAM8
				M12 connector	1	0.060	(0.13)	XS108B3PAM12
			NPN	Precabled (2 m) *[8]*	1	0.070	(0.15)	XS108B3NAL2
				M8 connector	1	0.030	(0.06)	XS108B3NAM8
				M12 connector	1	0.060	(0.13)	XS108B3NAM12
		NC	PNP	Precabled (2 m) *[8]*	1	0.070	(0.15)	XS108B3PBL2
				M8 connector	1	0.030	(0.06)	XS108B3PBM8
				M12 connector	1	0.060	(0.13)	XS108B3PBM12
			NPN	Precabled (2 m) *[8]*	1	0.070	(0.15)	XS108B3NBL2
				M8 connector	1	0.030	(0.06)	XS108B3NBM8
				M12 connector	1	0.060	(0.13)	XS108B3NBM12
	Ø 12, threaded M12 x 1							
	Three-wire 12–24 Vdc, flush mountable							
 XS112B3••L2	4 (0.15)	NO	PNP	Precabled (2 m) *[8]*	1	0.090	(0.19)	XS112B3PAL2
				M12 connector	1	0.030	(0.06)	XS112B3PAM12
			NPN	Precabled (2 m) *[8]*	1	0.090	(0.19)	XS112B3NAL2
				M12 connector	1	0.030	(0.06)	XS112B3NAM12
		NC	PNP	Precabled (2 m) *[8]*	1	0.090	(0.19)	XS112B3PBL2
				M12 connector	1	0.030	(0.06)	XS112B3PBM12
			NPN	Precabled (2 m) *[8]*	1	0.090	(0.19)	XS112B3NBL2
				M12 connector	1	0.030	(0.06)	XS112B3NBM12
	Ø 18, threaded M18 x 1							
	Three-wire 12–24 Vdc, flush mountable							
XS118B3••M12	8 (0.31)	NO	PNP	Precabled (2 m) *[8]*	1	0.110	(0.24)	XS118B3PAL2
				M12 connector	1	0.060	(0.13)	XS118B3PAM12
			NPN	Precabled (2 m) *[8]*	1	0.110	(0.24)	XS118B3NAL2
				M12 connector	1	0.060	(0.13)	XS118B3NAM12
		NC	PNP	Precabled (2 m) *[8]*	1	0.110	(0.24)	XS118B3PBL2
				M12 connector	1	0.060	(0.13)	XS118B3PBM12
			NPN	Precabled (2 m) *[8]*	1	0.110	(0.24)	XS118B3NBL2
				M12 connector	1	0.060	(0.13)	XS118B3NBM12
	Ø 30, threaded M30 x 1.5							
	Three-wire 12–24 Vdc, flush mountable							
 XS130B3••L2	15 (0.59)	NO	PNP	Precabled (2 m) *[8]*	1	0.180	(0.39)	XS130B3PAL2
				M12 connector	1	0.130	(0.28)	XS130B3PAM12
			NPN	Precabled (2 m) *[8]*	1	0.180	(0.39)	XS130B3NAL2
				M12 connector	1	0.130	(0.28)	XS130B3NAM12
		NC	PNP	Precabled (2 m) *[8]*	1	0.180	(0.39)	XS130B3PBL2
				M12 connector	1	0.130	(0.28)	XS130B3PBM12
			NPN	Precabled (2 m) *[8]*	1	0.180	(0.39)	XS130B3NBL2
				M12 connector	1	0.130	(0.28)	XS130B3NBM12

[8] For a 5 m cable replace L2 with L5; for a 10 m cable replace L2 with L10. Example: XS106B3PA**L2** becomes XS106B3PA**L5** with a 5 m cable.

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2-Wire AC or DC, Long Case Sensors

Table 20.17: Acessories, Basic Plus, XS•••B3

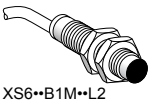
Mounting Bracket

Sensor Body	Catalog No.
M8	9006PA08
M12	9006PA12
M18	9006PA18
M30	9006PA30

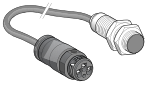
Mounting Bracket w/ Indexing Pin for Cylindrical Sensors

Diameter	Catalog No.
M6	XSZB165
M8	XSZB108
M12	XSZB112
M18	XSZB118
M30	XSZB130

Cables | See M8 and M12 connector cables on page 3–Wire, 12 — 48 Vdc, Long Case Sensors and Accessories, page 20-6.


XS6••B1M••L2

XS6••B1••U20


XS6••B1••L01B

XS6••B1••L01C

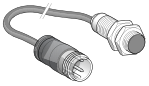

XS6••B1••L01G

Table 20.18: General Purpose, Long Case, Tubular, Increased Range, Flush Mountable, 2-Wire AC or DC

Sensors, 2-wire 24–240 V AC or DC, long case model

Sensing Distance Sn, mm (in.)	Function	Connection	Catalog Number	Weight kg	Weight lb
Ø 12, threaded M12 x 1					
4 (0.16)	NO	Precabled (2 m) *[1]*	XS612B1MAL2	0.075	0.17
		1/2"-20UNF connector	XS612B1MAU20	0.025	0.06
	NC	Precabled (2 m) *[1]*	XS612B1MBL2	0.075	0.17
		1/2"-20UNF connector	XS612B1MBU20	0.025	0.06
Ø 18, threaded M18 x 1					
8 (0.31)	NO	Precabled (2 m) *[1]*	XS618B1MAL2	0.100	0.22
		1/2"-20UNF connector	XS618B1MAU20	0.060	0.13
		Remote screw terminal connector	XS618B1MAL01B *[2]*	0.100	0.22
		Remote DIN 43650A connector	XS618B1MAL01C	0.100	0.22
		Remote M18 connector	XS618B1MAL01G	0.100	0.22
	NC	Precabled (2 m) *[1]*	XS618B1MBL2	0.100	0.22
		1/2"-20UNF connector	XS618B1MBU20	0.060	0.13
		Remote screw terminal connector	XS618B1MBL01B *[2]*	0.100	0.22
		Remote DIN 43650A connector	XS618B1MBL01C	0.100	0.22
		Remote M18 connector	XS618B1MBL01G	0.100	0.22
Ø 30, threaded M30 x 1.5					
15 (0.59)	NO	Precabled (2 m) *[3]*	XS630B1MAL2	0.205	0.45
		1/2"-20UNF connector	XS630B1MAU20	0.145	0.32
		Remote screw terminal connector	XS630B1MAL01B *[2]*	0.205	0.45
		Remote DIN 43650A connector	XS630B1MAL01C	0.205	0.45
		Remote M18 connector	XS630B1MAL01G	0.205	0.45
	NC	Precabled (2 m) *[3]*	XS630B1MBL2	0.205	0.45
		1/2"-20UNF connector	XS630B1MBU20	0.145	0.32
		Remote screw terminal connector	XS6 30B1MBL01B *[2]*	0.205	0.45
		Remote DIN 43650A connector	XS6 30B1MBL01C	0.205	0.45
		Remote M18 connector	XS6 30B1MBL01G	0.205	0.45

Description	For use with sensors	Catalog Number	Weight kg	Weight lb
Mounting brackets	Ø 12	XSZB112	0.006	0.01
	Ø 18	XSZB118	0.010	0.02
	Ø 30	XSZB130	0.020	0.04

Table 20.19: Osisense Capacitive Proximity Sensors, Cylindrical Stainless Steel, DC

Sensing Characteristics

Ø M12 threaded M12 x 1

Ø M18 threaded M18 x 1

Ø M30 threaded M30 x 1.5

Sensing Range	2 mm (0.078 in.)	5 mm (0.197 in.)	10 mm (0.394 in.)
Switching Frequency	300	200	150
Shock Resistance	Conforming to IEC 60068-2-27: 30 gn, 11 ms		
Vibration Resistance	Conforming to IEC 60068-2-6 10 gn, +/- 1 mm (10–55 Hz)		
Power Requirements			
Supply Voltage	30 mm: 24 Vdc (12–30 Vdc limits)		32 mm: 24–240 Vac (20–264 Vac limits)
Max. Load	200 mA		
Environment			
Operating Temperature Range	–25 +70 °C (–13 +158 °F)		
Product Certification	CE, ETL		
Environmental Protection Ratings	IP67, NEMA 4X (Indoor Use Only), IP65 (Ø M12 PCM and Ø18 PCM)		
Connection	Precabled, PvC (2 m)		
Catalog Numbers			
Housing Material	Stainless Steel	Nickel Plated Brass	
Cable (flush mountable)	Catalog No.	Catalog No.	Catalog No.
3-wire / PNP / N.O. function	XT112S1PAL2	XT118B1PAL2	XT130B1PAL2
3-wire / NPN / N.O. function	XT112S1NAL2	XT118B1NAL2	XT130B1NAL2
4-wire / PNP / N.O./N.C. function	XT112S1PCL2	XT118B1PCL2	XT130B1PCL2
Connector (flush mountable)		**M12**	
4-wire / PNP / N.O./N.C. function	XT112S1PCM12	XT118B1PCM12	XT130B1PCM12

[1] For a 5 m cable, replace **L2** with **L5**; for a 10 m cable, replace **L2** with **L10**. Example: XS612B1MA**L2** becomes XS612B1MA**L5** with a 5 m cable.
[2] Protective cable gland included with remote screw terminal connector.
[3] Available in ø8 plastic with double insulation. See page 2/30 of 9006CT1007.

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XUV and XXV Sensors

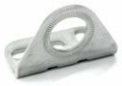
Table 20.20: XUV Label Sensor

Sensing Characteristics	
Nominal Sensing Distance	3 mm (0.12 in.)
Switching Frequency	500 Hz
Power Requirements	
Supply Voltage	12–24 Vdc (10–30 Vdc limits)
Max. Load	100 mA
Environmental	
Operating Temperature Range	+5 to +55 °C (+41 to +131 °F)
Environmental Protection Ratings	IP65, NEMA 4X (indoor use only), 5, 12, 12k, 13
Construction	
Flat Profile Dimensions (W x H x D)	92.5 x 47.3 x 16.0 mm (3.64 x 1.86 x 0.63 in.)
Housing Material	Aluminium
Transducer	Glass Epoxy
Connection	**Catalog No.**
M8 Connector	XUVU06M3KCNM8
Precabled (2 m)	XUVU06M3KCNL2

Table 20.21: XXV 18 mm Ultrasonic Sensors

Sensing Characteristics		
Nominal Sensing Distance		2 mm to 50.8 mm (0.08 in. to 2.0 in.)
Switching Frequency		80 Hz
Power Requirements		
Supply Voltage		12–24 Vdc
Max. Load		200 mA
Environmental		
Operating Temperature Range		0 to 60 °C (32 to 140 °F)
Environmental Protection Ratings		NEMA Type 4 and 13, and IP67
Construction		
Barrel Dimensions (Ø x L)		18 x 1 x 43.2 mm (0.71 x 0.04 x 1.70 in.)
Housing Material		Nickel Plated Brass
Transducer		Glass Epoxy
Connection		**Catalog No.**
Cable		Precabled, PvC (2 m)
PNP	N.O.	XXV18B1PAL2
	N.C.	XXV18B1PBL2
NPN	N.O.	XXV18B1NAL2
	N.C.	XXV18B1NBL2
Connection		M12
PNP	N.O.	XXV18B1PAM12
	N.C.	XXV18B1PBM12
NPN	N.O.	XXV18B1NAM12
	N.C.	XXV18B1NBM12

Table 20.22: Mounting Brackets



Body Type	Catalog No.
M12	9006PA12
M18	9006PA18
M30	9006PA30

Table 20.23: Sensor Accessories

Teachable Pushbutton Accessory for Virtu Series
Catalog No.
XXZPB100

Python AC/DC Power Convertor
Catalog No.
XXZPM100M12

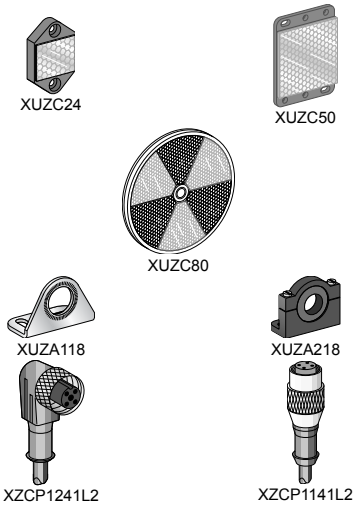


Table 20.24: Accessories

		mm	Catalog No.
Reflectors		24 x 21	XUZC24
		Ø 80	XUZC80
		50 x 50	XUZC50
		Material	Catalog No.
Mounting Brackets for XUB		Die Cast Zinc	XUZA118
		Plastic	XUZA218
		90°	Straight
		Catalog No.	Catalog No.
Cables (PUR), 2 m, without LED[1] Suitable plug-in female connectors, including pre-wired versions	M8 (4-Pin)	XZCP1041L2	XZCP0941L2
	M12 (4-pin)	XZCP1241L2	XZCP1141L2
	1/2- 20UNF	XZCP1965L2	XZCP1865L2

[1] For 5 or 10 meter lengths, replace 2 in the cable catalog number with 5 or 10.

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VM Sensors

Table 20.25: Specifications and Catalog Numbers

Virtu™ VM1 and VM18

Specifications						
Sensing Characteristics						
Sensing Range	51–508 mm (2–20 in.)					
Max. Switching Frequency	300 Hz					
Power Requirements						
Supply Voltage	12–24 Vdc					
Supply Current	40 mA (excluding load)					
Environmental Ratings						
Operating Temperature	–30 to 70 °C (–22 to 158 °F)					
Environment	NEMA 4X (indoor use only), IP67					
Construction						
VM18 Barrel, ØxL	18 x 1 x 77.62 mm (0.709 x 3.06 in.)					
VM1 Dual Mount	Ø 18 mm and Flat Format 43.7 x 18 x 59.7 mm (1.72 x 0.70 x 2.35 in.)					
Housing Material	PBT Resin					
Transducer	Glass Epoxy					
Output Type	**Catalog Number**					
	Output		**Cable**		**Quick Disconnect**	
			Dual Mount	**Barrel**	**Dual Mount**	**Barrel**
Proximity	PNP Sourcing	N.O.	VM1PNO	VM18PNO	VM1PNOQ	VM18PNOQ
		N.C.	VM1PNC	VM18PNC	VM1PNCQ	VM18PNCQ
	NPN Sinking	N.O.	VM1NNO	VM18NNO	VM1NNOQ	VM18NNOQ
		N.C.	VM1NNC	VM18NNC	VM1NNCQ	VM18NNCQ
	PNP Sourcing	N.O.	VM1PTO	VM18PTO	VM1PTOQ	VM18PTOQ
		N.C.				
	NPN Sinking	N.O.	VM1NTO	VM18NTO	VM1NTOQ	VM18NTOQ
		N.C.				
Dual-Level Pump In Normally Open	Off at loss of echo and at powerup	PNP	VM1PPI0000	VM18PPI0000	VM1PPI0000Q	VM18PPI0000Q
		NPN	VM1NPI0000	VM18NPI0000	VM1NPI0000Q	VM18NPI0000Q
	On at loss of echo and at powerup	PNP	VM1PPI1000	VM18PPI1000	VM1PPI1000Q	VM18PPI1000Q
		NPN	VM1NPI1000	VM18NPI1000	VM1NPI1000Q	VM18NPI1000Q
	Hold on loss of echo, Off at powerup	PNP	VM1PPI2000	VM18PPI2000	VM1PPI2000Q	VM18PPI2000Q
		NPN	VM1NPI2000	VM18NPI2000	VM1NPI2000Q	VM18NPI2000Q
Dual-Level Pump Out Normally Open	Off at loss of echo and at powerup	PNP	VM1PPO0000	VM18PPO0000	VM1PPO0000Q	VM18PPO0000Q
		NPN	VM1NPO0000	VM18NPO0000	VM1NPO0000Q	VM18NPO0000Q
	On at loss of echo and at powerup	PNP	VM1PPO1000	VM18PPO1000	VM1PPO1000Q	VM18PPO1000Q
		NPN	VM1NPO1000	VM18NPO1000	VM1NPO1000Q	VM18NPO1000Q
	Hold on loss of echo, Off at powerup	PNP	VM1PPO2000	VM18PPO2000	VM1PPO2000Q	VM18PPO2000Q
		NPN	VM1NPO2000	VM18NPO2000	VM1NPO2000Q	VM18NPO2000Q
Analog	Voltage 0–10 Vdc with Temperature Compensation For Direct/Inverse models, change VD or VI to VA.					
	Direct, 0 V at loss of echo and at powerup		VM1VD0000	VM18VD0000	VM1VD0000Q	VM18VD0000Q
	Inverse, 0 V at loss of echo and at powerup		VM1VI0000	VM18VI0000	VM1VI0000Q	VM18VI0000Q
	Direct, 10 V at loss of echo and at powerup		VM1VD1000	VM18VD1000	VM1VD1000Q	VM18VD1000Q
	Inverse, 10 V at loss of echo and at powerup		VM1VI1000	VM18VI1000	VM1VI1000Q	VM18VI1000Q
	Direct, hold on loss of echo, 0 V at powerup		VM1VD2000	VM18VD2000	VM1VD2000Q	VM18VD2000Q
	Inverse, hold on loss of echo, 0 V at powerup		VM1VI2000	VM18VI2000	VM1VI2000Q	VM18VI2000Q
	Direct, hold on loss of echo, 10 V at powerup		VM1VD3000	VM18VD3000	VM1VD3000Q	VM18VD3000Q
	Inverse, hold on loss of echo, 10 V at powerup		VM1VI3000	VM18VI3000	VM1VI3000Q	VM18VI3000Q
	Current 4–20 mA with Temperature Compensation For Direct/Inverse models, change CD or CI to CA					
	Direct, 4 mA at loss of echo and at powerup		VM1CD0000	VM18CD0000	VM1CD0000Q	VM18CD0000Q
	Inverse, 4 mA at loss of echo and at powerup		VM1CI0000	VM18CI0000	VM1CI0000Q	VM18CI0000Q
	Direct, 20 mA at loss of echo and at powerup		VM1CD1000	VM18CD1000	VM1CD1000Q	VM18CD1000Q
	Inverse, 20 mA at loss of echo and at powerup		VM1CI1000	VM18CI1000	VM1CI1000Q	VM18CI1000Q
	Direct, hold on loss of echo, 4 mA at powerup		VM1CD2000	VM18CD2000	VM1CD2000Q	VM18CD2000Q
	Inverse, hold on loss of echo, 4 mA at powerup		VM1CI2000	VM18CI2000	VM1CI2000Q	VM18CI2000Q
	Direct, hold on loss of echo, 20 mA at powerup		VM1CD3000	VM18CD3000	VM1CD3000Q	VM18CD3000Q
	Inverse, hold on loss of echo, 20 mA at powerup		VM1CI3000	VM18CI3000	VM1CI3000Q	VM18CI3000Q

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30 MM Ultrasonic Sensors

Table 20.26: Specifications and Catalog Numbers

Virtu™ 30 mm

M30
30 mm (1 or 2 m)

M30
30 mm (8 m)

Specifications								
Sensing Characteristics								
Sensing Range	102–1000 mm (4–39 in.)		51 mm to 1 m (2–39 in.); 119 mm to 2 m (4.7–79 in.)			304.8 mm to 8 m (12–315 in.)		
Sensing Frequency	180 kHz		200 kHz			75 kHz		
Power Requirements								
Supply Voltage	12–24 Vdc discrete, 15–24 Vdc analog		12–24 Vdc discrete; 15–24 Vdc analog			12–24 Vdc discrete; 15–24 Vdc analog		
Supply Current	40 mA discrete, 90 mA analog (excluding load)		80 mA (excluding load)			80 mA (excluding load)		
Environmental Ratings								
Operating Temperature	0 to 70 °C (32 to 158 °F)		0 to 50 °C (32 to 122 °F) discrete –20 to 60 °C (–4 to 140 °F) analog			–40 to 60 °C (–40 to 140 °F)		
Environment	NEMA 4X (indoor use only), IP67		NEMA 4X (indoor use only), IP67			NEMA 4X (indoor use only), IP67		
Construction								
Barrel, ØxL	30 x 1 x 95.26 mm (1.18 x 3.75 in.)		30 x 1 x 95 mm (1.18 x 3.74 in.)			30 x 1 x 116 mm (9.18 x 4.58 in.)		
Housing Material	PBT Resin		PEI Resin			PEI Resin		
Transducer	Glass Epoxy		Silicon Rubber or Fluorosilicone			Glass Epoxy		
Output Type			1 m / 2 m			8 m		
	Description	Catalog No.	Description		Catalog No.	Description	Catalog No.	
Proximity Output	PNP Sourcing N.O.	XX6V3A1PAM12	1 m	Connector	SM950A100000	Cable	SM900A800000	
	PNP Sourcing N.C.	XX6V3A1PBM12		Cable	SM900A100000			
	NPN Sinking N.O.	XX6V3A1NAM12	2 m	Connector	SM950A400000	Connector	SM950A800000	
	NPN Sinking N.C.	XX6V3A1NBM12		Cable	SM900A400000			
Dual-Level Pump In	Connector		Cable 1 m *[2]*		PNP, NO	Cable 8 m	PNP, NO	
	Normally Open		Pump-out latch		SM902A100000	Pump-out latch	SM902A800000	
	Hold on loss of echo; Off on power up		Pump-out latch w/alarm		SM902A1560000	Pump-out latch w/alarm	SM902A8560000	
	PNP	XX2V3A1PGM12	Pump-out latch, w/setpoint		SM902A1760000	Pump-out latch, w/setpoint	SM902A8760000	
	NPN	XX2V3A1NGM12	Pump-in latch		SM902A110000	Pump-in latch	SM902A810000	
	Off on loss of echo; Off on power up		Pump-in latch w/alarm		SM902A1460000	Pump-in latch w/alarm	SM902A8460000	
	PNP	XX2V3A1PFM12	Pump-in latch, w/setpoint		SM902A1660000	Pump-in latch, w/setpoint	SM902A8660000	
	NPN	XX2V3A1NFM12	Dual setpoint		SM902A1260000	Dual setpoint	SM902A8260000	
Dual-Level Pump Out	Hold on loss of echo; Off on power up		Dual alarm		SM902A1360000	Dual alarm	SM902A8360000	
	PNP	XX2V3A1PJM12	Connector		PNP, NO	Connector	PNP, NO	
	NPN	XX2V3A1NJM12	Pump-out latch		SM952A100000	Pump-out latch	SM952A800000	
	Off on loss of echo; Off on power up		Pump-out latch w/alarm		SM952A1560000	Pump-out latch w/alarm	SM952A8560000	
	PNP	XX2V3A1PHM12	Pump-out latch, w/setpoint		SM952A1760000	Pump-out latch, w/setpoint	SM952A8760000	
	NPN	XX2V3A1NHM12	Pump-in latch		SM952A110000	Pump-in latch	SM952A810000	
			Pump-in latch w/alarm		SM952A1460000	Pump-in latch w/alarm	SM952A8460000	
			Pump-in latch, w/setpoint		SM952A1660000	Pump-in latch, w/setpoint	SM952A8660000	
			Dual setpoint		SM952A1260000	Dual setpoint	SM952A8260000	
			Dual alarm		SM952A1360000	Dual alarm	SM952A8360000	
Analog	Quick Disconnect		Cable 1 m *[2]*			Cable 8 m		
	0–20 mA	Catalog No.	Voltage (0–10 Vdc)		Catalog No.	Voltage (0–10 Vdc)	Catalog No.	
	Direct/Inverse slope	XX9V3A1C4M12	Auto slope		SM906A180000	Auto slope	SM906A88000	
	Direct output	XX9V3A1D4M12	Direct slope		SM906A110000	Direct slope	SM906A81000	
	Inverse output	XX9V3A1E4M12	Inverse slope		SM906A100000	Inverse slope	SM906A80000	
	4–20 mA		Current (4–20 mA)			Current (4–20 mA)		
	Direct/Inverse slope	XX9V3A1C2M12	Auto slope		SM906A190000	Auto slope	SM906A890000	
	Direct output	XX9V3A1D2M12	Direct slope		SM906A130000	Direct slope	SM906A830000	
	Inverse output	XX9V3A1E2M12	Inverse slope		SM906A120000	Inverse slope	SM906A80000	
	0–5 Vdc		**Connector**			**Connector**		
	Direct/Inverse slope	XX9V3A1F3M12	Voltage (0–10 Vdc)			Voltage (0–10 Vdc)		
	Direct output	XX9V3A1G3M12	Auto slope		SM956A180000	Auto slope	SM956A85000	
	Inverse output	XX9V3A1H3M12	Direct slope		SM956A110000	Direct slope	SM956A81000	
	0–10 Vdc		Inverse slope		SM956A100000	Inverse slope	SM956A50000	
	Direct/Inverse slope	XX9V3A1F1M12	Current (4–20 mA)			Current (4–20 mA)		
	Direct output	XX9V3A1G1M12	Auto slope		SM956A190000	Auto slope	SM956A890000	
	Inverse output	XX9V3A1H1M12	Direct slope		SM956A130000	Direct slope	SM956A830000	
			Inverse slope		SM956A120000	Inverse slope	SM956A820000	

[2] For the 2 m version, change model from SMxxx**A1**xxxxx to SMxxx**A4**xxxxx.

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Section 21
Limit Switches

Encapsulated Miniature

9007MS

Industrial Snap Switches

9007A

Modular, Miniature, and Compact

XCMD

XCKD

XCKP

XCKT

Compact General Duty

XCKL

9007C

Heavy Duty Industrial

9007C

XCKJ

Severe Duty

9007T

L100

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Product Panorama 1 of 2

Refer to Catalog **9006CT1007**

Design	Miniature				Compact		
Catalog number	**9007 A/O**	**9007 MS/ML**	**XCMN**	**XCMD**	**XCKP**	**XCKD**	**XCKL**
Page	page 21-8	page 21-8	page 21-8	page 21-8	page 21-8	page 21-8	page 21-22
Enclosure	Open, plastic	Metal body, metal head	Plastic, double insulated	Metal	Plastic, double insulated	Metal	Metal
Features	A variety of operators are available.	Bottom or side cable entry. Full range of operating heads. See page 21-8.	Mounting by the body or by the head				1 conduit entry
Modularity	Selected operators	Operator	—	Head, body, lever, and connector			Head, body, and lever
Conforming to standards			—	—	CENELEC: EN 50047		—
Body dimensions (w x h x d), mm (in.)	29.0 x 63.5 x 21.0 (1.14 x 2.5 x 0.83)	40.1 x 44.4 x 15.8 (1.58 x 1.75 x 0.62)	30 x 50 x 16 (1.18 x 1.97 x 0.63)		31 x 65 x 30 (1.22 x 2.56 x 1.18)		52 x 72 x 30 (2.05 x 2.83 x 1.18)
Head	Linear	Linear or rotary	Linear movement, plunger Rotary movement, lever Rotary movement, multi-directional *[1]* Same heads for ranges XCMD, XCKD, XCKP and XCKT				Linear movement, plunger Rotary movement, lever Rotary movement, multi-directional *[1]*
Contact blocks							
2 snap action contacts ⊕	—	—	N.C. + N.O.	N.C. + N.O.; N.C. + N.C.	N.C. + N.O.; N.C. + N.C.	N.C. + N.O.; N.C. + N.C.	N.C. + N.O.
2 snap action contacts	—	—	N.C. + N.O.	N.C. + N.O.; N.C. + N.C.	N.C. + N.O.; N.C. + N.C.	N.C. + N.O.; N.C. + N.C.	N.C. + N.O.
3 snap action contacts ⊕	—	—	—	N.C. + N.C. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.
3 snap action contacts	—	—	—	N.C. + N.C. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.
4 snap action contacts ⊕	—	—	—	N.C. + N.C. + N.O. + N.O.	—	—	—
4 snap action contacts	—	—	—	N.C. + N.C. + N.O. + N.O.	—	—	—
2 slow break contacts ⊕⊕ break before make	—	—	—	N.C. + N.O.	N.C. + N.O.	N.C. + N.O.	N.C. + N.O.
2 slow break contacts break before make	—	—	—	N.C. + N.O.	N.C. + N.O.	N.C. + N.O.	N.C. + N.O.
2 slow break contacts ⊕ make before break	—	—	—	—	N.O. + N.C.	N.O. + N.C.	N.O. + N.C.
2 slow break contacts make before break	—	—	—	—	N.O. + N.C.	N.O. + N.C.	N.O. + N.C.
2 slow break contacts ⊕ simultaneous	—	—	—	—	N.C. + N.C.	N.C. + N.C.	N.C. + N.C.
2 slow break contacts simultaneous	—	—	—	—	N.O. + N.O.	N.O. + N.O.	N.O. + N.O.
3 slow break contacts ⊕ break before make	—	—	—	N.C. + N.C. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.
3 slow break contacts break before make	—	—	—	N.C. + N.C. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.
2 snap action contacts	N.C. + N.O., N.O. + N.O.	N.C. + N.O.	—	—	—	—	—
4 snap action contacts	N.C. + N.C., N.O. + N.O.	—	—	—	—	—	—
Insulation voltage (Ui) / thermal current (Ithe)	See page 21-10	300 Vac/Vdc 10 A (standard)	Screw terminal 2 contacts: 400 V/6 A	Pre-cabled 2 contacts: 400 V/6 A 3 contacts: 400 V/4 A 4 contacts: 400 V/3 A	Screw terminal: 2 contacts: 500 V/10 A 3 contacts: 400 V/6 A Connector: Integral M12, 4-pin: 250 V/3 A	Screw terminal: 2 contacts: 500 V/10 A 3 contacts: 400 V/6 A Connector: Integral M12, 5-pin: 60 V/4 A	Screw terminal: 2 contacts: 500 V/ 10 A 3 contacts: 400 V/6 A
Enclosure rating IP = IEC enclosure rating IK = EN shock test standard	None	NEMA Types 1, 2, 4, 6, 6P, 12, 13 IP67	NEMA Types 1, 2, 13 IP 65, IK 04	NEMA Types 1, 2, 4X, 6, 12 IP 66, IP 67, IP 68, IK 06	NEMA Types 1, 2, 4, 6, 6P, 12, 13 IP 66, IP 67, IK 04	NEMA Types 1, 2, 4, 6, 12, 13 IP 66, IP 67, IK 06	NEMA Types 1, 2, 4, 6, 6P, 12, 13 IP 66, IK 06
Electrical connection	Screw terminal or Faston® connector	Pre-wired cable or M12 connector	Pre-wired cable	Pre-cabled. Connector: Integral or remote M12 or remote 7/8" 16UN	Screw terminal: M16, M20, Pg 11, PG 13, 1/2" NPT, or PF 1/2 Connector: Integral M12		Screw terminal: M20 or 1/2" NPT

[1] Flexible operators do not guarantee direct (positive) opening operation.

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Product Panorama 2 or 2

Refer to Catalog **9006CT1007**

Design	Standard Duty Industrial			Severe Duty Mill and Foundry	
Catalog number	**9007C**	**XCKJ**	**XCKS**	**9007T/FT**	**L100/L300**
Page	page 21-22	page 21-32	page 21-48	page 21-36	page 21-39
Enclosure	Metal, diecast, zinc alloy	Metal	Plastic, double insulated	Metal	Metal
Features	Plug-in body	Fixed or plug-in body, -40 °C (-40 °F) or +120 °C (+248 °F) versions	—	Extra heavy duty contact ratings	
Modularity	Head, body, and lever			Lever	
Conforming to standards / Product certifications	UL 508, C22-2-14-95, NEMA 250, IEC 60947, EN 60947-1, EN 60947-5-1	CENELEC: EN 50041	CENELEC: EN 50041	NEMA A600 UL508 UL Listed, CSA Certified	NEMA A600 UL508 UL Listed, CSA Certified
Body dimensions (w x h x d), mm (in.)	Standard: 39 x 102 x 45 (1.54 x 4.02 x 1.77) Compact: 39 x 80 x 45 (1.54 x 3.15 x 1.77)	40 x 77 x 44 (1.57 x 3.03 x 1.73) 42.5 x 84 x 36 (1.67 x 3.31 x 1.42)	40 x 72.5 x 36 (1.57 x 2.85 x 1.42)	58.7 x 114.3 x 64.5 (2.31 x 4.5 x 2.54)	58.7 x 126 x 53.3 (2.31 x 4.95 x 2.10)
Head	Linear movement, plunger Rotary movement, lever Multi-directional movement (wobble stick, cat whisker) *[2]*	Linear movement, plunger Rotary movement, lever Rotary movement, multi-directional *[2]*	Linear movement, plunger Rotary movement, lever Rotary movement, multi-directional *[2]*	Rotary movement, lever	Rotary movement, lever
Contact blocks				—	Various options available for L100, 2- and 3-pole devices.
2 snap action contacts ⊕	—	N.C. + N.O.; N.C. + N.C.	N.C. + N.O.; N.C. + N.C.	—	—
2 snap action contacts	—	N.C. + N.O.; N.C. + N.C.	N.C. + N.O.; N.C. + N.C.	—	—
3 snap action contacts ⊕	—	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	—	—
3 snap action contacts	—	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	—	—
4 snap action contacts ⊕	—	—	—	—	—
4 snap action contacts	—	—	—	—	—
2 slow break contacts break before make ⊕	—	N.C. + N.O.	—	—	—
2 slow break contacts break before make	—	N.C. + N.O.	—	—	—
2 slow break contacts make before break ⊕	—	N.O. + N.C.	—	—	—
2 slow break contacts make before break	—	N.O. + N.C.	—	—	—
2 slow break contacts simultaneous ⊕	—	N.C. + N.C.	—	—	—
2 slow break contacts simultaneous	—	N.O. + N.O.	N.O. + N.O.	—	—
3 slow break contacts break before make ⊕	—	N.C. + N.C. + N.O. ; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	—	—
3 slow break contacts break before make	—	N.C. + N.C. + N.O. ; N.C. + N.O. + N.O.	N.C. + N.C. + N.O.; N.C. + N.O. + N.O.	—	—
1 slow break contact ⊕ Form Y1561 *[3]*	1 N.C	—	—	—	—
2 snap action contacts	1 N.O. + 1 N.C.	2 C/O	2 C/O	1 N.C. + 1 N.O.*[4]* convertible sequence	1 N.C. + 1 N.O.*[4]* Some conversions possible
4 snap action contacts	2 N.O. + 2 N.C. ; 2 N.O. + 2 N.C. , neutral position; 2 N.O. + 2 N.C. , two stage	—	—	—	—
Insulation voltage (Ui) and thermal current (Ithe)	Ui = 600 V, except: 9007C62, 9007C66, 9007C68 (Ui = 250 V) and 9007C84, 9007C86 (Ui = 125 V) Ithe = 10 A, except: 9007C84, 9007C86 (Ithe = 2.5 A)	**Screw terminal** 2 contacts: 500 V/10 A 3 contacts: 400 V/6 A **Connector** Integral M12, 5-pin: 60 V / 4 A Integral 7/8" 16UN: 250 V / 6 A	**Screw terminal** 2 contacts: 500 V/10 A 3 contacts: 400 V/6 A	600 V 20 A (AC/DC)	600 V 20 A (AC), 5 A (DC)
Enclosure rating IP = IEC enclosure rating IK = EN shock test standard	IP 67 conforming to IEC 60529, NEMA Types 2, 4, 6, 6P, 12, 13	NEMA Types 1, 2, 4, 12 IP 66, IK 07	IP 65, IK 03	NEMA Types 1, 2, 4, 12, 13 IP65, 66, 67	NEMA Types 1, 4, 13 IP65, 66
Electrical connection	**Cable entry** 1/2"-14 NPT, M20 x 1.5 ISO cable entry **Connector** Integral 5-pin mini-connector	**Screw terminal** M20 x 1.5, PG13, or 1/2" PT **Connector** Integral M12 or 7/8" 16UN	**Screw terminal** M20 x 1.5 or PG13	**Cable entry** 1/2" NPT or PG13.5	**Cable entry** 1/2" NPT or 3/4" NPT Other options available **Connector** 7/8" 16UN or Cannon MS3102E20-AP or equal; other options available

[2] Flexible operators do not guarantee direct (positive) opening operation.
[3] Single pole only. Refer to page 7-15 for details.
[4] For other contact options, see catalog 9006CT1007.

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Application Data for All Limit Switch Types

Table 21.1: Enclosure Ratings

Type	NEMA Style											IEC Style		
	1	2	3	4	4X	6	6P	7	9	12	1-3	I-P65	I-P6-6	IP67
▲ Indicates NEMA or IEC Type Rating available for each product														
9007C	▲	▲		▲		▲	▲			▲	▲	▲	▲	▲
9007CR	▲	▲		▲		▲	▲	▲	▲	▲	▲			
9007FT	▲	▲		▲						▲	▲	▲	▲	▲
L100/L300	▲			▲							▲	▲	▲	
9007MS/ML *[1]*	▲	▲	▲	▲		▲	▲			▲	▲			▲
9007T	▲	▲		▲						▲	▲	▲	▲	▲
XCKJ	▲	▲	▲	▲						▲			▲	
XCKL	▲	▲	▲	▲						▲			▲	
XCKN & XCNR					▲					▲		▲		
XCKP & XCKT *[2]*	▲			▲						▲		▲		
XCKS, XCMN												▲		
XCMD, XCKD					▲		▲			▲	▲		▲	▲

Table 21.2: Ambient Temperature Ranges

Type	Low Temperature	High Temperature at Full Rated Load
9007 C		
Lever Type	-20 °F (-28.9 °C)	+185 °F (+85 °C)
Plunger & Wobble Stick Type	0 °F (-17.8 °C)	+185 °F (+85 °C)
9007 FT *[3]* **, T**	-10 °F (-23 °C)	+185 °F (+85 °C)
HL100/HL300	0 °F (-17.8 °C)	+350 °F (+177 °C)
L100/L300	0 °F (-17.8 °C)	+200 °F (+93 °C)
9007 MS/ML	-4 °F (-20 °C)	+221 °F (+105 °C)
XCKJ, XCKL, XCKP, XCKT	-13 °F (-25 °C)	+158 °F (+70 °C)
XCMN, XCKN, XCNR	-13 °F (-25 °C)	+158 °F (+70 °C)
XCKS	-13 °F (-25 °C)	+158 °F (+70 °C)
XCMD	-13 °F (-25 °C)	+158 °F (+70 °C)

Some switches are available with higher or lower temperature limits, by selecting special versions or special options. Refer to the respective product sections for further information.
(Ex.: 9007MS/ML, see page 21-9.)

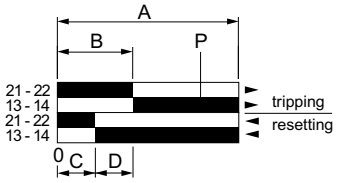
Table 21.3: Sealing

Type		Material
9007C, CR	Standard shaft seals on lever types	Fluorocarbon rubber (FKM)
	Plunger and wobble stick boots	Neoprene; Fluorocarbon optional
	All other seals	Nitrile (Buna N); Fluorocarbon optional
R.B.Denison™ L		PVC
9007T and FT	Shaft seal	Nitrile (Buna N)
	Cover gasket	Nitrile (Buna N)
	Base plate gasket	Cellulose fiber laminate
XCKJ, XCKL, XCKS		Nitrile (Buna N)
XCMD, XCKD, XCKP, XCKT, XCKN, XCNR		Nitrile (Buna N) and silicon

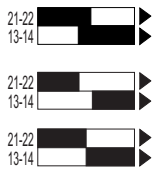
Table 21.4: Electrical Contact Ratings

AC—NEMA A600						DC			
Volts	Max. Current—35% Power Factor					Volts	Maximum Current		
	Make		Break		Continuous Carrying Amperes		Make or Break		Continuous Carrying Amperes
	A	VA	A	VA			A	VA	
120	60	7200	6	720	10	125	1.1/0.55 *[4]*	138/69 *[4]*	5/2.5 *[4]*
240	30	7200	3	720	10	—	—	—	—
480	15	7200	1.5	720	10	250	0.27	67.5	2.5
600	12	7200	1.2	720	10	600	0.10	60	2.5

Table 21.5: Contact Function Diagrams

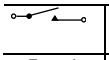
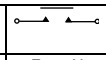
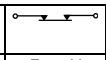
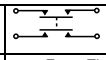
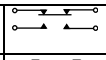
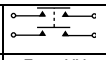


A=Maximum travel of the operator in mm or degrees.
B=Tripping travel of the contact.
C=Reset travel.
D=B-C=Differential travel.
P=Point from which positive opening is assured



Make-before-break (overlapping) SPDT
The normally open contact closes before the normally closed contact opens.
Break-before-make (offset) SPDT
The normally closed contact opens before the normally open contact closes.
Simultaneous make and break—SPDT
The normally closed contact opens at the same time as the normally open contact closes.

Table 21.6: Wiring Diagrams

												
Form A	Form B	Form C	Form AA	Form BB	Form CC	Form X	Form Y	Form Zb	Form Z	Form XX	Form YY	Form ZZ
SPST-NO	SPST-NC	SPDT	DPST-NO	DPST-NC	DPDT	SPST-NO-DB	SPST-NC-DB	SPDT-DB Isolated Contacts	SPDT-DB	DPST-NO-DB	DPST-NC-DB	DPDT-DB

[1] Enclosure ratings are NEMA 1, 2, 3, 4, 6, 6P, 12, and 13 except for option 21 (low force) which is NEMA 1 only. The 9007 MS/ML05 (omni-directional operation) enclosure ratings are NEMA 1, 2, 12, and 13
[2] For indoor use only—not UV protected.
[3] The Type FT will withstand hot falling sand up to +300°F (+149 °C); **however,** ambient temperature for the FT switch is the same as the Type T above (+185 °F, +85 °C). **Do not use in higher temperature ambients.**
[4] Type C52 compact unit ratings at 125 Vdc—same ratings as C54, CF53 and CR53 at other voltages.

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Contact Configurations

Contact Configurations—Direct opening contacts meet IEC 60947-5-1 requirements.
For contacts used in safety applications (end of travel, emergency stop device, etc.) the asurance of direct opening is required (see IEC 204, EN 60204, or NF C 79–130) after each test.
The opening of the contact must be verified by testing with an impulse voltage (2500 V).

Table 21.7: Maximum Current Ratings for Control Circuit Contacts—All Types

Switch Type	Contacts	Direct Opening Contacts Meet IEC 60947-5-1 Requirements ⊖	AC—50 or 60 Hz						DC			AC/DC
			V	Inductive 35% Power Factor				Resistive 75% Power Factor	V	Inductive and Resistive		Continuous Carrying Amperes
				Make		Break		Make and Break Amperes		Make and Break Amperes		
				A	VA	A	VA			Single Pole	Double Pole	
L100/L300	SPDT with 2 or 3 Contacts Form Z	No	120 240 480 600	150 75 37.5 30	18000 18000 18000 18000	20 12.5 6.25 5	2400 3000 3000 3000	6 3 1.5 1.2	125 250 600 —	1.1 0.55 0.2 —	—	20/5
XCKD 2 Contacts	SPDT Form Zb	Yes	120 240	60 30	7200 7200	6 3	720 720	6 3	125 250	0.55 0.27	—	10/2.5
XCKD 3 Contacts	3 Pole Form Zb	Yes	120 240	30 15	3600 3600	3 1.5	360 360	3 1.5	125 250	0.22 0.11	—	5/1.0
XCKJ Plug-in	SPDT Form Z	No	120 240	60 30	7200 7200	6 3	720 720	6 3	125 250	0.55 0.27	—	10
	2 SPDT Form ZZ	No	480 600	15 12	7200 7200	1.5 1.2	720 720	1.5 1.2	600 —	0.1 —	—	10 10
XCKJ Non-plug-in	SPDT Form Zb	Yes	120 240	60 30	7200 7200	6 3	720 720	6 3	125 250	0.55 0.27	—	10/2.5 10
	2 SPDT Form ZZ	No	120 240	60 30	7200 7200	6 3	720 720	6 3	125 250	0.55 0.27	—	10/2.5 10
XCKL	SPDT Form Zb	Yes	120 240	60 30	7200 7200	6 3	720 720	6 3	125 250	0.55 0.27	—	10
XCKN	2 Pole	Yes	120 240	60 30	7200 7200	6 3	720 720	6 3	125 250	0.55 0.27	—	10/2.5
XCKP 2 Contacts	SPDT Form Zb	Yes	120 240	60 30	7200 7200	6 3	720 720	6 3	125 250	0.55 0.27	—	10/2.5
XCKP 3 Contacts	3 Pole Form Zb	Yes	120 240	30 15	3600 3600	3 1.5	360 360	3 1.5	125 250	0.22 0.11	—	5/1.0
XCKT 2 Contacts	SPDT Form Zb	Yes	120 240	60 30	7200 7200	6 3	720 720	6 3	125 250	0.55 0.27	—	10/2.5
XCKT 3 Contacts	3 Pole Form Zb	Yes	120 240	30 15	3600 3600	3 1.5	360 360	3 1.5	125 250	0.22 0.11	—	5/1.0
XCMD 2-4 Contacts	2,3 or 4 Pole Form Zb	Yes	120 240	30 15	3600 3600	3 1.5	360 360	3 1.5	125 250	0.22 0.11	—	5/1.0
XCMN 2 Contacts	SPDT Form Zb	Yes	120 240	30 15	3600 3600	3 1.5	360 360	3 1.5	125 250	0.22 0.11	—	5/1.0
XCNR	2 Pole	Yes	120 240	60 30	7200 7200	6 3	720 720	6 3	125 250	0.55 0.27	—	10/2.5
9007AO1, AC	SPST, Form X or Y (rated 0.5 hp @ 110 and 200 Vac) SPDT, Form Z	No	120 240 480 600	40 20 10 8	4800 4800 4800 4800	15 10 6 5	1800 2400 2880 3000	15 10 6 5	125 250 600 —	0.5 0.25 0.05 —	0.25 0.1 — —	15
9007AO2, AO6, AB, AP	SPST, Form X or Y (rated 0.5 hp @ 110 and 200 Vac) SPDT, Form Z	No	120 240 480 600	40 20 10 8	4800 4800 4800 4800	15 10 6 5	1800 2400 2880 3000	15 10 6 5	125 250 600 —	2.0 0.5 0.1 —	0.5 0.2 0.02 —	15
9007CO3, CO6, CB, CC, CP	DPST Form AA or BB DPDT Form ZZ	No	120 240 480 600	30 15 7.5 6	3600 3600 3600 3600	3 1.5 0.75 0.6	360 360 360 360	3 1.5 0.75 0.6	125 250 600 —	1.0 0.3 0.1 —	0.2 0.1 — —	10
9007C	SPST Form Y1561 Slow break	Yes	120 240 480 600	60 30 15 12	7200 7200 7200 7200	6 3 1.5 1.2	720 720 720 720	6 3 1.5 1.2	125 250 600 —	0.55 0.27 0.1 —	—	10/2.5
	SPDT Form Z	No	120 240 480 600	60 30 15 12	7200 7200 7200 7200	6 3 1.5 1.2	720 720 720 720	6 3 1.5 1.2	125 250 600 —	0.55 0.27 0.1 —	0.22 0.11 — —	10/2.5
	DPDT Form ZZ	No	120 240 480 600	60 30 15 12	7200 7200 7200 7200	6 3 1.5 1.2	720 720 720 720	6 3 1.5 1.2	125 250 600 —	0.22 0.11 — —	0.22 0.11 — —	10/1.0
9007MS	SPDT Form C	No	120 240	60.0 30.0	7200 7200	6.0 3.0	720 720	—	—	—	—	10 (AC) / 5 (Res. @ 28 Vdc)
9007ML	SPDT Form Z	No	120 240	60.0 30.0	7200 7200	6.0 3.0	720 720	—	—	—	—	10 (AC) / 5 (Res. @ 28 Vdc)
9007T and FT	SPDT Quick Make and Break Form Z	No	120 240 480 600	150 75 37.5 30	18000 18000 18000 18000	20 12.5 6.25 5	2400 3000 3000 3000	20 12.5 6.25 5.0	125 250 600 —	5.0 1.0 0.2 —	—	20
	All Slow Make and Break Form Z	No	120 240 480 600	60 30 15 12	7200 7200 7200 7200	6 3 1.5 1.2	720 720 720 720	6 3 1.5 1.2	—	—	—	20

Electrical Symbols For Contacts	Form Za: the 2 contacts are the same polarity.	Form Zb: the 2 contacts are electrically separate.
Symbols for Direct Opening	⊖ Simplified Version	⊖ Complete symbol

NOTE: Alternate Current Ratings—Several product lines offer special versions or options with alternate contact configurations or contact materials, which may result in current ratings that differ from those listed above. Refer to the respective product sections for further information.

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Industrial Snap Switches Without Enclosures

Type AO2

Type AB21

Type AP222 with 2358C22G6 mushroom button

Industrial snap switches have been incorporated in many Square D products such as timers, specialty push buttons, foot switches, operating mechanisms, door interlocks, motor control centers, limit switches, and many other control products.

Recommended Actuator: An adjustable actuator is recommended. If nonadjustable actuator is used, a resilient type or a mechanical stop should be used to prevent "bottoming" of button mechanism.

Adjustable Actuator Overtravel: Minimum recommended overtravel in both trip and reset directions is 0.015 in.

Adjustable Actuator Total Travel: Maximum differential limit plus 0.030 in. (Example: 0.076 in. for Type AO2.)

Nonadjustable Actuator Total Travel: Fully retracted—at least 0.139 in. for Type AO1 and 0.160 in. for Types AO2 and CO3 from mounting surface. Fully engaged—at least 0.061 in. but not closer than 0.045 in. from mounting surface.

Contact Configurations: Single-pole snap switches that contain two double-break contact elements (1 N.O. and 1 N.C.) must be used on circuits of the same polarity. Double-pole snap switches contain two electrically separated sets of contact elements allowing use on circuits of opposite polarity. Each set contains two double-break contact elements (1 N.O. and 1 N.C.) that must be used on circuits of the same polarity.

Table 21.8: Quick Make and Break—600 Volts Max. AC and DC

Operator Style	Contact Arrangement	Type
Basic Snap Switch	1 N.O. 1 N.C.	AO1
	1 N.O.	AO1B
	1 N.O. 1 N.C.	AO2
		AO6 (Plug-in)
	1 N.C.	AO2A
	1 N.O.	AO2B
	2 N.O. 2 N.C.	CO3
	2 N.O.	CO6 (Plug-in)
	Two Stage 2 N.O. 2 N.C.	CO7
Rigid Roller Lever Style	1 N.O. 1 N.C. 7/32" width roller	AB21 (RH)
		AB22 (LH)
		AB41 (without side mtg. bracket)
	1 N.O. 1 N.C. 15/32" width roller	AB23 (RH)
		AB24 (LH)
	2 N.O. 2 N.C. 7/32" width roller	CB31 (RH)
		CB41 (without side mtg. bracket)
	2 N.O. 2 N.C. 15/32" width roller	CB33 (RH)
		CB34 (LH)
Rigid Roller Lever Style One Way Roller	1 N.O. 1 N.C.	AB25 (RH)

Operator Style	Contact Arrangement	Type
Cabinet Door Style	1 N.O. 1 N.C.	AC1
	2 N.O. 2 N.C.	CC1
Plunger Style Panel Mounting	1 N.O. 1 N.C.	AP221
	2 N.O. 2 N.C.	CP221
	Operator Only	AP201
Roller Plunger Style Panel Mounting Non-Oiltight	1 N.O. 1 N.C.	AP321 *[1]*
	2 N.O. 2 N.C.	CP321
	Operator Only	AP301 *[1]*
		AP304 *[2]*
Roller Plunger Style Panel Mounting Oiltight	1 N.O. 1 N.C.	AP323
	2 N.O. 2 N.C.	CP323
	Operator Only	AP303 *[1]*
		AP305 *[1][2]*
Mushroom Button Style Panel Mounting	1 N.O. 1 N.C.	AP222

Table 21.9: Maximum Current Ratings For Control Contacts—All Types

Switch Type	Contacts *[3]*	AC—50 or 60 Hz						DC			AC or DC
		Voltage	Inductive 35% Power Factor				Resistive 75% Power Factor	Voltage	Inductive and Resistive		
			Make		Break		Make and Break Amperes		Make and Break Amperes		Continuous Carrying Amperes
			A	VA	A	VA			Single Pole	Double Pole	
AO1, AC	SPDT Form Z SPST Form X or Y	120 240 480 600	40 20 10 8	4800 4800 4800 4800	15 10 6 5	1800 2400 2880 3000	15 10 6 5	125 250 600 —	0.5 0.25 0.05 —	0.25 0.1 — —	15 15 15 15
AW, AO2, and AO6, AB, AP	SPDT Form Z SPST Form X or Y	120 240 480 600	40 20 10 8	4800 4800 4800 4800	15 10 6 5	1800 2400 2880 3000	15 10 6 5	125 250 600 —	2.0 0.5 0.1 —	0.5 0.2 0.02 —	15 15 15 15
AW, CO3, and CO6, CB, CC, CP	DPDT Form ZZ DPST Form AA or BB	120 240 480 600	30 15 7.5 6	3600 3600 3600 3600	3 1.5 0.75 0.6	360 360 360 360	3 1.5 0.75 0.6	125 250 600 —	1.0 0.3 0.1 —	0.2 0.1 — —	10 10 10 10

Acceptable Wire Size 14–22 AWG
Recommended Terminal Clamp Torque 6–9 lb-in (0.7–1.0 N•m)

File E78403
CCN NKCR2

File LR25490
Class 3211-03

[1] For use with Type AO and CO basic switches.
[2] Roller turned 90° from standard (perpendicular to mounting holes).
[3] Do **not** meet IEC 60947–5–1 requirements for direct opening contacts

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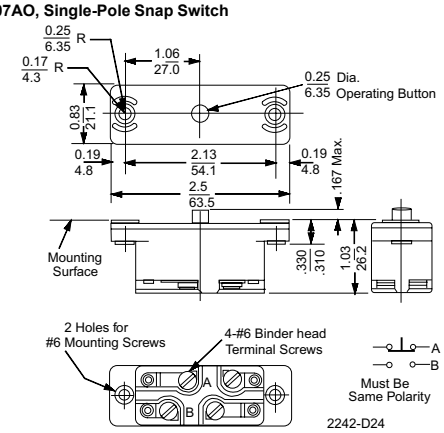
Approximate Dimensions and Operating Data, 9007AO, CO, AP, and CP

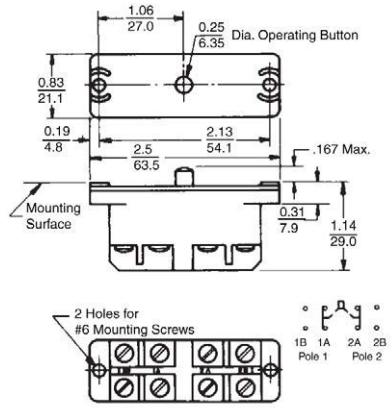
Approximate Dimensions and Operating Data, 9007AO, CO, AP, and CP

9007AO, Single-Pole Snap Switch



	Operating Data, in. (mm)	
	AO1, 1B	AO2, 2A, 2B
Pre-travel	0.057–0.074 (1.4–1.8)	0.057–0.074 (1.4–1.8)
Differential	0.015–0.025 (0.6–0.6)	0.035–0.046 (0.9–1.16)
Total travel	0.103–0.125 2.6–3.2)	0.103–0.125 (2.6–3.2)
Operating force	7–11 oz (0.05–0.08 N)	10–14 oz (0.07–0.1 N)
Shipping weight	0.25 lb (0.11 kg)	0.25 lb (0.11 kg)

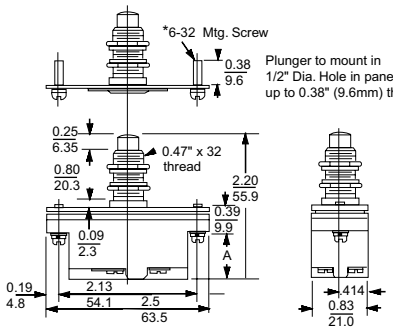
9007CO, Two-Pole Snap Switch



	Operating Data, in. (mm)	
	CO3	C07
Pre-travel 1st stage	0.057–0.074 (1.4–1.8)	0.035–0.060 (0.9–1.5)
Pre-travel 2nd stage	—	0.060–0.085 (1.5–2.1) *[4]*
Differential	0.025–0.046 (0.6–1.16)	0.010–0.020 (0.25–0.50)
Total travel	0.103–0.125 (2.6–3.2)	—
Operating force	7–12 oz (0.05–0.084 N)	7–12 oz (0.05–0.084 N)
Shipping weight	0.25 lb (0.11 kg)	0.25 lb (0.11 kg)

9007AP201, 221, and CP221

9007AP201



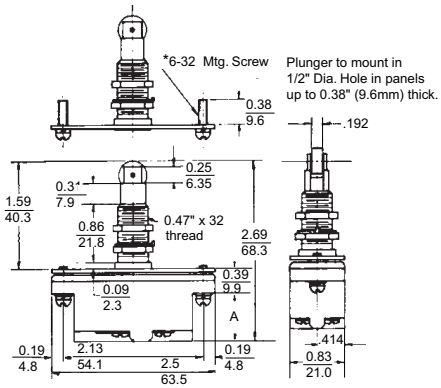
9007AP221

Type	Dimension A
AP221	0.70 (17.8)
CP221	0.80 (20.3)

	Operating Data, in. (mm)	
	AP221	CP221
Pretravel	0.070–0.089 (1.8–2.2)	0.070–0.089 (1.8–2.2)
Differential	0.035–0.046 (0.9–1.2)	0.025–0.046 (0.9–1.2)
Overtravel	0.161–0.180 (4.1–4.6)	0.161–0.180 (4.1–4.6)
Total travel	0.231–0.269 (5.8–6.8)	0.231–0.269 (5.8–6.8)
Operating force	10–14 oz (0.07–0.1 N)	7–12 oz (0.05–0.08 N)
Shipping weight	0.25 lb (0.11 kg)	0.25 lb (0.11 kg)

9007AP301, 303, 304, 305, 321, 323, 324, 325, and CP321, 323, 324, 325

9007AP301



9007AP321

Type	Dimension A
AP321, 323, 324, 325	0.70 (17.8)
CP321, 323, 324, 325	0.80 (20.3)

	Operating Data, in. (mm)			
	AP321	AP323, 325	CP321	CP323
Pretravel	0.060–0.150 (1.5–3.8)	0.060–0.150 (1.5–3.8)	0.060–0.150 (1.5–3.8)	0.060–0.150 (1.5–3.8)
Differential	0.035–0.046 (0.9–1.2)	0.035–0.046 (0.9–1.2)	0.025–0.046 (0.9–1.2)	0.035–0.046 (0.9–1.2)
Total travel	0.200–0.340 (5.1–8.6)	0.200–0.340 (5.1–8.6)	0.200–0.340 (5.1–8.6)	0.200–0.340 (5.1–8.6)
Operating force	20 oz (0.14 N)	28 oz (0.2 N)	26 oz (0.18 N)	28 oz (0.2 N)

[4] Separation between first and second stage trip points is 0.020–0.025 (0.5–0.6).

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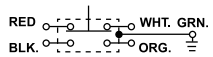
Miniature MS Limit Switch

9007MS

The heavy-duty, miniature MS limit switch is completely encapsulated and intended for difficult applications such as machine tools, earth moving equipment, and general transportation.
9007MS04S0084

The switch has 40 mm mtg hole centers.

MS Circuit—Form C	Electrical Ratings/SPDT Form C (MS Type)			
	Silver Contacts			Gold Contacts
1 N.O.–1 N.C.	Vac	Make	Break	
	120	60 A	6 A	100 mA @ 125 Vac 30 mA 28 Vdc
	240	30 A	3 A	
	10.0 Amperes Continuous			
	DC Contact Rating: 5 A (Res), 28 Vdc			

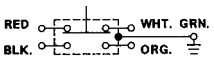
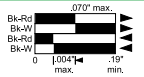
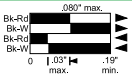
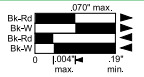
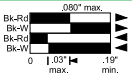
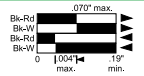
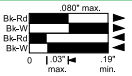
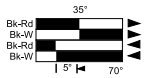
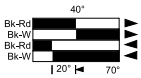
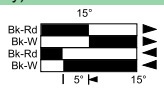
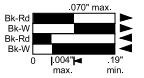
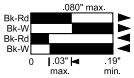
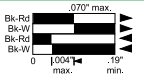
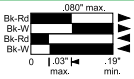
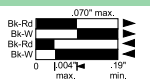
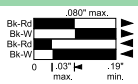
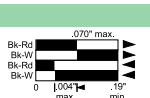
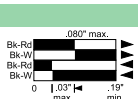
ML Circuit—Form Z	Electrical Ratings/SPDT-DB Form Z (ML Type)		
	Silver Contacts		
1 N.O.–1 N.C.	Vac	Make	Break
	120	60 A	6 A
	240	30 A	3 A
	10.0 Amperes, Continuous		
	DC Contact Rating: 5 A (Res), 28 Vdc		

Table 21.10: Specifications

Temperature range (The minimum temperatures listed are based on the absence of freezing moisture or water.)	-4 °F to +221 °F (-20 °C to +105 °C) For -40 °F / -40 °C minimum temperature, see Forms 21 and 80 on page 21-9.
Enclosure rating	NEMA 1, 2, 4, 6, 6P, 12, 13, IP67
Vibration resistance	10 G (75–1200 Hz)
Shock resistance	35 G
Contact Characteristics	
Rated thermal current	10 A (standard)
Rated insulation voltage	300 Vac and Vdc (standard)
Gold contact switching ratings	0.1A, 24 Vdc; 0.24 VA
Cable	#18 AWG SJTO

Table 21.11: Selection (append prefix 9007 to the catalog number)

Description / Functional Diagram[1]	MS	ML	Operating Force/Torque	Contact Form	Contact Type	Catalog Number[2]
Top plunger						
			80 oz	SPDT Form C	Silver	MS01S0100
			80 oz	SPDT Form C	Gold	MS01G0100
			80 oz	SPDT Form Z	Silver	ML01S0100
Parallel roller plunger						
			80 oz	SPDT Form C	Silver	MS02S0100
			80 oz	SPDT Form C	Gold	MS02G0100
			80 oz	SPDT Form Z	Silver	ML02S0100
Cross roller plunger						
			80 oz	SPDT Form C	Silver	MS03S0100
			80 oz	SPDT Form C	Gold	MS03G0100
			80 oz	SPDT Form Z	Silver	ML03S0100
Rotary lever, CW and CCW						
Not included (see Table 21.14 on page 21-9)			48 oz-in	SPDT Form C	Silver	MS04S0100
			48 oz-in	SPDT Form C	Gold	MS04G0100
			48 oz-in	SPDT Form Z	Silver	ML04S0100
Omnidirectional—wire whisker (NEMA 1, 2, 12, 13 only)						
			15 oz-in	SPDT Form C	Silver	MS05S0100
			15 oz-in	SPDT Form C	Gold	MS05G0100
Bushing mounted—top plunger						
			80 oz	SPDT Form C	Silver	MS06S0100
Bushing mounted—parallel roller plunger						
			80 oz	SPDT Form C	Silver	MS07S0100
			80 oz	SPDT Form C	Gold	MS07G0100
			80 oz	SPDT Form Z	Silver	ML07S0100
Bushing mounted—cross roller plunger						
			80 oz	SPDT Form C	Silver	MS08S0100
Adjustable top plunger						
			80 oz	SPDT Form C	Silver	MS09S0100
			80 oz	SPDT Form Z	Silver	ML09S0100

File CCN E78403 NKCR

File Class LR 25490 3211-03

[1] If the application includes oil, booted switches are recommended. See page 21-9

[2] For available options and part number explanations, see page 21-9. Add options to the end of the catalog number. Up to three options may be added, if applicable.

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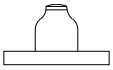
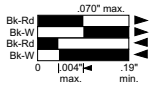
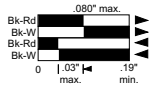
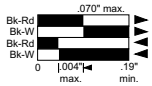
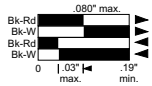
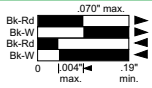
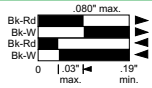
Lever Arms and Options

Table 21.12: Selection—Booted Devices (append prefix 9007 to the catalog number)

Description / Functional Diagram	MS	ML	Operating Force/ Torque	Contact Form	Contact Type	Catalog Number *[3][4]*
Booted top plunger						
			80 oz	SPDT Form C	Silver	MS10S0100
			80 oz	SPDT Form C	Gold	MS10G0100
			80 oz	SPDT Form Z	Silver	ML10S0100
Booted parallel roller plunger						
			80 oz	SPDT Form C	Silver	MS12S0100
			80 oz	SPDT Form Z	Silver	ML12S0100
Booted cross roller plunger						
			80 oz	SPDT Form C	Silver	MS13S0100

Shown with side entrance cable, option 06

8007MS04S0084

Lever

Table 21.13: Cable Length and General Options Designators: 9007MS01Sxxyy

Replace xx and yy in the catalog number above with the designators in the tables below.
Some combinations of cable lengths and options are unavailable; consult Schneider Electric.

Cable Length (xx) *[3]*	Designator
No cable *[5]*	00
3 ft—standard	01
6 ft	02
9 ft	03
12 ft	04
18 ft	05
33 ft	13

General Options (yy) *[3]*	Designator
#16 AWG SJTO cable (MS only)	02
Side entrance #18 AWG SJTO cable	06
Gray #18 AWG SJTO cable	10
Male 4 pin micro-connector in housing (DC type) (MS only)	54
Male 5 pin micro-connector (DC type) (ML only)	55
Low temperature (-40 °F / -40 °C), 9007MS04 (NEMA 1 only)	80
Tapped holes in top of plunger housing (MS and ML)	81
Male 4 pin micro-connector in housing (AC type) (MS only)	82
Male 4-pin micro-connector in housing (AC type) (no cable	84

Table 21.14: Style 7 Levers—0.75 in. (19 mm) diameter, nylon or steel roller (9007 prefix is not required on lever catalog numbers)

Length		Catalog Number 1/4 in. (6 mm) Wide		Catalog Number 1/2 in. (13 mm) Wide		Catalog Number 3/4 in. (19 mm) Wide	Catalog Number 1 in. (25 mm) Wide
inch	(mm)	Nylon	Steel	Nylon	Steel	Nylon	Nylon
0.875	(22.23)	7A2N	7A2	7B2N	7B2	—	—
1.375	(34.93)	7A3N	—	7B3N	—	7F3N	—
1.5	(38.10)	7A1N	7A1	7B1N	—	7F1N	7J1N
1.75	(44.45)	7A7N	—	—	—	—	—
2.00	(50.8)	7A4N	—	7B4N	—	7F4N	7J4N

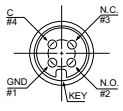
NOTE: Lever tightening torque for mounting the lever on the shaft: minimum **17 lb-in**.
Other levers available. See catalog 9006CT1007. For inside (reverse) roller option at no charge, replace 7 with 7X (for example: 7A2N changes to 7XA2N).

Table 21.15: Specialty Arms (9007 prefix is not required on lever catalog numbers)

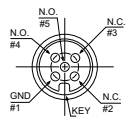
Description	Catalog Number
Style 7D adjustable length 1-3/8" to 3-3/8"—0.75" diameter, 1/4" wide, metal roller	7D
Style 7DN adjustable length 1-3/8" to 3-3/8"—0.75" diameter, 1/4" wide, nylon roller	7DN
Style 7S spring nylon, 6" rod, 0.3" diameter	7S
Style 7N nylon rod, 5" long, 0.3" diameter	7N

NOTE: Lever tightening torque for mounting the lever on the shaft: minimum **17 lb-in**.

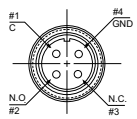
Male plug (face) pin-outs



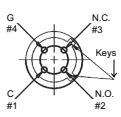
Option 54 (MS only)—DC



Option 55 (ML only)—DC



Option 12 (MS only)—AC or DC (3 Amps)



Option 82 (MS only)—AC

Option 84 (MS only)—AC

NOTE: DC connectors are rated 3 A, 250 Vac/Vdc.

[3] See available options below. Add to the end of the catalog number. Up to three options may be added, if applicable.
[4] This catalog number is for devices with a standard cable and no options.See page for other cable length selections and general options.
[5] Use with options 54, 55, and 82.

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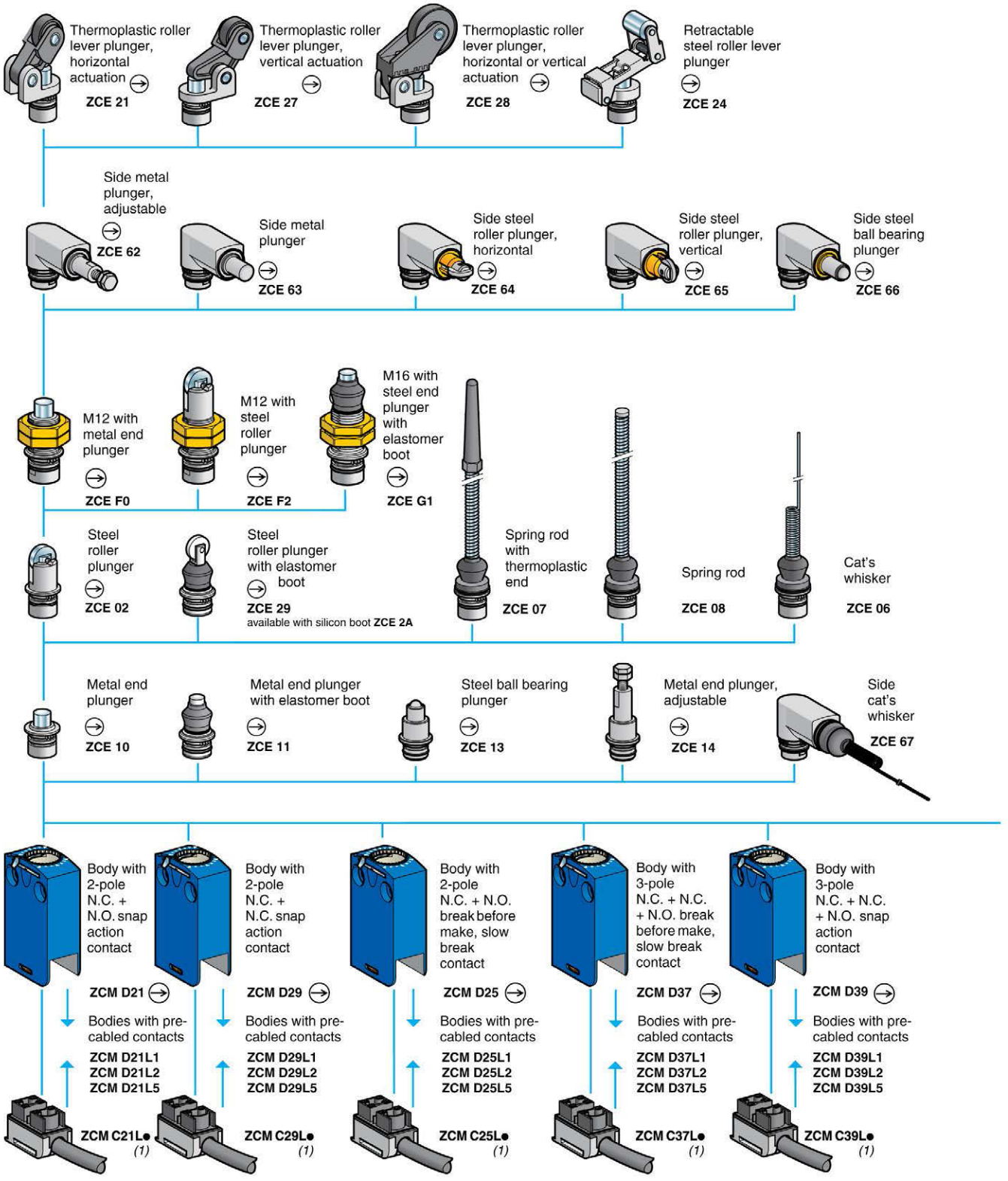
Overview — Metal



1. Pre-cabled connection components: replace the bullet (●) in the catalog number with the required cable length in meters, either 1, 2, 3, 5, 7 or 10.
Example: ZCMC21L• becomes ZCMC21L7 for a 7 m (23.0 ft) cable.
Note: only cable lengths of 1, 2 and 5 m (3.3, 6.6, and 16.4 ft) are available for pre-cabled connection components ZCMC37L● and ZCMC39L●.

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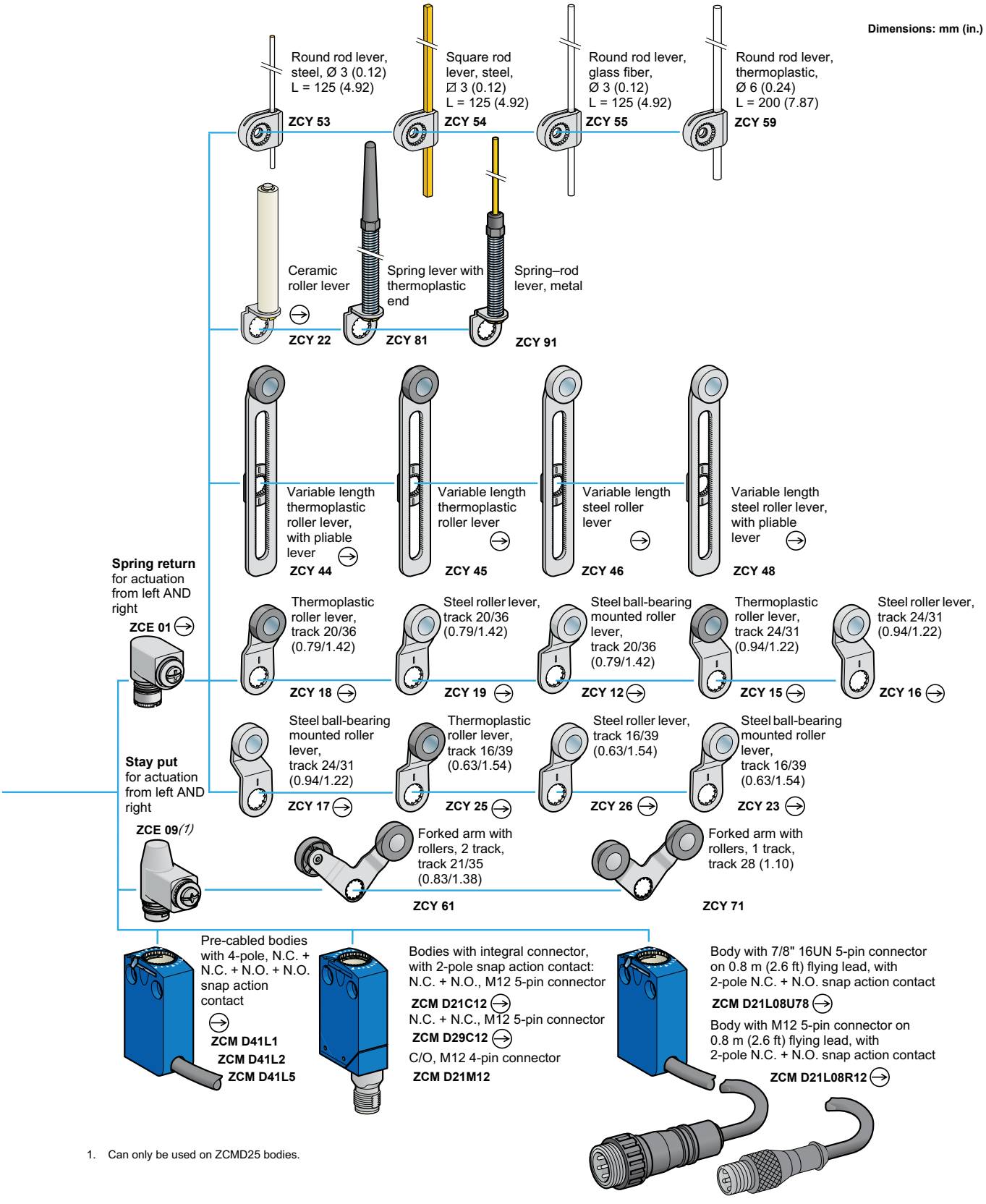
Dimensions: mm (in.)



1. Can only be used on ZCMD25 bodies.

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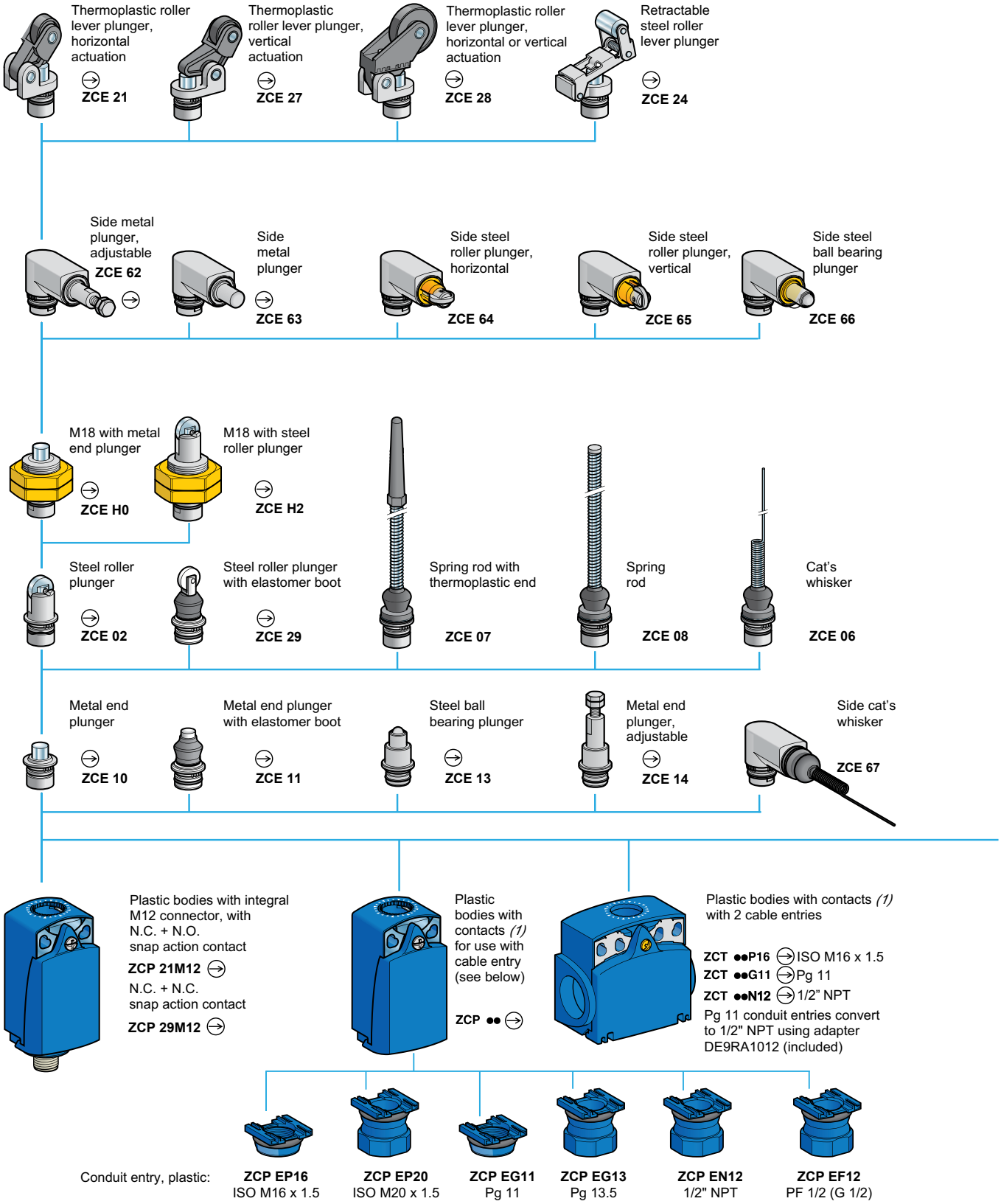
Overview — Metal and Plastic



1. For further details, see catalog 9006CT1007.

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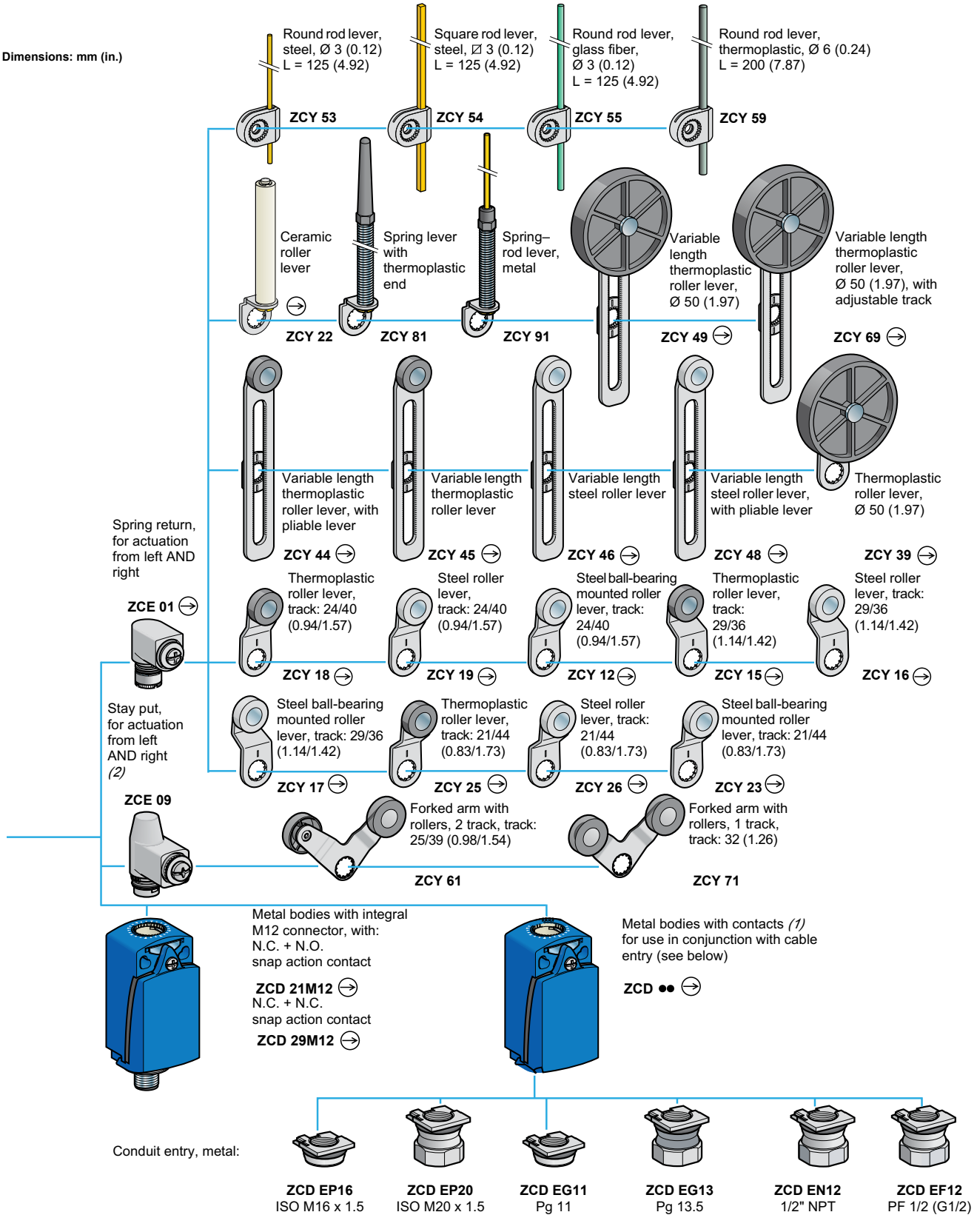
Dimensions: mm (in.)



1. For further details, see catalog 9006CT1007.

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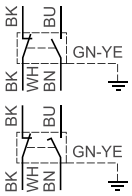
Miniature, Precabled Limit Switches, Metal

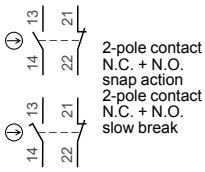
Table 21.16: XCMD Modular and XCMN Non-Modular

OsiSense XCMD, XCMN	Steel Roller Plunger	Plastic Roller Lever	Variable Length Plastic Roller Lever	M12 Head Steel Roller Plunger	Cat Whisker	End Plunger (non-modular)
						
Actuation speed (m/s)	0.5	1.5	1.5	0.1	1	0.5
Switches conforming to IEC 60947-5-1 section 3	yes	yes	yes	yes	no	yes
Degree of protection conforming to IEC 60529	IP66 and IP67	IP66 and IP67	IP66 and IP67	IP66 and IP67	IP66 and IP67	IP65
Rated operational characteristics	Vac 15; B 300 (Ue = 240 V, Ie = 1.5 A) / Vdc 13; R 300 (Ue = 250 V, Ie = 0.1 A)					
Cable entry	pre-cabled, adjustable direction, length = 1 m (other lengths available on request)					pre-cabled length = 1 m
Mounting holes—in. (mm)	0.79 (20)	0.79 (20)	0.79 (20)	0.79 (20)	0.79 (20)	0.79 (20)
Body dimensions—in. (mm), W x D x H	1.18 x 0.63 x 2.32 (30 x 16 x 59)	1.18 x 0.63 x 2.32 (30 x 16 x 59)	1.18 x 0.63 x 2.32 (30 x 16 x 59)	1.18 x 0.63 x 2.32 (30 x 16 x 59)	1.18 x 0.63 x 2.32 (30 x 16 x 59)	1.18 x 0.63 x 2.32 (30 x 16 x 59)
Ordering information	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
2-pole, N.C. + N.O. snap action	XCMD2102L1	XCMD2115L1	XCMD2145L1	XCMD21F2L1	XCMD2106L1	XCMN2110L1
2-pole, N.C. + N.O. break before make, slow break	XCMD2502L1	XCMD2515L1	XCMD2545L1	XCMD25F2L1	XCMD2506L1	—

Exploded view page 21-10

Compact, Modular Limit Switches, Metal or Plastic

Table 21.17: XCKD and XCKP Compact, 30 mm Wide, Conforming to Standard EN 50047

OsiSense XCKP	Metal End Plunger	Plastic Roller Lever Horizontal Actuation	M18 Head Metal End Plunger	Plastic Roller Lever	Variable Length Plastic Roller Lever	Rubber Roller Lever Ø 50 mm	Cat Whisker
							
Actuation speed (m/s)	0.5	1	0.5	1.5	1.5	1.5	1
Switches conforming to IEC 60947-5-1 section 3	yes	yes	yes	yes	yes	yes	no
Degree of protection conforming to IEC 50 529	IP66 and IP67	IP66 and IP67	IP66 and IP67	IP66 and IP67	IP66 and IP67	IP66 and IP67	IP66 and IP67
Rated operational characteristics	Vac 15; A 300 (Ue = 240 V, Ie = 3 A) / Vdc 13; Q 300 (Ue = 250 V, Ie = 0.27 A)						
Cable entry	1 tapped entry for 1/2" NPT						
Mounting holes (mm)	20	20	M18 x 1	20	20	20	20
Body dimensions (mm) W x D x H	30 x 30 x 73	30 x 30 x 73	30 x 30 x 73	30 x 30 x 73	30 x 30 x 73	30 x 30 x 73	30 x 30 x 73
Ordering information	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
XCKD Metal, 30 mm Wide							
2-pole, N.C.+ N.O. snap action	XCKD2110N12	XCKD2121N12	XCKD21H0N12	XCKD2118N12	XCKD2145N12	XCKD2139N12	XCKD2106N12
2-pole, N.C.+ N.O. break before make, slow break	XCKD2510N12	XCKD2521N12	XCKD25H0N12	XCKD2518N12	XCKD2545N12	XCKD2539N12	XCKD2506N12
XCKP Plastic, 30 mm Wide, Double Insulated							
2-pole, N.C.+ N.O. snap action	XCKP2110N12	XCKP2121N12	XCKP21H0N12	XCKP2118N12	XCKP2145N12	XCKP2139N12	XCKP2106N12
2-pole, N.C.+ N.O. break before make, slow break	XCKP2510N12	XCKP2521N12	XCKP25H0N12	XCKP2518N12	XCKP2545N12	XCKP2539N12	XCKP2506N12

Exploded view page 21-12

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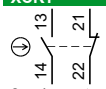
Compact Limit Switches with 2 Cable Entries and Modular Head

Table 21.18: XCKT Compact, Plastic, 2 Cable Entries, Standard, 40 mm

OsiSense XCKT		Metal End Plunger	Metal Roller Plunger	Plastic Roller Lever
 2-pole contact N.C. + N.O. snap action				
Actuation speed (m/s)		0.5	0.5	1.5
Switches conforming to IEC 60947-5-1 section 3		yes	yes	yes
Degree of protection conforming to IEC 60529		IP66 and IP67	IP66 and IP67	IP66 and IP67
Rated operational characteristics		Vac 15; A 300 (Ue = 240 V, Ie = 3 A) / Vdc 13; Q 300 (Ue = 250 V, Ie = 0.27 A)		
Cable entry		Two Pg 11 cable entries. One 1/2" NPT adapter, DE9RA1012, is included.		
Mounting holes—in. (mm)		0.79 or 1.57 (20 or 40)	0.79 or 1.57 (20 or 40)	0.79 or 1.57 (20 or 40)
Body dimensions—in. (mm), W x D x H		2.36 x 1.18 x 2.4 (60 x 30 x 61)	2.36 x 1.18 x 2.4 (60 x 30 x 61)	2.36 x 1.18 x 2.4 (60 x 30 x 61)
Ordering information		Cat. No.	Cat. No.	Cat. No.
Complete switch	2-pole, N.C. + N.O. snap action	XCKT2110N12	XCKT2102N12	XCKT2118N12

Modular, Compact Limit Switches with Manual Reset

Table 21.19: XCDR and XCPR Compact, Metal or Plastic, with Manual Reset, 30 mm

OsiSense XCDR and XCPR		Metal End Plunger	Plastic Roller Lever Horizontal Actuation	Plastic Roller Lever Vertical Actuation
Actuation speed (m/s)		0.5	1	1
Switches conforming to IEC 60947-5-1 section 3		yes	yes	yes
Degree of protection conforming to IEC 60529		IP66 and IP67	IP66 and IP67	IP66 and IP67
Rated operational characteristics		Vac 15; A 300 (Ue = 240 V, Ie = 3 A) / Vdc 13; Q 300 (Ue = 250 V, Ie = 0.27 A)		
Cable entry		1 tapped entry for 1/2" NPT		
Mounting holes—in. (mm)		0.79 (20)	0.79 (20)	0.79 (20)
Body dimensions—in. (mm), W x D x H		1.18 x 1.18 x 3.74 (30 x 30 x 95)	1.18 x 1.18 x 3.74 (30 x 30 x 95)	1.18 x 1.18 x 3.74 (30 x 30 x 95)
Ordering information		Cat. No.	Cat. No.	Cat. No.
XCDR Metal				
Complete switch	2-pole, N.C. + N.O. snap action	XCDR2110N12	XCDR2121N12	XCDR2127N12
	2-pole, N.C. + N.O. break before make, slow break	XCDR2510N12	XCDR2521N12	XCDR2527N12
XCPR Plastic, Double Insulated				
Complete switch	2-pole, N.C. + N.O. snap action	XCPR2110N12	XCPR2121N12	XCPR2127N12
	2-pole, N.C. + N.O. break before make, slow break	XCPR2510N12	XCPR2521N12	XCPR2527N12

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Common Head and Levers for XCMD, XCKD, XCKP, XCKT

Table 21.20: Metal Plunger and Multi-Directional Heads

Metal End Plunger	Metal End Plunger with Elastomer Protective Boot	Steel Roller Plunger	Retractable Steel Roller Lever	Plastic Roller Lever, Horizontal Actuation	Plastic Roller Lever, Vertical Actuation
Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
ZCE10	ZCE11	ZCE02	ZCE24	ZCE21	ZCE27

M12 Head Metal Plunger[1]	M18 Head Metal Plunger[2]	M12 Head Steel Roller Plunger[2]	M18 Head Steel Roller Plunger[2]	Spring Lever	Spring Lever with Plastic End	Cat Whisker
Bushing Mounted	Bushing Mounted	Bushing Mounted	Bushing Mounted			
Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
ZCEF0	ZCEH0	ZCEF2	ZCEH2	ZCE08	ZCE07	ZCE06

Table 21.21: Metal Rotary Heads and Levers

Rotary Head without Lever, Spring Return, for Actuation from RH or LH Side	Rotary Head without Lever, Stay Put, for Actuation from RH or LH Side [3]	Plastic Roller Lever, Track: 24/31 mm (ZCMD) 29/36 mm (ZCD/P/T)[1]	Steel Roller Lever, Track: 24/31 mm (ZCMD) 29/36 mm (ZCD/P/T)[1]	Plastic Roller Lever, Track: 16/39 mm (ZCMD) 21/44 mm (ZCD/P/T)[1]	Steel Roller Lever, Track: 16/39 mm (ZCMD) 21/44 mm (ZCD/P/T)[1]	Plastic, Roller Lever, Track: 20/36 mm (ZCMD) 24/40 mm (ZCD/P/T)[2]
Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
ZCE01	ZCE09	ZCY15	ZCY16	ZCY25	ZCY26	ZCY18

Steel Roller Lever, for Track: 20/36 mm (ZCMD) 24/40 mm (ZCD/P/T)[2]	Ceramic Roller Lever	Variable Length, Rigid Plastic Roller Lever	Variable Length, Bendable Plastic Roller Lever	Variable Length, Rigid Steel Roller Lever	Variable Length, Bendable Steel Roller Lever	Metal Spring Lever
Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
ZCY19	ZCY22	ZCY45	ZCY44	ZCY46	ZCY48	ZCY91

Plastic Roller Lever Ø 50 mm	Adjustable Plastic Roller Lever Ø 50 mm	Square Steel Rod Lever, U 3 mm, length = 125 mm	Round, Glass Fiber Rod Lever, Ø 3 mm length = 125 mm	Round Plastic Rod Lever, Ø 6 mm, length = 200 mm	Forked Lever Arm with 2 Tracks: 25/39 mm	Forked Lever Arm with 1 Track: 32 mm
					Recommended for Use with ZCE09 Head	Recommended for Use with ZCE09 Head
Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
ZCY39	ZCY49	ZCY54	ZCY55	ZCY59	ZCY61	ZCY71

[1] Recommended for use with body: ZCMD...
[2] Recommended for use with body ZCD... / ZCP... / ZCT...
[3] Can only be used on ZCMD25 bodies.

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Body/Contact Assemblies

NOTE: Metal components must be used with metal bodies. Plastic components must be used with plastic bodies.

Table 21.22: Miniature, Metal Body/Contact Assemblies

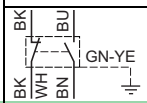
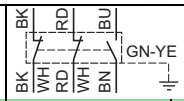
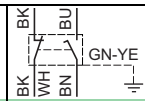
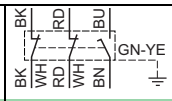
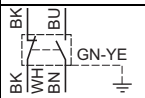
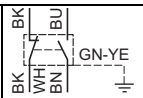
Type of contact	2-pole N.C. + N.O. Snap action	2-pole N.C. + N.C. Snap action	3-pole N.C. + N.C. + N.O. Snap action	4-pole N.C. + N.C. + N.O. + N.O. Snap action	2-pole N.C. + N.O. Slow break	3-pole N.C. + N.C. + N.O. Slow break	2-pole N.C. + N.O. Snap action 5-pin connector	1 SPDT contact Snap action 4-pin connector
								
	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
Metal body	ZCMD21	ZCMD29	ZCMD39	ZCMD41	ZCMD25	ZCMD37	ZCMD21C12	ZCMD21M12

Table 21.23: Connection of Miniature Body/Contact Assemblies

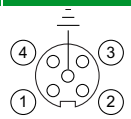
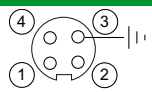
Length (m)	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.		
Specific pre-cabled connection components						 1 – 2 = N.C. 3 – 4 = N.O. 5 = Ground	 1 = Common 2 = N.C. 3 = Ground 4 = N.O.
1	ZCMC21L1	ZCMC29L1	ZCMC39L1		ZCMC25L1	ZCMC37L1	
2	ZCMC21L2	ZCMC29L2	ZCMC39L2		ZCMC25L2	ZCMC37L2	
5	ZCMC21L5	ZCMC29L5	ZCMC39L5		ZCMC25L5	ZCMC37L5	

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Table 21.24: Compact, Metal or Plastic Body/Contact Assemblies

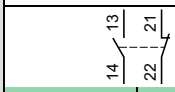
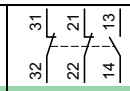
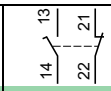
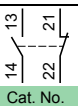
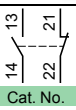
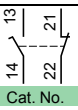
Type of contact	2-pole N.C. + N.O. Snap action	2-pole N.C. + N.O. Snap action	3-pole N.C. + N.C. + N. O. Snap action	2-pole N.C. + N.O. Slow break	2-pole N.C. + N.O. Snap action	2-pole N.C. + N.O. Snap action	2-pole N.C. + N.O. Snap action	2-pole N.C. + N.O. Snap action	2-pole N.C. + N.O. Slow break
									
	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	C at. No.	Cat. No.	Cat. No.	Cat. No.
Metal	ZCD21	ZCD29	ZCD39	ZCD25	—	ZCD21M12	—	—	—
Plastic	ZCP21	ZCP29	ZCP39	ZCP25	ZCP21D44	—	ZCP21M12	ZCT21P16	ZCT25P16

Table 21.25: Connection of Compact Body/Contact Assemblies

	ISO M16	ISO M20	Pg 11	Pg 13.5	1/2" NPT	PF 1/2 NPSF	Deutsch Connector
	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
Interchangeablecable entry							
Metal	ZCDEP16	ZCDEP20	ZCDEG11	ZCDEG13	ZCDEN12	ZCDEF12	—
Plastic	ZCPEP16	ZCPEP20	ZCPEG11	ZCPEG13	ZCPEN12	ZCPEF12	ZCPED44

NOTE: Plastic conduit entries shown. Order **plastic** conduit entries for **plastic** bodies (XCKP/ZCP).
Order **metal** conduit entries (chrome color) for **metal** bodies (XCKD/ZCD). *Metal conduit entries do not fit on plastic bodies.*

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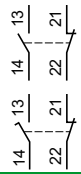
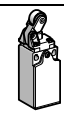
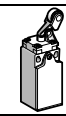
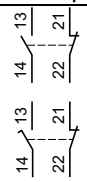
XCKN / XCNR Compact Plastic, Non-Modular Switches

Table 21.26: XCKN Compact Plastic, Non-Modular, 30 mm Wide

OsiSense Limit Switches



						
		Metal end plunger	**Plastic roller plunger for lateral cam approach**	**Plastic roller plunger for cross cam approach**	**Thermoplastic roller-lever plunger** **Horizontal actuation in 1 direction**	**Thermoplastic roller-lever plunger** **Vertical actuation in 1 direction**
Switch actuation		On end	By 30° cam			
Type of actuation						
Maximum actuation speed		0.5 m/s (1.64 ft/s)	0.3 m/s (0.99 ft/s)		0.1 m/s (3.28 ft/s)	
Minimum force of torque	For tripping	15 N (3.37 lb)	12 N (2.70 lb)		6 N (1.35 lb)	
	For positive opening	30 N (6.75 lb)	20 N (4.50 lb)		10 N (2.25 lb)	
Weight, kg (lb)		0.065 (0.143)	0.065 (0.143)	0.065 (0.143)	0.070 (0.154)	0.070 (0.154)
Ordering Information (sold in packs of 20)		Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
2 pole N.C. + N.O. snap action		XCKN2110P20	XCKN2102P20	XCKN2103P20	XCKN2121P20	XCKN2127P20
2 pole N.C. + N.O., break before make, slow break		XCKN2510P20	XCKN2502P20	XCKN2503P20	XCKN2521P20	XCKN2527P20
2 pole N.C. + N.C. snap action		XCKN2910P20	XCKN2902P20	XCKN2903P20	XCKN2921P20	XCKN2927P20



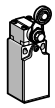
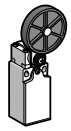
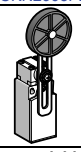
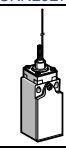
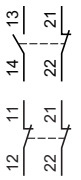
							
		Rotary, thermoplastic roller-lever	**Rotary, variable length thermoplastic roller-lever**	**Rotary, thermoplastic roller-lever, Ø 50 mm**	**Rotary, variable length, thermoplastic roller-lever, Ø 50 mm**	**Multi-directional, spring rod**	**Multi-directional, cat's whisker**
Switch actuation		By 30° cam				By any moving part	
Type of actuation							
Maximum actuation speed		1.5 m/s (4.92 ft/s)				1 m/s (3.28 ft/s), any direction	
Minimum force of torque	For tripping	0.1 N•m (0.89 lb-in)				0.13 N•m (0.11 lb-in)	
	For positive opening	0.15 N•m (1.33 lb-in)				–	
Weight, kg (lb)		0.085 (0.187)	0.090 (0.198)	0.110 (0.243)	0.115 (0.254)	0.085 (0.187)	0.075 (0.165)
Ordering Information (sold in packs of 20)		Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
2 pole N.C. + N.O. snap action		XCKN2118P20	XCKN2145P20	XCKN2139P20	XCKN2149P20	XCKN2108P20	XCKN2106P20
2 pole N.C. + N.O., break before make, slow break		XCKN2518P20	XCKN2545P20	XCKN2539P20	XCKN2549P20	XCKN2508P20	XCKN2506P20
2 pole N.C. + N.C. snap action		XCKN2918P20	XCKN2945P20	XCKN2939P20	XCKN2949P20	XCKN2908P20	XCKN2906P20

Table 21.27: XCNR Compact Plastic, Non-Modular, with Manual Reset, 30 mm Wide



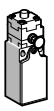
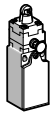
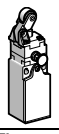
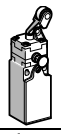
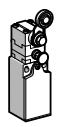
						
		Metal end plunger	**Plastic roller plunger**	**Thermoplastic roller-lever plunger** **Horizontal actuation in 1 direction**	**Thermoplastic roller-lever plunger** **Vertical actuation in 1 direction**	**Rotary head, thermoplastic roller-lever plunger**
Switch actuation		On end	By 30° cam			
Type of actuation						
Maximum actuation speed		0.5 m/s (1.64 ft/s)	0.3 m/s (0.99 ft/s)	0.1 m/s (3.28 ft/s)		1.5 m/s (4.92 ft/s)
Minimum force of torque	For tripping	15 N (3.37 lb)	12 N (2.70 lb)	6 N (1.35 lb)		0.1 N•m (0.89 lb-in)
	For positive opening	30 N (6.74 lb)	20 N (4.50 lb)	10 N (2.25 lb)		0.15 N•m (1.33 lb-in)
Weight, kg (lb)		0.080 (0.18)	0.080 (0.18)	0.085 (0.19)	0.090 (0.20)	0.100 (0.22)
Ordering Information (sold in packs of 20)		Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
2 pole N.C. + N.O.snap action		XCNR2110P20	XCNR2102P20	XCNR2121P20	XCNR2127P20	XCNR2118P20
2 pole N.C. + N.O. break before make, slow break		XCNR2510P20	XCNR2502P20	XCNR2521P20	XCNR2527P20	XCNR2518P20
2 pole N.C. + N.C. snap action		XCNR2910P20	XCNR2902P20	XCNR2921P20	XCNR2927P20	XCNR2918P20

Table 21.28: Cable Entries and Contact Configurations

Cable entry	M20	Order with suffix P20 for 1 entry tapped to M20 x 1.5 mm for ISO cable entry. Clamping capacity 7 to 13 mm (0.28 to 0.51 in.)
	Pg 11	Replace P20 suffix with G11suffix, 18.6 x 1.41
	1/2" NPT	Replace P20 suffix with G11 suffix. Order 1/2" NPT adapter DE91012
	Other cable entries	For other cable entries, including complete switches with ISO M16 x 1.5 or PF 1/2 (G 1/2) cable entry, please consult your local sales office.
Other contact configurations		For other 2- and 3-pole configurations, please consult your local sales office.
Function diagrams		See catalog 9006CT1007.

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XCKS Standard Body, Plastic, Double Insulated

Table 21.29: Enviromental Specifications

Conforming to standards	Products	IEC 60947-5-1, EN 60947-5-1, UL 508, CSA C22-2 n° 14
	Machine assemblies	IEC 60204-1, EN 60204-1
Approvals		UL, CSA, CCC
Ambient air temperature	For operation	- 25 to +70 °C (-13 to +158 °F)
	For storage	- 40 to +70 °C (-40 to +158 °F)
Vibration resistance	Conforming to IEC 60068-2-6	25 gn (10–500 Hz)
Shock resistance	Conforming to IEC 60068-2-27	50 gn (11 ms)
Electric shock protection		Class II conforming to IEC 61140 and NF C 20-030
Degree of protection		**IP 65** conforming to **IEC 60529; IK 03** conforming to **EN 50102**
Repeat accuracy		0.05 mm on the tripping points, with 1 million operating cycles for head with end plunger
Cable entry	Depending on model	Tapped entry for PG 13 conduit thread. To convert to 1/2" NPT, use adapter **DE9RA1212**. For ISO M20 x 1.5, add **H29** to the end of the catalog number. Example: **XCKS101** becomes **XCKS101H29**.
Materials		Plastic (body and head)

Table 21.30: Selection, Plunger and Rotary Heads

	Form B *[1]*	Form C *[1]*	Form A *[1]*				Form D *[1]*
2-pole N.C. + N.O. snap action							
2-pole N.C. + N.O. break before make, slow break	**Metal end plunger**	**Steel roller plunger**	**Thermoplastic roller lever** *[2]*	**Elastomer roller lever, Ø 50 mm (1.97 in.)** *[2]*	**Variable length thermoplastic roller lever** *[2]*	**Variable length elastomer roller lever, Ø 50 mm (1.97 in.)** *[2]*	**Round thermoplastic rod lever, Ø 6 mm (0.24 in.)** *[3] [4]*
2-pole N.C. + N.C.							
Ordering Information *[5]*	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
2-pole N.C. + N.O. snap action (XE2SP2151)	XCKS101 ⊖	XCKS102 ⊖	XCKS131 ⊖	XCKS139	XCKS141	XCKS149	XCKS159
2-pole N.C. + N.O. break before make, slow break (XE2NP2151)	XCKS501 ⊖	XCKS502 ⊖	XCKS531 ⊖	XCKS539	XCKS541	XCKS549	XCKS559
2-pole N.C. + N.C. snap action (XE2SP2141)	ZCKS9 + ZCKD01 ⊖	ZCKS9 + ZCKD02 ⊖	ZCKS9 + ZCKD31 ⊖	ZCKS9 + ZCKD39	ZCKS9 + ZCKD41	ZCKS9 + ZCKD49	ZCKS9 + ZCKD59
2-pole N.C. + N.C. simultaneous, slow break (XE2NP2141)	ZCKS7 + ZCKD01 ⊖	ZCKS7 + ZCKD02 ⊖	ZCKS7 + ZCKD31 ⊖	ZCKS7 + ZCKD39	ZCKS7 + ZCKD41	ZCKS7 + ZCKD49	ZCKS7 + ZCKD59
Weight, kg (lb)	0.095 (0.209)	0.105 (0.231)	0.145 (0.320)	0.150 (0.331)	0.155 (0.342)	0.155 (0.342)	0.150 (0.331)
Contact operation	⊖ N.C. contact with positive opening operation, when properly mounted and using a conforming operator.			—			

Table 21.31: Specifications

Switch actuation		On end	By 30° cam			By any moving part
Type of actuation						
Maximum actuation speed		0.5 m/s (1.64 ft/s)		1.5 m/s (4.92 ft/s)		1 m/s (3.28 ft/s)
Minimum force or torque	For tripping	15 N (3.37 lb)	12 N (2.70 lb)	0.15 N•m (1.33 lb-in)		
	For positive opening	45 N (10.12 lb)	36 N (8.09 lb)	0.3 N•m (2.66 lb-in)	—	—
Cable entry		1 entry tapped M20 x 1.5 mm for ISO cable entry, clamping capacity 7 to 13 mm (0.28 to 0.51 in.) To convert PG 13 to 1/2" NPT, use adapter **DE9RA1212**. For ISO M20 x 1.5, add **H29** to the end of the catalog number. Example: **XCKS101** becomes **XCKS101H29**.				

[1] Form conforming to EN 50041. See page 6/92 of catalog 9006CT1007.
[2] Adjustable throughout 360° in 5° steps, or in 90° steps by reversing the notched washer.
[3] Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting.
[4] Value taken with actuation by moving part at 100 mm (3.94 in.) from the mounting.
[5] Switches with gold contacts or eyelet type connections: please consult your local sales office.

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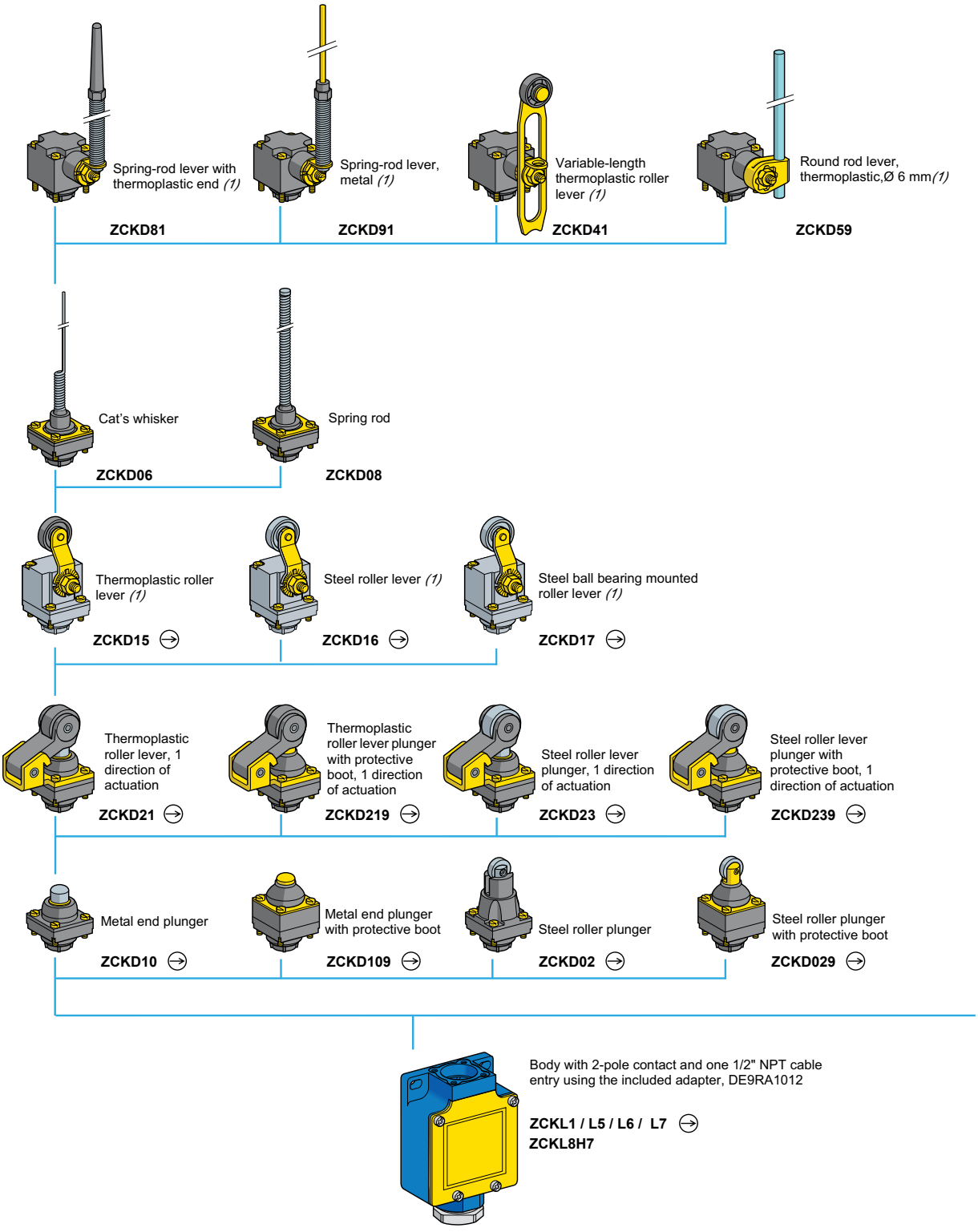
Overview — Metal, Variable Composition



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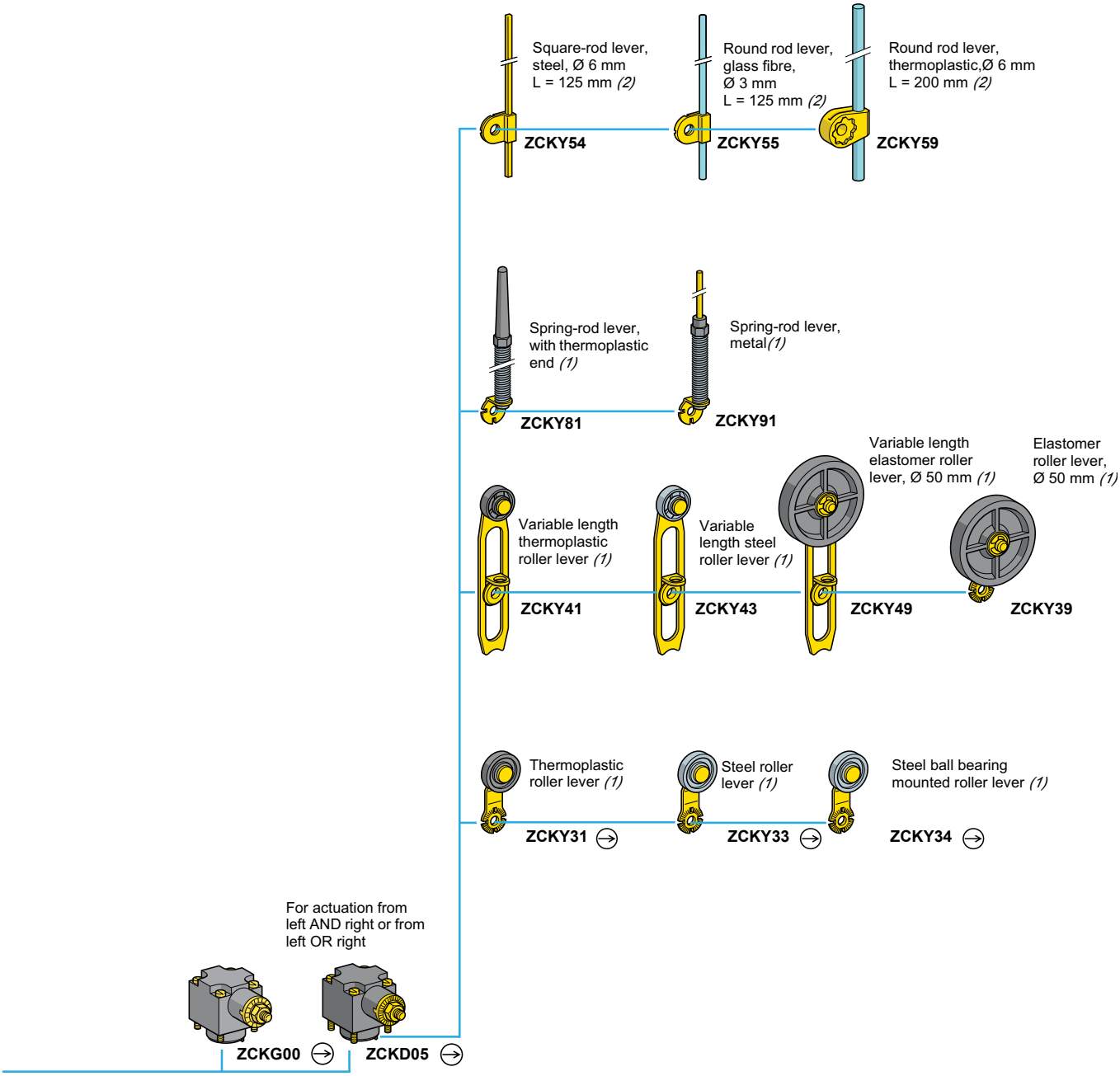

⊖ Head assuring positive opening operation when used with a conforming lever.
(1) Adjustable throughout 360° in 5° steps, or in 90° steps by reversing the notched washer.
(2) Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting.

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XCKL Limit Switch

XCKL is a compact, general-duty limit switch for applications such as machine tools and material handling.

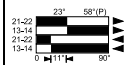
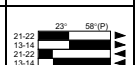
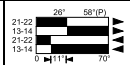
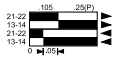
XCKL110H7

Table 21.32: Specifications

Rated Power (conforms to IEC 947-5-1, duty categories AC15 and DC13)	
Temperature range	-13 to +158 °F (-25 to +70 °C) The minimum temperatures listed are based on the absence of freezing moisture or water.
Enclosure rating	NEMA Type 1, 2, 3, 4, 12
	IP66
Vibration resistance	25 G (10–500 Hz), conforming to IEC 68-2-6
Shock resistance	50 G, conforming to IEC 68-2-27
Repeatability	0.002 in. (0.05 mm)
Cable entry	Standard: Pg 11 with DE9RA1012 adapter for 1/2" NPT conduit entry
Contact Characteristics	
Rated thermal current	10 A
Rated insulation voltage	300 Vac and dc (A300 and Q300)
Contact resistance (max.)	25 mW
Cable (max.)	2 x #16 AWG (1.5 mm²) per terminal
Short circuit protection (customer supplied)	10 A fuse type SC. Outside U.S. use gl or N.

Complete Switches

Table 21.33: Lever Operated Switches

Description *[1]*	Functional Diagram	Operating Torque/Force	Contact Configuration	Catalog Number
Programmable head CW and/or CCW–snap action Delrin® roller lever–adjustable in 5° or 45° in increments (reversible mounting).		14.2 oz-in	SPDT (N.O. + N.C.) snap	XCKL10011H7
		14.2 oz-in	SPDT (N.O. + N.C.) slow	XCKL50011H7
Adjustable length roller lever–adjustable in 5° or 45° increments (reversible mounting).		14.2 oz-in	SPDT (N.O. + N.C.) snap	XCKL10041H7
		14.2 oz-in	SPDT (N.O. + N.C.) slow	XCKL50041H7
CW and CCW, Delrin roller lever		21.3 oz-in	SPDT (N.O. + N.C.) snap	XCKL115H7
		21.3 oz-in	SPDT (N.O. + N.C.) slow	XCKL515H7
One way lever-Delrin roller		25.3 oz-in	SPDT (N.O. + N.C.) snap	XCKL121H7
		25.3 oz-in	SPDT (N.O. + N.C.) slow	XCKL521H7

XCKL10011H7

XCKL115H7

Table 21.34: Omnidirectional

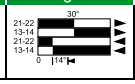
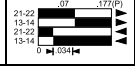
Description *[1]*	Functional Diagram	Operating Torque/Force	Contact Configuration	Catalog Number
Wobble stick-steel rod		1.84 oz-in	SPDT (N.O. + N.C.) snap	XCKL106H7
		1.84 oz-in	SPDT (N.O. + N.C.) slow	XCKL506H7

Table 21.35: Plunger Operated

Description *[1]*	Functional Diagram	Operating Torque/Force	Contact Configuration	Catalog Number
Rod plunger		35.6 oz	SPDT (N.O. + N.C.) snap	XCKL110H7
		35.6 oz	SPDT (N.O. + N.C.) slow	XCKL510H7
Roller plunger		35.6 oz	SPDT (N.O. + N.C.) snap	XCKL102H7
		35.6 oz	SPDT (N.O. + N.C.) slow	XCKL502H7

XCKL110H7

XCKL102H7

Exploded view page 21-20

Lever arms page 21-23

File CCN E39281 NKCR

File Class LR44087 3211-03

Acceptable Wire Sizes: 14–24 AWG
Recommended Terminal Clamp Torque: 13 lb-in

[1] Diagrams shown are for XCKL1 • • •.

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XCKL Components

ZCKL1H7, ZCKL5H7

ZCKG00H7

ZCKD15, 16, 17H7

Building a Complete Switch

Complete Switch =

Body (with contact assembly)
+ Head
+ Lever

Examples:

Body ZCKL1H7 +	**Head** ZCKD15 =		**XCKL115H7**
Body ZCKL5H7 +	**Head** ZCKD02 =		**XCKL502H7**
Body ZCKL1H7 +	**Head** ZCKG00 =	**Lever** ZCKY11 =	**XCKL10011H7**

NOTE: Some combinations are not available as complete switches.

ZCKD10H7

ZCKD02H7

ZCKD21,23H7

ZCKY11H7

ZCKY43H7

ZCKY51H7

ZCKY71H7

ZCKY81H7

ZCKY91H7

Table 21.36: Bodies—Electric

Components	Contacts	Catalog Number
Body: Single pole, double break, 1 N.O. + 1 N.C. Snap action, positive opening, same polarity	Silver	ZCKL1H7
	Gold Flashed	ZCKL18H7
Body: Single pole, double break, 1 N.O. + 1 N.C. Slow make, slow break isolated	Silver	ZCKL5H7

Table 21.37: Rotary Heads

Components		Catalog Number
Programmable head *[2]* CW and/or CCW	Select lever arm separately	ZCKG00
Offset Delrin roller lever *[3]*		ZCKD15
Offset steel roller lever *[3]*		ZCKD16
Offset ball-bearing roller lever *[3]*		ZCKD17

Table 21.38: Plunger Heads

Description	Catalog Number
Rod plunger	ZCKD10
Booted rod plunger	ZCKD109
Roller plunger	ZCKD02
Booted roller plunger	ZCKD029
One-way lever—Delrin roller	ZCKD21
Steel roller	ZCKD23

Table 21.39: Omnidirectional Heads

Description	Catalog Number
Cat whisker—steel rod *[4]*	ZCKD06
Wobble spring—steel spring *[4]*	ZCKD08

Table 21.40: Replacement Parts

Description	Catalog Number
Contact block for ZCKL1	XESP2151
Contact block for ZCKL5	XENP2151
Gold flashed contact block for ZCKL18	XESP2158
Pg 11 to 1/2" NPT conduit entry adapter	DE9RA1012

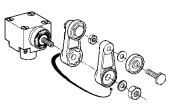
Table 21.41: Levers (for use with ZCKG00 heads only—will not fit ZCKD heads)

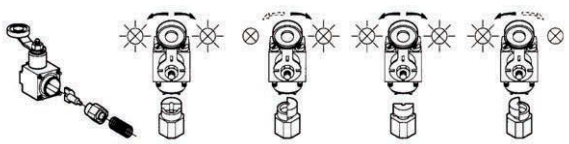
Description	Size	Adjustment *[5]* Increments	Catalog Number
Delrin roller	0.9 in. diameter, 0.2 in. wide, 1.6 in. long	5° or 45°	ZCKY11
Steel roller	0.9 in. diameter, 0.2 in. wide, 1.6 in. long	5° or 45°	ZCKY13
Ball bearing roller	0.9 in. diameter, 0.2 in. wide, 1.6 in. long	5° or 45°	ZCKY14
Adjustable length Delrin roller *[6]*	0.74 in. diameter, 0.2 in. wide, 4.2 in. long (max.)	5° or 90°	ZCKY41
Steel roller	0.74 in. diameter, 0.2 in. wide, 4.2 in. long (max.)	5° or 90°	ZCKY43
Steel rod, square *[6]*	1/8 in. side, 5.4 in. long (max.)	5° or 45°	ZCKY51
Fiberglass rod, round *[6]*	1/8 in. diameter, 5.4 in. long (max.)	5° or 45°	ZCKY52
Steel rod, round *[6]*	1/8 in. diameter, 5.4 in. long (max.)	5° or 45°	ZCKY53
Plastic rod, round *[6]*	1/4 in. diameter, 8.4 in. long (max.)	5° or 45°	ZCKY59
Fork, 2 track Delrin roller	0.9 in. diameter, 0.2 in. wide for ZCKE092	5° or 45°	ZCKY71
Coil spring lever *[6]*	4.41 in. (112 mm)	5° or 45°	ZCKY81
Spring rod lever *[6]*	7.05 in. (179 mm)	5° or 45°	ZCKY91

Acceptable Wire Sizes: 14–24 AWG
Recommended Terminal Clamp Torque: 13 lb-in

ZCKG00 Programming

The ZCKG00 head is field convertible to CW, CCW, or CW/CCW.


Reverse Lever Mounting



UL File: 78403 CCN: NKCR

CSA File: LR25490 Class: 3211 03

CE

[2] See page 21-22
[3] Replacement arms are not available separately. Order complete head as a replacement.
[4] Replacement cat whiskers and wobble extensions are not available separately. Order complete head as a replacement.
[5] Reverse mounting (for ZCKG00 head)—The higher increment (45° or 90°) is a positive opening contact feature which ensures no loss of mechanical effort between the actuation point and the moving contact bridge of the N.C. contact even if the lever is loosely mounted on the head shaft.
[6] Flexible operators do not guarantee direct (positive) opening operation.

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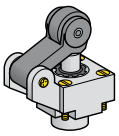
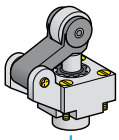
Overview — Standard Industrial, Metal



Thermoplastic roller lever plunger, 1 direction of actuation

ZCKE21

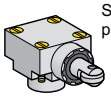


Steel roller lever plunger, 1 direction of actuation

ZCKE23

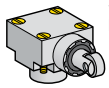
Side metal plunger

ZCKE63



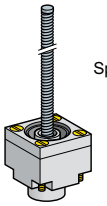
Side steel roller plunger, horizontal *(1)*

ZCKE64



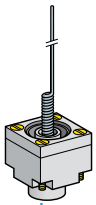
Side steel roller plunger, horizontal *(1)*

ZCKE65



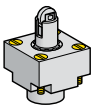
Spring rod

ZCKE08



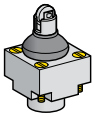
Cat's whisker

ZCKE06



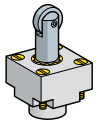
End reinforced steel roller plunger

ZCKE67



End steel roller plunger with protective boot

ZCKE629

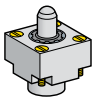


End steel roller plunger

ZCKE62

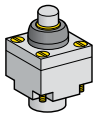
End metal plunger

ZCKE61



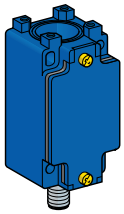
End steel ball bearing plunger

ZCKE66



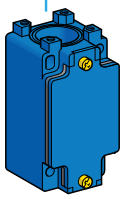
End metal plunger with protective boot

ZCKE619



Body with 2-pole contact, fixed, 1 step, M12 connector *(2)*

ZCKJ1D / J5D / J6D / J7D
ZCKJ8D



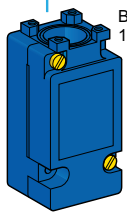
Body with contact, cable entry for 1/2" NPT fixed, 1 step *(2) (3)*

ZCKJD3●
ZCKJ1 / J5 / J6 / J7 / J9H7

Body with contact, cable entry for 1/2" NPT fixed, 1 step *(2) (3)*

ZCKJ2 / J8H7
Body with contact, cable entry for 1/2" NPT fixed, 2 step *(2) (3)*

ZCKJ4H7
2 CO snap action



Body with contact, cable entry for 1/2" NPT plug-in, 1 or 2 step *(2) (3)*

ZCKJ11 / J21 / J41H7

(1) Cannot be used with bodies ZCKJ4H7 and ZCKJ41H7.
(2) For further information, see page 21-27.
(3) For a cable entry tapped ISO M20 x 1.5, change H7 to H29. Example: ZCKJ1**H7** becomes ZCKJ1**H29**.
For a cable entry tapped Pg 13.5, delete H7 from the catalog number. Example: JCKJ1H7 becomes ZCKJ1.

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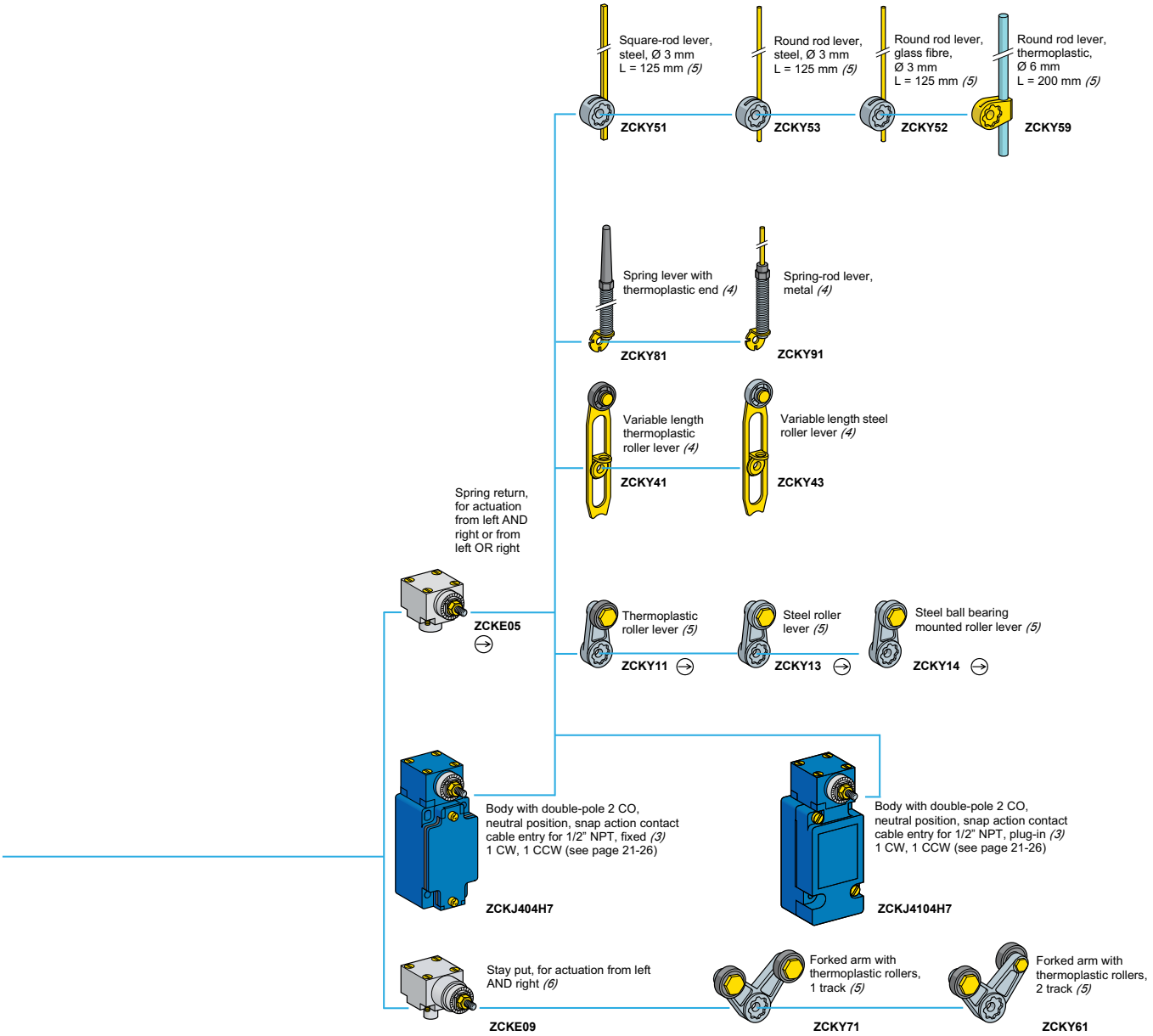

Ⓣ Head assuring positive opening operation when used with a conforming lever.
(4) Adjustable throughout 360° in 5° steps, or in 90° steps by reversing the notched washer.
(5) Adjustable throughout 360° in 5° steps, or in 45° steps by reversing the lever mounting.
(6) Suitable for bodies with contacts ZCKJ1 / J2 / J31 / J39H7.

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XCKJ110511H7

XCKJ10541H7

XCKJ161H7

XCKJ110511H7

XCKJ1167H7

XCKJ167H7

XCKJ Switches

XCKJ fixed body type precision switches with an SPDT configuration have direct opening contacts to meet most international standards.

Table 21.42: Specifications

Rated Power (conforms to IEC 947-5-1, duty categories AC15 and DC13)	
Temperature range	–13 to +158 °F (–25 to +70 °C); optional –40 to +248 °F (–40 to +120 °C). The minimum temperatures listed are based on the absence of freezing moisture or water.
Enclosure rating	NEMA 1,2,3,4,12; IEC Type IP66
Vibration resistance	25 G (10–500 Hz), conforming to IEC 68-2-6
Shock resistance	50 G, conforming to IEC 68-2-27
Repeatability (max.)	0.0004 in. (0.01 mm)
Cable entry	1/2" NPT standard
Contact Characteristics	
Rated thermal current	10 A, conforming to UL 508, CSA C22-2 No.14, IEC 337-1, NFC 63-140, VDE 0660-200
Rated insulation voltage	Non-plug-in: 300 Vac (A300) and DC (Q300) Plug-in: 600 Vac (A600) and DC (Q600)
Contact resistance (max)	Non-plug-in: 25 m W Plug-in: 45 m W
Cable (max.)	2 x 16 AWG (1.5 mm²) per terminal—1 x #16 AWG for 2 SPDT (2 N.O., 2 N.C.)
Short circuit protection	10 A fuse type SC; Form I Class J or equivalent. Outside US use type gl or N.

Table 21.43: Complete Switches, XCKJ

Description and Functional Diagram	Operating Torque	Contact Type		Direct Opening ⊖	Catalog Number
Non-plug-in Housings					
	Delrin roller lever adjustable in 5° or 45° increments (reversible mountings)				
Lever operated	33.3 oz-in	SPDT	(N.O. + N.C.)	Y *[1]*	XCKJ10511H7
	33.3 oz-in	2 SPDT	(2 N.O. + 2 N.C.)	N	XCKJ20511H7
	Adjustable length—Delrin roller lever adjustable in 5° or 90° increments				
	33.3 oz-in	SPDT	(N.O. + N.C.)	N	XCKJ10541H7
	33.3 oz-in	2 SPDT	(2 N.O. + 2 N.C.)	N	XCKJ20541H7
	Adjustable length—1/8 in. diameter steel rod adjustable in 5° or 45° increments				
	33.3 oz-in	SPDT	(N.O. + N.C.)	N	XCKJ10553H7
	Adjustable length—1/4 in. plastic rod adjustable in 5° or 45° increments				
	33.3 oz-in	SPDT	(N.O. + N.C.)	N	XCKJ10559H7
Neutral Position One SPDT contact switch per direction. Past 20° CW, contact 1 (11-12 / 13-14) switches. Past 20° CW, contact 2 (21-22 / 23-24) switches. Levers not included.					
	26.6 oz-in	2 SPDT (2 N.O. + 2 N.C.)		N	ZCKJ404H7
Plunger Operated	Rod plunger 48 oz	SPDT	(N.O. + N.C.)	Y *[1]*	XCKJ161H7
	Steel roller plunger 48 oz	SPDT	(N.O. + N.C.)	Y *[1]*	XCKJ167H7
Plug-in Housings					
Lever Operated	**Delrin roller lever adjustable in 5° or 45° increments (reversible mountings)**				
	33.3 oz-in	SPDT	(N.O. + N.C.)	N	XCKJ110511H7
	Adjustable length Delrin roller lever adjustable in 5° or 90° increments				
	33.3 oz-in	SPDT	(N.O. + N.C.)	N	XCKJ110541H7
Neutral Position One SPDT contact switch per direction. Past 20° CW, contact 1 (11-12 / 13-14) switches. Past 20° CW, contact 2 (21-22 / 23-24) switches. Levers not included.					
	26.6 oz-in	2 SPDT	(2 N.O. + 2 N.C.)	N	ZCKJ4104H7
Plunger Operated	Rod plunger 48 oz	SPDT	(N.O. + N.C.)	N	XCKJ1161H7
	Steel roller plunger 48 oz	SPDT	(N.O. + N.C.)	N	XCKJ1167H7

[1] Direct opening contacts meet IEC 947-5-1 requirements for positive opening contacts.

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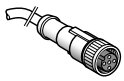
ZCKJ1H7
Non-plug-in

ZCKJ11H7
Plug-in


XZCP1141L•

Exploded view page 21-24

XCKJ Bodies and Options

Table 21.44: Non-plug-in

Silver Contacts (10 A)				Direct Opening ⊕	Catalog Number
1 Step	SPDT	(N.O. + N.C.)	Snap action	Y*[2]*	ZCKJ1H7
1 Step	SPDT	(isolated N.O. + N.C.)	Slow break-before-make	Y*[2]*	ZCKJ5H7
1 Step	2 SPDT	(2 N.O. + 2 N.C.)	Snap action	N	ZCKJ2H7
2 Step	2 SPDT	(2 N.O. + 2 N.C.)	Snap action	N	ZCKJ4H7
Gold Flashed Contacts (low power circuits max. 12 V, 0.1 A)					
1 Step	SPDT	(N.O. + N.C.)	Snap action	Y*[2]*	ZCKJ18H7
1 Step	2 SPDT	(2 N.O. + 2 N.C.)	Snap action	N	ZCKJ28H7
High Temperature: +248 °F (+120 °C)					
1 Step	SPDT	(N.O. + N.C.)	Snap action	Y*[2]*	ZCKJ15H7
1 Step	2 SPDT	(N.O. + N.C.)	Snap action	N	ZCKJ25H7
Neutral Position	2 SPDT	(2 N.O. + 2 N.C.)	Snap action	N	ZCKJ4045H7

Table 21.45: Plug-in

Silver Contacts (10 A)				Direct Opening ⊕	Catalog Number
1 Step	SPDT	(N.O. + N.C.)	Snap action	N	ZCKJ11H7
1 Step	2 SPDT	(2 N.O. + 2 N.C.)	Snap action	N	ZCKJ21H7
2 Step	2 SPDT	(2 N.O. + 2 N.C.)	Snap action	N	ZCKJ41H7
High Temperature: +248 °F (+120 °C)					
1 Step	SPDT	(N.O. + N.C.)	Snap action	N	ZCKJ115H7
1 Step	2 SPDT	(2 N.O. + 2 N.C.)	Snap action	N	ZCKJ215H7
Neutral Position	2 SPDT	(2 N.O. + 2 N.C.)	Snap action	N	ZCKJ41045H7

Table 21.46: Wiring Options

	Catalog Number	Pins	Suffix
Mini style male receptacle (For example, to order a ZCKJ1H7 body with a mini-style connector option, the part number is ZCKJ1547.)	ZCKJ1/J11/J5H7	5 pins	547
	ZCKJ2/J4/J21/J41H7	9 pins	947

Table 21.47: Plug and Cable Assemblies

Description	Cable Length	Pins	Matches Receptacle Option	Catalog Number
Plug and cable	3 ft	5	547	BH2053
	6 ft			BH2056
	12 ft			BH20512
	3 ft	9	947	BH2093
	6 ft			BH2096
	12 ft			BH20912
Pre-wired connector, female	6.56 ft	4	XCSDMR•L / XCSDMP•L	XZCP1141L2
	16.40 ft			XZCP1141L5
	32.81 ft			XZCP1141L10

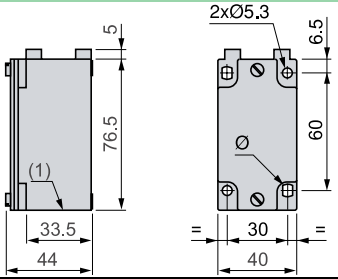
Building a Complete Switch

Complete Switch = Body (with contact assembly)**+ Head + Lever**

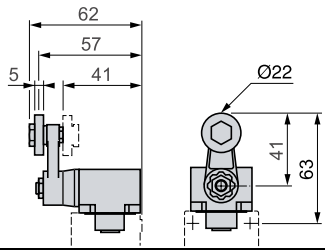
Example:

Body		Head		Lever		
ZCKJ1H7	+	ZCKE05	+	ZCKY11	=	XCKJ10511H7

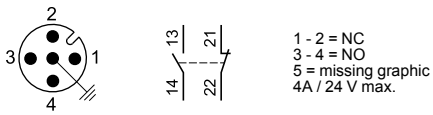
Non-Plug-in Body ZCKJ1H7



Rotary Head ZCKE05 with Operating Lever ZCKY11



ZCKJ*D



File CCN E39281 NKCR

File Class LR44087 3211-03

Acceptable Wire Sizes: 14–24 AWG
Recommended Terminal Clamp Torque: 13 lb-in

[2] Direct opening contacts meet IEC 947-5-1 requirements for positive opening contacts when using head.

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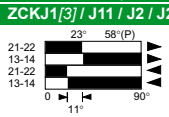
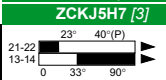
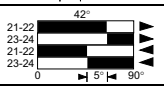
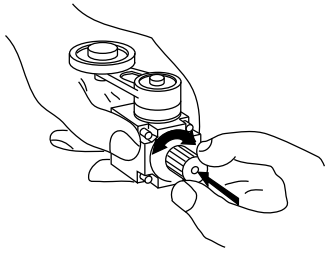
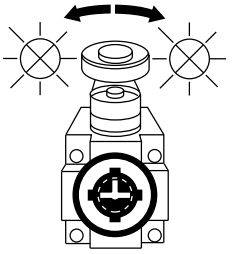
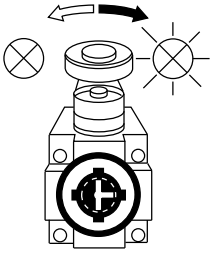
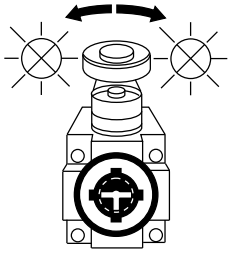
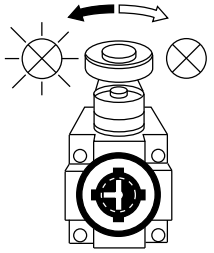
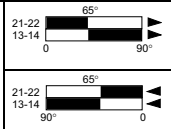
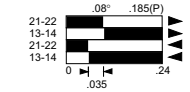
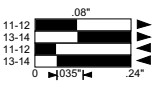
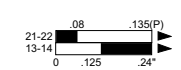
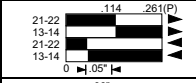
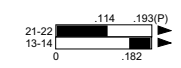
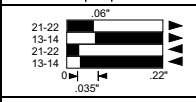
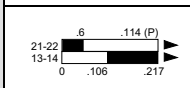
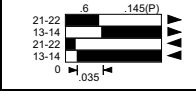
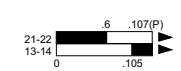
Operating Heads

Table 21.48: Lever-Operated Heads

Contact Operation with Switch Bodies:	1 Step ZCKJ1*[3]* / J11 / J2 / J21H7	2 Step ZCKJ4 / J41H7	1 Step ZCKJ5H7 *[3]*	Operating Force/Torque	Catalog Number
Standard operation 1 Step CW and/or CCW				33 oz-in, 0.25 N	ZCKE05
2 Step 11-12, 13-14 first step					
21-22, 23-24 second step					
ZCKE05 Programming 					
	CW and CCW	CW	CW and CCW	CCW	
Maintained operation				33 oz-in, 0.25 N	ZCKE09

NOTE: Neutral position head ZCKE04 is not available separately. Order the head and body subassemblies from page 21-24.

Table 21.49: Plunger-Operated Heads

Contact Operation with Switch Bodies:	1 Step ZCKJ1*[3]* / J11 / J2 / J21 / H7	2 Step ZCKJ4 / J41H7	1 Step ZCKJ5H7 *[3]*	Operating Force/Torque	Catalog Number
Top rod plunger				48 oz 18 N	ZCKE61
Ball-bearing top plunger				48 oz 18 N	ZCKE66
Steel roller plunger				48 oz 18 N	ZCKE67
One-way Delrin roller based on actuation by 30° cam				48 oz 18 N	ZCKE21
One way steel roller based on actuation by 30° cam				48 oz 18 N	ZCKE23
Side rod plunger				48 oz 18 N	ZCKE63
Side steel roller-plunger, horizontal based on actuation by 30° cam				48 oz 18 N	ZCKE64
Side steel roller-plunger, vertical based on actuation by 30° cam				48 oz 18 N	ZCKE65

[3] Direct opening
when used with any head on this page except ZCKE09 (maintained operation).

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Non-plug-in Style Contact Block

XE2SP2151

ZCKY11/13/14

ZCKY43/41

ZCKY51/52/53/59

ZCKY61

ZCKY71

ZCKY81

ZCKY91

XCKJ Accessories

Table 21.50: Omnidirectional Heads

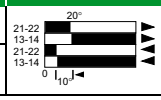
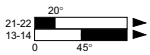
Contact Operation with Switch Bodies:	1 Step ZCKJ1, J11,J2,J21	2 Step ZCKJ4, J41	1 Step ZCKJ5	Operating Force/ Torque	Catalog Number
Cat whisker-steel *[4]*				18.4 oz-in, 0.13 N	ZCKE06
Wobble coil springs *[4]*				18.4 oz-in, 0.13 N	ZCKE08

Table 21.51: Operating Heads—for extended temperature ranges

Description		Catalog Number	
		Low temperature *[5]* -40 °F to +158 °F (-40 °C to +70 °C)	High temperature *[5]* -13 °F to +248 °F (-25 °C to +120 °C)
Lever operated	Standard operations	ZCKE056	ZCKE055
	Maintained operations	ZCKE096	ZCKE095
Plunger operated	Top rod plunger	ZCKE616	ZCKE615
	Ball-bearing top plunger	ZCKE666	ZCKE665
	Top roller plunger	ZCKE676	ZCKE675
	One way Delrin roller	ZCKE216	ZCKE215
	One way steel roller	ZCKE236	ZCKE235
	Side rod plunger	ZCKE636	ZCKE635
	Side steel roller plunger-horizontal	ZCKE646	ZCKE645
	Side steel roller plunger-vertical	ZCKE656	ZCKE655
Omnidirectional	Cat whisker	ZCKE066	ZCKE065
	Wobble coil spring	ZCKE086	ZCKE085

Table 21.52: Replacement Parts

Description	Direct Opening	Catalog Number
(see page 21-24for contact description)	⊕	
Contact block for ZCKJ1H7	Y	XE2SP2151
Contact block for ZCKJ2H7	N	XESP2021
Contact block for ZCKJ4H7	N	XESP2031
Contact block for ZCKJ5H7	Y	XE2NP2151
Contact block for ZCKJ18H7 (gold flashed)	Y	XE2SP2158
Contact block for ZCKJ28H7 (gold flashed)	N	XESP2028
Plug-in module for ZCKJ11H7 (includes contact block)	N	ZCKJ01H7
Plug-in module for ZCKJ21 (includes contact block)	N	ZCKJ02H7
Plug-in module for ZCKJ41 (includes contact block)	N	ZCKJ04H7
Base receptacle for ZCKJ11H7	—	ZCKJ019H7
Base receptacle for ZCKJ21H7	—	ZCKJ029H7
Base receptacle for ZCKJ41H7	—	ZCKJ029H7

Table 21.53: Lever Arms

Description	Adjustment Increments	Catalog Number
Adjustable or Flexible Operators *[6]*		
Adjustable Delrin roller, 0.74 in. diameter, 0.2 in. wide, 3 in. long (max.)	5° or 90°	ZCKY41
Adjustable steel roller, 0.74 in. diameter, 0.2 in. wide, 3 in. long (max.)	5° or 90°	ZCKY43
Adjustable rod-square, steel, 1/8 in. side, 5.4 in. long (max.)	5° or 45°	ZCKY51
Adjustable rod-round, fiberglass, 1/8 in. diameter, 5.4 in. long (max.)	5° or 45°	ZCKY52
Adjustable rod-round, steel, 1/8 in. diameter, 5.4 in. long (max.)	5° or 45°	ZCKY53
Adjustable rod-round, plastic, 1/4 in. diameter, 8.4 in. long (max.)	5° or 45°	ZCKY59
Coil spring lever	5° or 90°	ZCKY81
Spring rod lever	5° or 90°	ZCKY91
Reverse Mounting		
Delrin roller 0.9 in. diameter, 0.2 in. wide, 1.6 in. long ⊕	5° or 45° *[7]*	ZCKY11
Steel roller 0.9 in. diameter, 0.2 in. wide, 1.6 in. long ⊕	5° or 45° *[7]*	ZCKY13
Ball bearing roller 0.9' diameter, 0.2 in. wide, 1.6 in. long ⊕	5° or 45° *[7]*	ZCKY14
Fork, 2 track, Delrin roller, 0.9 in.diameter, 0.2 in. wide for ZCK-E09	5° or 45° *[7]*	ZCKY61
Fork, 1 track, Delrin roller, 0.9 in. diameter, 0.2 in. wide for ZCK-E09	5° or 45° *[7]*	ZCKY71

[4] Flexible operators do not guarantee direct (positive) opening operation.
[5] The minimum temperatures listed are based on the absence of freezing moisture or water.
[6] Adjustable and flexible operators do not guarantee positive opening operation.
[7] Reverse mounting: The higher increment (45°) is a direct (positive) opening contact feature which ensures no loss of mechanical effort between the actuation point and the moving contact bridge of the direct (positive) contact (N.C.) even if the lever is loosely mounted.

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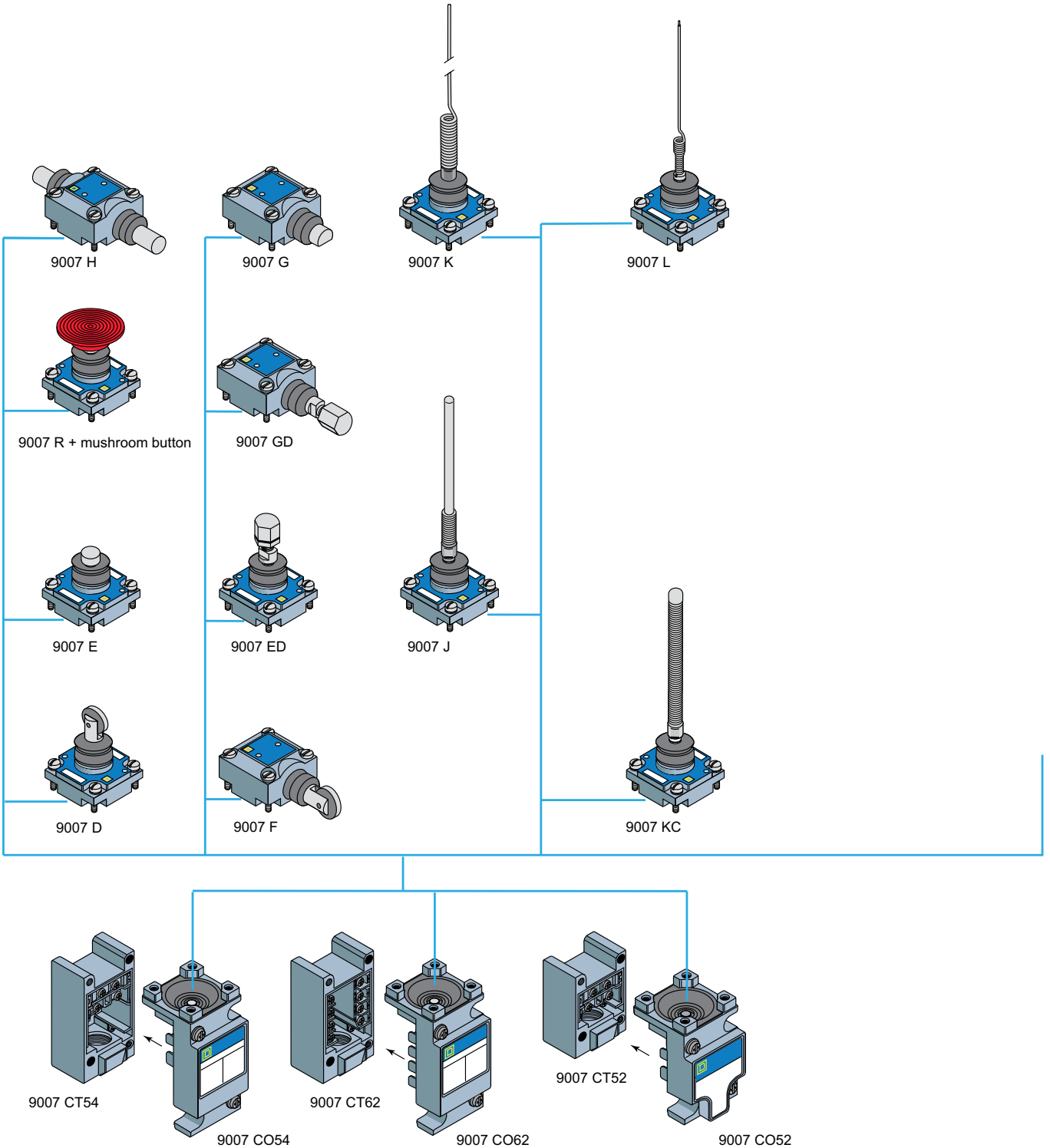
Overview — 9007C Adaptable Sub-Assemblies



NOTE: Order the mushroom operator cap from page 21-33.

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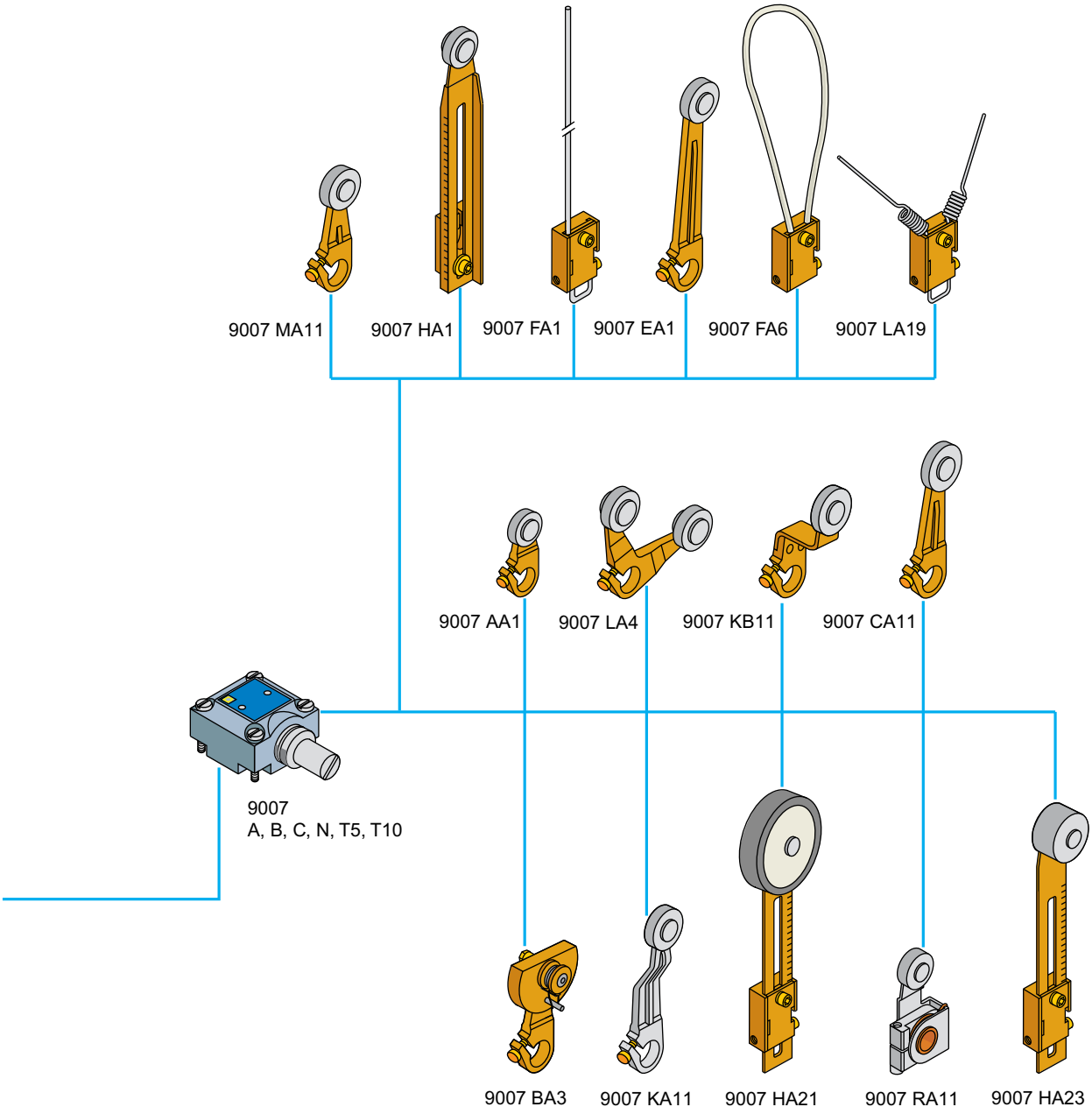
Overview — Head 9007C Lever Switches



NOTE: Head 9007C is for use with levers LA19 and LA4.

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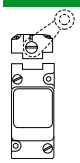
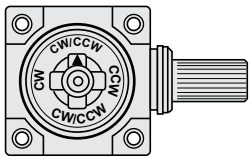
Oiltight, Watertight Switches—Standard and Compact Bodies

Table 21.54: All Type C Switches—Standard and Compact Bodies

Select Turret Head			Rotary Lever Arm						Side Plunger			
			Standard Pre-travel Spring Return	Low Differential Spring Return	Neutral Position: Standard Pre-travel Spring Return	Neutral Position: Low Differential Spring Return	Light Operating Torque Spring Return	Maintained Contact	Side Roller-Plunger Spring Return Vertical Roller Type [1]	Side Push-Rod Plunger Spring Return	Side Push-Rod Plunger Adjustable Spring Return [2]	Side Push-Rod Plunger Maintained Contact
			CW & CCW [3]	CW & CCW [3]	CW & CCW	CW & CCW	CW & CCW [3]	CW (Trip) CCW (Reset)				
Select Basic Switch	Contacts		Type	Type	Type	Type	Type	Type	Type	Type	Type	Type
Standard Box Plug-in	1 N.O. 1 N.C.		C54B2	C54A2	—	—	C54N2	C54C	C54F	C54G	C54GD	C54H
	2 N.O. 2 N.C.		C62B2	C62A2	—	—	C62N2	C62C	C62F	C62G	C62GD	C62H
	2 N.O.–2 N.C. Neutral Position		—	—	C68T10	C68T5	—	—	—	—	—	—
	2 N.O.–2 N.C. Two Stage		C66B2	C66A2	—	—	C66N2	—	C66F	C66G	C66GD	—
Compact Box Plug-in	1 N.O. 1 N.C.		C52B2	C52A2	—	—	C52N2	C52C	C52F	C52G	C52GD	C52H
UL Listed for Hazardous Location Division I Class I Groups B, C, D Class II Groups E, F, G	1 N.O. 1 N.C.		CR53B2	CR53A2	—	—	CR53N2	CR53C	CR53F	CR53G	CR53GD	CR53H
	2 N.O. 2 N.C.		CR61B2	CR61A2	—	—	CR61N2	CR61C	CR61F	CR61G	CR61GD	CR61H
	2 N.O.–2 N.C. Neutral Position		—	—	CR67T10	CR67T5	—	—	—	—	—	—
	2 N.O. –2 N.C. Two Stage		CR65B2	CR65A2	—	—	—	—	—	—	—	—
Head Only (Example: 9007B)			B	A	T10	T5	N	C	F	G	GD	H
Nominal Operating Data	Pre-travel		10°	5°	10°	5°	10°	45°	0.08 in. (2 mm)			0.14 in. (3.6 mm)
	Pre-travel Two Stage	First Stage	10°	5°	—	—	10°	—	0.08 in. (2 mm)			—
		First to Second Stage	2-1/2°	1-1/2°	—	—	2-1/2°	—	0.02 in. (0.5 mm)			—
	Total Travel		90°	90°	90°	90°	90°	90°	0.25 in. (6.3 mm)			0.25 in. (6.3 mm)
	Differential		4°	2°	4°	2°	4°	—	0.03 in. (0.8 mm)			—
	Reverse Overtravel		90°	90°	90°	90°	90°	—	—			—
	Operating Torque/ Force— 1 Pole & 2 Pole		4 lb-in (0.45 N•m)	4 lb-in (0.45 N•m)	4 lb-in (0.45 N•m)	4 lb-in (0.45 N•m)	25 oz-in (0.18 N•m)	3 lb-in (0.34 N•m)	4 lb (0.45 N•m)			7 lb (0.80 N•m)
	Repeat Accuracy —Linear travel of cam (1-1/2 in. lever arm)		± 0.002 in. (0.05 mm)	± 0.001 in. (0.03 mm)	± 0.002 in. (0.05 mm)	± 0.002 in. (0.05 mm)	± 0.002 in. (0.05 mm)	± 0.002 in. (0.05 mm)	0.001 in. (0.3 mm)			—

Acceptable Wire Sizes: 12–22 AWG
Recommended Terminal Clamp Torque: 7 lb-in (0.80 N•m)



Mode Change—Lever Arm Type

Mode of operation is easily convertible to clockwise, counterclockwise, or both. Simply point the arrow to the letters representing the desired direction—CW, CCW, or CW/CCW. All parts are captive.

Exploded view page 21-30, Rotary Head Lever Arms, page 21-31

Lever arms page 21-9, page 21-34, page 21-35

Electrical ratings page 21-5

Special features page 21-35, page 21-36

[1] Can be converted to horizontal roller type in the field. To order horizontal roller version add the letter "H" at the end of the equivalent vertical roller version type number (Example: C54F would become C54F**H**).

[2] To lock the nut in the desired position, crimp the slot near the bottom of the nut.

[3] These devices are factory set to operate the contacts in **both** the **CW and CCW** directions. **Mode of operation** is field convertible to CW only or CCW only. **To order factory converted devices—**for CCW only operation, change the "2" at the end of the type number to "1" (Example: C54B**2** becomes C54B**1**); for CW only operation, delete the "2" at the end of the type number (Example: C54B**2** becomes C54B).

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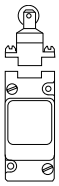
Type C Switches

Table 21.55: All Type C Switches Rated NEMA 6P And UL Type 6P

Select Turret Head		Top Plunger				Wobble Stick				Plug-In	
		**Top Roller-Plunger Spring Return**	**Top Push-Rod Plunger Spring Return**	**Top Push-Rod Plunger Adjustable** *[4]* **Spring Return**	**Palm Operated** *[5]*	**Wobble Stick Delrin** *[6]* **Extension** *[7]*	**Wobble Stick Wire Extension** *[7]*	**Wobble Stick Coil Spring Extension** *[7]*	**Cat Whisker**	**Plug-in Unit without Head**	**Plug-in Receptacle Only**
Select Basic Switch	**Contacts**	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**
Standard Box Plug-in	1 N.O. 1 N.C.	C54D	C54E	C54ED	C54R	C54J	C54K	C54KC	C54L	CO54	CT54
	2 N.O. 2 N.C.	C62D	C62E	C62ED	—	C62J	C62K	C62KC	C62L	CO62	CT62
	2 N.O.–2 N.C. Neutral Position	—	—	—	—	—	—	—	—	CO68	CT62
	2 N.O.–2 N.C. Two Stage	C66D	C66E	C66ED	—	C66J	C66K	C66KC	C66L	CO66	CT62
Compact Box Plug-in	1 N.O. 1 N.C.	C52D	C52E	C52ED	C52R	C52J	C52K	C52KC	C52L	CO52	CT52
UL Listed for Hazardous Location Division I Class I Groups B, C, D Class II Groups E, F, G	1 N.O. 1 N.C.	CR53D	CR53E	CR53ED	CR53R	CR53J	CR53K	CR53KC	CR53L	—	—
	2 N.O. 2 N.C.	CR61D	CR61E	CR61ED	CR61R	CR61J	CR61K	CR61KC	CR61L	—	—
	2 N.O.–2 N.C. Neutral Position	—	—	—	—	—	—	—	—	—	—
	2 N.O.–2 N.C. Two Stage	CR65D	—	CR65ED	—	CR65J	CR65K	CR65KC	—	—	—
Head Only		D	E	ED	R *[5]*	J	K	KC	L	—	—
Nominal Operating Data	Pre-travel	0.08 in. (2 mm)				10° (Any Direction)			20°	—	—
	Pre-travel Two Stage: First Stage	0.08 in. (2 mm)				10° (Any Direction)			20°	—	—
	Pre-travel Two Stage: First to Second Stage	0.01 in. (0.06 mm)				4°			5°	—	—
	Total Travel	0.25 in. (6.3 mm)				90°			90°	—	—
	Differential	0.02 in. (0.5 mm)				3°			6°	—	—
	Reverse Overtravel	—				—			—	—	—
	Operating Torque/ Force— 1 Pole and 2 Pole	3 lbs. (0.34 N•m)				3 lb-in (0.34 N•m)			7 oz-in (0.05 N•m)	—	—
	Repeat Accuracy — Linear travel of cam	± 0.001 in. (0.03 mm)				—			—	—	—

Acceptable Wire Sizes: 12–22 AWG
Recommended Terminal Clamp Torque: 7 lb-in (0.80 N•m)

Table 21.56: Mushroom Button For Palm Operated Turret Head

Color	1-3/8 in. Dia. Button Type No.	2-1/4 in. Dia. Button Type No.
Black	2358C6G3	2358C22G2
Red	2358C6G2	2358C22G3
Green	—	2358C22G6

Table 21.57: Wobble Stick Extensions

Description	Catalog Number
Delrin extension	9007WJ
Wire extension	9007WK
Coil spring extension	9007WKC

Type C — File CCN E78403 NKCR — File Class LR25490 3211-03

Type CR — File CCN E10054 NOIV — File Class LR26817 3218-02

Compact Body

Hazardous Location

Standard Body

[4] To lock the nut in the desired position, crimp the slot near the bottom of the nut.
[5] Mushroom button must be ordered separately. See Table 21.56.
[6] Delrin® is a registered trademark of DuPont. Not for use outdoors.
[7] Wobble stick extensions are available separately as replacements for complete devices. See Table 21.57.

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Lever Arms for 9007AW and 9007C Heavy Duty / Industrial Limit Switches

Standard roller is hardened oil-impregnated sintered iron. Bold-face Type numbers indicate the most commonly used lever arms.

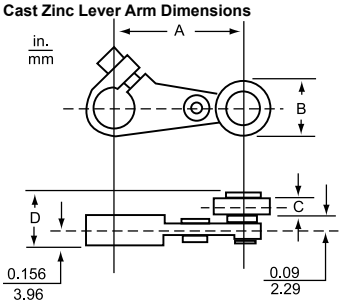
Table 21.58: Cast Zinc Lever Arms

Cast Lever Arm

Length of Arm (A)	Roller: Standard 3/4" Dia. (B) 1/4" Wide (C)	Standard 3/4" Dia. (B) 5/8" Wide (C)	Standard 5/8" Dia. (B) 1/4" Wide (C)	Standard 5/8" Dia. (B) 5/8" Wide (C)	Nylon 3/4" Dia. (B) 1/4" Wide (C)	Nylon 5/8" Dia. (B) 1/4" Wide (C)	Nylon 5/8" Dia. (B) 5/8" Wide (C)	Nylon *[8]* 1" Dia. (B) 5/8" Wide (C)
	Type	Type	Type	Type	Type	Type	Type	Type
7/8"	—	—	**AA1**	AA2	—	—	AA17	—
1-3/8"	**BA11**	BA12	**BA1**	BA2	BA18	BA8	BA17	BA13
1-1/2"	**MA11**	MA12	**MA1**	MA2	**MA18**	MA8	MA17	MA13
2"	**CA11**	CA12	**CA1**	CA2	CA18	CA8	CA17	CA13
2-1/2"	**DA11**	DA12	**DA1**	DA2	DA18	DA8	DA17	DA13
3"	**EA11**	EA12	**EA1**	EA2	EA18	EA8	EA17	EA13

Length of Arm (A)	Roller: Nylon 1" Dia. (B) 1/4" Wide (C)	Ball Bearing 11/16" Dia. (B) 1/4" Wide (C)	Standard 3/4" Dia. (B) 1/4" Wide (C) Roller on Opposite Side to Standard	Standard 5/8" Dia. (B) 1/4" Wide (C) Roller on Opposite Side to Standard	Standard 5/8" Dia. (B) 5/8" Wide (C) Roller on Opposite Side to Standard	Without Roller	Standard 3/4" Dia. (B) 1/4" Wide (C) (Countersunk Roller Pin)	Cable Operated With Eyebolt (3/8" I.D.) Instead of Roller
	Type	Type	Type	Type	Type	Type	Type	Type
7/8"	—	AA9	—	AA5	AA6	AA0	—	—
1-3/8"	BA4	BA9	BA15	BA5	BA6	BA0	—	—
1-1/2"	MA4	MA9	MA15	MA5	MA6	MA0	MA31	MA22
2"	CA4	CA9	CA15	CA5	CA6	CA0	CA31	—
2-1/2"	DA4	DA9	DA15	DA5	DA6	DA0	DA31	—
3"	EA4	EA9	EA15	EA5	EA6	EA0	—	—

Cast Zinc Lever Arm Dimensions



A = Length of Lever Arm
B = Roller Diameter
C = Roller Width
D = C + 5/16"

See the tables in this topic for A, B, and C dimensions.

Table 21.59: Flat Steel Lever Arms

Flat Steel Lever Arm

Length of Arm (A)	Standard Roller 5/8" Dia. (B) 1/4" Wide (C)	Standard Roller 5/8" Dia. (B) 5/8" Wide (C)	Nylon Roller 3/4" Dia. (B) 1/4" Wide (C)	Nylon Roller 1" Dia. (B) 1/4" Wide (C)	No Roller
	Type	Type	Type	Type	Type
7/8"	AA1S	AA2S	—	—	—
1-3/8"	BA1S	BA2S	—	BA4S	—
1-1/2"	—	—	MA18S	—	—
2"	CA1S	CA2S	—	CA4S	CA0S
2-1/2"	DA1S	DA2S	—	DA4S	DA0S
3"	EA1S	EA2S	—	EA4S	EA0S

Table 21.60: 90° Forked Cast Zinc Lever Arms

90° Forked Arm 1-1/2" Length

Roller Position	Standard Rollers 3/4" Dia. (B) 1/4" Wide (C)	Standard) Rollers 5/8" Dia. (B) 1/4" Wide (C)	Nylon Rollers 3/4" Dia. (B) 1/4" Wide (C)	Nylon Rollers 3/4" Dia. (B) 1" Wide (C)	Ball Bearing Rollers 11/16" Dia. (B) 1/4" Wide (C)
	Type	Type	Type	Type	Type
Rollers on Same Side	LA4	LA1	LA16	LA10	LA7
R.H. Roller on Opposite Side	LA5	LA2	LA17	LA11	—
L.H. Roller on Opposite Side	LA6	LA3	LA18	LA12	LA9

Approximate shipping weights range from 1/8 to 1/4 lb.

Table 21.61: One-Way Cast Zinc Roller Lever Arm

One-Way Roller Lever Arm

Roller, 1-1/4" Dia. (B) 1/4" Wide (C)		
Length of Arm	Cast Arm Type	Flat Steel Arm Type
1-3/8"	BA3	BA3S
1-1/2"	MA3	—
2"	CA3	CA3S
2-1/2"	DA3	DA3S
3"	EA3	EA3S

Table 21.62: Offset-style Cast Zinc Lever Arms

Offset Lever Arm	Dia. (B)	Width (C)	Type
2" Length 7/16" Offset	Standard Roller		
	5/8	1/4	**KA1**
	5/8	5/8	KA2
	3/4	1/4	KA11
	3/4	5/8	KA12
	Ball Bearing		
	11/16	1/4	KA9
	Nylon		
	3/4	1/4	KA18
	3/4	1	KA21
1-1/2" Length 7/8" Offset	Standard Roller		
	3/4	1/4	KB11
	3/4	1/4	KB15 *[9]*

Table 21.63: One-Way Lever Arms

One-Way Lever Arm

Length of Arm	Roller: Standard 3/4" Dia. (B) 1/4" Wide (C)	Roller: Nylon 3/4" Dia. (B) 1/4" Wide (C)	Roller: Ball Bearing 1-1/16" Dia. (B) 1/4" Wide (C)	Rod Type
	Type	Type	Type	Type
1-1/2"	RA11	RA18	RA9	—
5"	—	—	—	FA2

Table 21.64: Rod Type Lever Arms

Rod, in. (mm)	Type
10 (254) Stainless Steel Rod	**FA1**
12 (304) Spring Rod, Steel	**FA3**
18 (304) Spring Rod, Steel	FA4
12 Spring Rod, Delrin	**FA5**
Looped Delrin Rod	FA6
90° Forked Rod 2-1/2" Spring Rods, Steel	LA19

Dimensions page 21-35
For more information on LA19, refer to catalog 9006CT1007.

[8] Recommended in place of Types BA7, CA7, DA7, EA7 and MA7 lever arms with steel rollers. If necessary, the latter arms can be furnished at an additional cost.
[9] Roller inside.

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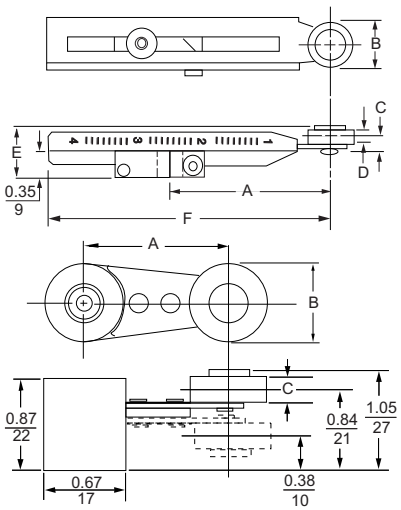


A = Length of Lever Arm; **B** = Roller Diameter; **C** = Roller Width

Lever Arms

Standard roller is hardened oil-impregnated sintered iron.
Bold-face Type numbers indicate the most commonly used lever arms.

Table 21.65: Adjustable Length Lever Arms

Lever Arm, Length Adjustable from 7/8" to 4"									
Description	Roller								
	Without Roller	Standard 5/8" Dia. 1/4" Wide	Standard 5/8" Dia. 5/8" Wide	Nylon 5/8" Dia. 1/4" Wide	Ball Brg. 11/16" Dia. 1/4" Wide	Nylon *[10]* 1" Dia. 5/8" Wide	Delrin 1-5/8" Dia. 1/4" Wide	Nylon 2" Dia. 1/4" Wide	Rubber Tire 2-1/8" Dia. 1/2" Wide
	Type	Type	Type	Type	Type	Type	Type	Type	Type
Non-bendable	HA0	**HA1**	**HA2**	**HA4**	HA24	HA22	—	—	—
Bendable	HA9	**HA5**	HA6	HA8	HA25	HA23	HA20	HA26	HA21

Table 21.66: 360° Angular Adjustable Lever Arms

Length of Arm	Standard 5/8" Dia. 1/4" Wide		Standard 3/4" Dia. 1/4" Wide	Nylon 5/8" Dia. 1/4" Wide	Nylon 3/4" Dia. 1/4" Wide	Ball Bearing 11/16" Dia. 1/4" Wide
	Roller Outside	Roller Inside	Roller Outside			Roller Outside
	Type	Type	Type	Type	Type	Type
7/8"	AA1M	—	—	AA8M	—	—
1-3/8"	BA1M	BA5M	BA11M	—	—	—
1-1/2"	MA1M	MA5M	MA11M	—	MA18M	MA9M
2 "	CA1M	CA5M	CA11M	CA8M	—	CA9M
2-1/2"	DA1M	—	DA11M	—	DA18M	—
3 "	EA1M	EA5M	EA11M	EA8M	EA18M	EA9M

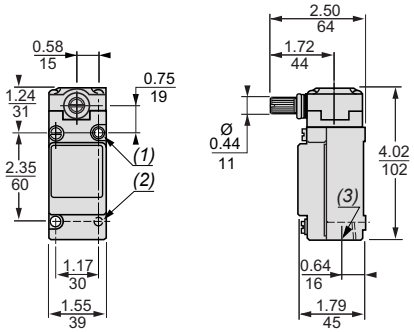
NOTE: Roller can be changed in the field from roller outside to roller inside position or vice versa.
Approximate shipping weights range from 1/8 to 1/4 lb.

Special Features

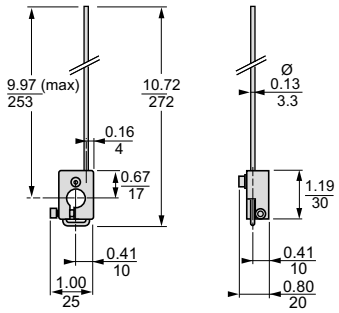
Table 21.67: Special Features (do not apply to Type CR unless noted)—Field Installable

Description		Part Number
Conduit Seal Only Conduit seal fits in conduit entrance and excludes liquids	5 hole seal 9 hole seal	3103248801 3103281501
Adapters		
Switch with adapter plate permitting substitution of any Type C switch with standard box for any Type T switch with Style B baseplate		Form Y147
Adapter plate kit only (plate plus mounting screws) for above		Class 9007 Type BT1
Adapter plate for direct substitution of Type C plunger switches for Type B plug-in plunger switches—**use only** if there is a problem in lining up cam tracks	Standard Box	Class 9007 Type CT10 *[11]*
Metric conduit-connection adapter—male 1/2" NPT on one end, female 20 mm on the other end		Class 9007 Type CT12

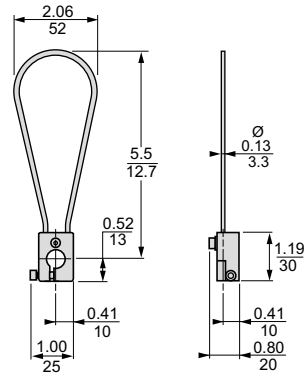
Rotary lever arms
9007C•••• A, B, C, N, T5, T10



Rod type lever arms
9007FA1



9007FA9



Dual dimensions:
in. / mm
1. 2 x 0.20/5 x 0.22/6 HLS.
2. 2 x 10-24 Tapped HLS Back Mtg 0.29/7 DP.
3. 1/2 14 NPT.

[10] Recommended in place of Types HA3 and HA7 lever arms with steel rollers. If necessary these arms can be furnished at an additional cost.
[11] Dimensions: 0.22 x 2.94 x 1.54 in.

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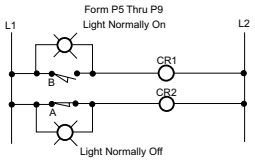
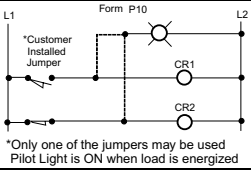
Factory Modifications

Table 21.68: Special Features (do not apply to Type CR unless noted)—Not Field Installable, Except Where Noted

Special Features		Form
Optional Shaft Equipped With 9007T / 9007FT Hub: Any lever arm Type C, CF or CR switch can be furnished with an optional shaft and hub combination which will accept the lever arms normally used with Type T and FT limit (position) switches. To order, add S9 as suffix to the device type number. For example, to order a 9007 C54B2 with this modification, order as a 9007 C54B2-S9. For details about the switches and lever arms that can be furnished with this modification, see catalog 9007CT1007.		Add **S9** as a suffix to the catalog number
Hub Only: Can be field installed on any Type C lever type switch.		Cat. No. 9007S9
LED Pilot Light, 24-120 Volts AC or DC on Plug-In Type Switch (Type C52, C54, C62, C64, C66, or C68):		
	Addition of LED pilot light in parallel with N.O. contact (light normally on)	P5
	Addition of LED pilot light in parallel with N.C. contact (light normally off)	P6
	Addition of one isolated LED pilot light (light on when load is energized) (Type C54 only. Not available with Y1901.)	P10
Pre-Wired Receptacle Single Pole	Plug-in limit (position) switch with pre-wired mini 5 pin male receptacle. For use with Brad Harrison female portable plug No. 41306, 41307, or 41308 (or equal). (Not available with P10 or for hazardous locations.)	Y1901
	Same as Y1901 but with different wire color coding	Y1905
Other versions with different wiring diagrams per automotive requirements are available. Contact your local Schneider Electric field office.		
Mating plug and cables available.	Wiring Diagrams Form Y190__ **Forms Y1901** Orange- 3 4 -Red White- 1 2 -Black Green- **Form Y1905** White- 3 4 -Black Orange- 1 2 -Red Green-	
Potted Limit (Position) Switch or Plug-In Receptacle Only: **With Individual Wires**		
• **Single pole** plug-in limit (position) switch or receptacle pre-wired with **five #16 wires** 5 ft long and wire entry completely sealed with epoxy resin		Y1841
With STOWA Cord		
• **Single pole** plug-in limit (position) switch or receptacle pre-wired with **five conductor #16 STOWA cord** 8 ft long and wire entry completely sealed with epoxy resin		Y1851
• **Double pole** plug-in limit (position) switch or receptacle pre-wired with **nine conductor #16 STOWA cord** 8 ft long and wire entry completely sealed with epoxy resin		Y1852
Other versions with different wiring diagrams for automotive requirements are available.		
Form Y1851 Red- 3 4 -Orange White- 1 2 -Black Green- **Form Y1852** Orange- 4 8 -Brown Red- 3 7 -Yellow Black- 2 6 -Blue White- 1 5 -Pink Green-		
Low Temperature—Lever Types Only: Limit (Position) switch will operate in an ambient temperature range of -40 to +185 °F (standard limit switch ambient temperature range is -20 to +185 °F). Minimum temperature is based on the absence of freezing moisture or water.		Y128
Fluorocarbon Rubber (FKM) Gaskets And Seals Substitute fluorocarbon rubber gaskets and seals on:		
Lever arm type, standard box (shaft seals on lever arm types are fluorocarbon rubber as standard)		Y140
Lever arm type, compact box (shaft seals on lever arm types are fluorocarbon rubber as standard)		Y140
Plunger type, standard box		Y140
Plunger type, compact box		Y140
NOTE: Fluorocarbon rubber has been shown to resist sunlight aging problems.		
Direct Acting Contacts *[12]* Substitution of direct acting contact unit for snap switch of single-pole switch: One pole, normally closed, slow-make slow-break, direct acting contact mechanism substituted for standard snap switch on Types C52, C54, CF53, and CR53 devices. This mechanism was designed for use in emergency overtravel applications. The movable contact of this basic switch unit is acted upon directly by the actuating mechanism of the limit switch—it does not depend on the force exerted by a snap-switch blade or a spring to open the circuit. Because these contacts are slow-make slow-break, they are best suited for applications where they are not actuated during normal operation, but only if abnormal overtravel is encountered. Direct Acting Contact Mechanism (shown without cover)		Y1561

[12] The direct acting contacts described above come standard on the 9007CLS1 hoist overtravel switch.

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Selection

Table 21.69: Complete with Base Plate, Without Lever Arm (bold type numbers indicate the most commonly used switches)

		Universal Type						
		No. 1	No. 2	No. 3*[1]*	No. 4	No. 5	No. 6	No. 7*[1]*
Select the Operating Sequence		Single-Pole Double-Throw Spring-Return CW Only	Single-Pole Double-Throw Spring-Return CW Only	Single-Pole Double-Throw Maintained Contact	Single-Pole Double-Throw Spring-Return Neutral Position	Single-Pole Double-Throw Spring-Return CCW Only	Single-Pole Double-Throw Spring-Return CCW Only	Single-Pole Double-Throw Maintained
Select the Basic Switch		Initial Position and CCW A B CW A B	Initial Position and CCW A B Inter-mediate Pos. CW A B Final Pos. CW A B	Spring return of arm to initial position, contact position maintained until operated in reverse direction CCW CW A B A B If high speed cam or snap-back is present **use No. 12**	Initial Position A B CCW CW A B A B	Initial Position and CW A B CCW A B	Initial Position and CW A B Intermediate Position CCW Final Position CCW A B A B	If high speed cam or snap-back is present **use No. 12** A B CW A B
Surface Mounting	Base Plate	Type	Type	Type	Type	Type	Type	Type
	A	TUA1	—	TUA3	TUA4	TUA5	—	—
	B	**TUB1**	TUB2	TUB3	**TUB4**	**TUB5**	TUB6	TUB7
	C	TUC1	—	TUC3	TUC4	TUC5	—	—
	D	TUD1	—	—	TUD4	TUD5	—	TUD7
Nominal Operating Data	Pre-travel	14°	Int. Pos. 9°, Final 16°	7°	6°	14°	Int. Pos. 9°, Final 16°	10°
	Total-travel	88°	88°	81°	81°	88°	88°	85°
	Differential	12°	5°	7°	5°	12°	5°	12°
	Oper. Torque	12 lb-in	12 lb-in	12 lb-in	12 lb-in	12 lb-in	12 lb-in	2.5 lb-in
	Repeat Accuracy *[2]*	±0.004 in.	±0.004 in.	±0.004 in.	±0.004 in.	±0.004 in.	±0.004 in.	±0.004 in.
To convert sequences, remove the base plate, positioning plate and latches. Reassemble the positioning plate and latches as shown.								*[3]*

		Universal Type					Standard Type		
		No. 8*[1]*	No. 9	No. 10	No. 11	No. 12	No. 1	No. 2	No. 3
Select the Operating Sequence		Single-Pole Maintained Double-Throw Neutral Position	Single-Pole Double-Throw Spring-Return Slow Make Slow Break	Single-Pole Double-Throw Spring-Return Slow Make Slow Break	Single-Pole Double-Throw Spring-Return Slow Make Slow Break	Single-Pole Double-Throw Maintained	Single-Pole Double-Throw Spring-Return CW & CCW	Single-Pole Double-Throw Spring-Return CW & CCW	Single-Pole Double-Throw Spring-Return CW & CCW Slow Make Slow Break
Select the Basic Switch		Initial Position If high speed cam or snap-back is present **use No. 12** A B CCW CW A B A B	Initial Position and CCW A B CW A B	Initial Position A B CCW CW A B A B	Initial Position and CW A B CCW A B	CCW A B CW A B	Initial Position A B CCW & CW A B	Initial Position A B CW & CCW Intermediate Position Final Position A B A B	Initial Position A B CW & CCW A B
Surface Mounting	Base Plate	Type	Type	Type	Type	Type	Type	Type	Type
	A	—	—	—	—	—	TSA1	—	—
	B	TUB8	TUB9	TUB10	TUB11	**TUB12**	**TSB1**	TSB2	TSB3
	C	—	—	—	—	TUC12	TSC1	—	—
	D	—	—	—	—	TUD12	TSD1	—	—
Nominal Operating Data	Pre-travel	6°	12°	3°	12°	45°	14°	Int. Pos. 9°, Final 16	9°
	Total-travel	81°	87°	81°	87°	90°	89°	89°	89°
	Differential	10°	0°	0°	0°	0°	12°	Int. Pos. 5.5°, Final 7.5°	5°
	Oper. Torque	2.5 lb-in	12 lb-in	12 lb-in	12 lb-in	8 lb-in	10 lb-in	10 lb-in	10 lb-in
	Repeat Accuracy *[2]*	±0.004 in.	±0.004 in.	±0.004 in.	±0.004 in.	±0.004 in.	±0.004 in.	±0.004 in.	±0.004 in.
To convert sequences, remove the base plate, positioning plate and latches. Reassemble the positioning plate and latches as shown.		*[3]*				Not Adjustable			

NOTE: To obtain a Type FT Foundry Switch, change the "T" at the beginning of the equivalent Type number to "FT" (for example, TUB1 changes to FTUB1).
Lever arms page 21-38

[1] Sequence 3, 7, and 8 devices are available but are not recommended where high speed cams or lever arm snap-back is present. The application should be checked and No. 12 sequence substituted where possible.
[2] Linear travel of cam on 1-1/2 in. lever arm.
[3] Remove the spring from the positioning plate.

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9007TUB4

9007FTUB4

Class 9007 Type T and FT, Oiltight

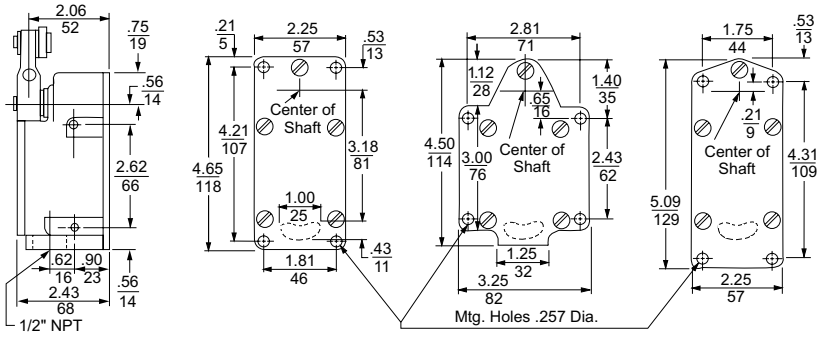
Table 21.70: Lever Arms for Types T and FT Limit Switches or Type C with S9 Hub

Description				Type		
Type of Arm	Length of Arm (in.)	Roller Position	Roller Width	Roller Dia. (in.)		
				3/4	1	1-3/8
Straight	1-1/2	Front or Back	1/4	B1	B2	B3
	1-1/2	Front or Back	1/2	B12	B13	B14
	2-1/2	Front or Back	1/4	B7	B8	B9
	2-1/2	Front or Back	1/2	B22	B23	B24
	2-7/8	None	None	Without Roller B21	—	—
	5	Front or Back	1/4	B19	—	—
	Adj.	Does not include a lever arm clamp or rod. Lever arm clamp is required—use 9007 R16 or R17, plus a customer-supplied rod.	1/4	R18	R19	R20
Offset	1-1/2	Inside Offset	1/4	C1	C2	C3
		Outside Offset	1/4	D1	D2	D3
	1-7/8	Outside Offset	1/4	E4	E5	E6
		Inside Offset	1/4	F4	F5	F6
120° Forked	1-1/2	Rollers on Same Side	1/4	J1	J2	—
	1-1/2	LH Roller on Opposite Side	1/4	K1	K2	—
	1-1/2	RH Roller on Opposite Side	1/4	N1	N2	—
90° Forked	1-1/2	Rollers on Same Side	1/4	X1	X2	—
	1-1/2	RH Roller on Opposite Side	1/4	Y1	Y2	—
	1-1/2	LH Roller on Opposite Side	1/4	Z1	Z2	—
Cable Operated	1-1/2	None	None	Y3		
	2-1/2	With eyebolt (1/4 in. I.D.) instead of roller	None	B27		
Rod	Adj.	Clamp for 3/16 in. Rod (rod not included)	None	R16		
	Adj.	Clamp for 1/4 in. Key Stock (key stock not included)	None	R17		
Weld-On	3-1/2	None	None	G10		
1-Way Roller	1-1/2	Outside Offset	1/4	D4		
Conveyor Side Guide	8-7/16	1-1/2 in. dia. 3-3/4 in. Delrin roller. For use with Type T and FT only.		R21		
		7/8 in. dia. 3-3/4 in. Delrin roller. For use with Type T, FT, or C with S9.		R22		

Table 21.71: Separate Base Plates

Style	Mounting Holes	Part Number
A	None[4]	2934D32G1
B	End	2934D14G1
C	Side	2934D33G1
D	End	2934D34G1

For all Type T and FT:
Acceptable Wire Sizes: 14–18 AWG
Recommended Terminal Clamp Torque: 13–16 lb-in



Style A Baseplate Shown | **Style B** | **Style C** | **Style D**

Dual Dimensions: INCHES / Millimeters

File 78403
CCN NKCR

File LR25490
Class 3211 03

[4] No mounting holes in base plate. Side mounting holes in switch case must be used.

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L300WS2M1

R.B.Denison™ Lox-Switch™ L

Table 21.72: General Specifications

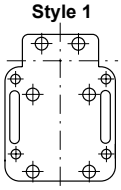
Temperature range	0 to +200 °F (-17 to +93 °C) standard. For high and low temperature options, see page 21-39. Minimum temperatures are based on the absence of freezing moisture or water.
Enclosure rating	NEMA 1, 4, and 13; IP 65, 66
Vibration resistance	30G max. (10–55Hz)
Repeatability	0.03°
Cable entry	1/2" NPT standard double circuit, 3/4" NPT triple circuit
Contact Characteristics	
Rated thermal current	20 A
Rated insulation voltage	600 Vac and Vdc
Wire (max.)	1 x 12 AWG or 2 x 14 AWG per screw terminal

Table 21.73: Switching Ratings: A600 (AC), P600 (DC)

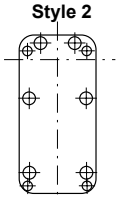
Contact Rating Designation	Maximum current (A)												Maximum VA	
	120 V		125 V		240 V		250 V		480 V		< 600 V			
(M=Make, B=Break)	M	B	M	B	M	B	M	B	M	B	M	B	M	B
A600 (AC)	60	6.00	—	—	30	3.00	—	—	15	1.50	12	1.20	7200	720
P600 (DC)	—	—	1.1	1.1	—	—	0.55	0.55			0.2	0.2	138	138

Mounting Plates, L100 and L300 Models

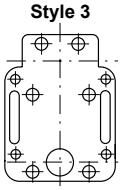
Style 1



Style 2



Style 3



Style 4

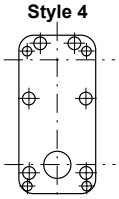
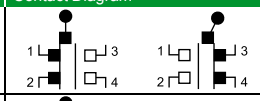
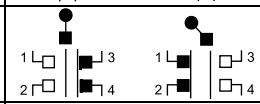
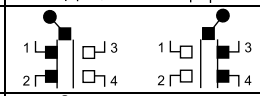
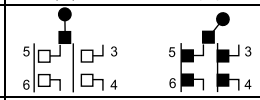
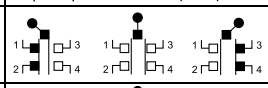
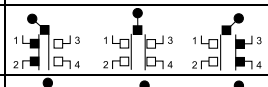
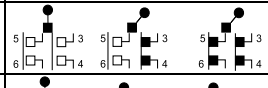
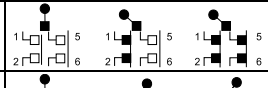
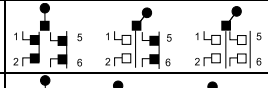
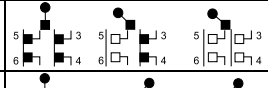
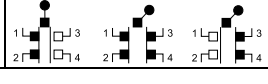


Table 21.74: Type L Selection

Select L100 for a standard (mill) switch and L300 for an extra heavy duty (foundry) switch

Description	Contact Diagram	Operating Torque	Cat. No.
Snap-action CW Spring return		190 oz-in (1.34 N•m)	L100WS2M1
		190 oz-in (1.34 N•m)	L300WS2M1
Snap-action CCW Spring return		190 oz-in (1.34 N•m)	L100WS2M2
		190 oz-in (1.34 N•m)	L300WS2M2
Maintained contact CW and CCW Snap action[5]		45 oz-in (0.32 N•m)	L100WS2M3
		45 oz-in (0.32 N•m)	L300WS2M3
Snap action CW Spring return		190 oz-in (1.34 N•m)	L100WDR2M4
		190 oz-in (1.34 N•m)	L300WDR2M4
Neutral position N.O.-CW, N.O.-CCW Spring return Snap action[5]		170 oz-in (1.2 N•m)	L100WNS2M26
		170 oz-in (1.2 N•m)	L300WNS2M26
Neutral position N.O.-CW, N.O.-CCW Maintained in CW only[5]		170 oz-in (1.2 N•m)	L100WNSL2M29
2 Step Sequence CW Spring return, Snap action, 2 N.O.		150 oz-in (1.06 N•m)	L525WDR2M56
2 Step Sequence CCW Spring return, Snap action, 2 N.O.		150 oz-in (1.06 N•m)	L525WDL2M57
2 Step Sequence CW Spring return, Snap action, 2 N.C.		150 oz-in (1.06 N•m)	L525WDL2M58
2 Step Sequence CCW Spring return, Snap action, 2 N.C		150 oz-in (1.06 N•m)	L525WDR2M59
2 Step Sequence CW Spring return Snap action N.O./N.C		150 oz-in (1.06 N•m)	L100WS0S2M60

[5] The lever must not be allowed to snap freely from any overtravel position.

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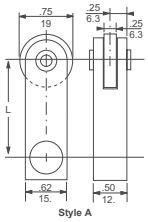
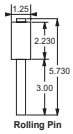
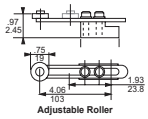


Style A





Rolling pin

Ministyle male receptacle

Straight male receptacle

90° angle male receptacle

Interpreting the Catalog Numbers

Use the table below to interpret the catalog numbers of the L100/L300 switches. Do **not** generate new catalog numbers from the table. If the required contact sequence is not listed, contact your local field office.

The only modifications to the existing catalog numbers are:

- Mounting Plates—Style 1, 2, 3 or 4
- Front Covers—Metal, transparent plastic, or transparent plastic with a neon light.
- Special Features—Select from catalog **9006CT1007** and add to the type number.

Style	Housing		Function		Mounting Plate	Front Cover		Contact Arrangement	
L	1	0	0	W	S	2	P	F		

Housing: 100 = Standard (mill); 300 = Extra heavy duty (foundry)

Function: WS = Two circuit single operation; WD = Two circuit dual operation; WT = Triple circuit; WN = Neutral

Mounting Plate: 1; 2; 3; 4

Front Cover: M = Standard metal; PF = Transparent plastic; GF = Transparent plastic with neon light

Contact Arrangement: See catalog 9006CT1007

Table 21.75: Steel Roller Lever Arms (0.25 in. wide, 0.75 in. dia.)

Length (L)		Lever Number
in.	mm	
1.50	(38.1)	AA
2.00	(50.8)	AH
2.50	(63.5)	AO
2.75	(69.8)	AK
3.00	(76.2)	AB
4.00	(101.6)	AM
6.00	(152.4)	AR

Table 21.76: Lever Arm Options *[6]*

Description	Suffix
1 in. diameter roller	1
1-1/4 in. diameter roller	4
1-1/2 in. diameter roller	2
Nylon roller	N
Ball bearing roller (3/4 in. diameter)	R
Stainless steel roller pin nylon roller	NS
Ex: AB1; ABR	

Table 21.77: Rolling Pin

For use with 2 step switches for conveyor or belt applications

Length (L), In. (mm)		Lever Number
2.25 (75.1)		AL1650
2.25 (75.1)	(Teflon for high temperature applications)	AL16501
3 (50.8)		AL1802

Table 21.78: Roller, Adjustable

from 2 to 4 in. (0.25 in. wide, 0.75 in. diameter)

Length (L), In. (mm)	Lever Number
Adjustable 2 to 4 (50.8 to 101.6)	AL2820

Table 21.79: Housing options *[6]*

Description	Examples	Prefix Adder or Modifier
3/4" conduit opening: Available on 2 circuit switches. Standard on 3 circuit switches.	L100WS2M1 changes to **G**L100WS2M1	G
High temperature 0 to +350 °F *[7]* Metal front cover only	L100WS2M1 changes to **H**L100WS2M1	H
Low temperature -20 to +200 °F *[7]*	L100WS2M1 changes to **T**L100WS2M1	T
High shock. Available only on operating sequences 1, 2, 4, 5, 7-11, 13, 14.	L100WS2M1 changes to L**526**WS2M1 L300WS2M1 changes to L**326**WS2M1	526/326
Gold contacts	L100WS2M1 changes to L**522**WS2M1 L300WS2M1 changes to L**322**WS2M1	522/322

Table 21.80: Wiring *[6]*

Description		Examples	Prefix Adder or Modifier
Straight male receptacle 4 pin *[8]*	Factory prewired	L100WS2M1 changes to **P**L100WS2M1	P
90° Angle male receptacle 4 pin *[8]*	Factory prewired—facing right	L100WS2M1 changes to **AP**L100WS2M1	AP
Ministyle male receptacle *[9]*	8 A max., 5 pin (double circuit) 7 A max., 7 pin (triple circuit)	L100WS2M1 changes to **B**L100WS2M1	B B
Potted and prewired	5 wires, 6 ft long 5 wires, 12 ft long 5 wires 18 ft long	L100WS2M1 changes to L100WS2M1**P** L100WS2M1 changes to L100WS2M1**P12** L100WS2M1 changes to L100WS2M1**P18**	P P12 P18

Table 21.81: Accessories

Description		Catalog Number
Sealed female plug and cable for P and AP receptacles		
4 pins, 16 AWG STO cable, 60 °C	4 ft	1010004
	6 ft	1010006
	10 ft	10100010
Sealed female plug and cable for ministyle receptacle (B)		
5 pins, 16 AWG STO cable, 105 °C	3 ft cable	BH2053
	6 ft cable	BH2056
	12 ft cable	BH20512

Table 21.82: Front covers *[6]*

Description	Designator
Standard metal	M
Transparent plastic cover with metal frame	PF
Transparent plastic cover with metal frame and Neon indicator light (not connected)	GF

Example: L100WS2M1 changes to L100WS2**PF**1

[6] Some product configurations are not available—contact your Schneider Electric representative for details.
[7] The minimum temperatures listed are based on the absence of freezing moisture or water.
[8] Receptacle is a 4 pin male APL/PL-SWTS, Cannon part # MS3102E20-4P-F79 or equal.
[9] Ministyle male receptacles are: **5-pin**, Brad Harrison #41310 (or equal); **7-pin**, Brad Harrison #42805 (or equal)

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Section 22

Pressure, Vacuum, and Float Switches

Electronic Pressure Sensors
XMLG XMLK XMLR

9012G
Industrial Pressure Switch

9012G Machine Tool
Pressure Switch

XMLA Electromechanical
Pressure Switch

9016G
Vacuum Switch

9013F
Water Pump Switch

9013G
Air Compressor Switch

9036D
Open Tank Float Switch

9037H
Closed Tank Float Switch

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XMLR Pressure Switches 22-8

Pressure Switches 22-10

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9012 Sensor Selections

Application	Electronic			Electromechanical Control		
Product Family	**XMLG**	**XMLK**	**XMLR**	**XMLA, B, C, D**	**9012G**	**9016G**
Type of Installation/ Application	Control circuits	Control circuits Pumping applications	Control circuits	Control circuits	Control circuits	Control/power circuits
Fluids Controlled	Air, water, hydraulic oils, corrosive fluids	Air, fresh water, 0 to + 80 ° C (32 to 176 °F)	Air, water, hydraulic oils, corrosive fluids			
Type of Operation and Features	Pressure/vacuum switches and transmitters Analog output 4–20 mA or 0–10 V	Pressure transmitters Analog output, 4–20 mA or 0–10 V	Pressure/vacuum switches and transmitters Configurable units with digital display Analog output 4–20 mA, 0–10 V Regulation between 2 trip points (adjustable differential)	Pressure/vacuum switches Detection of single trip point (nonadjustable differential) Regulation between 2 trip points (adjustable differential)	Pressure switches Detection of single trip point (nonadjustable differential) Regulation between 2 trip points (adjustable differential) 2-stage	Vacuum switches Regulation between 2 trip points (adjustable differential)
Size/Range	–14.5 to 5800 psi	0 to 25 bar or 0 to 300 psi, depending on the model	–14.5 to 8700 psi	–14.5 to 7250 psi	0.2 to 9000 psi	0 to 29 in. of Hg
Type of Output	Analog, 4–20 mA or 0–10 V Digital, PNP or NPN normally closed (N.C.) output	Analog, 4–20 mA or 0–10 V	Analog, 4–20 mA, `0–10 V Digital, PNP or NPN,	Snap action contacts SPDT or DPDT 10 A continuous	Snap action contacts SPDT or DPDT 10 A continuous	Snap action contacts SPDT 10 A continuous DPST horsepower rated
Electrical Connection	M12 connector or Integrated quick connection	M12, DIN 43650 A or Metri-Pack connector *[1]*	M12 connector SAE 7/8-16 UN2A	Cable entry for Pg 13 (DIN PG13.5) cable gland, ISO M20, 1/2" NPT, and 1/2" PF	1/2" -14 NPT Cable entry 20 mm	**9016G**: 1/2" -14 NPT Cable entry 20 mm 9016GVG **NEMA Type 1 and 3R**: 3 knockouts for 1/2 in. conduit **NEMA Type 7 and 9**: 2 conduit entries, 3/4"-14 NPT
Fluid Connection	G 1/4" BSP internal, 1/4" NPT internal SAE 7/16"-20 UNF female	G 1/4 A (male) conforming to ISO7 or 1/4"-18 NPT male *[1]*	G 1/4" BSP internal, 1/4" NPT internal SAE 7/16"-20 UNF female	G 1/4" BSP internal, 1/4" NPT internal 1/4"-18 NPT external	1/4" - 18 NPTF internal 7/16"-20 UNF-2B internal G 1/4" BSP internal G 1/4"-19 BSP internal	G 1/4" BSP internal, 1/4" NPT internal 1/4"-18 NPT external
Fluid Characteristics	Hydraulic oils, air, fresh water, sea water, corrosive fluids from –15 to +125 °C (5 to +257 °F)	Air, fresh water, 0 to + 80 ° C (32.0 to 176.0 °F)	Hydraulic oils, air, fresh water, sea water, corrosive fluids from –15 to +80 °C (5 to +176 °F)	Hydraulic oils, air, fresh water, sea water, steam, corrosive fluids, viscous products, 32 to 320 °F (0 to 160 °C) depending on the model	Hydraulic oils, air, fresh water, sea water, corrosive fluids from –26 to +120 °C (–15 to +250 °F) depending on the model	Hydraulic oils, air, fresh water, sea water, from –26 to +120 °C (–15 to +250 °F) depending on the model
Enclosure Rating	IP66, IP67 conforming to IEC/EN 60529, NEMA 4	IP65 conforming to IEC/ EN60529, NEMA 4	IP67 conforming to IEC/ EN 60529, NEMA 4/6/12/ 13	Screw terminal models: IP66 conforming to IEC 529, NEMA 4	NEMA Type 4, 4X, 7, 9, 13	**9016G**: NEMA Type 4, 4X, 7, 9, 13 **9016GVG**: NEMA Type 1
Dimensions of Case, in. (mm) width x height x depth	dia. 0.90 x 2.76 (dia. 22.8 x 70.1 mm)	dia. 1.40 x 3.10 (dia. 36 x 79.5)	1.6 x 3.93 x 1.6 in. (41 x 100 x 42 mm)	4.45 x 1.38 x 2.95 in. (113 x 35 x 75 mm) NEMA 4: 3.50 x 3.60 x 2.63 in. (89 x 91 x 67 mm)	NEMA 1: 2.06 x 5.03 x 2.75 in. (52 x 128 x 70 mm) NEMA 4: 3.50 x 3.60 x 2.63 in. (89 x 91 x 67 mm)	Control circuit: same as 9012G Power circuit: same as 9013G
Conforming to Standards	CE, IEC/EN 60947-1, IEC/EN 60947-5-1, EN 50081-1, EN 50082-2, EN 61000-6-2	CE, IEC/EN 60947-1, IEC/EN 60947-5-1 EN 50081-1, EN 50082-2, EN 61000-6-2	CE, IEC/EN 60947-1, IEC/EN 60947-5-1, EN 50081, EN 50082, EN 61000-6-2, EN 61000-4-2/3/4/5/6/8/ 11	CE, IEC/EN 60947-5-1, VDE 0660-200, UL 508, CSA C22-2 No. 14	NEMA A600 UL508	NEMA A600 UL508
Certifications	UL Listed, CSA Certified	UL: File E97729, CCN NKPZ CSA: File 240515, Class 3211-03	UL Listed, CSA Certified	UL B300 - R300 Listed. CSA B300 - R300, (BV, GL, RINA, LROS pending)	UL Listed, CSA Certified	UL Listed, CSA Certified
Catalog Number	XMLG	XMLK	XMLR	XMLA, XMLB, XMLC, XMLD	9012GA, 9012GC, 9012GG, 9012GH, 9012GK, 9012GM, 9012GR, 9012GS, 9012GT, 9012GN, 9012GP, 9012GQ	9016GA, 9016GV

[1] For other connections, consult the Sensor Competency Center.

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9013,9036, 9037, 9038 Sensor Selections

Application	Electromechanical Pressure Switches		Electromechanical Float Switches			
Product Family	**9013F**	**9013G**	**9036D, 9036F**	**9036G**	**9037**	**9038**
Type of Installation/ Application	Power circuits	Power circuits	Power circuits	Power circuits	Power circuits	Power circuits
Fluids Controlled	Fresh water, air		Fresh or sea water, hydraulic oils; suitable for corrosive fluids except for cast iron bushing (shown above)			
Type of Operation and Features	Pressure switches Detection of single trip point (fixed differential) Regulation between 2 trip points (adjustable differential)	Pressure switches Regulation between 2 trip points (adjustable differential)	Liquid level control in **Open** tanks—either pumping in or pumping out of tank	Liquid level control in **Open** tanks—either pumping in or pumping out of tank	Liquid level control in **Closed** tanks for condensate, return heating water, fuel oil, etc.	Liquid level control in **Open** or **Closed** tanks—two pumps alternate, and both pumps run in peak demand Non-alternating option also available
Size/Range (psi)	6 to 200 psi	10 to 250 psi	Light duty	Medium duty	—	—
Type of Output	1-pole or 2-pole, snap action contacts HP rated	2-pole, snap action contacts HP rated	2-pole, snap action contacts HP rated	2-pole, snap action contacts HP rated	2-pole, snap action contacts HP rated	2 sets of 2-pole, snap action contacts HP rated
Electrical Connection	2 open side entries, 0.88 in. diameter, with two flats	**NEMA Type 1 and 3R**: 3 knockouts for 1/2 in. conduit **NEMA Type 7 and 9**: 2 conduit entries, 3/4"-14 NPT	4 screw terminals **NEMA Type 1**: 2 open side entries, 0.88 in. diameter, with two flats **NEMA Type 4, 7, 9**: 2 cable entries, 3/4-14 conduit entry **9036FG**: 2 cable entries, 0.88 in. (22.4 mm) with 0.84 in. (21.3 mm) across flat	4 screw terminals **NEMA Type 1**: 3 knockouts for 1/ 2 in. conduit entry **NEMA Type 4, 7, 9**: 2 cable entries, 3/4-14 conduit entry	4 screw terminals **NEMA Type 1**: 2 open side entries, 0.88 in. diameter, with two flats **NEMA Type 4, 7, 9**: 2 cable entries, 3/4-14 conduit entry	8 screw terminals **NEMA Type 1**: 8 knockouts for 1/2 or 3/4 in. conduit entry **NEMA Type 4, 7, 9**: 2 cable entries, 3/4-14 conduit entry
Fluid Connection	1/4" NPSF internal, 1/4" NPT external, plus other options	1/4" NPSF internal, 1/4" NPT external	Open tank	Open tank	Closed tank	Open tank (9038A) Closed tank (9038C, D)
Fluid Characteristics	Fresh water, air		Fresh water, sea water, hydraulic oils (and corrosive fluids, depending on the model) with a density ≥ 0.8			
Enclosure Rating	NEMA Type 1 NEMA Type 3R IP20	NEMA Type 1, 3R, 7, 9 IP20	NEMA Type 1, 4 , 7, 9	NEMA Type 1, 4 , 7, 9	NEMA Type 1, 4 , 7, 9	NEMA Type 1, 4 , 7, 9
Dimensions of Case width x height x depth in. (mm)	3.76 x 2.8 x 2.78 in. (95.5 x 71.12 x 70.6 mm)	3.68 x 3.85 x 3.44 in. (93.47 x 97.79 x 87.37 mm)	See page 22-24	See page 22-24	See page 22-26–page 22-27	See page 22-28
Conforming to Standards	NEMA A600 UL508	NEMA A600 UL508	NEMA A600 UL508	NEMA A600 UL508	NEMA A600 UL508	NEMA A600 UL508
Certifications	UL Listed, CSA Certified	UL Listed, CSA Certified	UL Listed, CSA Certified	UL Listed, CSA Certified	UL Listed, CSA Certified	UL Listed, CSA Certified
Catalog Number	9013FS, 9013FR, 9013FH, 9013FT, 9013FY	9013GS, 9013GH, 9013GM	9036DG, 9036DW, 9036DR, 9036FG	9036GG, 9036GW, 9036GR	9037EG, 9037EW, 9037ER, 9037HG, 9037HW, 9037HR	9038AG, 9038AW, 9038AR, 9038CG, 9038CW, 9038CR, 9038DG, 9038DW, 9038DR

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XMLG●●●D
M12 Connector

XMLG●●●Q
Quick Connect

XMLG Pressure Transmitters and Switches

XMLG pressure transmitters and pressure switches are characterized by their ceramic pressure-measuring cell. The deformation caused by the pressure is transmitted to the resistors of a Wheatstone bridge silk-screened on the ceramic. The change in resistance is then processed by the integrated electronics, providing either a digital or analog output signal.

Table 22.1: Specifications

Enclosure Rating	IP66, IP67 conforming to IEC/EN 60529, NEMA 4
Ambient Temperature (Operation)	-15 to +85 °C (+5 to +185 °F)
Media Temperature	-15 to +125 °C (+5 to +257 °F)
Precision (Linearity, Repeat Accuracy, Hysteresis)	Transmitters: <0.3%; pressure/vacuum switches: <1%
Repeat Accuracy (PNP/NPN output)	0.1% of the measuring range
Current Consumption	Transmitters: < 20 mA Pressure/vacuum switches: < 4 mA
Maximum Load Current	Transmitters: < 20mA Pressure/vacuum switches: 150 mA switching capacity
Rated Voltage	12/24 V for transmitters and pressure/vacuum switches
Voltage Limits	24 V for transmitters and pressure/vacuum switches
Fluids Controlled	Hydraulic oils, air, fresh/sea water, corrosive fluids from -15 to +125 °C (+5 to +257 °F)
Materials in Contact with Fluid	Ceramic Al_2O_3, stainless steel type AISI 303, Viton® FPM, PPS (leakage protection for P> 40 bar)
Output Response Time	< 2 ms

Table 22.2: Interpretation of the Catalog Number (example: XMLG100D23TQ)

XMLG	100			D	2	3	TQ
Units without Display, 22.8 mm diameter	Rated Pressure Range			Electrical Connection	Output	Fluid Connection	Bulk Pack
	Code	psi	bar				
	M01	–14.5 to 0	–1 to 0	**D**: M12	**1**: DC Analog, 4–20 mA, shunt calibration	**1**: G 1/4 A (BSP male)	
	001	0 to 14.5	0 to 1	**Q**: Integrated quick connect	**2**: Analog, 4–20 mA	**3**: 1/4" NPT male	
	006	0 to 87.0	0 to 6		**3**: Solid state, NPN	**7**: 7/16-20 UNF male	
	010	0 to 145	0 to 10		**4**: Solid state, PNP		
	016	0 to 232.1	0 to 16		**7**: Analog, 0–10 V (bulk packs only)		
	025	0 to 362.5	0 to 25		**11**: DC Analog, 0–10 V shunt calibration		
	100	0 to 1450	0 to 100				
	160	0 to 2329.6	0 to 160				
	250	0 to 3625	0 to 250				
	400	0 to 5800	0 to 400				

NOTE: Use this table only to interpret the catalog number. Some combinations are not available.

Table 22.3: Selection

Rated Pressure Range		Fluid Connection	Electrical Connection	Catalog Number*[1][2]*	
				Analog Output, 4–20 mA	Analog Output, 0–10 Vdc
-14.5 to 0 psi	-1 to 0 bar	1/4" NPT Male	M12	XMLGM01D23	XMLGM01D73
0 to 14.5 psi	0 to 1 bar			XMLG001D23	XMLG001D73
0 to 87 psi	0 to 6 bar			XMLG006D23	XMLG006D73
0 to 145 psi	0 to 10 bar			XMLG010D23	XMLG010D73
0 to 232 psi	0 to 16 bar			XMLG016D23	XMLG016D73
0 to 362.5 psi	0 to 25 bar			XMLG025D23	XMLG025D73
0 to 1450 psi	0 to 100 bar			XMLG100D23	XMLG100D73
0 to 2320 psi	0 to 160 bar			XMLG160D23	XMLG160D73
0 to 3625 psi	0 to 250 bar			XMLG250D23	XMLG250D73
0 to 5800 psi	0 to 400 bar			XMLG400D23	XMLG400D73

NOTE: For units with a solid-state output, the settings must be specified for each order.

Table 22.4: Wiring Configurations (M12)

Output	Pin 1	Pin 3	Pin 4
Analog, 4–20 mA	+ Power supply	Output	—
Analog, 0–10 Vdc	+ Power supply	Output	Ground
Solid State, NPN	+ Power supply	Ground	Output
Solid State, PNP	+ Power supply	Ground	Output

UL E164865
CCN NKPZ

LR 44087
Class 3211-03

For wiring diagrams, refer to page 22-5.

[1] For devices with a switch output or 0–10 Vdc analog output, contact the Sensor Competency Center at 1-800-435-2121.

[2] For a bulk package (25 units), add TQ to the end of the catalog number. The minimum order quantity is 50 units (two bulk packs). When ordering, specify the individual number of units, NOT the number of bulk packs. Minimum order quantity for factory ordered individual items (non-stock) is 50 pieces.

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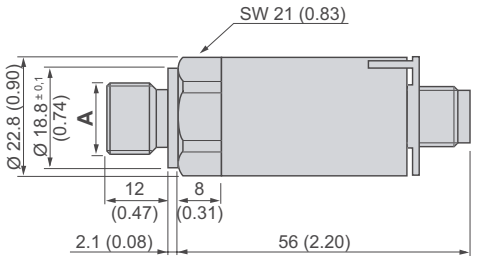
XMLG Pressure Transmitters and Switches

For connectors and cables, see page 22-9.

Dimension A	
XMLG•••D2••1	G 1/4 A (BSAP Male)
XMLG•••D2••3	1/4" NPT Male
XMLG•••D2••7	7/16-20 UNF Male

Table 22.5: Dimensions, in. (mm)

XMLG●●●D●●, M12 x 1 Connection



XMLG●●●Q●●, Integrated Quick Connection

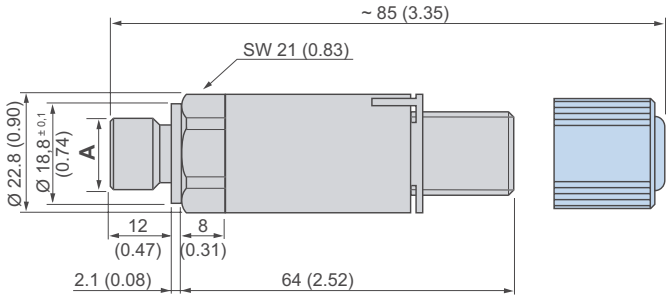
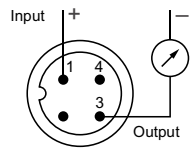
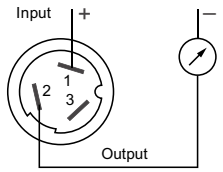
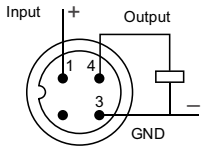
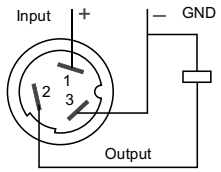
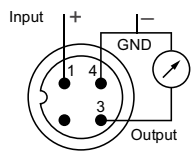
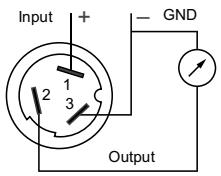
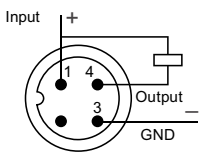
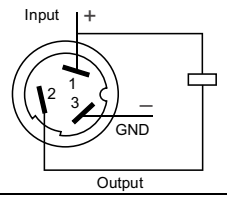


Table 22.6: Connector Wiring

Pressure Transmitters		Electronic Pressure Switches	
M12	**Integrated Quick Connection**	**M12**	**Integrated Quick Connection**
2-wire (4–20 mA)	**2-wire (4–20 mA)**	**3-wire (PNP)**	**3-wire (PNP)**
			
3-wire (0–10 V)	**3-wire (0–10 V)**	**3-wire (NPN)**	**3-wire (NPN)**
			

For wiring configurations, refer to page 22-5.

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XMLK•••••C
DIN 43650A Connector

XMLK•••••D
M12 Connector

XMLK•••••P
Metri-Pack Connector

XMLK Pressure Transmitters

Type XMLK pressure transmitters are characterized by their ceramic pressure-measuring cell. The deformation caused by the pressure is transmitted to the resistors of a Wheatstone bridge silk-screened on the ceramic. The change in resistance is then processed by the integrated electronics to provide an analog output signal.

Table 22.7: Environmental Specifications

Enclosure Rating		IP65 conforming to IEC/EN 60529, NEMA 4
Ambient Air Temperature	**For Operation**	0 to + 80 °C (32 to 176 °F)
	For Storage	–25 to + 85 °C (13 to 185 °F)
Precision (Resolution)		Combined sum of linearity, hysteresis, and repeat accuracy <± 0.5% of the measuring range
		Setting tolerance of zero point and measuring range limit < ± 1% of the measuring range
Repeat Accuracy		± 0.3% of the measuring range
Current Consumption		4–20 mA: < 20 mA 0–10 V: < 6 mA
Rated Supply Voltage		24 Vdc
Voltage Limits		4–20 mA: 8–33 V c 0–10 V: 16.2–33 V c
Fluids or Products Controlled		Air, fresh water (0 to + 80 °C / 32 to 176 °F)
Materials in Contact with Fluid		Steel, type AISI 303 (stainless steel) nitrile (NBR)
Output Response Time		< 2 ms

Table 22.8: Interpretation of the Catalog Number

Units Without Display	Rated Pressure			Unit of Pressure	O-Ring	Electrical Connection	Output	Fluid Connection	Bulk Pack
	Code	psi	bar						
XMLK	**100**			**P**	**2**	**D**	**2**	**3**	**TQ**
36 mm (1.42 in.) diameter	006		0–6	B: bar	2: NBR (Nitrile)	C: DIN 43650A	2: Analog, 4–20 mA	1: G 1/4 A (male)	
	010		0–10	P: psi		D: M12	7: Analog, 0-10 V	3: 1/4"-18 NPT (male)	
	016		0–16			P: Metri-Pack			
	025		0–25						
	100	0–100							
	150	0–150							
	200	0–200							
	300	0–300							

NOTE: Use this table only to interpret the catalog number. Some combinations are not available.

Table 22.9: Selection

Rated Pressure Range	Catalog Number *[3]*					
	4–20 mA Analog Output			0–10 Vdc Analog Output		
	DIN	M12	Metri-Pack	DIN	M12	Metri-Pack
Bar Version, G 1/4 A Male Fluid Connector						
0–6 bar (0–87 psi)	XMLK006B2C21	XMLK006B2D21	—	XMLK006B2C71	XMLK006B2D71	—
0–10 bar (0–145 psi)	XMLK010B2C21	XMLK010B2D21	—	XMLK010B2C71	XMLK010B2D71	—
0–16 bar (0–232 psi)	XMLK016B2C21	XMLK016B2D21	—	XMLK016B2C71	XMLK016B2D71	—
0–25 bar (0–362.5 psi)	XMLK025B2C21	XMLK025B2D21	—	XMLK025B2C71	XMLK025B2D71	—
PSI Version, 1/4"-18 NPT Male Fluid Connector						
0–100 psi (0–6.9 bar)	XMLK100P2C23	XMLK100P2D23	XMLK100P2P23	XMLK100P2C73	XMLK100P2D73	XMLK100P2P73
0–150 psi (0–10.3 bar)	XMLK150P2C23	XMLK150P2D23	XMLK150P2P23	XMLK150P2C73	XMLK150P2D73	XMLK150P2P73
0–200 psi (0–13.8 bar)	XMLK200P2C23	XMLK200P2D23	XMLK200P2P23	XMLK200P2C73	XMLK200P2D73	XMLK200P2P73
0–300 psi (0–.20.7 bar)	XMLK300P2C23	XMLK300P2D23	XMLK300P2P23	XMLK300P2C73	XMLK300P2D73	XMLK300P2P73

Table 22.10: Wiring Configurations (M12)

Output	Pin 1	Pin 3	Pin 4
Analog, 4–20 mA	+ Power supply	Output	—
Analog, 0–10 Vdc	+ Power supply	Output	Ground
Solid State, NPN	+ Power supply	Ground	Output
Solid State, PNP	+ Power supply	Ground	Output

UL E164865
CCN NKPZ

LR 44087 Class 3211-03

For wiring diagrams, refer to page 22-5.

[3] For a bulk package (25 units), add TQ to the end of the catalog number. The minimum order quantity is 50 units (two bulk packs). When ordering, specify the individual number of units, **not** the number of bulk packs. Minimum order quantity for factory ordered individual items (non-stock) is 50 pieces.

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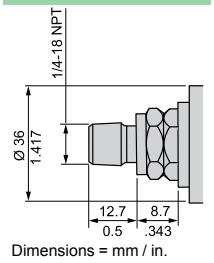
XMLK Dimensions

For connectors and cables, see XMLF Accessories, Wiring Configurations, and Electrical Connections, page 22-9.

Table 22.11: Dimensions

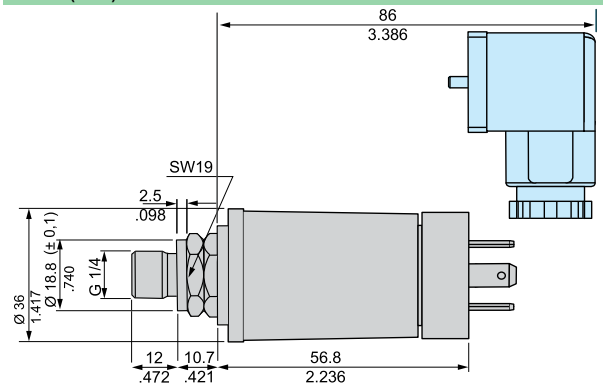
XMLK, DIN connector

NPT



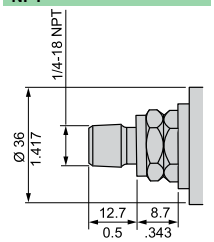
Dimensions = mm / in.

G 1/4 A (male)

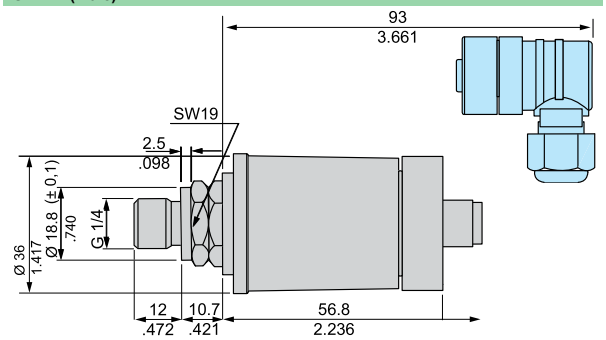


XMLK, M12 connector

NPT

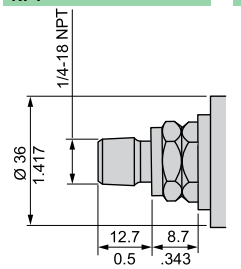


G 1/4 A (male)



XMLK, Metri-Pack connector

NPT



G 1/4 A (male)

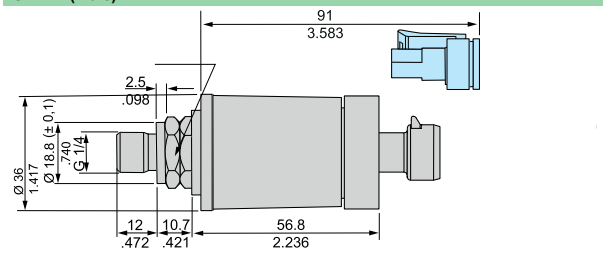
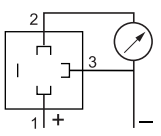
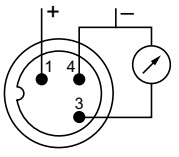
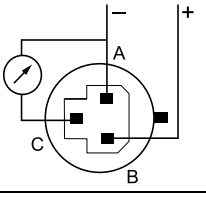


Table 22.12: Connector Wiring

DIN 43650A	M12	Metri-Pack
		

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XMLR

ZMLP

XMLR and ZMLP Pressure Switches

XMLR and ZMLP are user-friendly electronic pressure switches with an easy-to-read four digit display and finger-operated adjustment buttons for scrolling up and down through the menu functions. Burst pressure is six times the nominal pressure (up to 1,800 bar or 26,100 psi).

Configurable functions:
Display

- Pressure unit of measurement (bar, psi, kPa, or MPa).
- Display refresh time: fast (50 ms), normal (200 ms), slow (600 ms).
- 180° reversed display function.

Analog output (4…20 mA or 0…10 V):

- Offset compensation in the range of ±5% of the nominal pressure.
- Adjustment of analog end point between 75 and 125% of the nominal pressure.

Solid-state output

- NO or NC contact.
- Switching mode of outputs: Hysteresis (pumping) or Window (control).
- Time delay both on trip and on reset (adjustable from 0 to 50 s, in steps of 1 s).

Diagnostic functions

- Illumination of all the segments of the display on each power-up, enabling checking of their operation.
- Diagnostic function for checking correct operation of the sensor.
- Saving of min. and max. pressures measured by the sensor and their subsequent display.

Outputs change state when the pressure ranges outside the window settings.

Table 22.13: Interpretation of the Catalog Number (example: XMLRM01G0T25)

XMLR	M01	G	0	T	2	5
Pressure range						
-1 – +0	M01					
1	001					
2.5	002					
10	010					
16	016					
25	025					
40	040					
100	100					
160	160					
250	250					
400	400					
600	600					
Pressure technology						
Gauge ceramic		G				
Gauge metal		M				
Digital output						
No digital output			0			
1 DC Digital output			1			
2 DC Digital output			2			
Output / input type						
No digital output / Test input				T		
PNP				P		
NPN				N		
Analog output						
No analog output					0	
DC analog 4 – 20 mA					2	
DC analog 0 – 10 V					7	
Fluid entry						
G 1/4 (female) DIN 3852-E						5
1/4 in. – 18 NPT (female)						6
7/16 in. – 20 UNF-2B (female)						9

NOTE: Use this table only to interpret the catalog number. Some combinations are not available.

Table 22.14: Specifications

Enclosure Rating		IP67 NEMA 4, 6, 12, 13
Ambient Air Temperature for Operation		DC Models: –25 to +80 °C (–13 to + 176 °F) AC Models: –25 to +80 °C (–13 to + 176 °F)
Media Temperature		–15 to +80 °C (+5 to + 176 °F)
Precision	Analog Output	≤ 0.6% of the measurement range, output offset < 200 mV
	Digital Output	≤ 0.6% of the measurement range
Repeat Accuracy (PNP/NPN output)		≤ 0.5% of the measurement range
Maximum Load Current		**DC:** 200 mA for 17–33 Vdc; **AC:** 2.5A AC15 C300

Table 22.15: ZMLP Selection

Output 1	Output 2	Switching Mode	Reference
4...20 mA	PNP	Hysteresis	ZMLPA2PSH
		Windows	ZMLPA2PSW
	NPN	Hysteresis	ZMLPA2NSH
		Windows	ZMLPA2NSW
PNP	PNP	Hysteresis	ZMLPDPPSH
NPN	NPN	Hysteresis	ZMLPDNNSH

Table 22.16: XMLR Selection

Fluid entries	Outputs			Size						
	4...20 mA	PNP	NPN	-1 bar	1 bar	10 bar	16 bar	40 bar	250 bar	400 bar
1/4" -18NPT	1	—	1	XMLRM01G1N26	XMLR001G1N26	XMLR010G1N26	XMLR016G1N26	XMLR040G1N26	XMLR250M1N26	XMLR400M1N26
	—	—	2	XMLRM01G2N06	XMLR0012G2-N06	XMLR010G2N06	XMLR016G2N06	XMLR040G2N06	XMLR250M2N06	XMLR400M2N06
G1/4A	1	—	—	XMLRM01G0T25	XMLR001G0T25	XMLR010G0T25	XMLR016G0T25	XMLR040G0T25	XMLR250M0T25	XMLR400M0T25
	1	1	—	XMLRM01G1P25	XMLR001G1P25	XMLR010G1P25	XMLR016G1P25	XMLR040G1P25	XMLR250M1P25	XMLR400M1P25
	—	2	—	XMLRM01G2P05	XMLR001G2P05	XMLR010G2P05	XMLR016G2P05	XMLR040G2P05	XMLR250M2P05	XMLR400M2P05

For more options for fluid entry, output, and size, visit www.schneider-electric.com.

File: E164865
CCN / NKPZ

File: LR44087
Class: 3211-03

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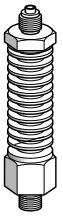
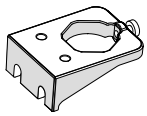
XMLR Accessories, Wiring, and Electrical Connections


XMLZL009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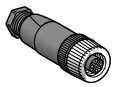
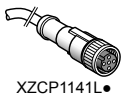
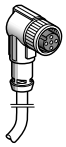

XZCC12FDM●0B

XZCC12FC●0B


XZCP1141L●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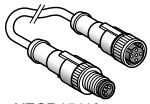
XZCR15110●●●●

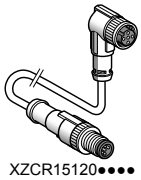
XZCR15120●●●●

Table 22.17: Accessories

Description	For use with	Catalog Number	Weight kg (oz)
Cooler with G 1/4 A (male) connections Usage temperature: 150° C (302° F) max. for the fluid, 50°C (122° F) for the ambient air	XMLR●●●●●●●5	XMLZL009	0.370 (13.051)
Fixing bracket aluminium	XMLR●●●	XMLZL017	0.029 (1.023)

Table 22.18: Connectors

Description	For use with	Type	Catalog Number	Weight kg (oz)
M12 female connector, 4-pin metal clamping ring	XMLR●●●●0T●● XMLR●●●●1P●● XMLR●●●●1N●● XMLR●●●●2P0p	Straight	XZCC12FDM40B	0.020 (0.705)
	XMLR●●●●2N0●	Elbowed	XZCC12FCM40B	0.020 (0.705)
M12 female connector,5-pinMetal clamping ring	XMLR●●●●2P2● XMLR●●●●2N2●	Straight	XZCC12FDM50B	0.020 (0.705)
		Elbowed	XZCC12FCM50B	0.020 (0.705)

Table 22.19: Pre-wired connectors and jumper cables

Description	For use with	Type	Cable length m (ft)	Catalog Number	Weight kg (oz)
Pre-wired M12, 4-pin connectors Metal clamping ring PUR cable	XMLR●●●●0T●● XMLR●●●●1●●● XMLR●●●●2P0● XMLR●●●●2N0●	Straight	2 (6.561)	XZCP1141L2	0.090 (3.174)
			5 (16.404)	XZCP1141L5	0.190 (6.702)
			10 (32.808)	XZCP1141L10	0.370 (13.051)
		Elbowed	2 (6.561)	XZCP1241L2	0.090 (3.174)
			5 (16.404)	XZCP1241L5	0.190 (6.702)
			10 (32.808)	XZCP1241L10	0.370 (13.051)
Pre-wired M12, 5-pin connectors PVC cable	XMLR●●●●2P2● XMLR●●●●2N2●	Straight female connector	2 (6.561)	XZCPV11V12L2	0.100 (3.527)
			5 (16.404)	XZCPV11V12L5	0.200 (7.054)
			10 (32.808)	XZCPV11V12L10	0.400 (14.109)
		Elbowed female connector	2 (6.561)	XZCPV12V12L2	0.100 (3.527)
			10 (32.808)	XZCPV12V12L10	0.400 (14.109)
M12-M12 4-pin jumper cables PUR cable	XMLR●●●●0T●● XMLR●●●●1●●● XMLR●●●●2P0● XMLR●●●●2N0●	Straight female connector	1 (3.280)	XZCR1511041C1	0.100 (3.527)
			2 (6.561)	XZCR1511041C2	0.100 (3.527)
		Elbowed female connector	1 (3.280)	XZCR1512041C1	0.100 (3.527)
			2 (6.561)	XZCR1512041C2	0.100 (3.527)
M12-M12 5-pin jumper cables PUR cable	XMLR●●●●2P2● XMLR●●●●2N2●	Straight female connector	1 (3.280)	XZCR1511064D1	0.100 (3.527)
			2 (6.561)	XZCR1511064D2	0.100 (3.527)
		Elbowed female connector	1 (3.280)	XZCR1512064D1	0.100 (3.527)
			2 (6.561)	XZCR1512064D2	0.100 (3.527)

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XMLB

XMLD

XML International Pressure Switches

XML international pressure switches meet IEC, Cenelec, UL, and CSA standards. They are CE marked.

- Fixed differential (XMLA), adjustable differential single-pole (XMLB) or double-pole (XMLC), and dual stage (XMLD)
- Range listed is on increasing pressure (psi, bar, kPa)
- External pressure setting window available
- 1 N.O.–1 N.C. snap acting contacts standard
- Temperature range: –13 to +158 °F (–25 to +70 °C)
- Enclosure rating: IP65 with plug-in connector, IP66 with terminal connections
- Operating rate: up to 120 operations / min. for diaphragm and 60 / min. for piston
- Media connection: 1/4" NPT
- Conduit connection: 1/2" NPT

Table 22.20: Specifications

Enclosure Rating		Screw terminal models: IP66 conforming to IEC/EN 60529; Connector models: IP65 conforming to IEC/EN 60529
Ambient Temperature	**Operation**	–25 to +70 °C (–13 to +158 °F)
	Storage	–40 to +70 °C (–40 to 158 °F)
Repeat Accuracy		< 2%
Fluids Controlled		Hydraulic oils, air, fresh water, 32 to 320 °F (0 to +160 °C), depending on the model Steam, corrosive fluids, viscous products, 32 to 320 °F (0 to +160 °C), depending on the model
Operating Rate (operating cycles/minute)		Piston version switches: up to 60 cycles/minute for temperatures above 32 °F (0 °C) Diaphragm version switches: up to 120 cycles/minute for temperatures above 32 °F (0 °C)
Operational Characteristics		AC-15; B300 (Ue = 240 V, Ie = 1.5 A; Ue = 120 V, Ie = 3 A) DC-13; R300 (Ue = 250 V, Ie = 0.1) conforming to IEC 947-5-1 Appendix A, EN 60 947-5-1
Type of Contacts		Silver tipped contacts XMLA & XMLB: 1 C/O single-pole contact (4 terminal), snap action XMLC: 2 C/O single-pole contacts (8 terminals), simultaneous snap action XMLD: 2 C/O single-pole contacts (8 terminals), staggered snap action
Resistance Across Terminals		< 25 mW conforming to NF C 93-050 method A or IEC 255-7 category 3
Terminal Referencing		Conforming to CENELEC EN 50013
Short-Circuit Protections		10 A cartridge fuse type gG (gI) recommended
Connection		Screw clamp terminals; Clamping capacity, min: 1 x 0.2 mm², max: 2 x 2.5 mm²

Table 22.21: Component Materials in Contact with Fluid

Pressure Switch Catalog Number	Zinc Alloy	Stainless Steel	Brass	Steel	Nitrile	PTFE	FPM, FKM	Aluminum
XMLAM01V•••• / XML•M02V••••	X	X *[1]*	—	—	X	—	—	—
XMLBM03S••••	—	X *[1]*	—	—	—	X	—	—
XML•M05A••••	X	X *[1]*	—	—	X	—	—	—
XMLBL05S••••	—	X *[2]*	—	—	—	X	—	—
XML•L35R••••	—	X *[2]*	—	X	—	—	X	—
XML•L35S•••• / XML•001S••••	—	X *[2]*	—	—	—	X	—	—
XML•002A••••	X	—	—	—	X	—	—	—
XML•002B••••	—	—	—	X	—	—	X	—
XMLA004A•••• / XMLB004A••••	X	—	—	—	X	—	—	—
XML•004B••••	—	—	—	X	—	—	X	—
XML•010A••••	X	—	—	—	X	—	—	—
XML•010B••••	—	—	X	—	—	—	X	—
XML•020A•••• / XML•035A••••	X	—	—	—	X	—	—	X
XML•020B•••• / XML•035B••••	—	—	X	—	—	—	X	—
XML•070D•••• / XML•160D•••• / XML•300D••••	—	—	X	X	—	X	X	—
XML•500D••••	—	—	X1	X	—	X	X	—

Table 22.22: Interpretation of the Catalog Number (example: XMLD070D1S13)

(XML) D	070		D	1	S	1	3	
Contacts	**Rated Pressure**		**Actuator**	**Scale**	**Electrical Connection**	**Output**	**Fluid Connection**	
	Code	**psi** / **bar**	***Diaphragm***				**Fluid**	**Electrical**
A Fixed differential, single-pole contact	**L05**	0 to 0.725 / 0 to 0.05	**A** Hydraulic oil, air, fresh water, sea water (0 to 70 °C)	**1** Without	**S** Without connector (not available on solid-state devices)	**1** Contacts		
	L35	0 to 5.075 / 0 to 0.35		**2** With	**C** Square / DIN 43650		**1** 1/4 Gas	Type 13 (PG 13,5)
B Adjustable differential, single-pole contact	**M01**	-14.5 to -4.06 / -1 to -0.28	**B** Hydraulic oil, air, fresh water, sea water (0 to 160 °C)		**D** M12 Micro connector			
	M02	-14.5 to -2.03 / -1 to -0.14						
	M03	-2.9 to -.029 / -0.2 to -0.02	**C** Corrosive fluids				**2** 1/4 Gas	ISO M20
C 2 adjustable differential, single-pole contacts, simultaneous	**M05**	-7.25 to 72.5 / -0.5 to 5	**P** Viscous fluids					
	001	0 to 14.5 / 0 to 1	**R** Hydraulic oil, air (0 to 160 °C)				**3** 1/4 in. NPTF	1/2 in. NPT
	002	0 to 36.25 / 0 to 2.5	**S** Fresh/sea water, corrosive fluids (0 to 160 °C)					
	004	0 to 58 / 0 to 4					**4** PT 1/4 (JIS B0203)	1/2 in. PF (JIS B0202)
D 2 fixed differential, single-pole contacts, staggered	**010**	0 to 145 / 0 to 10	***Vacuum***					
	020	0 to 290 / 0 to 20	**V** Hydraulic oil, air, fresh water, sea water (0 to 70 °C)					
	035	0 to 507.5 / 0 to 35						
	040	0 to 580 / 0 to 40	**T** Hydraulic oil, air, fresh water, sea water (0 to 160 °C)					
	070	0 to 1015 / 0 to 70						
	160	0 to 2320 / 0 to 160	***Piston***					
	300	0 to 4350 / 0 to 300	**D** Hydraulic oil					
	500	0 to 7250 / 0 to 500	**E** Fresh / sea water					

NOTE: Use this table only to interpret the catalog number. Some conbinations are not available

[1] X2GNiMo 17-12-2 (AISI 316L)
[2] X8GNiS 18-09 (AISI 303)

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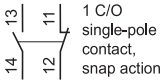
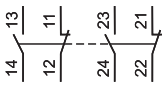
Terminal Diagrams

XMLA, XMLB



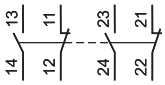
1 C/O single-pole contact, snap action

XMLC

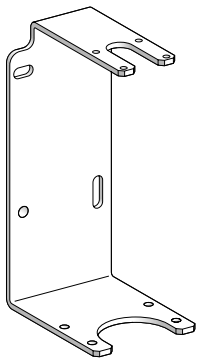


2 C/O single-pole contacts, simultaneous snap action

XMLD

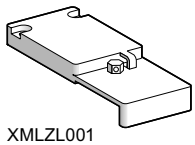


2 C/O single-pole contacts, snap action (1 per stage)

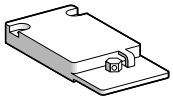


XMLZL006

XMLZL002



XMLZL001



XMLZL011

XML Catalog Numbers and Accessories

Table 22.23: Fixed Differential Catalog Numbers

Range on Increasing Pressure (psi)	Approximate Differential Across Range	Maximum Allowable Pressure	Catalog Number
Fixed, 1 Single-Pole Contact (XMLA)			
-4.06 to -14.5	3.5	130.5	XMLAM01V2S13
0.435 to 14.5	0.29 low / 0.58 high	32.62	XMLA001S2S13
2.17 to 36.25	1.88	130.5	XMLA002A2S13
5.8 to 58	5.07	130.5	XMLA004A2S13
8.7 to 145	7.25	326.25	XMLA010A2S13
10.2 to 290	5.8 low / 14.5 high	652.5	XMLA020A2S13
21.75 to 507.5	18.12	1160	XMLA035A2S13
72.5 to 1015	43.5 low / 108.75 high	2320	XMLA070D2S13
145 to 2320	79.75 low / 261 high	5220	XMLA160D2S13
290 to 4350	239.25 low / 507.5 high	9787.5	XMLA300D2S13
435 to 7250	290 low / 652.5 high	16312.5	XMLA500D2S13
Fixed, 2 Single-Pole Contacts, Staggered (XMLD)			
0.84 to 5.07	0.44	32.62	XMLDL35S1S13
-1.74 to -14.5	1.45	130.5	XMLDM02V1S13
1.74 to 14.5	0.44 low / 1.02 high	32.62	XMLD001S1S13
4.93 to 36.25	2.03 low / 2.76 high	130.5	XMLD002B1S13
5.8 to 58	2.18 low / 2.76 high	130.5	XMLD004B1S13
17.4 to 145	6.53 low / 8.7 high	326.25	XMLD010B1S13
2.14 to 20	10.15 low / 18.85 high	652.5	XMLD020B1S13
63.8 to 507.5	21.75 low / 37.7 high	1160	XMLD035B1S13
136.3 to 1015	72.5 low / 137.75 high	2320	XMLD070D1S13
239.25 to 2320	127.6 low / 290 high	5220	XMLD160D1S13
522 to 4350	246.5 low / 609 high	9787.5	XMLD300D1S13
594.5 to 7250	304.5 low / 942.5 high	16312.5	XMLD500D1S13

Table 22.24: Adjustable Differential Catalog Numbers

Range on Increasing Pressure (psi)	Approximate Differential Across Range	Maximum Allowable Pressure	Catalog Number
Adjustable, 1 Single-Pole Contact (XMLB)			
0.038 to 0.72	0.02 low / 0.06 high	1.63	XMLBL05S2S13
0.65 to 5.07	0.6 low / 0.72 high	32.62	XMLBL35R2S13
-2 to -14.5	1.9	130.5	XMLBM02V2S13
-0.29 to -2.9	0.26	29	XMLBM03S2S13
-7.25 to 72.5	7.25	163.12	XMLBM05A2S13
0.72 to 14.5	0.58 low / 0.87 high	32.62	XMLB001S2S13
4.35 to 36.25	2.32 low / 3.04 high	130.5	XMLB002A2S13
3.62 to 58	2.9 low / 3.62 high	130.5	XMLB004A2S13
10.15 to 145	8.26 low / 12.32 high	326.25	XMLB010A2S13
18.9 to 290	14.5 low / 23.2 high	652.5	XMLB020A2S13
50.75 to 507.5	24.65 low / 36.97 high	1160	XMLB035A2S13
101.5 to 1015	68.15 low / 127.6 high	2320	XMLB070D2S13
145 to 2320	134.85 low / 301.6 high	5220	XMLB160D2S13
319 to 4350	281.3 low / 536.5	9787.5	XMLB300D2S13
435 to 7250	333.5 low / 762.7 high	16312.5	XMLB500D2S13
Adjustable, 2 Single-Pole Contacts, Simultaneous (XMLC)			
0.65 to 5.07	0.29 low / 0.51 high	32.62	XMLCL35S2S13
-2 to -14.5	1.89 low / 2.03 high	130.5	XMLCM02V2S13
-7.97 to 72.5	6.52	163.12	XMLCM05S2S13
0.725 to 14.5	0.43 low / 0.58 high	32.62	XMLC001S2S13
4.35 to 36.25	1.89 low / 2.47 high	130.5	XMLC002B2S13
4.35 to 58	2.18 low / 2.47 high	130.5	XMLC004B2S13
10.15 to 145	6.53 low / 10.15 high	326.25	XMLC010B2S13
18.85 to 290	10.15 low / 14.5 high	652.5	XMLC020B2S13
50.75 to 507.5	14.5 low / 21.75 high	1160	XMLC035B2S13
101.5 to 1015	65.25 low / 129.05 high	2320	XMLC070D2S13
174 to 2320	130.5 low / 304.5 high	5220	XMLC160D2S13
319 to 4350	232 low / 507.5 high	9787.5	XMLC300D2S13
435 to 7250	275.5 low / 754 high	16312.5	XMLC500D2S13

Table 22.25: Accessories for XML Pressure and Vacuum Switches

Description	For Use with Switches	Catalog Number
Rear mounting bracket For vibrations > 2 gn	XML•L35 XML•001	XMLZL006
Additional top support bracket For vibrations > 4 gn	XMLAM01 XML•M05 XMLA004 XML•010 … XML•500	XMLZL002
Lead sealable protective cover To prevent unauthorized access to the adjustment screws and the switch cover mounting screw	XMLA XMLB	XMLZL001
Lead sealable protective cover To prevent unauthorized access to adjustment screws	All models	XMLZL011

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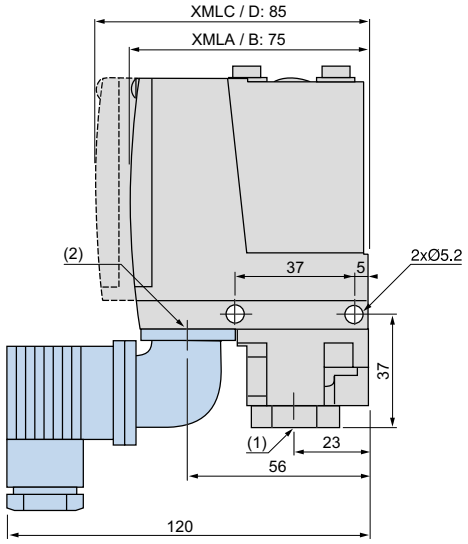
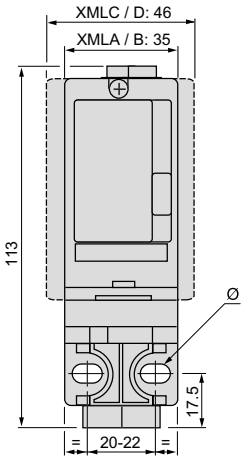
XML Dimensions

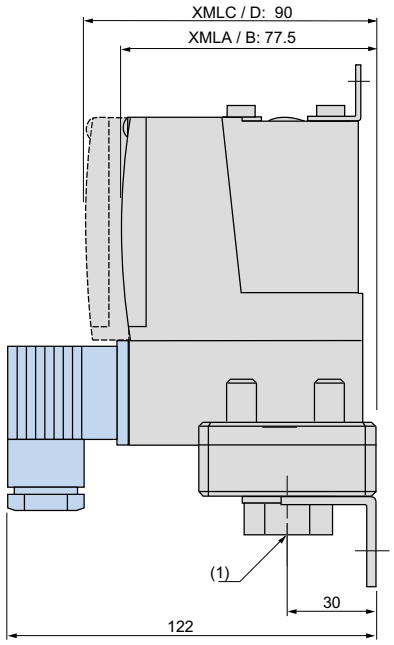
XMLAM01, XMLBM05, XMLCM05, XMLA004, X•ML010…500

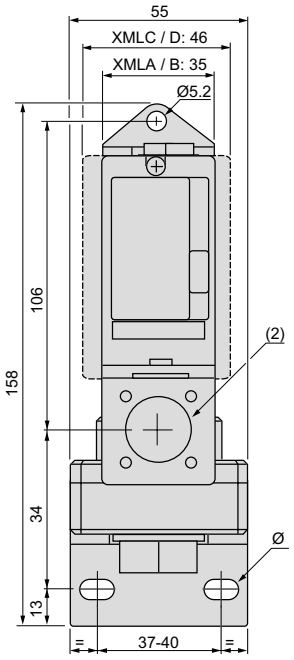




(1) 1 fluid entry, tapped G 1/4 (BSP female) or 1/4" NPT
(2) 1 electrical connections entry, tapped M20 x 1.5 or Pg 13.5, or 1/2" NPT
Ø: 2 elongated holes Ø 5.2 x 6.7

XML•M02, XML•002, XMLB004, XMLC004, XMLD004





(1) 1 fluid entry, tapped G 1/4 (BSP female) or 1/4" NPT
(2) 1 electrical connections entry, tapped M20 x 1.5 or Pg 13.5, or 1/2" NPT
Ø: 2 elongated holes Ø 10.2 x 5.2

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NEMA 1

Open Type

Type G Pressure Switches

Table 22.26: Fixed Differential, Open Type or NEMA 1 Enclosure

Range On Decreasing Pressure psig	Approximate Differential at Mid-Range psig *[3]*	Maximum Allowable Pressure psig	Open Type Type	NEMA 1 Type
Diaphragm Actuated—**Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing**				
0.2–10	0.4 ±0.1	100	GRO1	GRG1
1–40	1.2 ±0.3	100	GRO3	GRG3
1.5–75	2.2 ±0.4	240	GRO4	GRG4
3–150	4.2 ±1	475	GRO5	GRG5
5–250	7.4 ±2	750	GRO6	GRG6
13–425	13 ±3	850	—	GSG1
20–675	19 ±5	2000	—	GSG2
Piston Actuated—**#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton® Fluorocarbon Diaphragm and O-Ring, Teflon® Retaining Ring**				
20–1000	49 ±10	10000	—	GTG1
90–2900	141 ±15	15000	GTO2	GTG2
170–5600	200 ±40	20000	GTO3	GTG3
270–9000	350 ±45	25000	—	GTG4

Table 22.27: Adjustable Differential, Open Type or NEMA 1 Enclosure

Range On Decreasing Pressure psig	Approximate Mid-Range Differential Adds to Decreasing Set Point *[3]*	Maximum Allowable Pressure psig	Open Type Type	NEMA 1 Type
Diaphragm Actuated—**Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing**				
0.2–10	0.4–0.9	100	GNO1	GNG1
1–40	1.2–3.6	100	GNO3	GNG3
1.5–75	2.2–6.6	240	GNO4	GNG4
3–150	4.2–13.2	475	GNO5	GNG5
5–250	7.4–33.6	750	GNO6	GNG6
13–425	13–37.2	850	GPO1	GPG1
20–675	19–58.8	2000	GPO2	GPG2
Piston Actuated—**#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton Fluorocarbon Diaphragm and O-Ring, Teflon Retaining Ring**				
20–1000	49–150	10000	—	GQG1
90–2900	141–455	15000	GQO2	GQG2
170–5600	200–950	20000	GQO3	GQG3
270–9000	350–1400	25000	—	GQG4

Table 22.28: Available Modifications *[4]*

Modification	Applies to	Form
Standard Nitrile (Buna-N) diaphragm in #316 stainless steel housing	**Not available** on GNG1, GNO1, GRG1, or GRO1. **Available** on all other GNG, GNO, GPG, GPO, GRG, GRO, GSG, and GSO switches.	Q1
Ethylene propylene diaphragm in #316 stainless steel housing	**Not available** on GNG1, GNO1, GRG1, or GRO1. **Available** on all other GNG, GNO, GPG, GPO, GRG, GRO, GSG, and GSO switches.	Q3
Viton fluorocarbon diaphragm in #316 stainless steel housing	**Not available** on GNG1, GNO1, GRG1, or GRO1. **Available** on all other GNG, GNO, GPG, GPO, GRG, GRO, GSG, and GSO switches.	Q4
1/4–18 NPT external thread pressure connection	GNG, GNO, GRG, GRO	Z
1/2–14 NPT external thread, 1/4–18 NPTF internal thread pressure connection. Standard actuator only.	GNG, GNO, GRG, GRO	Z16
7/16–20 UNF-2B internal thread pressure connection	GNG, GNO, GPG, GPO, GQG, GQO, GRG, GRO, GSG, GSO, GTG, GTO	Z18

Table 22.29: Class 9049 Accessories for Class 9012 Pressure Switches

Description	Applies to Class	Type
Stainless steel surge reducer for use on oils, coolants, and hydraulic fluids (not recommended for air or water)	9012G	A26S

Acceptable Wire Sizes 12-22 AWG

Recommended Terminal Clamp Torque 7 lb-in

Electrical Rating page 22-16

Temperature Rating page 22-16

Renewal Parts Kits page 22-30

UL File E12158 CCN NKPZ

CSA File LR25490 Class 3211-03

CE

[3] Determines operating point on rising pressure.
[4] Some product configurations are not available—contact your Schneider Electric representative for details.

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Control Circuit Rated Type G Pressure Switches

9012GAW5
NEMA 4, 4X, 13

Class 9012 single stage pressure switches are control circuit rated devices used in pneumatic or hydraulic systems on a wide variety of machine and process applications to protect the equipment and control or monitor the system pressure.

- Type G machine tool switches are available with NEMA Type 4, 4X, and 13 (IEC IP66) enclosure ratings.
- The NEMA 7 and 9 devices are UL listed for use in the following hazardous locations: Class I, Divisions 1 and 2, Groups C and D; and Class II, Divisions 1 and 2, Groups E, F, and G.
- Enclosure materials are cast aluminum.
- To ensure repeatability and minimize setting drift, pressure settings should fall within the middle 80 percent of the pressure range.

Table 22.30: Fixed Differential *[5]*
NEMA 4, 4X, 13 Enclosure
UL Listed and CSA Certified As Industrial Control Equipment

Range on Decreasing Pressure psig	*[6]*Approximate Differential at Mid-Range psig	Maximum Allowable Pressure psig	Single Pole Double Throw Type	Double Pole Double Throw Type
Diaphragm Actuated—**Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing**				
.2–10	0.6 ±0.1	100	GDW1	GDW21
1–40	1.6 ±0.4	100	GDW2	GDW22
1.5–75	3.0 ±0.5	240	GDW4	GDW24
3–150	6.0 ±0.8	475	GDW5	GDW25
5–250	10.0 ±1.5	750	GDW6	GDW26
13–425	16 ±3.5	850	GEW1	GEW21
20–675	27 ±5	2000	GEW2	GEW22
Piston Actuated—**#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton® Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring**				
20–1000	59 ±9	10000	GFW1	GFW21
90–2900	170 ±15	15000	GFW2	GFW22
170–5600	289 ±55	20000	GFW3	GFW23
270–9000	495 ±70	25000	GFW4	GFW24

Table 22.31: Adjustable Differential *[5]*
NEMA 4, 4X, 13 EnclosureUL Listed and CSA Certified As Industrial Control Equipment

Range on Decreasing Pressure psig	*[6]*Adjustable Differential Approximate at Mid-Range	Maximum Allowable Pressure psig	Single Pole Double Throw Type	Double Pole Double Throw Type
Diaphragm Actuated—**Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing**				
.2–10	0.6–2	100	GAW1	GAW21
1–40	1.6–8	100	GAW2	GAW22
1.5–75	3.5–15	240	GAW4	GAW24
3–150	6.0–30	475	GAW5	GAW25
5–250	10.0–49	750	GAW6	GAW26
13–425	16–90	850	GBW1	GBW21
20–675	27–130	2000	GBW2	GBW22
Piston Actuated—**#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring**				
20–1000	59–200	10000	GCW1	GCW21
90–2900	170–560	15000	GCW2	GCW22
170–5600	289–1260	20000	GCW3	GCW23
270–9000	495–1900	25000	GCW4	GCW24

Table 22.32: Fixed Differential
NEMA 7 & 9 Enclosure
Class I & II, Division 1 & 2, Groups C, D, E, F, G

Range on Decreasing Pressure psig	*[6]*Approximate Differential at Mid-Range psig	Maximum Allowable Pressure psig	Single Pole Double Throw Type	Double Pole Double Throw Type
Diaphragm Actuated—**Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing**				
0.2–10	1.0 ±0.1	100	GDR1	—
1–40	2.4 ±0.8	100	GDR2	GDR22
1.5–75	4.5 ±1	240	GDR4	GDR24
3–150	9 ±1.5	475	GDR5	GDR25
5–250	15 ±3	750	GDR6	GDR26
13–425	25 ±7	850	GER1	GER21
Piston Actuated—**#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring**				
20–1000	89 ±18	10000	GFR1	GFR21
90–2900	255 ±30	15000	GFR2	GFR22
170–5600	578 ±110	20000	GFR3	—

Table 22.33: Adjustable Differential
NEMA 7 & 9 Enclosure
Class I & II, Division 1 & 2, Groups C, D, E, F, G

Range on Decreasing Pressure psig	*[6]*Adjustable Differential Approximate at Mid-Range	Maximum Allowable Pressure psig	Single Pole Double Throw Type	Double Pole Double Throw Type
Diaphragm Actuated—**Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing**				
0.2–10	1.0–2	100	GAR1	GAR21
1–40	2.4–8	100	GAR2	GAR22
1.5–75	4.5–15	240	GAR4	GAR24
3–150	9–35	475	GAR5	GAR25
5–250	15–49	750	GAR6	GAR26
13–425	25–90	850	GBR1	GBR21
20–675	41–130	2000	GBR2	GBR22
Piston Actuated—**#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring**				
20–1000	89–200	10000	GCR1	GCR21
90–2900	255–560	15000	GCR2	—
170–5600	578–1260	20000	GCR3	GCR23
270–9000	788–1900	25000	GCR4	—

Acceptable Wire Sizes: 12–22 AWG
Recommended Terminal Clamp Torque: 7 lb-in
Electrical Rating: see page 22-16
Temperature Rating: see page 22-16
Modifications: see page 22-18
Accessories: see page 22-18
Renewal Parts Kits: see page 22-30
Dimensions: see page 22-17

File: E12443 Haz. Loc.	CCN	NOWT	G•R	
File: E12158	CCN	NKPZ	G•O, G•G, G•W	
File: E12158	CCN	NTHT	Marine Use, G•W	

File: LR25490	Class	3211-03	G•W, G•O, G•G
File: LR26817	Class	3218-02	G•R

Complies with IEC 60957.5.1, 5C8.3.4 when protected with a Bussmann CCKTK-R-10 fuse.

[5] For metric threads, add **M** after the **W** on all types (offered at an additional cost).
To order a Pg13.5 electrical conduit entry and a 1/4"-19 BSP pressure connection, add M12 to the end of the catalog number, as well as adding "M" after "W" for metric threads. For example:
9012GAW1 = 1/2" NPT electrical conduit entry
9012GAWM1 = 20 x 1.5 mm electrical conduit entry
9012GAWM1M12 = Pg13.5 electrical conduit entry and 1/4-19 BSP pressure connection.
[6] The differential adds to the range setting and determines the operating point on rising pressure.

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9012GGW1

Differential/Dual Stage, Type G

Differential-Pressure Operation

Pressure switches for differential-pressure operation monitor the change in the difference between two pressures. Type G differential-pressure switches are used in applications to signal that a predetermined pressure difference has been reached as a result of a widening or increasing difference between the two pressures. They can also signal that a predetermined pressure difference has been reached as a result of a narrowing or decreasing difference between the two pressures.

Table 22.34: Differential-Pressure Switches
NEMA 4, 4X, 13 Enclosures
UL Listed and CSA Certified As Industrial Control Equipment *[7]*

Working Pressure Range on Decreasing X (upper) Actuator	Adjustable Difference on Decreasing Pressure (adds to working pressure) Y (lower) Actuator	Adjustable Differential Actuates on Increasing Pressure (adds to adjustable difference)	Maximum Allowable Pressure psi	Single Pole Double Throw Type	Double Pole Double Throw Type
Diaphragm Actuated**—Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing**					
0–75	0.25–10	0.8–2	100	GGW1	GGW21
0–175	0.5–36	5–15	240	GGW4	GGW24
0–500	3–175	22–90	850	GHW1	GHW21
Piston Actuated**—#440 Stainless Steel Piston. #303 Stainless Steel Housing, Viton® Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring**					
0–5000	15–825	80–200	7500	GJW1	GJW21

Dual-Stage Operation

Type G dual stage pressure switches are designed for use in applications where two separate pressure operations must be controlled by a single pressure monitoring device. These controls are most commonly used where dual functions are required or in sequencing applications such as alarm, followed by shutdown.

Table 22.35: Dual-Stage Pressure Switch
NEMA 4, 4X, 13 Enclosure
UL Listed and CSA Certified As Industrial Control Equipment *[8]*

	Range Setting Limits of Pressure Between Which Stage 1 Can Be Adjusted to Operate on Decreasing Pressure	Add Adjustable Spread to Range Setting to Obtain Decreasing Operating Point of Stage 2	Fixed Differential—Add to Low (Decreasing) Operating Point to Obtain Approximate High (Rising) Operating Point of Each Stage		Maximum Allowable Pressure psi	SPDT Each Stage
			Stage 1	Stage 2		Type
	Diaphragm Actuated**—Nitrile (Buna-N) Diaphragm, Zinc Plated Steel Housing**					
	.2–10	1–5	1.0 ±0.2	1.5 ±0.4	100	GKW1
	1–40	4–20	4.0 ±1.0	6.0 ±1.5	100	GKW2
	1.5–75	6–30	5.0 ±1.5	8.0 ±2.0	240	GKW4
	3–150	12–75	8.0 ±2.0	12 ±3	475	GKW5
	5–250	22–110	14 ±3	21 ±5	750	GKW6
	13–425	40–180	20 ±4	30 ±7.5	850	GLW1
	20–675	45–250	30 ±6	45 ±11	2000	GLW2
	Piston Actuated**—#400 Stainless Steel Piston. #300 Stainless Steel Housing, Viton Fluorocarbon Diaphragm and O-ring, Teflon® Retaining Ring**					
	20–1000	50–300	50 ±10	75 ±19	10000	GMW1
	90–2900	140–800	140 ±30	210 ±52	15000	GMW2
	170–5600	300–1700	275 ±60	400 ±100	20000	GMW3
	270–9000	500–2500	400 ±80	800 ±150	25000	GMW4

9012GKW1

Ordering Dual-Stage Pessure Switches

1. Specify Class 9012 Type..., and indicate the high or low operating point for each stage within the limits shown in the above table.
   Example:
   Class 9012 Type GKW4
   Set: Stage 1 at 30 psi decreasing pressure
   Stage 2 at 50 psi decreasing pressure
   (20 psi spread)
   Differential of each stage will be approximately as shown in the table above.

2. For available modifications see page 22-18. If one or more of these modifications are desired, add the appropriate Form to the Class and Type. Arrange form letters in alphabetical order when ordering more than one modification.

Acceptable Wire Sizes 12-22 AWG
Recommended Terminal Clamp Torque 7 lb-in
Electrical Rating page 22-16
Temperature Rating page 22-16
Modifications page 22-18
Accessories page 22-18
Renewal Parts Kits page 22-30
Dimensions page 22-17

File E12158 CCN NKPZ
File E12158 CCN NTHT - Marine Use

File LR25490 Class 3211-03

[7] UL Marine Listed for use on vessels greater than 65 feet long where ignition protection is not required.
[8] UL Marine Listed for use on vessels greater than 65 feet long where ignition protection is not required.

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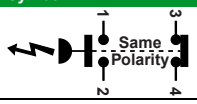
Electrical Ratings

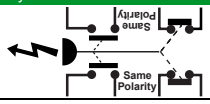
Table 22.36: Control Duty Circuit Ratings

Contacts	AC—50 or 60 Hz						DC			AC or DC
	V	Inductive, 35% Power Factor				Resistive 75% Power Factor	V	Inductive and Resistive		Continuous Carrying Amperes
		Make		Break				Make and Break Amperes		
		A	VA	A	VA	Make and Break Amperes		Single Throw	Double Throw	
SPDT	120	60	7200	6	720	6	120	0.55	0.22	10
	240	30	7200	3	720	3	250	0.27	0.11	10
	480	15	7200	1.5	720	1.5	600	0.10	—	10
	600	12	7200	1.2	720	1.2	—	—	—	—
DPDT	120	60	7200	6	720	6	125	0.22	0.22	10
	240	30	7200	3	720	3	250	0.11	0.11	10
	480	15	7200	1.5	720	1.5	600	—	—	10
	600	12	7200	1.2	720	1.2	—	—	—	—

Table 22.37: Type G Machine Tool and Vacuum (except GVG)

Type	Contact Arrangement	Contact Symbol
Single Pole Double Throw	1 N.O.–1 N.C.	

NOTE: Snap switch contains two double-break contact elements (1 N. O. and 1 N.C.) that must be used on circuits of same polarity.

Type	Contact Arrangement	Contact Symbol
Double Pole Double Throw	2 N.O.–2 N.C.	

NOTE: Snap switch contains two electrically separated sets of contact elements allowing use on circuits of opposite polarity. Each set contains two double break contact elements (1 N.O. and 1 N.C.) that must be used on circuits of the same polarity.

Table 22.38: Type G Industrial

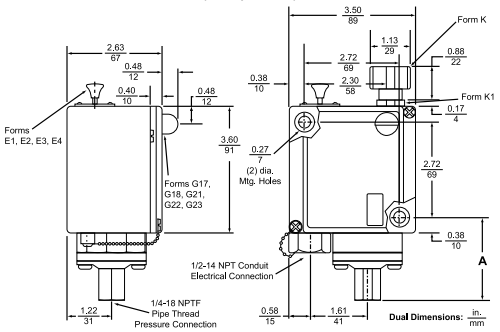
Contact Arrangement	Contact Symbol
1 N.O. – 1 N.C. (600 Vdc rating does not apply)	

NOTE: Contacts are single pole, double throw—one circuit normally open and one circuit normally closed. These circuits are not electrically separate and can not be used on opposite polarities.

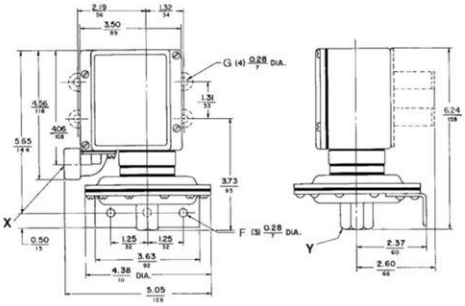
Table 22.39: Temperature Ratings

	Actuator	Minimum	Maximum
Ambient	All	-23 °C (-10 °F)	+85 °C (+185 °F)
Media	Diaphragm	-40 °C (-40 °F)	+120 °C (+250 °F)
	Piston	-26 °C (-15 °F)	
	All with Forms Q4 and Q14	-26 °C (-15 °F)	

Types GAW, GBW, GCW, GDW, GEW, GFW, GKW, GLW, and GMW Machine Tool Switches
(except 1, 21)



Types GAW, GDW, GKW 1, 21



X: Conduit connection: G•W = 1/2-14 NPT; G•WM = 20MMBGS4568, Form M12 = Pg13.5; DIN40430.

Y: Pressure connection: G•W = 1/4-18 NPTF; G•WM = 8; Form M14 = G 1/4 BS 2779; RP1/4 ISO 711; R 1/4 DIN 2999; GJ 1/4 UN1339.

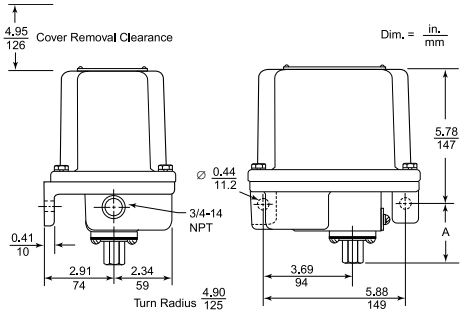
Table 22.40: Dimension A for G•W Switches

Type	Dimension A, in. (mm)
GAW, GDW, GKW 2, 4, 5, 6 22, 24, 25, 26, 52, 54, 55, 56	2.33 (59)
GBW, GEW, GLW 1, 2, 21, 22, 51, 52	2.23 (57)
GCW, GFW, GMW 1, 2, 3, 4 21, 22, 23, 24, 51, 52, 53, 54	3.15 (80)

Table 22.41: Dimension A for G•R, Switches

Type / Tipo / Type	Dimension A, in. (mm)
GAR1, 2, 21, 22	2.02 (51.3)
GAR4, 5, 6, 24, 25, 26	1.42 (36.1)
GBR1, 2, 21, 22; GCR1, 21	1.32 (33.5)
GCR2, 3, 4, 22, 23, 24	2.24 (56.9)
GDR1, 2, 21, 22	2.02 (51.3)
GDR4, 5, 6, 24, 25, 26	1.42 (36.1)
GER1, 2, 21, 22; GFR1, 21	1.32 (33.5)
GFR2, 3, 4, 22, 23, 24	2.24 (56.9)

Types GAR, GBR, GCR, GDR, GER, and GFR



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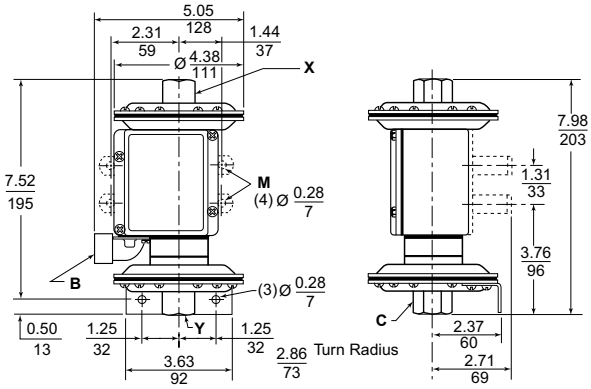
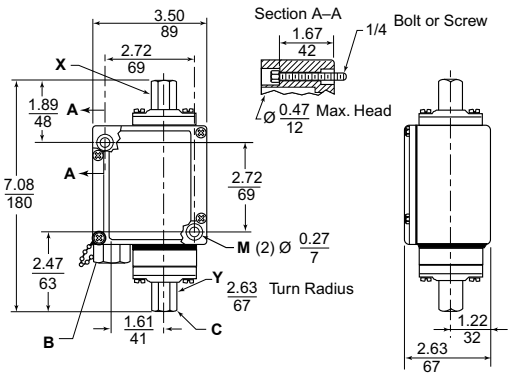
Dimensions

9012G Dimensions, in. (mm)

GGW1, 21



GGW4, 24



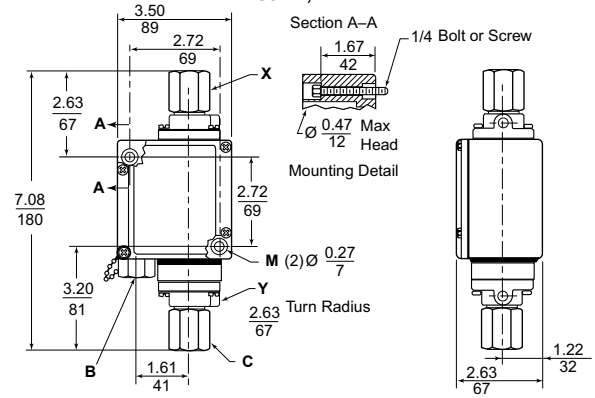
B = Conduit
Standard = 1/2-14 NPT
Options = Pg 13.5, 20 mm

C = Fluid Connection
Standard = 1/4-18 NPTF
Options = G 1/4

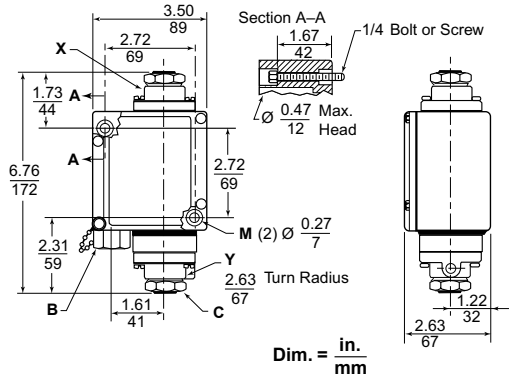
X = Lower pressure source

Y = Higher pressure source

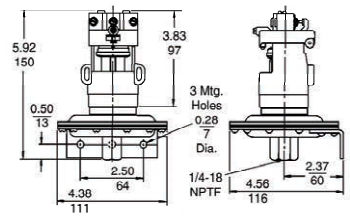
GJW1, 21



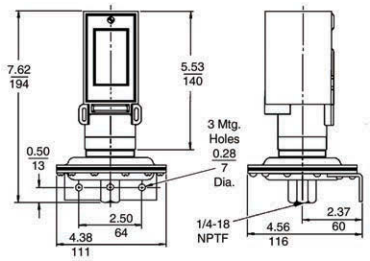
GHW1, 21



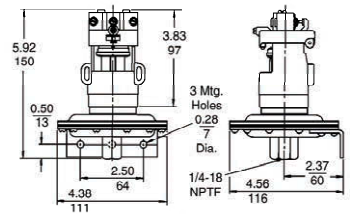
9012GNO1, GRO1



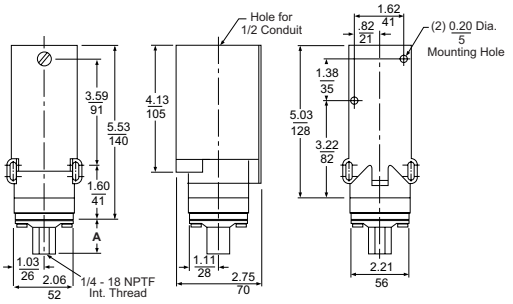
9012GNG1, GRG1



9012GNO, GRO



9012GNG, GRG



Type	Dimension A, in. (mm)
GNO, GRO 3, 4, 5, 6	1.41 (35.8)
GPO, GSO 1, 2, 3	1.31 (33.3)
GQO, GTO 1, 2, 3, 4	2.24 (56.9)

Type	Dimension A, in. (mm)
GNG, GRG 3, 4, 5, 6	1.41 (35.8)
GPG, GSG 1, 2, 3	1.31 (33.3)
GQG, GTG 1, 2, 3, 4	2.24 (56.9)

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Factory Modifications and Accessories

Table 22.42: Factory Modifications for Class 9012 Pressure Switches

Modification	Applies to Pressure Switch Type		Form
Lock on rising pressure, manual reset only	Available on GDW, GDWM, GEW, GEWM, GFW, GFWM only		E3
120 Vac or Vdc neon pilot light	Available on all GAW–GMW, GAWM–GFWM	with clear lens	G17
		with red lens	G18
24 Vdc only LED	For pilot light conversion kits: See 9998 PC-306–308. Complete Class and Type information required	with clear lens	G21
		with red lens	G22
24 Vdc LED pilot light with green lens	Class 9012 GAW–GMW and GAWM–GFWM, or Class 9016 GAW and Class 9025G		G23
SPDT snap switch rated 1.1 A at 125 Vdc (minimum differential doubles)	Available on GAR–GFR, GAW–GJW, GAWM–GFWM		H3
Prewired 5-pin Brad Harrison male receptacle #41310 or interchangeable Crouse-Hinds receptacle. For use with Brad Harrison female portable plug #41306, 41307, 41308, or equivalent.	Available on GAW–GJW single pole devices only		H10 or H11
Micro connector, 4-pin, for 24 Vdc pilot light	G•W (single pole only), except GAW2 and Form B2.		H17
External range adjustment (includes knob and range scale window)	GAW–GFW, GAWM–GFWM, GKW–GMW		K
External range adjustment slotted for screwdriver (includes range scale window)	GAW–GFW, GAWM–GFWM, GKW–GMW		K1
Pg 13.5 conduit thread and 1/4—19 BSP pressure connection	G•WM only		M12
Standard Nitrile (Buna-N) diaphragm in #316 stainless steel flange	**Not available** on Types 1 and 21. **Available** on all other GAR, GAW, GBR, GBW, GDR, GDW, GER, GEW, GAWM, GBWM, GDWM, GEWM, GGW, GHW, GKW, and GLW switches.		Q1
Ethylene propylene diaphragm in #316 stainless steel flange	**Not available** on Types 1 and 21. **Available** on all other GAR, GAW, GBR, GBW, GDR, GDW, GER, GEW, GAWM, GBWM, GDWM, GEWM, GGW, GHW, GKW, and GLW switches.		Q3
Viton® fluorocarbon diaphragm in #316 stainless steel flange	**Not available** on Types 1 and 21. **Available** on all other GAR, GAW, GBR, GBW, GDR, GDW, GER, GEW, GAWM, GBWM, GDWM, GEWM, GGW, GHW, GKW, and GLW switches.		Q4
Range scale window (standard with Forms K and K1)	GAW–GMW, GAWM–GFWM		V1
Special setting specified (If indicating only a fixed differential setting, specify whether this setting is on increasing or decreasing pressure.)	All 9012G		Y1
1/4"-18 NPT external thread pressure connection	GAR, GAW, GDR, GDW, GGW, GKW Not available in combination with Forms Q1, Q3, Q4.		Z
1/2"-14 NPT external thread, 1/4"-18 NPTF internal thread pressure connection	GAR, GAW, GDR, GDW, GGW, GKW Not available in combination with Forms Q1, Q3, Q4.		Z16
7/16"-20 UNF-2B internal thread pressure connection	GAR–GFR; GAW–GMW Not available in combination with Forms Q1, Q3, Q4.		Z18

Table 22.43: Factory Modifications for Renewal Parts Kits for Class 9012 Pressure Switches

Suffixes for renewal parts kits, see **page 22-30**

Modification	Applies to Parts Kit Type	Form
SPDT snap switch rated 1.1 A at 125 Vdc (minimum differential doubles)	PC313	H3
Standard Nitrile (Buna-N) diaphragm in #316 stainless steel flange	PC177–179, PC268, 269	Q1
	PC265–267	
Ethylene propylene diaphragm in #316 stainless steel flange	PC177–178, PC268, 269	Q3
	PC266, 267	
Viton® fluorocarbon diaphragm in #316 stainless steel flange	PC177–178, PC268, 269	Q4
	PC265–267	
1/4"-18 NPT external thread pressure connection	PC265–269	Z
1/2"-14 NPT external thread, 1/4"-18 NPTF internal thread pressure connection	PC265–269	Z16
7/16"-20 UNF-2B internal thread pressure connection	PC177, 178, PC265–273	Z18

Table 22.44: Class 9049 Accessories for Class 9012 Pressure Switches

Description	Applies to Class	Type
Stainless steel surge reducer for use on oils, coolants, and hydraulic fluids (not recommended for air or water)	9012G	A26S

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Type GAW—Sensitive Control Applications

9016GAW vacuum switches are provided with double throw contacts; normally open and normally closed circuits allow these controls to be used for standard or reverse action applications.

Standard devices can be mounted from the front with the bracket provided. Two mounting screws are required for a firm attachment to any smooth, flat surface. Allowance must be made for flange projection. Controls with Form F modification include two mounting feet with 9/32" mounting holes on 3-3/4" centers. Range and Differential adjustments are internal and exposed by removal of the front cover.

Maximum allowable positive pressure: 100 psig.
Diaphragms are oil resistant, nitrile butadiene (Buna N) rubber.
Electrical Ratings and Temperature Limitations—See page 22-14 for Type G machine tool.
Dimensions—See page 22-17.

Table 22.45: Class 9016, Diaphragm Actuated

Range on Decreasing Vacuum (In. of Hg)	Adjustable Differential Adds to Range *[1]* (In. of Hg)	Contact Arrangement	Pipe Tap (NPTF)	Enclosure	
				NEMA 4, 4X & 13	NEMA 7 & 9 *[2]*
				Type	Type
0–28.7	At Minimum Range: 0.8–9 At Mid-Range: 1.3–7.4	1 N.O., 1 N.C.	1/4"-18	GAW1	GAR1
0–25	5–20	1 N.O., 1 N.C.	1/4"-18	GAW2	N/A
0–28.3	At Minimum Range: 1–9 At Mid-Range: 1.7–7.4	2 N.O., 2 N.C.	1/4"-18	GAW21	GAR21
0–25	5–20	2 N.O., 2 N.C.	1/4"-18	GAW22	N/A

Table 22.46: Available Modifications

Description	Form
Range scale window	V1
1/4"-18 NPT external thread pressure connection	Z
1/2"-14 NPT external thread, 1/4"-18 NPTF internal thread pressure connection (standard actuator only)	Z16

File E12443 Haz Loc
File E12158
File E12158

CCN NOWT G*R
CCN NKPZ G*W
CCN NTHT Marine Use, G*W

File LR25490 Type GAW only
File LR26817 Type GAR only
(NEMA 7 and 9 Haz Loc)

PUMPTROL™

Class 9016 Type GVG1
Forms E, F

Type GVG—Power Circuit Applications

The 9016GVG1 vacuum switch is a companion to the 9036GG and 9037GG float switches commonly used on vacuum heating pumps. Electrical ratings of float and vacuum switch types are equal.

Table 22.47: Class 9016, Contacts Open on Increasing Vacuum

Cut-out Range (In. of Hg)	Approximate Adjustable Differential (In. of Hg)	Cut-in Range (In. of Hg)	Poles	Pressure Connection	NEMA 1 Enclosure
					Type
5–25	5–10	0–20	2	1/4"-18 NPSF	GVG1

NOTE: Maximum allowable positive pressure: 150 psig. In. of Hg = inches of mercury.

Table 22.48: Available Modifications

Description	Form
3-way lever—nameplate marked: Float only—Vacuum and Float—Continuous (factory modification only)	E
Mounting bracket (for retrofit, order 9049A53 bracket kit)	F
Reverse action—normally open contacts	R
1/4" male pipe connection (1/4"-18 NPT, external thread) (for retrofit, use 1/4" pipe nipple)	Z

Table 22.49: Electrical Ratings—9016GVG

Voltage	AC		DC
	Single Phase	Polyphase	
110 V	2 hp	3 hp	1 hp
220 V	3 hp	5 hp	1 hp
440–550 V	5 hp	5 hp	—
32 V	—	—	1/2 hp

NOTE: Control Circuit Rating: A600

Table 22.50: Vacuum Codes

Settings (In. of Hg)	Code
3–8	J09
16.5–25	J10
17–22	J11
18–23	J12
20–25	J13
Specify other setting (minimum order quantity is 4 pieces)	J99

Ordering Information: Specify Class 9016 Type G. Give vacuum settings within the limits of the listings above.
For Setting Codes, see the table entitled Vacuum Codes above. If special features are desired, add the appropriate Form letter to the Class and Type. Arrange the Form letters in alphabetical order when ordering more than one special feature.

File E12158
CCN NKPZ

File LR25490

Dimensions page 22-16

[1] Add Differential to Range to obtain the operating point on increasing vacuum (within vacuum limitations). The differential increases linearly over its range.
[2] The minimum differential doubles with NEMA 7 & 9 enclosures.

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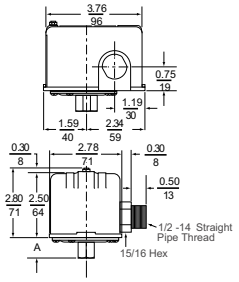
Pressure Switch



Shown with Form T

FHG Pressure Switch Selection and Features

Class 9013 Type FHG pressure switches are designed for the control of small electrically driven air compressors.

- Contacts open on pressure rise.
- Diaphragm actuated.
- For application data, see page 22-16.
  For repair parts kits, see page 22-30.

Table 22.51: Dimensions, Type F (Net Weight, 1-1/8 lb)

Switch Type	A	
	in.	mm
FHG2, 12, 22, 32, 42, 52 / FRG2, FSG2, FYG2	2-29/32	23
FHG3, 13, 33 / FRG3, FSG3, FYG3	1-9/32	33
FHG9, 19, 29, 39, 49, 59 / FSG9, FYG9	1-3/32	28

Table 22.53: Selection Table

Description				NEMA 1 Enclosure	
Adjustable Cut-out Range Increasing Pressure (psig)	Approximate-Differential Fixed (psig)	Poles	PressureConnec-tion	Lower hp Type	Higher hp Type
40-100	20	2	1/4" NPSF internal	FHG2	FHG22
			3/8" NPSF internal	FHG3	—
			1/4" four way	FHG4	FHG24
			1/4" NPT external	FHG9	FHG29
70-150	30	2	1/4" NPSF internal	FHG12	FHG32
			3/8" NPSF internal	FHG13	FHG33
			1/4" four way	FHG14	FHG34
			1/4" NPT external	FHG19	FHG39
100-200	40	2	1/4" NPSF internal	FHG42	FHG52
			1/4" four way	FHG44	FHG54
			1/4" NPT external	FHG49	FHG59

Table 22.55: Electrical Ratings For All 9013 Switches

Switch Type	Voltage	Single Phase AC	Polyphase AC *[4]*	DC	Control Circuit Rating
FHG2, 9, 12, 13, 14, 19,	115	1-1/2 hp	2 hp	1/4 hp*[5]*	A600
42, 43, 44, 49	230	2 hp	3 hp	1/4 hp*[5]*	
FSG, FSW	460/575	—	1 hp	—	
FHG22, 29, 32, 33, 34, 39,	115	2 hp	3 hp	1/2 hp*[6]*	A600
52, 54, 59	230	3 hp	5 hp	1/2 hp*[6]*	
FYG, FYW	460/575	—	1 hp	—	
FRG One Pole (All Form H)	32	—	—	—	A300
	115	1 hp	—	1/4 hp	
	230	1 hp	—	1/4 hp	
FRG Two Pole	32	—	—	1/4 hp	A300
	115	1 hp	1 hp	1/4 hp	
	230	1 hp	1 hp	1/4 hp	
All 9013G Form H	115	1 hp	—	1/2 hp	A600
	230	2 hp	—	1/2 hp	
	460/575	2 hp	—	—	
All 9013G, except Form H	115	2 hp	3 hp	1 hp	A600
	230	3 hp	5 hp	1 hp	
	460/575	1 hp	1 hp	—	

Table 22.52: Special Features and Modifications for Type FHG*[1]*

Description	Form
Bulk pack	*[2]*
Addition of a second ground screw	G4*[3]*
Maintained manual cut-out lever (Auto-Off)	M1
Pulsation plug—factory order only (available only on 1/4-inch fittings, not to include 4-way)	P
Slip-on connectors (load side terminals only)	U
Slip-on connectors (line and load terminals)	U2
Two-way pressure release valve	X
Quick connect two-way pressure release valve (for use with Polyflow® tubing)	X1
Black cover	Z22

Table 22.54: Pressure Code (fixed differential)*[1]*

Off at...	CodeA
80 psi	J43
100 psi	J27
110 psi	J37
115 psi	J38
120 psi	J69
125 psi	J52
135 psi	J39
140 psi	J68
155 psi	J40
150 psi	J55
175 psi	J59
Specify other pressure (minimum order quantity is 4 pieces)	J99

NOTE: The existence of a code does not imply that the code is available for any or all devices.

File E12158
CCN NKPZ

File LR25490

NOTE: If conduit or pressure line is rigid, UL; if both are flexible, UR.

Ordering Information

- Specify Class 9013 Type FHG.
- Select pressure code from the table entitled Pressure Code (fixed differential) on the left side of the page, and add the code designation to end of the Type number. Ensure that the pressure rating of the code falls within the limits of the device as shown in Table 22.53, page 22-20.
- To order special features as shown in Table 22.52, add the appropriate Form designation to the Class and Type. Arrange Forms in alphabetical order when specifying more than one feature or modification.
  Accessories: page 22-22

[1] Some product configurations are not available—contact your Schneider Electric representative for details.
[2] For bulk package quantities and Form numbers, see Table 22.62 on page 22-21. If a Form is not specified, devices will be shipped individually packaged.
[3] Can be field installed. Nameplate should then be marked with the Form letter and maintenance and ordering records corrected.
[4] See 1993 NEC Article 430-84
[5] DC rating does not apply to Form M4.
[6] 1/4 hp with Form MI.

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Type F Pressure Switch Selection and Features

- Designed for the control of electrically driven water pumps. Diaphragm actuated.
- Type FSG is the standard water pump switch, suitable for all types of pumps: jets, submersible, reciprocating, etc.
- Type FYG is designed to meet higher horsepower and pressure requirements.
- Type FRG is reverse acting: contacts open on falling pressure.

Table 22.56: Pressure Codes *[7]*

Standard Action Devices		Reverse Action Devices	
Settings	Code	Settings	Code
5–21 psi	J15	10–5 psi	J36
8–20 psi	J16	22–12 psi	J22
20–40 psi	J20	22–16 psi	J19
20–50 psi	J18	35–20 psi	J70
30–50 psi	J21	40–20 psi	J23
40–60 psi	J24	50–30 psi	J35
50–70 psi	J33	150–120 psi	J64*[8]*
60–80 psi	J25		
Specify other pressure	J99*[8]*	Specify other pressure	J99*[8]*

Table 22.57: Standard Action: Contacts Open On Rising Pressure

Cut-out Range (psig)	Approximate Adjustable Differential (psig)	Cut-in Range (psig)	Pressure Connection	2 Pole	
				NEMA 1	NEMA 3R*[9]*
				Type	Type
20–65	15–30	5–45	1/4" NPSF internal	FSG2	FSW2
			1/4" NPT external	FSG9	FSW9
			1/4" bayonet (barbed)	FSG10	FSW10
			90° elbow 1/4" bayonet	FSG20	FSW20
20–50	10–30	10–30	1/4" NPSF internal	FSG22	FSW22
20–60	10–30	10–45	1/4" NPT external	FSG29	FSW29
9–30	6–20	3–10	1/4" NPSF internal	FSG42	FSW42
9–30	6–20	3–10	1/4" NPT external	FSG49	FSW49
25–80	20–30	5–60	1/4" NPSF internal	FSG52	—
			1/4" NPT external	FSG59	—
34–65	15–30	19–45	(FSG1 through 20 with Form M4 is only available in this range)		
25–80	20–30	5–60	1/4" NPSF internal	FYG2	FYW2
			1/4" NPT external	FYG9	FYW9
			1/4" bayonet (barbed)	FYG10	FYW10
			90° elbow 1/4" bayonet	FYG20	FYW20
39–80	20–30	19–60	(FYG1 through 20 with Form M4 is only available in this range)		
20–50	10–30	10–30	1/4" NPSF internal	FYG22	FYW22
20–60	10–30	10–45	1/4" NPT external	FYG29	FYW29
9–40	6–30	3–10	1/4" NPSF internal	FYG42	FYW42
9–40	6–30	3–10	1/4" NPT external	FYG49	FYW49

Table 22.58: Maximum Allowable Pressure for All 9013 Switches

Type	Pressure
FHG, FSG, FYG, FSW, FYW, FRG	220 psig
GHB, GHG, GSB, GSG	300 psig
GMG, GSR, GSW	100 psig
GHR, GHW	250 psig

Table 22.59: Temperature Limitations for All 9013 Switches

Operation (Media)	Storage
Min. -36 °C (-33 °F) Max. +125 °C (+257 °F)	Min. -36 °C (-33 °F) Max. +125 °C (+257 °F)

Table 22.60: Reverse Action: Contacts Open On Falling Pressure

Cut-in Range (psig)	Approximate Adjustable Differential (psig)	Cut-out Range (psig)	Pressure Connection	1-Pole	2-Pole
				Type	Type
23–65	15–30	8–45	1/4" NPSF internal	FRG12	FRG2
			3/8" NPSF internal	FRG13	FRG3
			1/4" NPT external	FRG19	FRG9
10–45	6–20	4–25	1/4" NPSF internal	FRG32	FRG22
			3/8" NPSF internal	FRG33	FRG23
			1/4" NPT external	FRG39	FRG29
6–14	5, Fixed	1–9	1/4" NPSF internal	FRG52	FRG42
			3/8" NPSF internal	FRG53	FRG43
			1/4" NPT external	FRG59	FRG49
40–100	20–30	20–80	1/4" NPSF internal	FRG72	FRG62
			3/8" NPSF internal	FRG73	FRG63
65–150	30–45	35–120	1/4" NPSF internal	FRG92	FRG82
			3/8" NPSF internal	FRG93	FRG83
			1/4" NPT external	FRG99	FRG89

Table 22.61: Special Features and Modifications for Type FSG, FYG & FRG Devices

[10]

Description	Applies to Types	Form
Bulk package	All Type F	*[11]*
One normally open—one normally closed contact	FRG 2-Pole only	H
Maintained manual cut-out lever (Auto-Off)	FSG, FYG	M1
Momentary manual cut-in lever (Auto-Start)	FRG2-59 only	M3
Low pressure cut-off (Auto-Start-Off) – Operates at approximately 10 psig below cut-in and will turn off the pump	FSG, FYG	M4
Maintained manual cut-in lever (Auto-On)	FRG2-59 only	M5
Pulsation plug (Type 2 & 9 only)	FRG, FSG, FYG	P*[12]*
Plastic flange (max. temp. 120 °F) (max. pressure 80 psi) Available only on Types FSG2, FYG2, FRG2, FSG•2, FYG•2, FRG•2	FSG•, FYG•, FRG•	Q8
	1/4" NPSF internal only	
1/2" conduit bushing, 1/2" long thread—on left	All Type F	T
Slip-on connectors (load side terminals *only*)	FSG, FYG	U
Slip-on connectors (line *and* load terminals)	FSG, FYG	U2
Black cover	FSG, FYG	Z22

Ordering Information

- Specify Class 9013 Type F.
- Select the pressure code from the Pressure Code table above, and add the code designation to the end of the Type number. Ensure that the pressure rating of the code falls within the limits of the device as shown in Table 22.57 and Table 22.60.
- To order special features from Table 22.61, add the appropriate Form letter to the Class and Type. Arrange the Form letters in alphabetical order when ordering more than one special feature.

Electrical Ratings: see
Dimensions: see
Renewal Parts Kits

File E12158 CCN NKPZ File LR25490

NOTE: Products on this page are UL Listed, however type numbers ending in 8, 10 or 20 (non rigid pressure lines) must have Form T or TI —otherwise these are UL component recognized.

[7] Existence of a code does not imply that the code is available for any or all devices.
[8] Minimum order quantity is 4 pieces.
[9] Must be mounted in vertical position to maintain enclosure rating.
[10] Some product configurations are not available—contact your Schneider Electric representative for details.
[11] For bulk package quantities and Form numbers, see Table 22.62 on page 22-21. If a Form is not specified, devices will be shipped individually packaged.
[12] Nylon pulsation plug can be field installed on types having 1/4" NPSF internal connector. Part number 1530S6G1 is one bag of 50 plugs.

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Table 22.62: Bulk Package Form Numbers for 9013F Pressure Switches

Description		Bulk Package Quantity					
		16	20	40	50	400	500
Product without Forms M1, M3, M4, M5, T, X1	9013FHG (without 1/4" four-way)	—	C20		C50	—	—
	9013FHG4, 14, 24, 34, 44, 54 (with 1/4" four-way)	—	C20	—	C50	C400	—
	9013FRG	—	C20	—	C50	—	—
	9013FSG	—	C20	—	C50	—	—
	9013FYG	—	C20	—	C50	—	—
Product with Forms M1, M3, M4, M5	9013FHG (without 1/4" four-way)	—	C20	C40	—	—	—
	9013FHG4, 14, 24, 34, 44, 54 (with 1/4" four-way)	—	C20	C40	—	—	—
	9013FRG	—	C20	C40	—	—	—
	9013FSG	—	C20	C40	—	—	—
	9013FYG	—	C20	C40	—	—	—
Product with Forms T, X1	9013FHG (without 1/4" four-way)	C16	—	C40	—	—	—
	9013FHG4, 14, 24, 34, 44, 54 (with 1/4" four-way)	C16	—	C40	—	—	—
	9013FRG	C16	—	C40	—	—	—
	9013FSG	C16	—	C40	—	—	—
	9013FYG	C16	—	C40	—	—	—
9013FHG9 Special with Extended Flange		C16	—	—	—	—	C500

PUMPTROL™

Shown with Form X

File E12158 CCN NKPZ

File E12443 CCN NOWT Haz Loc

File 25490 File 26817 Haz. Loc.

Table 22.63: Pressure Codes

Code	Pressure Setting (Close-Open), psi
J20	20–40
J21	30–50
J23	40–20 (reverse action)
J24	40–60
J25	60–80
J26	70–90
J28	70–100
J29	75–100
J30	80–100
J31	90–120
J50	135–175
J51	100–80 (reverse action)
J53	100–125
J54	110–125
J56	110–150
J57	120–150
J58	125–150
J60	125–175
J61	130–175
J62	140–175
J63	145–175
J64	150–120 (reverse action)
J65	215–250
J99	Specify the required setting

Table 22.64: Special Features and Modifications

Description	Form Letter
3-Way Lever (On-Auto-Off)	E
One Normally Open / One Normally Closed Contact	H
Pulsation Plug	P
Reverse Action	R
Slip-On Connectors (Load Side Terminals Only)	U
Slip-On Connectors (Line and Load Terminals)	U2
Two-Way Pressure Release Valve	X
¼" Male Pipe Thread on Pressure Connection	Z
½"-14 NPT External ¼"-18 NPT Internal	Z16

Type G Pressure Switch Selection and Features

Class 9013 Type G Pumptrol pressure switches are designed to control electrically driven water pumps and air compressors. These devices cover higher electrical ratings for directly controlling motors in pump and compressor applications.

- Contacts open on pressure rise.
- Diaphragm actuated.
- For electrical ratings, see .
  For repair parts kits, see page 22-30.

Table 22.65: Selection Tables

Cut-out Range (psig)	Approximate Adjustable Differential (psig)	Cut-in Range (psig)	Enclosure	Poles	NPSF Internal Pressure Connection	Type
10–35	4–8	5.5–30.5	NEMA 1 (General Purpose)	2	1/4	GMG2
20–80	15–30	5–60	NEMA 3R *[13]* (Rainproof)	2	1/4	GSB2
20–80	15–30	5–60	NEMA 1 (General Purpose)	2	1/8	GSG1
					1/4	GSG2
					3/8	GSG3
20–80	20–40	5–50	NEMA 7 & 9 (Hazardous Locations)	2	1/8	GSR1
					1/4	GSR2
					3/8	GSR3
			NEMA 4 (Watertight)		1/8	GSW1
					1/4	GSW2
					3/8	GSW3
65–200	20–40	40–170	NEMA 3R *[13]* (Rainproof)	2	1/4	GHB2
65–200	20–40	40–170	NEMA 1 (General Purpose)	2	1/8	GHG1
					1/4	GHG2
					3/8	GHG3
65–200	30–50	35–150	NEMA 7 & 9 (Hazardous Locations)	2	1/8	GHR1
					1/4	GHR2
					3/8	GHR3
			NEMA 4 (Watertight)		1/8	GHW1
					1/4	GHW2
					3/8	GHW3
80–250	25–45	32–215	NEMA 3R *[13]* (Rainproof)	2	1/4	GHB5
80–250	24–45	32–215	NEMA 1 (General Purpose)	2	1/8	GHG4
					1/4	GHG5
					3/8	GHG6
80–250	40–60	30–190	NEMA 7 & 9 (Hazardous Locations)	2	1/8	GHR4
					1/4	GHR5
					3/8	GHR6
			NEMA 4 (Watertight)		1/8	GHW4
					1/4	GHW5
					3/8	GHW6

NOTE: Some product configurations are not available. Contact your Schneider Electric representative for details.

Ordering Information

- Specify Class 9013 Type G.
- Select the pressure code from Table 22.63, and add the code to the end of the Type number. Ensure that the pressure rating of the code falls within the limits of the device. See Table 22.65.
- To order special features, add the appropriate Form letter to the Class and Type. Arrange Form letters in alphabetical order when ordering more than one special feature.

[13] Must be mounted in vertical position to maintain enclosure rating.

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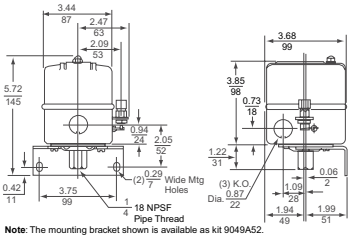
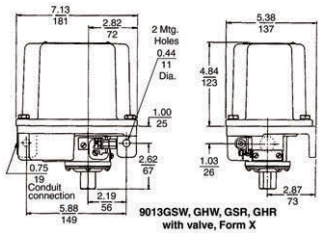


Note: The mounting bracket shown is available as kit 9049A52.

9013GHG, GSG - with or without Form X



9013GSW, GHW, GSR, GHR with valve, Form X

Table 22.66: Special Features and Modifications for Type G Devices *[14]*

Description	Applies to	Form
Standard pack of 10 switches*[15]*	All Type G	C10
3-way lever (On-Auto-Off) (not compatible with Form X)	GHG, GMG, GSG	E
1 N.O., 1 N.C. contact	All Type G	H
Pulsation plug (not field replaceable.)	All Type G	P
Reverse action (Select pressure code from Table 22.60)	All Type G	R
Slip-on connectors (load side terminals only)	All Type G	U
Slip-on connectors (line and load terminals)	All Type G	U2
Two-way pressure release valve (Not compatible with Form E)	GHB, GMG, GSB, GHG, GSG	X
	GHR, GHW, GSR, GSW	X
1/4" male pipe thread on pressure connection	All Type G	Z
1/2"-14 NPT external 1/4"-18 NPT internal*[16]*	All Type G	Z16

Table 22.67: Class 9049 Accessories for Class 9013 Pressure Switches

Type	Description	Applies to Class
A12	Two-way pressure release valve, replacement only. Cannot be added to switch that originally had no valve.	9013GHG, GSG, Form X only
A52	Mtg. bracket—replacing obsolete 9013A with 9013G	9013GHG, GSG
A53	Mtg. bracket—replacing obsolete 9013A with 9013G, or for current 9016GVG	9013GMG, 9016GVG
A56	Two-way pressure release valve. Replacement only. Cannot be added to switch that originally had no valve.	9013FHG, Form X only

[14] Some product configurations are not available—contact your Schneider Electric representative for details.
[15] Available on GHB, GHG, GSB, and GSG.
If Form C10 is not speciied, devices will be shipped individually packaged
[16] UL Listed industrial control equipment.

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Type DG2

File No. E12158
File No. E12443
Haz Loc

Type GG

File LR25490
File LR26817
Haz Loc

Open Tank or Sump Applications

Ambient temperature ratings: Min. -30 °C (-22 °F); Max. +105 °C (+220 °F).

For accessories, refer to page 22-30.

Table 22.68: Class 9036, 2-Pole, Single Lever Operated

Contact Operation	NEMA 1 Type	NEMA 4 Type	NEMA 7, 9 Type
Close on liquid rise	DG2	DW31	DR31
Open on liquid rise	DG2R	DW31R	DR31R
Close on liquid rise	GG2	GW1	GR1
Open on liquid rise	GG2R	GW1R	GR1R

Order the universal mounting bracket and float accessory kits separately from the Class 9049 Accessories section on page 22-30. Types GW and GR use a center-hole float. Devices with Form C use a center-hole float. All others use a tapped-at-top float.

Table 22.69: Modifications *[1]*

Description	Factory Installed Form	Field Installed Class 9049 Kit
Types DG, DW, DR		
Reverse action (Type DG)	R	A58
Compensating spring (Type DG)	C	A19
Compensating spring (Type DR, DW)	C	A20
Compensating spring and reverse action	CR	Not available
Types GG, GW, GR		
Compensating spring for Type GG2	C	9049A13
Combination of compensating spring and reverse action (Type GG2)	CR	9049A13
1 N.O., 1 N.C. contact configuration	H	Not available
Combination of comp. spring & 1 N.O., 1 N.C. contact for Type GG2	CH	Not available
Reverse action (Type GR, GW)	R	Not available

Table 22.70: Class 9049 Float Accessory Specifications (oz)

Item	Type A6	Type A6S	Type A6C	Type A6CS	Type A6A	Type A6CA
Net buoyancy*[2]* (in water) 7" float	60*[3]*	60*[3]*	70*[3]*	70*[3]*	60*[3]*	70*[3]*
Weight of 5 ft rod	18.5	16.9	18.5	16.9	6	6
Weight of extra ft of rod (per ft)	3.7	3.4	3.7	3.4	1.2	1.2
Total weight of stops	3 (2 stops)	3 (2 stops)	6 (4 stops)	6 (4 stops)	3 (2 stops)	6 (4 stops)

[1] Some product configurations are not available—contact your Schneider Electric representative for details.

[2] Buoyancy data is calculated for use in water. Consult factory for buoyancy data in media with a different specific gravity than water.
When ordering float accessories, first specify the desired float accessory package, such as 9049A6 or 9049A6CS, then as a second item give the number of additional rod kits required. For example, for a 9049A6 with 15 ft of rod, order as follows:
Item A = 9049A6, quantity = 1; Item B = 9049T1, quantity = 4.

[3] Net buoyancy of float has been calculated with float 80% submerged, thus allowing 20% factor of safety.

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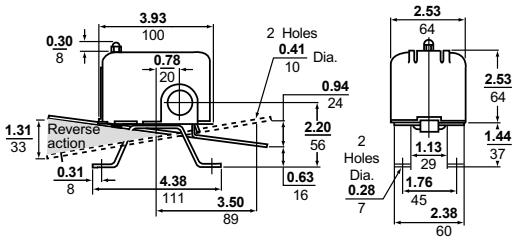
Table 22.71: Maximum Forces at Which Switches Are Tested (oz)

Type	Force Up To Trip	Force Down To Trip	Weight Supported with Compensating Spring	Type (with or without Form H)	Lever Length Position	Force Up to Trip	Force Down to Trip	Weight Supported with Compensating Spring at Max. Adjustment (oz)
DG2	9	8	60	GG2	Short	33	39	*[4]*
DG2 Form R	8	8	60	GG2	Long	21	27	100
DW31	8	8	66	GG2 Form R	Short	30	24	*[4]*
DW31 Form R	8	8	66	GG2 Form R	Long	22	16	150
DR31	8	8	66	GR1, GW1	Short	24	31	80
DR31 Form R	8	8	66	GR1, GW1	Medium	22	29	72
				GR1, GW1	Long	20	27	64

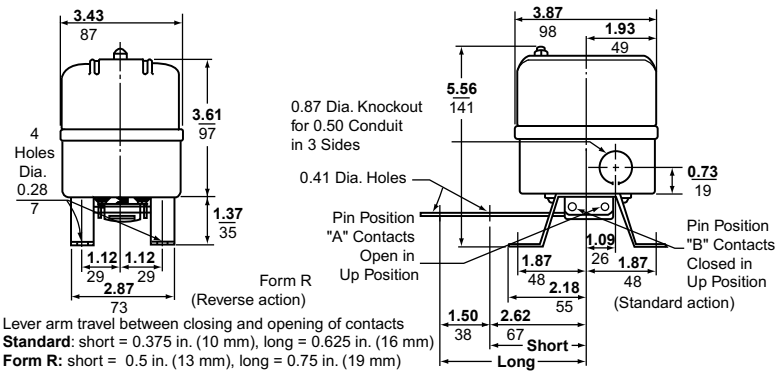
Type DG Dimensions



Float lever travel between closing and opening of contacts: short = 1 in. (25 mm), medium = 1.12 (28 mm), long = 1.25 in. (31.8)

For Type DR/DW dimensions, see catalog 9034CT9701.

Type GG Dimensions



Lever arm travel between closing and opening of contacts
Standard: short = 0.375 in. (10 mm), long = 0.625 in. (16 mm)
Form R: short = 0.5 in. (13 mm), long = 0.75 in. (19 mm)

For Type GR/GW dimensions, see catalog 9034CT9701.

Table 22.72: Electrical Ratings for All Float Switches

Applies to Class and Type	Control Circuit	Single Phase AC			Polyphase AC *[5]*			DC		
		115 V	230 V	460/ 575 V	115 V	230 V	460/ 575 V	32 V	115 V	230 V
9036DG, DR, DW (2-pole), FG	A600	2 hp	3 hp	—	3 hp	5 hp	1 hp	1/4 hp	1/2 hp	1/2 hp
9036GG, GR, GW (2-pole)	A600	2 hp	3 hp	5 hp	3 hp	5 hp	5 hp	1/2 hp	1 hp	1 hp
9036G Form H (1 N.O., 1 N.C.)	A300	1 hp	2 hp	2 hp	—	—	—	—	1/2 hp	1/2 hp
9037EG, ER, EW; HG, HR, HW (2-pole)	A600	2 hp	3 hp	—	3 hp	5 hp	1 hp	1/4 hp	1/2 hp	1/2 hp
9038 All Devices (2-pole)	A600	2 hp	3 hp	—	3 hp	5 hp	1 hp	1/4 hp	1/2 hp	1/2 hp

9036FG, 9049A60, and 9049A61

Open Tank or Sump Applications, Float Switch, Class 9036 Type FG

The Class 9036 Type FG30 pedestal style float switch is designed for liquid level control with electric motor operated pumps either directly or through a magnetic starter. It can also be used to activate alarms in liquid level control systems. The upward or downward movement of the lever arm of the Class 9036 Type FG30 float switch controls the On and Off positions corresponding to the water level changes required to turn the pump or alarm on and off.

Ambient temperature ratings: Min. -30 °C (-22 °F); Max. +105 °C (+220 °F)

Table 22.73: Type FG Float Switch and Accessories

Description	Class	Type
2-pole, NEMA 1, contacts close on liquid rise	9036	FG30
Plastic center hole float (1 required)	9049	A60
33.75 inch aluminum rod, 2 float stop assemblies and attaching hardware (1 required)	9049	A61

[4] Compensating spring not effective in combination with Short lever length position.
[5] See 1993 NEC Article 430-84

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9037EG with
9049ER3 Rod Kit and
9049EF1 Float

Closed Tank, Class 9037 Type E

Type E switches are flange mounted and float movement is transmitted through a Quad-Ring® seal.

Build up the switch to meet your exact requirements from the **basic switch, float rod,** and **float** groups below. Switch may be assembled in the field to give contacts that open on liquid rise or close on liquid rise. Consult Schneider Electric for use in media with a different specific gravity than water.

Ambient temperature ratings: Min. -30 °C (-22 °F); Max. +105 °C (+220 °F)

Table 22.74: Class 9037 Type E

Application	Post Length L (in.)	NEMA 1 Type	NEMA 4 Type	NEMA 7 & 9 Type
For minimum water level change	2-5/8	EG8	EW8	ER8
	4-11/16	EG10	—	—
For maximum water level change	2-5/8	EG9	EW9	ER9
	4-11/16	EG13	EW13	—

Table 22.75: Class 9049 Floats for Type E Switches

Description	Type
#304 stainless steel	EF1
#316 stainless steel	EF2

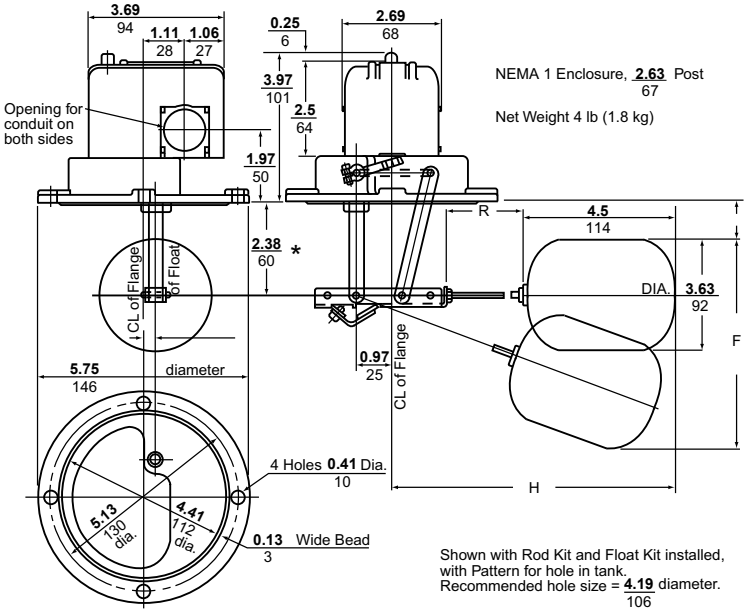
Table 22.76: Class 9049 Float Rod Kits

Type	A (in.)	F (in.)	R (in.)	H (in.)
ER1	1.00	4.75	1.75	8.25
ER2	1.00	4.75	2.5	9.00
ER3	1.00	4.75	3.50	9.50
ER5	1.00	4.75	5.25	11.75
ER7	1.00	5.00	7.25	13.75
ER12	1.00	5.75	12.25	18.75

File No. E12158 and E12443 Haz Loc

File 25490 except Types ER8, ER9

Type EG Dimensions, in. (mm)
For 9037ER/EW dimensions and rod positions, see catalog 9034CT9701



Shown with Rod Kit and Float Kit installed, with Pattern for hole in tank.
Recommended hole size = 4.19 diameter.
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Type H Switches

Type H switches are attached to the tank by means of a 2-1/2 in. screw-in bushing. An external pointer indicates the float position within the tank when the unit is mounted. Switches come complete with stainless steel float and rod. A Buna N Quad-Ring® seal is used between the float rod and sealing connector. Normal application is at atmospheric pressure, but where higher pressures are encountered, the switch will withstand tank pressures up to 50 psi at temperatures up to +220 °F. Occasional replacement of the Quad-Ring seal may be necessary.
Ambient temperature ratings: Min. -30 °C (-22 °F); Max. +105 °C (+220 °F)

Type HG35
Float on Right, 90° Offset Rod

File No. E12158 and E12443 Haz Loc

File LR25490, File LR26817 Haz Loc

Table 22.77: Class 9037 Type H Contacts Close On Liquid Rise

Float Position (viewed from front of switch, facing indicator scale)	Float Rod Angle	Approximate Water Level Change (Field Adjustable)		NEMA 1	NEMA 4	NEMA 7 & 9
		Min. (in.)	Max. (in.)	Type	Type	Type
Right	45°	2	5	HG33	HW33	HR33
	90° Offset	2	5	HG35	HW35	HR35
			7	HG37	HW37	HR37
			8-1/4	HG39	HW39	—
			11-1/2	HG31	HW31	HR31
Left	45°	2	5	HG34	HW34	HR34
	90° Offset	2	5	HG36	HW36	HR36
			7	HG38	—	HR38
			8-1/4	HG30	HW30	HR30
			11-1/2	HG32	HW32	HR32

NOTE: For replacement floats, see Class 9049 Type H on page 22-30. Types shaded in gray are available with Form Z19; see Table 22.79 on page 22-27. See Accessories and Renewal Parts on page 22-30.

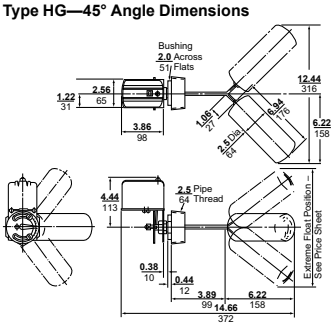
Table 22.78: Type H Float Travel Distances

Float Rod Angle	R in. (mm)	H [6] in. (mm)	f1 in. (mm)		f2 in. (mm)		F in. (mm)	
			Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
45°	—	6.22 (158)	2.25 (57)	4.50 (114)	2.00 (52)	4.50 (110)	4.25 (108)	9.00 (229)
90° offset	3.00 (76)	4.25 (108)	2.75 (70)	4.25 (108)	2.25 (57)	4.25 (108)	5.00 (127)	7.50 (191)
	4.25 (108)	5.50 (140)	3.50 (89)	5.50 (140)	2.75 (70)	4.00 (102)	6.25 (159)	9.50 (241)
	5.00 (127)	6.25 (159)	3.75 (95)	6.25 (159)	3.00 (76)	4.50 (110)	6.75 (171)	10.75 (273)
	7.00 (178)	8.25 (210)	4.75 (121)	8.25 (210)	3.75 (95)	5.75 (146)	8.50 (216)	14.00 (356)

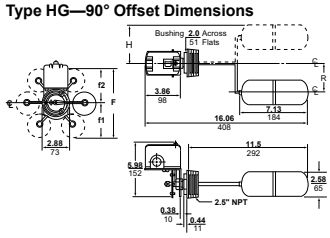
Table 22.79: Available Modifications For Class 9037 Type H *[7]*

Description	Form
Omit 2-1/2" tank connecting bushing	F3
Omit float	L
Reverse action, contacts open on rise	R
Viton® packing: 5 oz. float (diesel fuel) for Types shaded in gray in Table 22.77 above.	Z19
Viton packing (suitable for applications up to +250 °F)	Z20
#316 stainless steel float and Viton packing	Z21

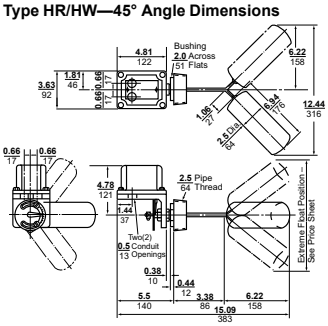
Type HG—45° Angle Dimensions



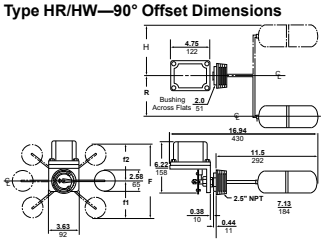
Type HG—90° Offset Dimensions



Type HR/HW—45° Angle Dimensions



Type HR/HW—90° Offset Dimensions



[6] Clearance from the centerline of the hub to the side of the tank.
[7] Some product configurations are not available—contact your Schneider Electric representative for details.

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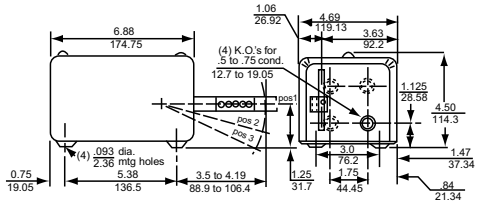
Type AG1
Mechanical Alternator, Float Operated



Type A Dimensions, in. (mm)

File No. E12158
excludes NEMA 7 & 9 products
(9038AR, CR, and DR)

File LR25490
excludes NEMA 7 & 9 products
(9038AR, CR, and DR)

Type A, Open Tank

Alternators are designed to provide motor alternation in the operation of two motors.

Table 22.80: Class 9038 Type A

Application	Description	NEMA 1 Type	NEMA 4 Type	NEMA 7 and 9 Type
For open tank or sump systems using duplex pumps	Mechanical alternator float operated	AG1	AW1	AR1

NOTE: For use with Class 9049 float accessories listed on page 22-30.
Type AW and AR alternators **must** use center hole floats.

Table 22.81: Operating Forces—Types AG, AR and AW

Type	Without Compensating Spring (No Form C)		With Compensating Spring (Form C)			
			Maximum Weight of Rod and Stops Supported	Length of Rod Supported at the Maximum Adjustment		
	Force Up *[8]*	Force Down	Note: AW1 and AR1 have compensating spring standard.	Brass *[9]*	Stainless Steel *[9]*	Aluminum *[9]*
AG1 (min. lever ext.)	18 oz	20 oz	47 oz.	10 ft	12 ft	25 ft
AG1 (max. lever ext.)	16	17	41	8	10	21
AG1 Form R (min. lever ext.)	14	16	33	7	8	17
AG1 Form R (max. lever ext.)	11	12	30	6	7	15
AR1, AW1 (standard lever)	—	—	74	16	20	41
AR1, Form R, AW1 Form R (std. lever)	—	—	85	19	23	47

Type C, Closed Tank, with Bushing

Flange mounted with bushing for control of liquid level within a closed tank. Build up the switch to meet your requirements from the basic switch, rod kit, and float kit groups below.

Type C switches are attached to the tank by means of a 2-1/2 in. screw-in bushing. An external pointer indicates the float position within the tank when the unit is mounted. Switches come complete with screw-in connector, stainless steel float and rod.

Type CG36
Float on left

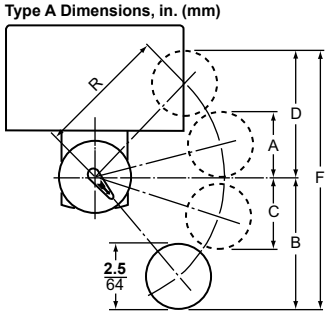
Table 22.82: Class 9038 Type C

Float Position Viewed from Front of Switch Facing Indicator Scale	R in. (mm)	Approx. Water Level Change		NEMA Type 1	NEMA Type 4	NEMA Type 7, 9
		Min. (in.)	Max. (in.)	Type	Type	Type
Right	7 (178)	6.5 (165)	13 (330)	CG31	CW31	CR31
Left	7 (178)	6.5 (165)	13 (330)	CG32	CW32	CR32
Right	4.25 (108)	4 (102)	7.75 (197)	CG33	CW33	CR33
Left	4.25 (108)	4 (102)	7.75 (197)	CG34	CW34	CR34
Right	5 (127)	4.75 (121)	9.25 (235)	CG35	—	—
Left	5 (127)	4.75 (121)	9.25 (235)	CG36	CW36	CR36

Table 22.83: Type C Float Travel Adjustments

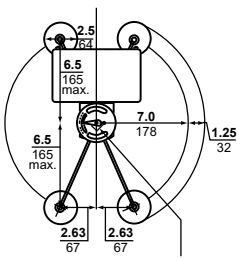
R in. (mm)	A in. (mm)		B in. (mm)		C in. (mm)		D in. (mm)		F in. (mm)	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
7 (178) *[10]*	2.5 (64)	5 (127)	5 (127)	7 (178)	2 (51)	4 (102)	5 (152)	7 (178)	10 (254)	14 (495)
5 (127) *[11]*	2.25 (57)	3.75 (95)	4 (102)	5.25 (133)	2.75 (70)	3 (76)	4 (102)	5.25 (133)	8 (203)	10.5 (267)
4.25 (108) *[12]*	2 (51)	3.5 (89)	3.5 (89)	4.75 (121)	2.5 (64)	3.75 (95)	3.5 (89)	4.75 (121)	7 (178)	9.5 (241)

Type A Dimensions, in. (mm)

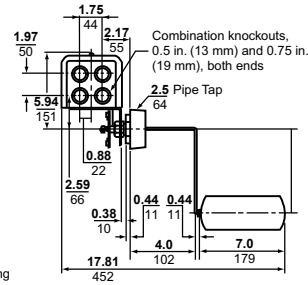


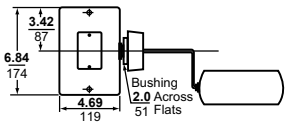
Replacement Float: 9049HF page 22-28

Type CG Dimensions



To reverse the float, change the operating link in the holes of the adjusting plate.





[8] Add 2 oz for Form N5 High Water alarm.
[9] Rod length has been determined using the weight of the rod material furnished on Class 9049 accessories (3/8" O.D. tubing). Other types of rod should be weighed and compared to the Maximum Weight of Rod column in Table 22.81.
[10] CG31, CG32, CW31, CW32, CR31, CR32
[11] CG35, CG36, CW35, CW36, CR35, CR36
[12] CG33, CG34, CW33, CW34, CR33, CR34

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Type DG Shown with
Rod Kit 9049ER5 and
Float Kit 9049HF3 Installed.

File No. E12158,
excludes NEMA 7 & 9 products (9038AR, CR, and DR)

File LR25490,
excludes NEMA 7 & 9 products (9038AR, CR, and DR)

Type D, Closed Tank, Top Mounted

Designed for applications where mounting is to be made at the top of a closed tank.

Table 22.84: Class 9038 Type D Contacts Close On Liquid Rise

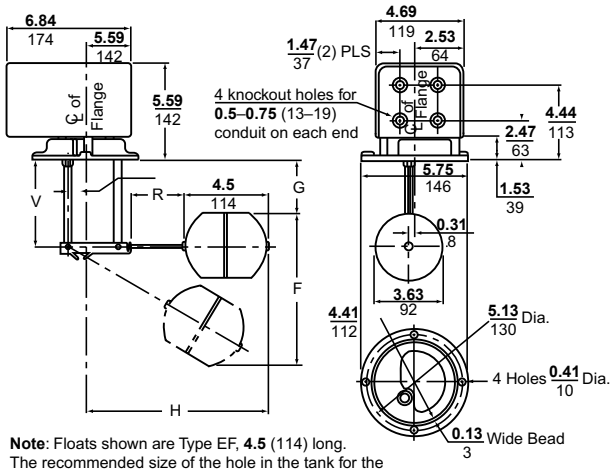
Water Level Change	Hinge Post Dimension "V" (in.)	NEMA 1 Type	NEMA 4 Type	NEMA 7 and 9 Type
Min.	2-5/8	DG7	DW7	—
Max.		DG8	DW8	DR8
Min.	4-11/16	DG9	—	—
Max.		DG10	—	—

Float Kits, For Use with Type D Switches		Float Rod Kit, Class 9049				
Size and Material Diameter x Length (in.)	Class and Type	Type	R (in.)	H (in.)	G (in.)	F (in.)
		ER1	1.75	8.25	3.25	8.75
		ER2	2.50	9.00	3.50	10.50
3.625 x 4.50, #304 stainless steel	9049EF1	ER3	3.25	9.50	3.50	11.00
3.625 x 4.50, #316 stainless steel	9049EF2	ER5	5.25	11.75	3.75	12.75
2.50 x 7, #304 stainless steel	9049HF3	ER7	7.25	13.75	4.00	14.50
2.50 x 7, #316 stainless steel	9049HF4	ER12	12.25	18.75	4.75	19.00

Table 22.85: Available Modifications for All Mechanical Alternators *[13]*

Description	Form
Compensating spring (Type AG)	C
Omit 2-1/2 in. connecting bushing (Type CG, CR, CW)	F3
Omit float (Type CG, CR, CW)	L
Two-level non-alternating unit	N4
Addition of a third, high-water alarm circuit (Type AG, AR, AW, CG, DG only)	N5
High-water alarm circuit, 2-pole (Type CG only)	N25
Reverse action (contacts open on Rise)	R
Viton® packing, 5 oz. float (diesel fuel) (Type CG)	Z19
Viton packing (Type CG, CR, CW)	Z20
#316 stainless steel float and Viton packing (Type CG, CR, CW)	Z21

Type DG Dimensions, in. (mm)



Note: Floats shown are Type EF, **4.5** (114) long.
The recommended size of the hole in the tank for the entry of the float and the mounting of the control is **4.19** (106).
Add **2.5** (64) to "H" if using Type HF Floats, which are **7.0** (178) long.

Table 22.86: Temperature Ratings for Class 9038

Description		Rating
Ambient Temperature		-22 to 200 °F (-30 to 93 °C)
Media	Buna-N Seal	Up to 215 °F (102 °C)
	Viton® Seal	Up to 250 °F (121 °C

[13] Some product configurations are not available—contact your Schneider Electric representative for details.

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Accessories for Float Switches

To order, specify the Class and Type number of the kit.

Table 22.87: Class 9049 Accessories for Float Switches

Description			Applies to Class	Type
Compensating Spring			9036GG	A13
			9038AG	A15
			9036DR, DW	A20
Float	Dia. 3.62 in. (92 mm), length 4.5 in. (114 mm)	#304 stainless steel	9037E, 9038D	EF1
		#316 stainless steel	9037E, 9038D	EF2
	Dia. 2.5 in. (64 mm), length 7 in. (178 mm)	#304 stainless steel	9037H, 9038C	HF3
		#316 stainless steel	9037H, 9038C	HF4
Float Kit	7 in. tapped-at-top #304 stainless steel float, 5 ft rod, 2 stops	Brass rod	All 9036, 9038A	A6
		Aluminum rod	All 9036, 9038A	A6A
	7 in. center-hole #304 stainless steel float, 5 ft rod, 4 stops	Brass rod	All 9036, 9038A	A6C
		Aluminum rod	All 9036, 9038A	A6CA
	7 in. center-hole #316 stainless steel float, 5 ft stainless steel rod, 4 stainless steel stops		All 9036, 9038A	A6CS
	7 in. tapped-at-top #316 stainless steel float, 5 ft stainless steel rod, 2 stainless steel stops		All 9036, 9038A	A6S
	Replacement float—7 in. round center-hole #304 stainless steel		9049A6C, A6CA	AF1
Lever	Form R		9036DG	A58
Mounting Bracket	Replacing obsolete 9036A with 9036G		9036GG	A54
	Replacing 9036A (S or F1) with 9036G		9036GG	A55
	Universal		All 9036, 9038AG, AR, AW	UMS1
Rod	Stainless steel	1-3/4 in. long	9037E, 9038D	ER1
		2-1/2 in. long	9037E, 9038D	ER2
		3-1/4 in. long	9037E, 9038D	ER3
		5-1/4 in. long	9037E, 9038D	ER5
		7-1/4 in. long	9037E, 9038D	ER7
		12-1/4 in. long	9037E, 9038D	ER12
Rod Kit	Additional 2-1/2 ft section with connector	Brass rod	9049A6, A6C	T1
		Aluminum rod	9049A6A, A6CA	T1A
		Stainless steel rod	9049A6S, A6CS	T1S

Renewal Parts for Class 9012–9038 Devices

Renewal parts are generally available for Pump Control Products with a numerical date code—for example, 172 (first quarter, 1972)—or a current date code. Parts are no longer available for devices manufactured before 1965.

To order, specify the Class and Type number of the kit.

Table 22.88: Class 9998 Renewal Parts Kits for Class 9012–9038 Devices

Description / Equipment To Be Serviced9thl		Parts Kit Type
Actuator Assembly	9012GA, GD, GG, GK, GN, GR 5, 25, 55 Series C only	PC268*[1]*
	9012GA, GD, GG, GK, GN, GR 6, 26, 36, 46, 56 Series C only	PC269
	9012GB, GE, GH1, 21, 31, 41, 51; GL, GP, GS1	PC177*[1]*
	9012GB, GE, GH2, 22, 32, 42, 52; GL, GP, GS2	PC178*[1]*
Contact Kit (2-Pole Contacts)	9013FHG22, 29, 32, 39, 52, 59; 9013 FYG; 9036DG, DR, DW; 9037EG, ER, EW, HG, HR, HW30–39; 9038 All Types (2 Kits Required); obsolete 9013HHGY, HSGY; HSWY; 9037HEG, HSG3, 4; 9035DG10, DW10 (This kit also contains a replacement diaphragm for pressure switches. The diaphragm fits pressure switch only.)	PC242
	9013GHG, GSG, GHR, GSR, GMG; 9036GG, GR, GW; 9037GG Series C All except Forms H & R; 9016GVG, Form R	PC205
	9013GHG, GSG, GSR, GMG; 9036GG, GR, GW; 9037GG, GR, GW Series C Form H only; 9016GVG, Form H	PC206
	9013GHG, GSG, GHR, GSR, GMG; 9036GR, GW: Series C Form R only; 9016GVG	PC207
Contact Replacement Kit	9013FHG2 thru 19, 42 thru 49, all FSG (Complete contact replacement kit—includes new diaphragm)	PC241
Diaphragm Assembly	9012GA, GD, GN, GR1, 21 Series C only	PC265
	9012GA, GD, GG, GK, GN, GR 2, 3, 22, 52 Series C only	PC266*[1]*
	9012GA, GD, GG, GK, GN, GR4, 24, 54 Series C only	PC267*[1]*
	Convoluted diaphragm assembly for 9013GHG, GSG: Series C	PC208
	9013GHW, GSW; and GSW, GHR: Series C	PC211
	9016 GAW-1, 21	PC233
Gasket Kit	Contains all replaceable gaskets for all 9012 open, NEMA 1, 4, 4X, 13 devices	PC184
Pilot Light, 24 Vdc	9012, 9016G Forms G7, G8, G9, G10, G21, G22	PC305
Piston Assembly	9012GC, GF, GJ, GQ, GT1, 21, 31, 41, 51 Series C only	PC270*[1]*
	9012GC, GF, GJ, GQ, GT2, 22, 32, 42, 52 Series C only	PC271*[1]*
	9012GC, GF, GQ, GT4, 24, 34, 44, 54 Series C only	PC273
Seal Kit	Buna N, for Series A devices: 9037HG/HW/HR30–39; 9038CG/CW/CR31–36	PC337
	Viton®, for Series A devices with Form Z19 or Z20: 9037HG/HW/HR30–39; 9038CG/CW/CR31–36	PC338
Seal Tube Kit	Buna N Quad-Ring®, for Series C devices: 9037HG/HW/HR3–12; 9038CG/CW/CR1–6	PC282
	Viton Quad-Ring, for Series C devices: 9 037HG/HW/HR3–12; 9038CG/CW/CR1–6	PC333
Snap Switch	SPDT, for 9012GA, GB, GC, GD, GE, GF, GG, GH, GJ single pole; except Forms E2, E3, E4, H3: Series C only	PC313
	DPDT, for 9012GA, GB, GC, GD, GE, GF, GG, GH, GJ double pole; except Forms E2, E3, H6, H7: Series C only	PC314
Switch Mechanism	9036DR1, DW1 Series B	PC285

[1] If one of these **Form** designations appears on the pressure switch nameplate, complete the 9998 PC number by adding that same **Form suffix** from page 22-18, and add the Form price to the kit price.

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Section 23

Relays and Timers

RXM

RSL

RSB

SSR

8501X

CAD32

9050JCK

RE17

ABL8

REG24, REG48, REG96

CA2SKE

SR2, SR3

RM17, RM35

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- Zelio™ RSB Interface Relays 23-3
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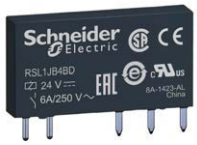
RSL 1PV••

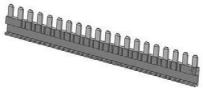
RSL 1PR••



RSL 1AB••

RSL ZVA•

RSL ZRA•



RSL Z2

RSL Z3

Zelio™ RSL Interface Relays

Zelio RSL slim interface relays save valuable panel space with a 6 mm width and have a 6 A general purpose load rating. Features include:

- Pre-assembled option: relay and socket are combined into one catalog number.
- Universal AC/DC sockets have built-in protection from transients and reverse polarity voltages (see catalog DIA3ED2090304EN-US for more detailed information).
- Accessories, which include isolators, ID tags, and bus jumper save valuable installation time.
- SPDT (1 C/O) design

Refer to Online Relay Configurator.

Table 23.1: Pre-assembled Relay and Socket Combination (sold in lots of 10)

Socket Supply Voltage	Pre-Assembled Catalog Number[1]		Replacement Relays Catalog Number
	Screw Connector	Spring Terminal	
12 Vac/Vdc	RSL1PVJU	RSL1PRJU	RSL1AB4JD
24 Vac/Vdc	RSL1PVBU	RSL1PRBU	RSL1AB4BD
48 Vac/Vdc	RSL1PVEU	RSL1PREU	RSL1AB4ED
110 Vac/Vdc	RSL1PVFU	RSL1PRFU	RSL1AB4ND
230 Vdc	RSL1PVPU	RSL1PRPU	RSL1AB4ND

Table 23.2: Relays (sold in lots of 10)

Relay Coil Voltage[2]	Catalog Number
12 Vdc	RSL1AB4JD
24 Vdc	RSL1AB4BD
48 Vdc	RSL1AB4ED
60 Vdc	RSL1AB4ND

Table 23.3: Sockets (sold in lots of 10)

Control Voltage	Socket Type		For Use with Relays:
	Screw Connector Catalog Number	Spring Terminal Catalog Number	
12 Vac/Vdc	RSLZVA1	RSLZRA1	RSL1AB4JD
24 Vac/Vdc			RSL1AB4BD
48 Vac/Vdc	RSLZVA2	RSLZRA2	RSL1AB4ED
60 Vac/Vdc			RSL1AB4ND
110 Vac/Vdc	RSLZVA3	RSLZRA3	RSL1AB4ND
230 Vac/Vdc	RSLZVA4	RSLZRA4	RSL1AB4ND

Table 23.4: Accessories

Description	Compatibility	Catalog Number
ID tags (2 sheets of 64 tags)	With all RSL and SSL series sockets	RSLZ5
Bus jumper (10 x 20-pole jumpers)		RSLZ2
Butterfly isolator (10 isolators)		RSLZ3

Approvals for RSL Relays

c UL us — File: E173076 CCN: NRNT2, NRNT8 — CSA — File: 240278 Class: 3211 04 — CE — IEC 61810-1 — RoHS Compliant

Approvals for RSLZ Sockets

c UL us — File: E172326 CCN: SWIV2, SWIV8 — CSA — File: 254977 Class: 3211 07 — CE — IEC 61984 — RoHS Compliant

[1] Relays are mounted on sockets equipped with LED and protection circuit.
[2] The RSL sockets will accept an AC or DC input voltage; however, the relay always receives a filtered DC voltage.

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RSB1A160F7

RSB2A080BD

RSZE1S48M

RSB1A120JD Relay
+ RZM031FPD Socket
+ RSZE1S35M Module

RSB1A160BD Relay
+ RSZE1S48M Socket

Zelio™ RSB Interface Relays

Zelio RSB interface relays and sockets provide the optimum combination of robust performance and space saving for the most demanding applications. Relays are rated at 8 A, 12 A, and 16 A (250 Vac / 28 Vdc). Features include:

- Optional protection modules for protection against electrical transients
- Optional plastic hold-down ejector clips
- Socket or printed circuit board installation options

Refer to Online Relay Configurator.

Table 23.5: Relays (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)		
	SPDT (1 C/O) -12 A Res.	SPDT (1 C/O) -16 A Res.	DPDT (2 C/O) -8 A Res.
	Catalog Number*[3]*	Catalog Number*[3]*	Catalog Number*[3]*
6 Vdc	RSB1A120RD	RSB1A160RD	RSB2A080RD
12 Vdc	RSB1A120JD	RSB1A160JD	RSB2A080JD
24 Vdc	RSB1A120BD	RSB1A160BD	RSB2A080BD
48 Vdc	RSB1A120ED	RSB1A160ED	RSB2A080ED
60 Vdc	RSB1A120ND	RSB1A160ND	RSB2A080ND
110 Vdc	RSB1A120FD	RSB1A160FD	RSB2A080FD
24 Vac	RSB1A120B7	RSB1A160B7	RSB2A080B7
48 Vac	RSB1A120E7	RSB1A160E7	RSB2A080E7
120 Vac	RSB1A120F7	RSB1A160F7	RSB2A080F7
220 Vac	RSB1A120M7	RSB1A160M7	RSB2A080M7
230 Vac	RSB1A120P7	RSB1A160P7	RSB2A080P7
240 Vac	RSB1A120U7	RSB1A160U7	RSB2A080U7

Table 23.6: Sockets – 12 A, 300 Vac (sold in lots of 10)

Contact Terminal Arrangement	Connection	For Use with Relays	Catalog Number
Separate*[4]*	Box lug connector	RSB1A120••	RSZE1S35M
		RSB1A160••*[5]* RSB2A080••	RSZE1S48M

Table 23.7: Protection Modules (sold in lots of 10)

Description	Compatibility	Voltage	Catalog Number
Diode	RSZ•••••• sockets (RSB series), RGZ•••••• sockets (RXG series)	6–230 Vdc	RZM040W
RC circuit		24–60 Vac	RZM041BN7
		110–240 Vac	RZM041FU7
Diode + green LED		6–24 Vdc	RZM031RB
		24–60 Vdc	RZM031BN
		110–230 Vdc	RZM031FPD
Varistor + green LED		6–24 Vac/Vdc	RZM021RB
		24–60 Vac/Vdc	RZM021BN
		110–230 Vac/Vdc	RZM021FP

Table 23.8: Accessories (sold in lots of 10)

Description	Compatibility	Catalog Number
Plastic hold-down ejector clip	RSZ•••••• sockets (RSB series)	RSZR215
ID tags		RSZL300

Approvals for RSB Relays

c UL us — File: E173076, CCN: NRNT2, NRNT8 | CSA — File: 215736, Class: 3211 07 | CE — IEC 61810-1 | RoHS Compliant

Approvals for RSZ Sockets

c UL us — File: E173076, CCN: NRNT2, NRNT8 | CSA — File: 254977, Class: 3211 07 | CE — IEC 61810-1 | RoHS Compliant

- RZM modules are RoHS compliant.
- For mounting track, see Mounting Track, End Clamps, Jumpers, Fanning Strips, page 24-19.

[3] To order a relay complete with socket (sold in lots of 20): add suffix S to the catalog numbers selected above.
Example: RSB 2A080RD + RSZ E1S48M becomes RSB 2A080RDS.
[4] The inputs and outputs are on separate sides.
[5] When using the RSB1A160•• relay with socket RSZ E1S48M, terminals 11 and 21, 14 and 24, 12 and 22 must be linked.

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RGZE1S35M Socket
+ RXG12BD Relay

RXG11RD

RXG22B7

RXG13RD

RXG15RD

New!

Zelio™ RXG Interface Relays

The Zelio RXG interface relay range is comprised of 10 A relays with 1 C/O contact and 5 A relays with 2 C/O contacts all in the same optimal foot print. The mating sockets feature separate contact terminals with reliable screw connections that attach either to a convenient 35 mm DIN rail or flexible panel mounting. The entire offer is a complete system solution with protection modules (diode, diode + LED, RC circuit, or varistor + LED), plastic ejector/maintaining clip and ID Tags to identify relays.

- Standard hold-down ejector clip integrated with socket
- Optional protection modules for protection against electrical transients
- Industry standard footprint for seamless compatibility with competitive sockets
- UL Listed combination (Relay + Socket) for expedited system certification

Refer to Online Relay Configurator.

Table 23.9: Relays: Standard Cover, without LED, with Test Button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)	
	SPDT (1 C/O) - 10 A	DPDT (2 C/O) - 5 A
	Catalog Number	Catalog Number
6 Vdc	RXG11RD	RXG21RD
12 Vdc	RXG11JD	RXG21JD
24 Vdc	RXG11BD	RXG21BD
48 Vdc	RXG11ED	RXG21ED
60 Vdc	RXG11ND	RXG21ND
110 Vdc	RXG11FD	RXG21FD
24 Vac	RXG11B7	RXG21B7
48 Vac	RXG11E7	RXG21E7
120 Vac	RXG11F7	RXG21F7
220 Vac	RXG11M7	RXG21M7
230 Vac	RXG11P7	RXG21P7

Table 23.10: Relays: Standard Cover, with LED, with Test Button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)	
	SPDT (1 C/O) - 10 A	DPDT (2 C/O) - 5 A
	Catalog Number	Catalog Number
6 Vdc	RXG12RD	RXG22RD
12 Vdc	RXG12JD	RXG22JD
24 Vdc	RXG12BD	RXG22BD
48 Vdc	RXG12ED	RXG22ED
60 Vdc	RXG12ND	RXG22ND
110 Vdc	RXG12FD	RXG22FD
24 Vac	RXG12B7	RXG22B7
48 Vac	RXG12E7	RXG22E7
120 Vac	RXG12F7	RXG22F7
220 Vac	RXG12M7	RXG22M7
230 Vac	RXG12P7	RXG22P7

Table 23.11: Relays: Standard Cover, with LED, without Test Button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)	
	SPDT (1 C/O) - 10 A	DPDT (2 C/O) - 5 A
	Catalog Number	Catalog Number
6 Vdc	RXG13RD	RXG23RD
12 Vdc	RXG13JD	RXG23JD
24 Vdc	RXG13BD	RXG23BD
48 Vdc	RXG13ED	RXG23ED
60 Vdc	RXG13ND	RXG23ND
110 Vdc	RXG13FD	RXG23FD
24 Vac	RXG13B7	RXG23B7
48 Vac	RXG13E7	RXG23E7
120 Vac	RXG13F7	RXG23F7
220 Vac	RXG13M7	RXG23M7
230 Vac	RXG13P7	RXG23P7

Table 23.12: Relays: Clear Cover, without LED, without Test Button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)	
	SPDT (1 C/O) - 10 A	DPDT (2 C/O) - 5 A
	Catalog Number	Catalog Number
6 Vdc	RXG15RD	RXG25RD
12 Vdc	RXG15JD	RXG25JD
24 Vdc	RXG15BD	RXG25BD
48 Vdc	RXG15ED	RXG25ED
60 Vdc	RXG15ND	RXG25ND
110 Vdc	RXG15FD	RXG25FD
24 Vac	RXG15B7	RXG25B7
48 Vac	RXG15E7	RXG25E7
120 Vac	RXG15F7	RXG25F7
220 Vac	RXG15M7	RXG25M7
230 Vac	RXG15P7	RXG25P7

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RGZE1S48M

RZM031RB

RSZL300

Table 23.13: Sockets (sold in lots of 10)

Contact Terminal Arrangement	Connection	For Use with Relays	Catalog Number
Separate*[6]*	Box lug connector	RXG1•••	RGZE1S35M*[7]*
		RXG2•••	RGZE1S48M*[7]*

Table 23.14: Protection Modules (sold in lots of 10)

Description	Voltage	Compatibility	Catalog Number
Diode	6 to 230 Vdc	RSZ•••••• sockets (RSB series), RGZ•••••• sockets (RXG series)	RZM040W
RC circuit	24 to 60 Vac		RZM041BN7
	110 to 240 Vac		RZM041FU7
Diode + green LED	6 to 24 Vdc		RZM031RB
	24 to 60 Vdc		RZM031BN
	110 to 230 Vdc		RZM031FPD
Varistor + green LED	6 to 24 Vdc/Vac		RZM021RB
	24 to 60 Vdc/Vac		RZM021BN
	110 to 230 Vdc/Vac		RZM021FP

Table 23.15: Accessories (sold in lots of 10)

Description	For Use With	Catalog Number
Plastic ejector clip	RXG series (RSZ•••••• sockets)	RGZR215
Socket ID tags		RSZL300
Relay ID tags	RXG series relays	RGZL520

Approvals for RXG Relays

c UL us LISTED — File: E173076 CCN: NRNT, NRNT7*[8]*

c UL us — File: E173076 CCN: NRNT2, NRNT8

CSA — File: 254977 Class: 3211 07

CE — IEC 61810-1

RoHS Compliant

Approvals for RGZ Sockets

c UL us — File: E172326 CCN: SW1V2, SW1V8

CSA — File: 254977 Class: 3211 07

CE — RoHS Compliant

[6] The inputs and outputs are on separate sides.
[7] Please note that RGZE1S35M and RGZE1S48M sockets come standard with the RGZR215 ejector clip
[8] When used with the appropriate RGZ socket.

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RXZE2M114M Socket
+ RXM4AB2P7 Relay

RXM2AB1B7

RXM2AB2BD

RXM2AB3F7

Zelio™ RXM Plug-In Relays

Zelio RXM miniature plug-in relays and sockets provide a complete system solution in response to the most demanding applications ranging from 3 to 12 A. Some of the features include:

- Test button with removable lock-down door for testing the contacts (depending on model)
- Green LED indication of relay status (depending on model)
- Mechanical indication of relay status (standard)
- Optional protection modules to protect against electrical spikes
- Bus jumpers for connecting multiple terminals reduce installation time

Refer to Online Relay Configurator.

Table 23.16: Relays: without LED, with Test button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)		
	DPDT (2 C/O) -12 A Res.	3PDT (3 C/O) - 10 A Res.	4PDT (4 C/O) - 8 A Res.
	Catalog Number	Catalog Number	Catalog Number
12 Vdc	RXM2AB1JD	RXM3AB1JD	RXM4AB1JD
24 Vdc	RXM2AB1BD	RXM3AB1BD	RXM4AB1BD
48 Vdc	RXM2AB1ED	RXM3AB1ED	RXM4AB1ED
110 Vdc	RXM2AB1FD	RXM3AB1FD	RXM4AB1FD
220 Vdc	—	—	RXM4AB1MD
24 Vac	RXM2AB1B7	RXM3AB1B7	RXM4AB1B7
48 Vac	RXM2AB1E7	RXM3AB1E7	RXM4AB1E7
120 Vac	RXM2AB1F7	RXM3AB1F7	RXM4AB1F7
230 Vac	RXM2AB1P7	RXM3AB1P7	—
240 Vac	—	—	RXM4AB1U7

Table 23.17: Relays: with LED, with Test Button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)		
	DPDT (2 C/O) -12 A Res.	3PDT (3 C/O) - 10 A Res.	4PDT (4 C/O) - 8 A Res.
	Catalog Number	Catalog Number	Catalog Number
12 Vdc	RXM2AB2JD	RXM3AB2JD	RXM4AB2JD
24 Vdc	RXM2AB2BD	RXM3AB2BD	RXM4AB2BD
48 Vdc	RXM2AB2ED	RXM3AB2ED	RXM4AB2ED
110 Vdc	RXM2AB2FD	RXM3AB2FD	RXM4AB2FD
125 Vdc	—	—	RXM4AB2GD
24 Vac	RXM2AB2B7	RXM3AB2B7	RXM4AB2B7
48 Vac	RXM2AB2E7	RXM3AB2E7	RXM4AB2E7
120 Vac	RXM2AB2F7	RXM3AB2F7	RXM4AB2F7
230 Vac	RXM2AB2P7	RXM3AB2P7	RXM4AB2P7

Table 23.18: Relays: with LED, without Test Button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)		
	DPDT (2 C/O) -12 A Res.	3PDT (3 C/O) - 10 A Res.	4PDT (4 C/O) - 8 A Res.
	Catalog Number	Catalog Number	Catalog Number
12 Vdc	RXM2AB3JD	—	RXM4AB3JD
24 Vdc	RXM2AB3BD	—	RXM4AB3BD
48 Vdc	RXM2AB3ED	—	RXM4AB3ED
110 Vdc	RXM2AB3FD	—	RXM4AB3FD
125 Vdc	—	—	RXM4AB3GD
24 Vac	RXM2AB3B7	—	RXM4AB3B7
48 Vac	RXM2AB3E7	—	RXM4AB3E7
120 Vac	RXM2AB3F7	—	RXM4AB3F7
230 Vac	RXM2AB3P7	—	RXM4AB3P7

Table 23.19: Relays: Low level Contacts, without LED, with Test Button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)
	4PDT (4 C/O) -3 A Res.
	Catalog Number
12 Vdc	RXM4GB1JD
24 Vdc	RXM4GB1BD
48 Vdc	RXM4GB1ED
110 Vdc	RXM4GB1FD
24 Vac	RXM4GB1B7
48 Vac	RXM4GB1E7
120 Vac	RXM4GB1F7
230 Vac	RXM4GB1P7

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RXM4GB2F7

Table 23.20: Relays: Low Level Contacts, with LED, with Test button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)
	4PDT (4 C/O) -3 A Res.
	Catalog Number
12 Vdc	RXM4GB2JD
24 Vdc	RXM4GB2BD
48 Vdc	RXM4GB2ED
110 Vdc	RXM4GB2FD
24 Vac	RXM4GB2B7
48 Vac	RXM4GB2E7
120 Vac	RXM4GB2F7
230 Vac	RXM4GB2P7
240 Vac	RXM4GB2U7

Table 23.21: Relays: Low Level Contacts, with LED, without Test Button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)
	4PDT (4 C/O) - 3 A Res.
	Catalog Number
12 Vdc	RXM4GB3JD
24 Vdc	RXM4GB3BD
48 Vdc	RXM4GB3ED
110 Vdc	RXM4GB3FD
125 Vdc	—
24 Vac	RXM4GB3B7
48 Vac	RXM4GB3E7
120 Vac	RXM4GB3F7
230 Vac	RXM4GB3P7

- For sockets and accessories, see page 23-8.

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Sockets and Accessories for Zelio™ RXM Relays

Refer to Online Relay Configurator.

RXZE2S108M

RXM040W

RXZ400

Table 23.22: Sockets (sold in lots of 10)

Contact Terminal Arrangement	Connection	For Use with Relays	Catalog Number
Mixed[9]	Screw clamp terminals	RXM2•••••[10] RXM4•••••[10]	RXZE2M114[11]
	Box lug connector	RXM2••••• RXM4•••••	RXZE2M114M[11]
Separate[12]	Box lug connector	RXM2•••••	RXZE2S108M[13]
		RXM3•••••	RXZE2S111M[11]
		RXM4•••••	RXZE2S114M
	Spring Terminal	RXM2•••••	RXZE2S114S

Table 23.23: Protection Modules (sold in lots of 10)

Description	Voltage	Compatibility	Catalog Number
Diode	6–250 Vdc	RXZ•••••• sockets (RXM series), RPZF1 and RPZF2 sockets (RPM series)	RXM040W
RC circuit	24–60 Vac		RXM041BN7
	110–240 Vac		RXM041FU7
Varistor	6–24 Vac/Vdc		RXM021RB
	24–60 Vac/Vdc		RXM021BN
	110–240 Vac/Vdc		RXM021FP

Table 23.24: Accessories (sold in lots of 10)

Description	Compatibility	Catalog Number
Metal hold-down clip	RXZ sockets (RXM series)	RXZ400
Plastic hold-down ejector clip	RXZ sockets (RXM series)	RXZR335
Bus jumper, 2-pole (Ith: 5 A max.)	RXZE2S sockets (RXM series)	RXZS2
DIN rail mounting adapter[14]	RXM series relays, RPM1 and RPM2 series relays	RXZE2DA
Panel mounting adapter[14]		RXZE2FA
Relay ID tags (sheet of 108 tags)	RXM series relays, RPM series relays, RUM series relays	RXZL520
Socket ID tags	RXZ sockets (RXM series, except RXZE2M114), RUZS sockets (RUM series)	RXZL420

Approvals for RXM Relays

c UL us LISTED — File: E164862 CCN: NLDX, NLDX7[15]

c UL us — File: E164862 CCN: NLDX2, NLDX8

CSA — File: 230765 Class: 3211 07

CE — IEC 61810-1

RoHS Compliant

Approvals for RXZ Sockets

c UL us — File: E172326 CCN: SWIV2, SWIV8

CSA — File: 230765 Class: 3211 07

CE — IEC 61984

RoHS Compliant

[9] The inputs and outputs are mixed on both sides.
[10] When mounting relay RXM2••••• on socket RXZE2M••••, the thermal current must not exceed 10 A.
[11] Thermal current Ith: 10 A
[12] The inputs and outputs are on separate sides.
[13] Thermal current Ith: 12 A
[14] Test button and lock-down door become inaccessible.
[15] When used with the appropriate RXZ socket.

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RPZF4 Socket
+RPM42P7 Relay

RPM13BD

RPM23P7

RPM33BD

RPM43BD

Zelio™ RPM Plug-In Relays

Zelio RPM plug-in relays and sockets provide a complete system solution for the most demanding applications up to 15 A. Some of the features include:

- Test button with removable lock-down door for testing the contacts (depending on model)
- Green LED indication of relay status (depending on model)
- Mechanical indication of relay status (standard)
- Optional modules to protect against electrical spikes

Refer to Online Relay Configurator.

Table 23.25: Relays: without LED, with Test Button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)			
	SPDT (1 C/O) - 15 A Res.	DPDT (2 C/O) - 15 A Res.	3PDT (3 C/O) - 15 A Res.	4PDT (4 C/O) - 15 A Res.
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
12 Vdc	RPM11JD	RPM21JD	RPM31JD	RPM41JD
24 Vdc	RPM11BD	RPM21BD	RPM31BD	RPM41BD
48 Vdc	RPM11ED	RPM21ED	RPM31ED	RPM41ED
110 Vdc	RPM11FD	RPM21FD	RPM31FD	RPM41FD
24 Vac	RPM11B7	RPM21B7	RPM31B7	RPM41B7
48 Vac	RPM11E7	RPM21E7	RPM31E7	RPM41E7
120 Vac	RPM11F7	RPM21F7	RPM31F7	RPM41F7
230 Vac	RPM11P7	RPM21P7	RPM31P7	RPM41P7

Table 23.26: Relays: with LED, with Test Button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)			
	SPDT (1 C/O) - 15 A Res.	DPDT (2 C/O) - 15 A Res.	3PDT (3 C/O) - 15 A Res.	4PDT (4 C/O) - 15 A Res.
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
12 Vdc	RPM12JD	RPM22JD	RPM32JD	RPM42JD
24 Vdc	RPM12BD	RPM22BD	RPM32BD	RPM42BD
48 Vdc	RPM12ED	RPM22ED	RPM32ED	RPM42ED
110 Vdc	RPM12FD	RPM22FD	RPM32FD	RPM42FD
24 Vac	RPM12B7	RPM22B7	RPM32B7	RPM42B7
48 Vac	RPM12E7	RPM22E7	RPM32E7	RPM42E7
120 Vac	RPM12F7	RPM22F7	RPM32F7	RPM42F7
230 Vac	RPM12P7	RPM22P7	RPM32P7	RPM42P7

Table 23.27: Relays: with LED, without Test Button and Lock-Down Door (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)			
	SPDT (1 C/O) - 15 A Res.	DPDT (2 C/O) - 15 A Res.	3PDT (3 C/O) - 15 A Res.	4PDT (4 C/O) - 15 A Res.
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
12 Vdc	RPM13JD	RPM23JD	RPM33JD	RPM43JD
24 Vdc	RPM13BD	RPM23BD	RPM33BD	RPM43BD
48 Vdc	RPM13ED	RPM23ED	RPM33ED	RPM43ED
110 Vdc	RPM13FD	RPM23FD	RPM33FD	RPM43FD
125 Vdc	—	—	—	—
24 Vac	RPM13B7	RPM23B7	RPM33B7	RPM43B7
48 Vac	RPM13E7	RPM23E7	RPM33E7	RPM43E7
120 Vac	RPM13F7	RPM23F7	RPM33F7	RPM43F7
230 Vac	RPM13P7	RPM23P7	RPM33P7	RPM43P7

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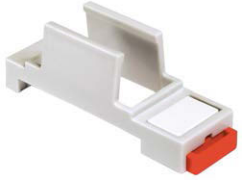
RPZF2

RXM041BN7

RUW241P7

RUW101MW



RPZ1DA

RPZ3FA

Sockets and Accessories for Zelio™ RPM Relays

Table 23.28: Sockets (sold in lots of 10)

Contact Terminal Arrangement	Connection	For Use with Relays	Catalog Number
Mixed*[16]*	Screw terminals	RPM1•••	RPZF1
		RPM2•••	RPZF2
		RPM3•••	RPZF3
		RPM4•••	RPZF4

Table 23.29: Protection Modules (sold in lots of 10)

Description	Voltage	Compatibility	Catalog Number
Diode	6–250 Vdc	RXZ sockets (RXM series), RPZF1, RPZF2	RXM040W
		RPZF3 RPZF4	RUW240BD
RC circuit	24–60 Vac	RXZ sockets (RXM series), RPZF1, RPZF2	RXM041BN7
	110–240 Vac		RXM041FU7
	110–240 Vac	RPZF3 RPZF4	RUW241P7
Varistor	6–24 Vac/Vdc	RXZ sockets (RXM series), RPZF1, RPZF2	RXM021RB
	24–60 Vac/Vdc		RXM021BN
	110–240 Vac/Vdc		RXM021FP
	24 Vac/Vdc	RPZF3 RPZF4	RUW242B7
	240 Vac/Vdc	RPZF3 RPZF4	RUW242P7

Table 23.30: Timer Module*[17]* (sold in lots of 1)

Description	Voltage	Compatibility	Catalog Number
On-delay timer, interval timer, repeat cycle timer/starting on-delay, repeat cycle timer/starting off-delay, off-delay timer, one-shot timer, timing on de-energization, on-delay timer	24–240 Vac/Vdc	RPZF3 RPZF4	RUW101MW

Table 23.31: Accessories (sold in lots of 10)

Description	Compatibility	Catalog Number
Metal hold-down clip (for single-pole relays)	RPZF1	RPZR235
DIN rail mounting adapter *[18]*	RPM1•••	RPZ1DA
	RPM2•••	RXZE2DA
	RPM3•••	RPZ3DA
	RPM4•••	RPZ4DA
Panel mounting adapter*[19]*	RPM1•••	RPZ1FA
	RPM2•••	RXZE2FA
	RPM3•••	RPZ3FA
	RPM4•••	RPZ4FA
ID tags (sheet of 108 tags)	RXM series relays, RPM series relays, RUM series relays	RXZL520

Approvals for RPM Relays

c UL us LISTED — File: E164862 CCN: NLDX, NLDX7*[20]*

c TÜV us — File: E164862 CCN: NLDX2, NLDX8

CSA — File: 230765 Class: 3211 07

CE — IEC 61810-1

RoHS Compliant

Approvals for RPZ Sockets

c TÜV us — File: E172326 CCN: SWIV2, SWIV8

CSA — File: 230765 Class: 3211 07

CE — IEC 61810-1

RoHS Compliant

[16] The inputs and outputs are mixed on both sides.
[17] See timer module description (selection of functions and time delays) in catalog **DIA3ED2090304EN-US**.
[18] Test button and lock-down door become inaccessible
[19] Test button and lock-down door become inaccessible
[20] When used with the appropriate RPZ socket.

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RUZSF3M Socket
+ RUMF32BD Relay

RUMC31F7

RUMF22BD

RUMC23F7

New!

Zelio™ RUM Plug-In Relays

Zelio RUM plug-in relays and sockets provide a complete system solution for the most demanding applications up to 10 A. Some of the features include:

- Test button with lock-down door for testing the contacts (depending on model)
- Green LED indication of relay status (depending on model)
- Mechanical indication of relay status (standard)
- Optional protection modules to protect against electrical spikes
- Bus jumpers for connecting multiple terminals reduce installation time.

Refer to Online Relay Configurator.

Table 23.32: Relays: without LED, with Test Button, and Lock-Down Door (sold in lots of 10)

Pins	Coil Voltage	Number and type of contacts - Thermal current (Ith)	
		DPDT (2 C/O) -10 A Res.	3PDT (3 C/O) -10 A Res.
		Catalog Number	Catalog Number
Octal	12 Vdc	RUMC21JD	RUMC31JD
	24 Vdc	RUMC21BD	RUMC31BD
	48 Vdc	RUMC21ED	RUMC31ED
	60 Vdc	—	RUMC31ND
	110 Vdc	RUMC21FD	RUMC31FD
	125 Vdc	—	RUMC31GD
	220 Vdc	—	RUMC31MD
	24 Vac	RUMC21B7	RUMC31B7
	48 Vac	RUMC21E7	RUMC31E7
	120 Vac	RUMC21F7	RUMC31F7
	230 Vac	RUMC21P7	RUMC31P7
Blade	12 Vdc	RUMF21JD	RUMF31JD
	24 Vdc	RUMF21BD	RUMF31BD
	48 Vdc	RUMF21ED	RUMF31ED
	110 Vdc	RUMF21FD	RUMF31FD
	24 Vac	RUMF21B7	RUMF31B7
	48 Vac	RUMF21E7	RUMF31E7
	120 Vac	RUMF21F7	RUMF31F7
	230 Vac	RUMF21P7	RUMF31P7

Table 23.33: Relays: with LED, Test Button, and Lock-Down Door (sold in lots of 10)

Pins	Coil Voltage	Number and type of contacts - Thermal current (Ith)	
		DPDT (2 C/O) -10 A Res.	3PDT (3 C/O) -10 A Res.
		Catalog Number	Catalog Number
Octal	12 Vdc	RUMC22JD	RUMC32JD
	24 Vdc	RUMC22BD	RUMC32BD
	48 Vdc	RUMC22ED	RUMC32ED
	60 Vdc	—	RUMC32ND
	110 Vdc	RUMC22FD	RUMC32FD
	125 Vdc	—	RUMC32GD
	24 Vac	RUMC22B7	RUMC32B7
	48 Vac	RUMC22E7	RUMC32E7
	120 Vac	RUMC22F7	RUMC32F7
	230 Vac	RUMC22P7	RUMC32P7
Blade	12 Vdc	RUMF22JD	RUMF32JD
	24 Vdc	RUMF22BD	RUMF32BD
	48 Vdc	RUMF22ED	RUMF32ED
	110 Vdc	RUMF22FD	RUMF32FD
	24 Vac	RUMF22B7	RUMF32B7
	48 Vac	RUMF22E7	RUMF32E7
	120 Vac	RUMF22F7	RUMF32F7
	230 Vac	RUMF22P7	RUMF32P7

Table 23.34: Relays: with LED, without Push Button, and Lock-Down Door (sold in lots of 10)

Pins	Coil Voltage	Number and type of contacts - Thermal current (Ith)	
		DPDT (2 C/O) -10 A Res.	3PDT (3 C/O) -10 A Res.
		Catalog Number	Catalog Number
Octal	12 Vdc	RUMC23JD	RUMC33JD
	24 Vdc	RUMC23BD	RUMC33BD
	48 Vdc	RUMC23ED	RUMC33ED
	60 Vdc	—	RUMC33ND
	110 Vdc	RUMC23FD	RUMC33FD
	125 Vdc	—	RUMC33GD
	24 Vac	RUMC23B7	RUMC33B7
	48 Vac	RUMC23E7	RUMC33E7
	120 Vac	RUMC23F7	RUMC33F7
	230 Vac	RUMC23P7	RUMC33P7
Blade	12 Vdc	RUMF23JD	RUMF33JD
	24 Vdc	RUMF23BD	RUMF33BD
	48 Vdc	RUMF23ED	RUMF33ED
	110 Vdc	RUMF23FD	RUMF33FD
	125 Vdc	—	—
	24 Vac	RUMF23B7	RUMF33B7
	48 Vac	RUMF23E7	RUMF33E7
	120 Vac	RUMF23F7	RUMF33F7
	230 Vac	RUMF23P7	RUMF33P7

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Sockets and Accessories for Zelio™ RUM Relays

Refer to Online Relay Configurator.

RUZC2M

RUW241P7

RUW101MW

RUZS2

RUZC200

Table 23.35: Sockets (sold in lots of 10)

Contact Terminal Arrangement	Connection	For Use with Relays	Catalog Number
Mixed *[21]*	Box lug connector (screw terminals)	RUMC2•••••	RUZC2M
		RUMC3•••••	RUZC3M
Separate*[22]*		RUMC2•••••	RUZSC2M
		RUMC3•••••	RUZSC3M
		RUMF2•••••	RUZSF3M
		RUMF3•••••	

Table 23.36: Protection Modules (sold in lots of 10)

Description	Compatibility	Voltage	Catalog Number
Diode	RUZ··· sockets (RUM series)	6–250 Vdc	RUW240BD
RC circuit		110–240 Vac	RUW241P7
Varistor		24 Vac/Vdc	RUW242B7
		240 Vac/Vdc	RUW242P7

Table 23.37: Timer Module*[23]* (sold in lots of 1)

Description	Compatibility	Voltage	Catalog Number
On-delay timer, interval timer, repeat cycle timer/starting on-delay, repeat cycle timer/starting off-delay, off-delay timer, one-shot timer, timing on de-energization, on-delay timer.	RUZ··· sockets (RUM series)	24–240 Vac/Vdc	RUW101MW

Table 23.38: Accessories (sold in lots of 10)

Description	Compatibility	Catalog Number
Metal hold-down clip	RUZ sockets (RUM series)	RUZC200
Bus jumper, 2-pole (Ith: 5 A)	RUZS sockets (RUM series)	RUZS2
Relay ID tags (sheet of 108 tags)	RXM series relays, RPM series relays, RUM series relays	RXZL520
Socket ID tags	RXZ sockets (RXM series, except RXZE2M114), RUZS sockets (RUM series),	RUZL420

Approvals for RUM Relays

c UL us LISTED — File: E164862 CCN: NLDX, NLDX7*[24]*

c UL us — File: E164862 CCN: NLDX2, NLDX8

CSA — File: 230765 Class: 3211 07

CE — IEC 61810-1

RoHS Compliant

Approvals for RUZ Sockets

c UL us — File: E172326 CCN: SWIV2, SWIV8

CSA — File: 230765 Class: 3211 07

CE — IEC 61810-1

RoHS Compliant

[21] The inputs and outputs are mixed on both sides.
[22] The inputs and outputs are on separate sides.
[23] See timer module description (selection of functions and time delays) in catalog **DIA3ED2090304EN-RUM-US**.
[24] When used with the appropriate RUZ socket.

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RPF2AP7

RPF2BBD

Zelio™ RPF Power Relays

Zelio RPF power relays respond to the most demanding applications up to 30 A. Features include:

- UL Listed
- Sealed construction
- Motor load ratings: 1 hp @ 120 Vac / 3 hp @ 240 Vac (N/O contacts only)
- DIN rail and panel mounting capability
- Short circuit rating of 5,000 A rms @ 3 hp, 240 Vac (N/O contacts only)

Refer to Online Relay Configurator.

Table 23.39: Relays (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)	
	DPST (2 N/O) - 30 A at 277 Vac, 20 A at 28 Vdc	DPDT (2 C/O) - 30 A at 277 Vac, 20 A at 28 Vdc, 3A (NC)
	Catalog Number	Catalog Number
12 Vdc	RPF2AJD	RPF2BJD
24 Vdc	RPF2ABD	RPF2BBD
24 Vac	RPF2AB7	RPF2BB7
120 Vac	RPF2AF7	RPF2BF7
230 Vac	RPF2AP7	RPF2BP7

Approvals for RPF Relays

c UL us LISTED — File: E43641 CCN: NLDX, NLDX7

CSA — File: 040787 Class: 3211-07

CE — IEC 61810-1

RoHS Compliant

- For mounting track (DIN rail), see Mounting Track, End Clamps, Jumpers, Fanning Strips, page 24-19.

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8501KPDR12V60

8501KFR13V20

8501KUDR12P14V60

8501NR61

8501NR52

8501NR82

8501NR52 Socket
+8501KPR13P14V2 Relay

8501NR82 Socket
+8501KUDR12P14V Relay

New!

Square D™ Universal Relays

8501K relays are designed for multipole switching applications at 240 Vac or lower. These relays have industry standard wiring and pin terminal arrangements which allow for their use as replacements for many competitive relays without wiring or hardware modifications.

- 10 A relays
- DPDT or 3PDT
- Green pilot light option
- Motor load (hp) ratings
- DPDT latching models available
- AC or DC operation
- RoHS Compliant

Table 23.40: Relays: Standard Cover, without LED

Pins	Coil Voltage	Number and Type of Contacts - Thermal current (Ith)	
		DPDT (2 C/O) - 10 A	3PDT (3 C/O) - 10 A
		Catalog Number	Catalog Number
Octal	12 Vdc	8501KPDR12V51	8501KPDR13V51
	24 Vdc	8501KPDR12V53	8501KPDR13V53
	48 Vdc	8501KPDR12V56	8501KPDR13V56
	110 Vdc	8501KPDR12V60	8501KPDR13V60
	24 Vac	8501KPR12V14	8501KPR13V14
	120 Vac	8501KPR12V20	8501KPR13V20
	240 Vac	8501KPR12V24	8501KPR13V24
Blade	12 Vdc	8501KUDR12V51	8501KUDR13V51
	24 Vdc	8501KUDR12V53	8501KUDR13V53
	48 Vdc	8501KUDR12V56	8501KUDR13V56
	110 Vdc	8501KUDR12V60	8501KUDR13V60
	24 Vac	8501KUR12V14	8501KUR13V14
	120 Vac	8501KUR12V20	8501KUR13V20
	240 Vac	8501KUR12V24	8501KUR13V24

Table 23.41: Relays: Flange Mount Cover

Pins	Coil Voltage	Number and Type of Contacts - Thermal current (Ith)	
		DPDT (2 C/O) - 10 A	3PDT (3 C/O) - 10 A
		Catalog Number	Catalog Number
Blade	12 Vdc	8501KFDR12V51	8501KFDR13V51
	24 Vdc	8501KFDR12V53	8501KFDR13V53
	48 Vdc	8501KFDR12V56	8501KFDR13V56
	110 Vdc	8501KFDR12V60	8501KFDR13V60
	24 Vac	8501KFR12V14	8501KFR13V14
	120 Vac	8501KFR12V20	8501KFR13V20
	240 Vac	8501KFR12V24	8501KFR13V24

Table 23.42: Relays: Standard Cover, with LED

Pins	Coil Voltage	Number and Type of Contacts - Thermal current (Ith)	
		DPDT (2 C/O) - 10 A	3PDT (3 C/O) - 10 A
		Catalog Number	Catalog Number
Octal	12 Vdc	8501KPDR12P14V51	8501KPDR13P14V51
	24 Vdc	8501KPDR12P14V53	8501KPDR13P14V53
	48 Vdc	8501KPDR12P14V56	8501KPDR13P14V56
	110 Vdc	8501KPDR12P14V60	8501KPDR13P14V60
	24 Vac	8501KPR12P14V14	8501KPR13P14V14
	120 Vac	8501KPR12P14V20	8501KPR13P14V20
	240 Vac	8501KPR12P14V24	8501KPR13P14V24
Blade	12 Vdc	8501KUDR12P14V51	8501KUDR13P14V51
	24 Vdc	8501KUDR12P14V53	8501KUDR13P14V53
	48 Vdc	8501KUDR12P14V56	8501KUDR13P14V56
	110 Vdc	8501KUDR12P14V60	8501KUDR13P14V60
	24 Vac	8501KUR12P14V14	8501KUR13P14V14
	120 Vac	8501KUR12P14V20	8501KUR13P14V20
	240 Vac	8501KUR12P14V24	8501KUR13P14V24

Table 23.43: Sockets

Contact Terminal Arrangement	Connection	For Use with Relays	Sold in Lots of	Catalog Number[1]
Mixed	Screw Connector	8501KPR12••• 8501KPDR12•••	1	8501NR51
		8501KPR12••• 8501KPDR12•••	10	8501NR51B
		8501KPR13••• 8501KPDR13•••	1	8501NR61
		8501KPR13••• 8501KPDR13•••	10	8501NR61B
Separate	Screw Connector	8501KPR12••• 8501KPDR12•••	1	8501NR52
		8501KPR12••• 8501KPDR12•••	10	8501NR52B
		8501KPR13••• 8501KPDR13•••	1	8501NR62
		8501KPR13••• 8501KPDR13•••	10	8501NR62B
		8501KUR12••• 8501KUDR12•••	1	8501NR82
		8501KUR12••• 8501KUDR12•••	10	8501NR82B
		8501KUR13••• 8501KUDR13•••	1	8501NR82

[1] Please note that the B suffix only designates quantities of 10 and is not printed on the socket.

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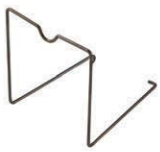
Table 23.43 Sockets (cont'd.)

Contact Terminal Arrangement	Connection	For Use with Relays	Sold in Lots of	Catalog Number[1]
		8501KUR13••• 8501KUDR13•••	10	8501NR82B

Table 23.44: Accessories (Sold in Lots of 10)

Description	For Use With	Sold in Lots of	Catalog Number
Metal Restraining Srap	8501NR51 sockets	1	8501NH7
	8501NR52 sockets		
	8501NR62 sockets		
	8501NR82 sockets		
Metal Hold-Down Clip	8501NR52 sockets	10	8501NH52
	8501NR62 sockets		
	8501NR82 sockets		8501NH82

8501NH7



8501NH52

8501NH82

Approvals for 8501 KPR, KUR, and KFR Relays

c UL us LISTED — File: E3190 CCN: NLDX, NLDX7[2]

c SP us — File: E3190 CCN: NLDX2, NLDX8

SP — File: 260367 Class: 3211 07

CE — IEC 61810-1

RoHS Compliant

Approvals for 8501NR Sockets

c SP us — File: E66924 CCN: SWIV2, SWIV8

SP — File: 211268 Class: 3211 07

CE — IEC 61810-1

RoHS Compliant

[1] Please note that the B suffix only designates quantities of 10 and is not printed on the socket.
[2] When used with the appropriate 8501NR socket.

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8501RS41P14V20

8501RSD42P14V51

8501RS43P14V20

8501RS44P14V20

8501NR41 Socket
+8501RS41P14V20 Relay

8501NR42 Socket
+8501RSD42P14V51 Relay

8501NR43 Socket
+8501RS43P14V20 Relay

8501NR34 Socket
+8501RS44P14V20 Relay

Square D™ Plug-in Relays

8501R miniature plug-in relays have a 15 A resistive rating. The compact size of these relays makes them ideal for downsizing equipment and applications where space is at a premium.

- SPDT through 4PDT
- AC or DC operated
- Horsepower rated
- Socket compatible
- Green LED pilot light option
- Silver alloy contacts

Table 23.45: Relays: Standard Cover, without LED

Coil Voltage	Number and Type of Contacts - Thermal current (Ith)			
	SPDT (1 C/O) - 15 A	DPDT (2 C/O) - 15 A	3PDT (3 C/O) - 15 A	4PDT (4 C/O) - 15 A
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
12 Vdc	8501RSD41V51	8501RSD42V51	8501RSD43V51	8501RSD44V51
24 Vdc	8501RSD41V53	8501RSD42V53	8501RSD43V53	8501RSD44V53
110 Vdc	8501RSD41V60	8501RSD42V60	8501RSD43V60	8501RSD44V60
12 Vac	8501RS41V36	8501RS42V36	8501RS43V36	8501RS44V36
24 Vac	8501RS41V14	8501RS42V14	8501RS43V14	8501RS44V14
120 Vac	8501RS41V20	8501RS42V20	8501RS43V20	8501RS44V20
240 Vac	8501RS41V24	8501RS42V24	8501RS43V24	8501RS44V24

Table 23.46: Relays: Standard Cover, with LED

Coil Voltage	Number and Type of Contacts - Thermal current (Ith)			
	SPDT (1 C/O) - 15 A	DPDT (2 C/O) - 15 A	3PDT (3 C/O) - 15 A	4PDT (4 C/O) - 15 A
	Catalog Number	Catalog Number	Catalog Number	Catalog Number
12 Vdc	8501RSD41P14V51	8501RSD42P14V51	8501RSD43P14V51	8501RSD44P14V51
24 Vdc	8501RSD41P14V53	8501RSD42P14V53	8501RSD43P14V53	8501RSD44P14V53
110 Vdc	8501RSD41P14V60	8501RSD42P14V60	8501RSD43P14V60	8501RSD44P14V60
12 Vac	8501RS41P14V36	8501RS42P14V36	8501RS43P14V36	8501RS44P14V36
24 Vac	8501RS41P14V14	8501RS42P14V14	8501RS43P14V14	8501RS44P14V14
120 Vac	8501RS41P14V20	8501RS42P14V20	8501RS43P14V20	8501RS44P14V20
240 Vac	8501RS41P14V24	8501RS42P14V24	8501RS43P14V24	8501RS44P14V24

Table 23.47: Sockets

Contact Terminal Arrangement	Connection	For Use with Relays	Sold in Lots of	Catalog Number*[3]*
Separate*[4]*	Screw Connector	8501RS41••• 8501RSD41•••	1	8501NR41
			10	8501NR41B
		8501RS42••• 8501RSD42•••	1	8501NR42
			10	8501NR42B
		8501RS43••• 8501RSD43•••	1	8501NR43
			10	8501NR43B
		8501RS44••• 8501RSD44•••	1	8501NR34
			10	8501NR34B

Table 23.48: Accessories (Sold in Lots of 10)

Description	For Use With	Sold in Lots of	Catalog Number
Plastic ID Clip	8501NR41 socket	Supplied with socket	—
Metal Hold-Down Clip	8501NR42 socket 8501NR43 socket 8501NR34 socket	10	8501NH42

Approvals for 8501 RS41, RSD41, RS42, RSD42, RS43, RSD43, RS44, and RSD44

c UL us LISTED — File: E3190 CCN: NLDX, NLDX7*[5]*

c UL us — File: E3190 CCN: NLDX2, NLDX8

CSA — File: 260367 Class: 3211 07

CE — IEC 61810-1

RoHS Com-pliant

Approvals for 8501NR Sockets

c UL us — File: E66924 CCN: SWIV2, SWIV8

CSA — File: 211268 Class: 3211 07

CE — IEC 61810-1

RoHS Compliant

[3] Please note that the B suffix only desginates quantities of 10 and is not printed on the socket.
[4] The inputs and outputs are on separate sides.
[5] When used with the appropriate 8501NR socket.

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8501NR45 Socket
+8501RS14V20 Relay

8501RS14V14

8501RSD24P14V60

8501RSD34V51

Square D™ Miniature Control Relays

8501R relays are suited for use as logic elements and power switching output devices. The short stroke motion of the armature provides long mechanical life required for high speed operation of control systems. Different contact compositions allow these relays to be used in a variety of applications. Bifurcated crossbar (gold overlay silver) is suitable for high contact reliability and low level switching requirements. Silver alloy is best suited for inductive loads. Class I Division II sealed relays can be used in specified hazardous locations.

- 4PDT
- Complete socket line
- Horsepower rated
- AC or DC operation
- Green pilot light option

Table 23.49: Relays: Standard Cover, without LED

Coil Voltage	Number and Type of Contacts — Thermal current (Ith)	
	4PDT (4 C/O) — 6 A	4PDT (4 C/O) — 3 A
	Catalog Number	Catalog Number
12 Vdc	8501RSD14V51	8501RSD24V51
24 Vdc	8501RSD14V53	8501RSD24V53
48 Vdc	8501RSD14V56	8501RSD24V56
110 Vdc	8501RSD14V60	8501RSD24V60
24 Vac	8501RS14V14	8501RS24V14
120 Vac	8501RS14V20	8501RS24V20
240 Vac	8501RS14V24	8501RS24V24

Table 23.50: Relays: Standard Cover, with LED

Coil Voltage	Number and Type of Contacts — Thermal current (Ith)	
	4PDT (4 C/O) — 6 A	4PDT (4 C/O) — 3 A
	Catalog Number	Catalog Number
12 Vdc	8501RSD14P14V51	8501RSD24P14V51
24 Vdc	8501RSD14P14V53	8501RSD24P14V53
48 Vdc	8501RSD14P14V56	8501RSD24P14V56
110 Vdc	8501RSD14P14V60	8501RSD24P14V60
24 Vac	8501RS14P14V14	8501RS24P14V14
120 Vac	8501RS14P14V20	8501RS24P14V20
240 Vac	8501RS14P14V24	8501RS24P14V24

Table 23.51: Relays: Hermetically Sealed Miniature Control Relays

Coil Voltage	Number and Type of Contacts — Thermal current (Ith)
	4PDT (4 C/O) — 5 A
	Catalog Number
6 Vdc	8501RSD34V50
12 Vdc	8501RSD34V51
24 Vdc	8501RSD34V53
48 Vdc	8501RSD34V56
110 Vdc	8501RSD34V60
6 Vac	8501RS34V35
12 Vac	8501RS34V36
24 Vac	8501RS34V14
48 Vac	8501RS34V17
110 Vac	8501RS34V20
240 Vac	8501RS34V24

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8501NR45

8501NH45

Table 23.52: Sockets

Contact Terminal Arrangement	Connection	For Use With Relays	Sold in Lots of	Catalog Number[6]
Separate[7]	Screw Clamp Terminals	8501RS(D)14••• 8501RS(D)24••• 8501RS(D)34•••	1	8501NR45
		8501RS(D)14••• 8501RS(D)24••• 8501RS(D)34•••	10	8501NR45B
	Spring Clamp Terminals	8501RS(D)14••• 8501RS(D)24••• 8501RS(D)34•••	10	RXZE2S114S

Table 23.53: Accessories (Sold in Lots of)

Description	For Use With	Sold in Lots of	Catalog Number
Metal hold-down clip	8501NR45 socket	10	8501NH45
Clip-in ID tags	RXZE2S114S socket	10	RSZL300

Approvals for 8501 RS14, RSD14, RS24, and RSD24 Relays

c UL us LISTED — File: E3190 CCN: NLDX, NLDX7[8]

c UL us — File: E3190 CCN: NLDX2, NLDX8

CSA — File: 260367 Class: 3211 07

CE — IEC 61810-1

RoHS Compliant

Approvals for 8501 RS34 and RSD34 Relays

c UL us LISTED — File: E123950 CCN: NLDX, NLDX7[8] ANSI/ISA 12.12.01

c UL us — File: E196809 CCN: NQMJ2, NQMJ8

CSA — File: 211268 Class: 3218 06

CE — IEC 61810-1

RoHS Compliant

Approvals for 8501NR Sockets

c UL us — File: E66924 CCN: SWIV2, SWIV8

CSA — File: 211268 Class: 3211 07

CE — IEC 61810-1

RoHS Compliant

[6] Please note that the B suffix only desginates quantities of 10 and is not printed on the socket.
[7] The inputs and outputs are on separate sides.
[8] When used with the appropriate 8501NR socket.

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8501CDO6V51

Square D™ Power Relays

8501C relays are ideally suited for controlling single-phase motors, electric heaters, pumps, conveyors, material handling equipment, and other applications.

- 40 A contact rating
- Motor load (hp) ratings
- Durable open-frame construction
- UL Listed
- CSA certified
- CE approved
- RoHS compliant

Table 23.54: Relays: AC Rated Contacts, 40 A at 277 V (sold in lots of 1)

Coil Voltage	Number and type of contacts - Thermal current (Ith)				
	SPST: 1 NO / 0 NC	DPST: 2 NO / 0 NC	SPST: 0 NO / 1 NC	SPDT: 1 NO / 1 NC	DPDT: 2 NO / 2 NC
	Catalog Number	Catalog Number	Catalog Number	Catalog Number	Catalog Number
6 Vdc	8501CDO6V50	8501CDO7V50	8501CDO8V50	8501CDO15V50	8501CDO16V50
12 Vdc	8501CDO6V51	8501CDO7V51	8501CDO8V51	8501CDO15V51	8501CDO16V51
24 Vdc	8501CDO6V53	8501CDO7V53	8501CDO8V53	8501CDO15V53	8501CDO16V53
110 Vdc	8501CDO6V60	8501CDO7V60	8501CDO8V60	8501CDO15V60	8501CDO16V60
6 Vac	8501CO6V35	8501CO7V35	8501CO8V35	8501CO15V35	8501CO16V35
12 Vac	8501CO6V36	8501CO7V36	8501CO8V36	8501CO15V36	8501CO16V36
24 Vac	8501CO6V14	8501CO7V14	8501CO8V14	8501CO15V14	8501CO16V14
120 Vac	8501CO6V20	8501CO7V20	8501CO8V20	8501CO15V20	8501CO16V20
208 Vac	8501CO6V08	8501CO7V08	8501CO8V08	8501CO15V08	8501CO16V08
240 Vac	8501CO6V24	8501CO7V24	8501CO8V24	8501CO15V24	8501CO16V24
277 Vac	8501CO6V04	8501CO7V04	8501CO8V04	8501CO15V04	8501CO16V04
480 Vac	8501CO6V29	8501CO7V29	8501CO8V29	8501CO15V29	8501CO16V29

Table 23.55: Relays: DC Rated Contacts, 20 A at 110 V (sold in lots of 1)

Coil Voltage	Number and type of contacts - Thermal current (Ith)
	SPST: 1 NO / 0 NC
	Catalog Number
6 Vdc	8501CDO21V50
12 Vdc	8501CDO21V51
24 Vdc	8501CDO21V53
110 Vdc	8501CDO21V60
6 Vac	8501CO21V35
12 Vac	8501CO21V36
24 Vac	8501CO21V14
120 Vac	8501CO21V20
208 Vac	8501CO21V08
240 Vac	8501CO21V24
277 Vac	8501CO21V04
480 Vac	8501CO21V29

Table 23.56: Relays: DC Rated Contacts, 10 A at 110 V (sold in lots of 1)

Coil Voltage	Number and type of contacts - Thermal current (Ith)
	DPDT: 1 NO / 0 NC
	Catalog Number
6 Vdc	8501CDO22V50
12 Vdc	8501CDO22V51
24 Vdc	8501CDO22V53
110 Vdc	8501CDO22V60
6 Vac	8501CO22V35
12 Vac	8501CO22V36
24 Vac	8501CO22V14
120 Vac	8501CO22V20
208 Vac	8501CO21V08
240 Vac	8501CO22V24
277 Vac	8501CO22V04
480 Vac	8501CO22V29

Approvals for Square D Power Relays

File: E78351
CCN: NLDX, NLDX7

File: 218139
Class: 3211 04

IEC 60947-4-1

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CAD32

TeSys™ D IEC Style Instantaneous Control Relays

These 600 V relays are approved for use around the world. TeSys D relays are usually mounted on 35 mm DIN track, but can also be mounted directly to a panel. The contacts have NEMA A600 and Q600 ratings, in addition to the standard IEC ratings, making them suitable for use in most any control circuit. Low consumption versions are available for use with low level DC control signals from a computer or a PLC. Adder decks can be added to a basic five pole relay to make it up to an 11 pole relay. The serrated silver-nickel contacts with wiping action provide excellent reliability in 12 or 24 V control circuits. Special auxiliary contacts are available for switching low power down to 5 V at 10 mA. Timer and mechanical latch attachments are available.

Table 23.57: Instantaneous Control Relays

Terminal Type	Number of Contacts	Contact Composition: Normally Open	Contact Composition: Normally Closed	Catalog Number[1]
Screw Clamp	5	5	0	CAD50
		3	2	CAD32
Spring Terminal	5	5	0	CAD503
		3	2	CAD323
Ring Tongue	5	5	0	CAD506
		3	2	CAD326

Table 23.58: Coil Voltage Codes: 12–240 Vac, 12–72 Vdc, 5–72 Vdc Low Consumption [2]

AC 50/60 Hz Coil (for additional voltage code options see page 7 of Catalog 8501CT0101).						
Volts	12	24	48	120	208	240
Code	J7	B7	E7	G7	LE7	U7
DC Coil (coils have built in suppression as standard)						
Volts	12	24	36	48	60	72
Code	JD	BD	CD	ED	ND	SD
DC Low Consumption Coil (coils have built in suppression as standard)						
Volts	5	12	24	48	72	
Code	AL	JL	BL	EL	SL	

Table 23.59: Coil Voltage Codes (cont.): 277–600 Vac, 110–440 Vdc[2]

AC 50/60 Hz Coil (for additional voltage code options see page 7 of Catalog 8501CT0101).					
Volts	277	480	600		
Code	W7	T7	X7		
DC Coil (coils have built in suppression as standard)					
Volts	110	125	220	250	440
Code	FD	GD	MD	UD	RD

Table 23.60: Instantaneous Auxiliary Contact Blocks (for use in normal operation environments)

Number of Contacts	Maximum Number per Device Clip-on Mounting: Front	Maximum Number per Device Clip-on Mounting: Left Side Only	Termination Type	Contact Composition: Normally Open	Contact Composition: Normally Closed	Catalog Number
2	1	—	Screw Clamp	2	0	LADN20
				1	1	LADN11
				0	2	LADN02
			Spring Terminal	2	0	LADN203
				1	1	LADN113
				0	2	LADN023
	—	1 Not for DC devices	Screw Clamp	2	0	LAD8N20
				1	1	LAD8N11
				0	2	LAD8N02
4 [3]	1	—	Screw Clamp	4	0	LADN40
				3	1	LADN31
				2	2	LADN22
				1	3	LADN13
				0	4	LADN04
			Spring Terminal	4	0	LADN403
				3	1	LADN313
				2	2	LADN223
				1	3	LADN133
				0	4	LADN043
4 [3]	1	—	Screw Clamp	2 [4]	2 [4]	LADC22
			Spring Terminal	2 [4]	2 [4]	LADC223

Table 23.61: Instantaneous Auxiliary Contacts with Dust and Damp Protected Contacts (for use in harsh industrial environments)

Number of Contacts	Maximum Number per Device: Front Mounting	Contact Composition: Sealed	Sealed	[5]	Normal	Normal	Catalog Number
2	1	2	—	—	—	—	LA1DX20
		—	2	—	—	—	LA1DX02
		2	—	2	—	—	LA1DY20
4 [3]	1	2	—	—	2	—	LA1DZ40
		2	—	—	1	1	LA1DZ31

Approvals for TeSys D IEC Style Instantaneous Control Relays

File: E164353
CCN: NKCR

File: LR43364
Class: 3211 03

- For replacement AC coils, see TeSys™ D and F Overload Relay Accessories, page 18-22. DC coils are not replaceable.

[1] Add the proper voltage code from Table 23.58 or Table 23.59 to the end of the catalog number. For example, CAD50**B7**.
[2] Add the proper voltage code to the end of catalog number.
[3] Auxiliary contact blocks with four contacts cannot be used on relays with low consumption coils.
[4] Includes 1 N.O. and 1 N.C. overlapping contact.
[5] Grounding terminal points (2 terminals jumpered together; see diagram on page 8 of Catalog 8501CT0101).

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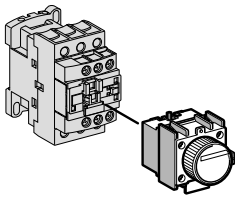
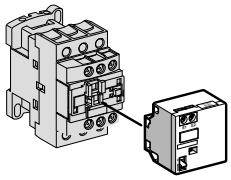
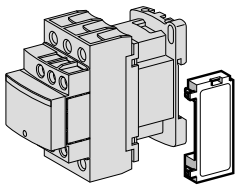


LADT



LA6DK



LAD4

TeSys™ D IEC Style Contact Blocks and Accessories

Table 23.62: Time Delay Auxiliary Contact Blocks

Number and Type of Contacts	Maximum Number per Device – Front Mounting	Time Delay Type	Termination Type	Range	Catalog Number
1 N.C. and 1 N.O.	1	On-Delay	Screw Clamp	0.1–3 s *[6]*	LADT0
				0.1–30 s	LADT2
				10–180 s	LADT4
				1–30 s *[7]*	LADS2
			Spring Terminal	0.1–3 s *[6]*	LADT03
				0.1–30 s	LADT23
				10–180 s	LADT43
				1–30 s *[7]*	LADS23
		Off-Delay	Screw Clamp	0.1–3 s *[6]*	LADR0
				0.1–30 s	LADR2
				10–180 s	LADR4
			Spring Terminal	0.1–3 s *[6]*	LADR03
				0.1–30 s	LADR23
				10–180 s	LADR43

NOTE: For Lockout Cover, see page 7 of catalog 8501CT0101.

Table 23.63: Mechanical Latch Blocks *[8]*

Unlatching Control	Maximum Number per Device – Front Mounting	Catalog Number *[9]*
Manual or electrical	1	LAD6K10

Table 23.64: Coil Suppressor Modules

These modules clip onto the right hand side of the control relay and the electrical connection is instantly made. Adding an input module is still possible.

RC Circuits (Resistor-Capacitor)

- Effective protection for circuits highly sensitive to “high frequency” interference.
- Voltage limited to 3 Uc maximum and oscillating frequency limited to 400 Hz maximum.
- Slight increase in drop-out time (1.2 to 2 times the normal time).

For Mounting On:	Operational Voltage	Catalog Number
CAD (Vac)	24 to 48 Vac	LAD4RCE
	110 to 240 Vac	LAD4RCU

Varistors (Peak Limiting)

- Protection provided by limiting the transient voltage value to 2 Uc maximum.
- Maximum reduction of transient voltage peaks.
- Slight increase in drop-out time (1.1 to 1.5 times the normal time).

CAD (Vac)	24 to 48 Vac	LAD4VE
	50 to 127 Vac	LAD4VG
	110 to 250 Vac	LAD4VU

Bidirectional Peak Limiting Diode

- Protection provided by limiting the transient voltage value to 2 Uc maximum.
- Maximum reduction of transient voltage peaks.

CAD (Vac)	24 Vac	LAD4TB
	72 Vac	LAD4TS

Table 23.65: Coil Voltage Codes

Volts (Vac/Vdc)	24	32/36	42/48	60/72	100	110/127	220/240
Code	B	C	E	EN	K	F	M

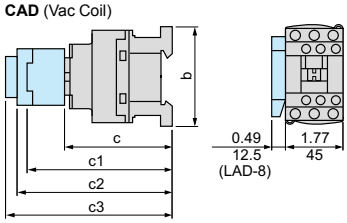
Table 23.66: Dimensions (See Figures at Left)

CAD (Vac Coil)		in. (mm) 32 50	in. (mm) 323 503
b		3.03 (77)	3.90 (99)
c	Without cover or add-on blocks	3.31 (84)	3.31 (84)
	With cover, without add-on blocks	3.39 (86)	3.39 (86)
c1	with LADN or C (2 or 4 contacts)	4.61 (117)	4.61 (117)
c2	with LA6DK10	5.08 (129)	5.08 (129)
c3	with LADT, R, S	5.39 (137)	5.39 (137)
	with LADT, R, S and sealing cover	5.55 (141)	5.55 (141)

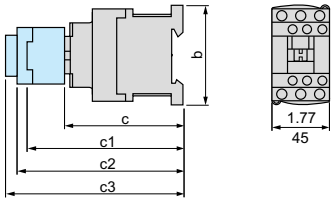
CAD (Vdc Coil or Low Consumption Vdc Coil)		in. (mm) 32 50	in. (mm) 323 503
b		3.03 (77)	3.90 (99)
c	Without cover or add-on blocks	3.66 (93)	3.66 (93)
	With cover, without add-on blocks	3.74 (95)	3.74 (95)
c1	with LADN or C (2 or 4 contacts)	4.96 (126)	4.96 (126)
c2	with LA6DK10	5.43 (138)	5.43 (138)
c3	with LADT, R, S	5.75 (146)	5.75 (146)
	with LADT, R, S and sealing cover	5.91 (150)	5.91 (150)

Dimensions (in./mm)

CAD (Vac Coil)



CAD (Vdc Coil or Low Consumption Vdc Coil)



[6] With extended scale from 0.1 to 0.6 s.
[7] With switching time of 40 ms ± 15 ms between opening of the N.C. contact and closing of the N.O. contact.
[8] Power should not be simultaneously applied or maintained to the mechanical latching block and the CAD relay. The duration of the control signal to the mechanical latching block and the CAD relay should be greater than or equal to 100 ms.
[9] Complete the catalog number by adding the coil voltage code from Table 23.65. For example, LADK10**B**.

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TeSys™ D IEC Style Accessories

Table 23.67: Cabling Accessory

Description			Catalog Number
Mounting Adapter For adapting existing wiring to a new product	Without coil suppression		LAD4BB
	With coil suppression	24 to 48 Vac	LAD4BBVE
		50 to 127 Vac	LAD4BBVG
		110 to 250 Vac	LAD4BBVU

Table 23.68: Electronic Serial Timer Modules *[10]*

On-Delay Type		
Mounted using adaptor LAD4BB, to be ordered separately, see listing above.		
Operational Voltage	Time Delay	Catalog Number
24 to 250 Vac	0.1 to 2 s	LA4DT0U
	1.5 to 30 s	LA4DT2U
	25 to 500 s	LA4DT4U

Table 23.69: Auto-Man-Stop Control Modules

For local override operation tests with two-position "Auto-Man" switch and "O-I" switch	
Mounted using adaptor LAD4BB, to be ordered separately, see listing above.	
Operational Voltage	Catalog Number
24 to 100 Vac	LA4DMK

Table 23.70: Accessories (ordered separately)

Description	For Mounting On:	Must be Ordered in Multiples of:	Catalog Number
For Marking			
Sheet of 64 self-adhesive blank labels 8 x 33	CAD, LAD (4 contacts), LA6DK	10	LAD21
Sheet of 112 self-adhesive blank labels 8 x 12	LAD (2 contacts), LADT	10	LAD22
For Protection			
Lockout cover	LADT, LADR	1	LA9D901
Relay cover preventing access to the moving contact carrier	CAD	1	LAD9ET1

Table 23.71: Application Data

Type		CAD (Vac)	CAD (Vdc)	CAD (Vdc) Low Consumption
Rated Insulation Voltage (Ui)	Conforming to IEC 60947-1-1 Overvoltage category III and degree of pollution 3	690 V	690 V	690 V
	Conforming to UL, CSA	600 V	600 V	600 V
Rated Impulse Withstand Voltage (Uimp)	Conforming to IEC 60947-1-1	6 kV	6 kV	6 kV
Separation of Electrical Circuits	To IEC 536 and VDE 0106	Reinforced insulation up to 400 V		
Conforming to Standards		IEC 60947-1-1, N-F C 63-140, VDE 0660, BS 4794. EN 60947-5-15		
Approvals		UL: File: E164353 CSA: File: LR43364 CE	CCN: NKCR Class: 3211 03	
Protective Treatment	Conforming to IEC 60068	"TH" (Tropical Finish). See page 23 of Catalog 8501CT0101 for details.		
Degree of Protection	Conforming to VDE 0106	Front face protected against direct finger contact IP 2X		Protection against direct finger contact

[10] For 24 V operation, the relay must be fitted with a 21 V coil (code Z7).

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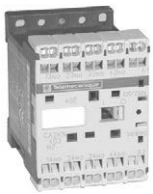
CA2KN22


CA2KN403

CA4KN405

CA3KN407

TeSys™ K IEC Style Control Relays

- Mounting on 35 mm DIN 3 track or 4 screw direct mounting.
- Screws in open “ready-to-tighten” position
- NEMA A600, Q600
- IEC AC15, DC13

Table 23.72: Control Relays

Control Circuit		Type of Termination	Contact Configuration		Catalog Number *[11]*
Supply	Consumption		N.O.	N.C.	
AC	4.5 VA	Screw clamp	4	0	CA2KN40 • •
			3	1	CA2KN31 • •
			2	2	CA2KN22 • •
		Spring Termination	4	0	CA2KN403 • •
			3	1	CA2KN313 • •
			2	2	CA2KN223 • •
		Faston 1 x 6.35 or 2 x 2.8	4	0	CA2KN407 • •
			3	1	CA2KN317 • •
			2	2	CA2KN227 • •
		Solder pins for printed circuit board	4	0	CA2KN405 • •
			3	1	CA2KN315 • •
			2	2	CA2KN225 • •
DC	3 W	Screw clamp	4	0	CA3KN40 • •
			3	1	CA3KN31 • •
			2	2	CA3KN22 • •
		Spring Termination	4	0	CA3KN403 • •
			3	1	CA3KN313 • •
			2	2	CA3KN223 • •
		Faston 1 x 6.35 or 2 x 2.8	4	0	CA3KN407 • •
			3	1	CA3KN317 • •
			2	2	CA3KN227 • •
		Solder pins for printed circuit board	4	0	CA3KN405 • •
			3	1	CA3KN315 • •
			2	2	CA3KN225 • •

Table 23.73: Low Consumption Control Relays

Compatible with programmable controller outputs.

- LED indicator incorporated.
- Wide range coil (70 to 130% Uc), suppressor fitted as standard.
- Mounting on 35 mm DIN 3 track or 4 screw direct mounting.
- Screws in open “ready-to-tighten” position.

Control Circuit		Type of Termination	Contact Configuration		Catalog Number *[12]*
Supply	Consumption		N.O.	N.C.	
DC	1.8 W	Screw clamp	4	0	CA4KN40 • • •
			3	1	CA4KN31 • • •
			2	2	CA4KN22 • • •
		Spring Termination	4	0	CA4KN403 • • •
			3	1	CA4KN313 • • •
			2	2	CA4KN223 • • •
		Faston 1 x 6.35 or 2 x 2.8	4	0	CA4KN407 • • •
			3	1	CA4KN317 • • •
			2	2	CA4KN227 • • •
		Solder pins for printed circuit board	4	0	CA4KN405 • • •
			3	1	CA4KN315 • • •
			2	2	CA4KN225 • • •

[11] Complete the catalog number by adding the proper voltage code from Table 23.74, Table 23.75, Table 23.76, or Table 23.77. For example, CA2KN40**G7**.
[12] Complete the catalog number by adding the proper voltage code from Table 23.78. For example, CA4KN40**BW3**.

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Table 23.74: Coil Voltage Codes for CA2K Control Relays (0.8–1.15 Uc) (0.85–1.10 Uc)—12 to 220/230 Vac 50/60 Hz

Voltage	12 Vac	24 Vac	36 Vac	42 Vac	48 Vac	110 Vac	120 Vac	127 Vac	208 Vac	220/230 Vac
Code	J7	B7	C7	D7	E7	F7	G7	FC7	L7	M7

NOTE: Up to and including 240 V, coil with integral suppression device available: add **2** to the code required. Example: **J72**.

Table 23.75: Coil Voltage Codes for CA2K Control Relays (0.8–1.15 Uc) (0.85–1.10 Uc)—230 to 660/690 Vac 50/60 Hz

Voltage	230 Vac	230/240 Vac	380/400 Vac	400 Vac	400/415 Vac	440 Vac	480 Vac	500 Vac	660/690 Vac
Code	P7	U7	Q7	V7	N7	R7	T7	S7	Y7

NOTE: Up to and including 240 V, coil with integral suppression device available: add **2** to the code required. Example: **J72**.

Table 23.76: Coil Voltage Codes for CA3K Control Relays (0.8–1.15 Uc)—12 to 72 Vdc

Voltage	12 Vdc	20 Vdc	24 Vdc	36 Vdc	48 Vdc	60 Vdc	72 Vdc
Code	JD	ZD	BD	CD	ED	ND	SD

NOTE: Coil with integral suppression device available: add **3** to the code required. Example: **JD3**.

Table 23.77: Coil Voltage Codes for CA3K Control Relays (0.8–1.15 Uc)—100 to 250 Vdc

Voltage	100 Vdc	110 Vdc	125 Vdc	200 Vdc	220 Vdc	230 Vdc	240 Vdc	250 Vdc
Code	KD	FD	GD	LD	MD	MPD	MUD	UD

NOTE: Coil with integral suppression device available: add **3** to the code required. Example: **JD3**.

Table 23.78: Coil Voltage Codes for CA4K, Low Consumption Control Relays (Wide Range Coil: 0.7–1.3 Uc)

Voltage	12 Vdc	24 Vdc	48 Vdc	72 Vdc
Code	JW3	BW3	EW3	SW3

Approvals for TeSys K IEC Style Control Relays

File: E164353
CCN: NKCR

File: LR43364
Class: 3211 03

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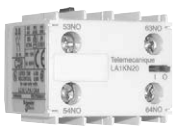
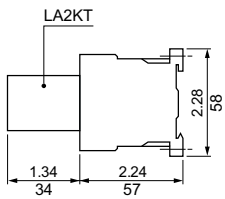
2/15/2017


LA1KN20

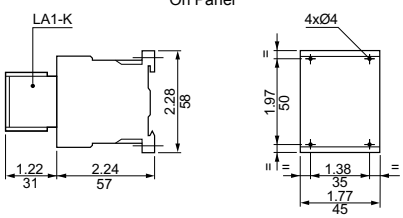
LA1KN40

LA1KN403

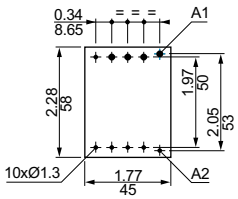
Approximate Dimensions for
LA2KT Electronic Time Delay Contact Blocks (in./mm)



Approximate Dimensions
for CA2, CA3, CA4K Control Relays (in./mm)
On Panel



On Printed Circuit Board



TeSys™ K IEC Style Contact Blocks and Accessories

Table 23.79: Instantaneous Auxiliary Contact Blocks *[13][14]*

Clip-on Front Mounting, 1 Block Per Control Relay			
Type of Connection	Contact Configuration N.O.	Contact Configuration N.C.	Catalog Number
Screw Clamp	2	0	LA1KN20
	0	2	LA1KN02
	1	1	LA1KN11
	4	0	LA1KN40*[15]*
	3	1	LA1KN31*[15]*
	2	2	LA1KN22*[15]*
	1	3	LA1KN13*[15]*
	0	4	LA1KN04*[15]*
Spring Termination	2	0	LA1KN203
	1	1	LA1KN113
	0	2	LA1KN023
	4	0	LA1KN403*[15]*
	3	1	LA1KN313*[15]*
	2	2	LA1KN223*[15]*
	1	3	LA1KN133*[15]*
	0	4	LA1KN043*[15]*
Faston 1 x 6.35 or 2 x 2.8	2	0	LA1KN207
	0	2	LA1KN027
	1	1	LA1KN117
	4	0	LA1KN407*[15]*
	3	1	LA1KN317*[15]*
	2	2	LA1KN227*[15]*
	1	3	LA1KN137*[15]*
	0	4	LA1KN047*[15]*

Table 23.80: Clip-On Front Mounting, 1 Block per Control Relay

Voltage	Type	Timing Range (s)	Composition C.O.	Catalog No.
AC or DC: 24 to 48	On-delay	1 to 30 s	1	LA2KT2E
AC: 110 to 240	On-delay	1 to 30 s	1	LA2KT2U

Table 23.81: Electronic Time Delay Contact Blocks

Relay output, with common point changeover contact	240 Vac/Vdc, 2 A maximum
Control voltage	0.85–1.1 Uc
Maximum switching capacity	250 VA or 150 W
Operating temperature	–10 to + 60ºC (+14º F to 140º F)
Reset time	1.5 s during the time delay period, 0.5 s after the time delay.

NOTE: For other electronic timers, see Type JCK60 and JCK70 Timers, page 23-43.

Table 23.82: Accessories (supplied separately)

Description			Sold in lots of	Catalog No.
Marker holder*[16]*	Clips on front of relay		100	LA9D90
Clip-on markers*[16]*	4 maximum per device	Strip of 10 identical numbers, 0 to 9 Strip of 10 identical capital letters A to Z	25	AB1R•*[16]*
		Strip of 10 identical capital letters A to Z		AB1G•*[16]*
Suppressor modules with incorporated LED indicator	Clips onto front of relay with locating device. No tools required for connection.	For 12 to 24 Vac and Vdc (varistor)	5	LA4KE1B*[17]*
		For 32 to 48 Vac and Vdc (varistor)		LA4KE1E*[17]*
		For 50 to 129 Vac and Vdc (varistor)		LA4KE1FC*[17]*
		For 130 to 250 Vac and Vdc (varistor)		LA4KE1UG*[17]*
		For 12 to 24 Vdc (diode + Zener diode)		LA4KC1B*[18]*
		For 32 to 48 Vdc (diode + Zener diode)		LA4KC1E*[18]*
		For 220 to 250 Vac (RC)		LA4KA1U*[19]*

Table 23.83: Environment

Conforming to Standards		IEC 947, NF C 63-140, VDE 0660, BS 5424, CE
Approvals		UL, CSA, DEMKO, NEMKO, SEMKO, FI
Protective treatment	Conforming to IEC 68 (DIN 50016)	"TC" (Climateproof)
Degree of protection	Conforming to VDE 0106	Protection against direct finger contact
Ambient air temperature	Storage	-58 to 176 ºF (-50 to 80ºC)
	Operation	-13 to 122 ºF (-25 to 50ºC)
Max. operating altitude	Without derating	6562 ft (2000 m)

[13] Clip-on front mounting, 1 block per control relay.
[14] Auxiliary contact module not suitable for safety circuits.
[15] Not to be used on CA4KN relays.
[16] See "Clip-in Marker Strips" in Catalog 8501CT0101 for information on completing the catalog number.
[17] Protection by the limitation of the transient voltage to 2 Uc maximum. Maximum reduction of the transient voltage peaks. Slight time delay on drop-out (1.1 to 1.5 times normal).
[18] No overvoltage or oscillation frequency. Polarized component. Slight time delay on drop-out (1.1 to 1.5 times normal).
[19] Protection by limitation of the transient voltage to 3 Uc max. and limitation of the oscillation frequency. Slight time delay on drop-out (1.2 times to twice normal).

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TeSys™ SK IEC Style Control Relays

- Miniature size saves space.
- Mounts on 35 mm DIN 3 track.
- Up to 4 poles.

CA2SK11G7

LA1SK11

Table 23.84: IEC Style Industrial Control Relays

Control Circuit Supply	Consumption	Type of Termination	Contact Configuration		Catalog Number *[20]*
			N.O.	N.C.	
AC	4.2 VA	Screw clamp	1	1	CA2SK11 • •
			2	0	CA2SK20 • •
DC	2.2 W		1	1	CA3SK11 • •
			2	0	CA3SK20 • •

Table 23.85: Contact Adder Decks (for CA2SK20 only)

Type of Termination	Contact Configuration		Catalog Number
	N.O.	N.C.	
Screw clamp	2	0	LA1SK20
	1	1	LA1SK11
	0	2	LA1SK02

Transient Suppressor Module dampens the voltage spike that may occur when the relay coil is de-energized. The spike may adversely affect solid state equipment near the relay. The transient suppressor module snaps into a cavity located in the side of the relay. These modules can be used with CA2SK and CA3SK relays.

Table 23.86: Transient Suppressor Module

Control Circuit Voltage	Catalog Number
24–48 Vac 50/60 Hz, 24–48 Vdc	LA4SKEIE
110–250 Vac 50/60 Hz, 110–250 Vdc	LA4SKEIU

Table 23.87: Coil Voltage Codes for Control Relays

Voltage	12	24	36	48	72	110	120	220	230	240	277	380	400	480
50/60 Hz	—	B7 *[21]*	—	E7 *[21]*	—	F7	G7 *[21]*	M7 *[21]*	P7	U7 *[21]*	UE7	Q7	V7	T7 *[21]*
DC	JD	BD	CD	ED	SD	—	—	—	—	—	—	—	—	—

CA2SKE20

IEC Style Alternating Relays are used to alternate the use of 2 motor circuits. When the coil is energized the first time, one contact closes and will open when the coil is de-energized. When the coil is energized again, the other contact will close and will open when the coil is de-energized. The contacts from these alternators are to be used in the control circuit of the starters that are controlling pump or compressor motors.

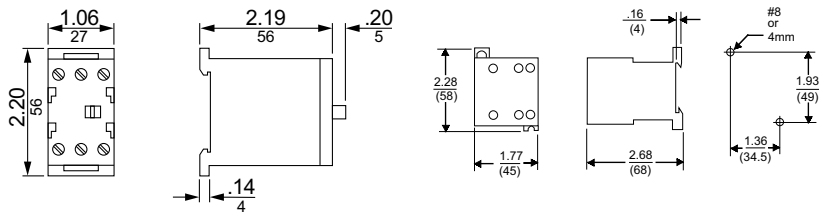
Table 23.88: Alternating Relays

Coil Voltage (Voltage-Hz)	Type
24–50/60	CA2SKE20• •*[22]*

Table 23.89: Contact Ratings for CA2SK, CA3SK, and CA2SKE20 Relays

AC								DC	
V	Inductive 35% PF					Resistive 75% PF		V	Continuous Amperes
	NEMA Rating	Make		Break		Continuous Amperes	Make, Break and Continuous Amperes		
		A	VA	A	VA				
120	A600	60	7200	6	720	10	10	24	3
240		30		3				60	2
480		15		1.5				110	0.8
600		12		1.2				240	0.2

Approximate Dimensions for CA2SKE Relay



Dual Dimensions: **INCHES**
Millimeters

Approvals for TeSys SK IEC Style Relays

File: E164353
CCN: NKCR

File: LR43364
Class: 3211 03

[20] Use the appropriate voltage code from Table 23.87 to complete the catalog number. For example, CA2SK11**G7**.
[21] Alternating relays CA2SKE available in these voltages only. No other voltages are available.
[22] Use the appropriate voltage code from Table 23.87 to complete the catalog number (for example, CAZSK11**G7**). Only available with voltages indicated in this table.

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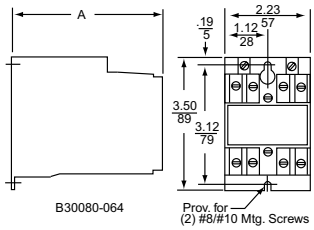
8501XO40V02 AC Control Relay

8501XMO40V02 AC Master Relay

AC Control and Master Relays Dimensions



Dual Dimensions: **INCHES**
Millimeters

8501XO40XTE1V02 AC Timing Relay

Square D™ NEMA Style AC Relays

Class 8501 Type X relays combine a rugged, heavy-duty design with modular construction for greater flexibility. They are ideal for applications where long life, high reliability, and ease of maintenance are important. The Type X family offers a complete line of relays and accessories for most control applications. The 8501X relay consists of a standard 4 pole base to which it is possible to add additional contacts, timer, and latch functionality. Instantaneous and Master contacts are converted from N.O. to N.C. by flipping the contact cartridge within the base. The 8501X relay can either be built from individual part numbers or ordered pre-assembled.

AC Control Relays

- Straight-through wiring
- Plug-in contact cartridges for easy contact conversion and replacement
- Contact conversion without removing terminal screws or wires
- Self-lifting pressure wire connectors
- Replaceable coil

Table 23.90: AC Control Relays (lots of 1)

No. of N.O. 10 A Convertible Instantaneous Contacts*[1]*	Type*[1][2]*
0	XO00
2	XO20
3	XO30
4	XO40
6	XO60
8	XO80
10	XO1000
12	XO1200

AC Master Relays

- 20 ampere contact rating due to use of master contact cartridges.*[3]*
- Provisions for standard cartridges to be used in contact cavities not occupied by master cartridges in 2-8 pole AC relay.

Table 23.91: AC Master Relays

No. of N.O. 20 A Convertible Contacts	Type*[2][4]*
2	XMO20
4	XMO40
6	XMO60

Table 23.92: Dimension A (See Figure at Left) and Weights

No. of Poles	Dim. A		Shipping Weight, lb
	in.	mm	
0–4	3.95	100	2.0
6–8	5.16	131	2.3
10–12	6.36	162	2.7

AC Timing Relays

- Easily convertible On or Off Delay
- Two adjustable timing ranges
- Repeat accuracy well above ±10%
- Convertible 1 N.O. and 1 N.C. timed contacts
- Large knob for easy adjustment of time delay
- Off Delay mode times out even after loss of power

Table 23.93: AC Timing Relays (lots of 1)

Timing Mode	No. of N.O. 10 A Convertible Instantaneous Contacts	Timed Convertible Contacts		Timing Relay	
				0.2–60 s	5–180 s
		N.O.	N.C.	Type *[2]*	Type *[2]*
On Delay	0	1	1	XO00XTE1	XO00XTE2
	2	1	1	XO20XTE1	XO20XTE2
	4	1	1	XO40XTE1	XO40XTE2
Off Delay	0	1	1	XO00XTD1	XO00XTD2
	2	1	1	XO20XTD1	XO20XTD2
	4	1	1	XO40XTD1	XO40XTD2

[1] A maximum of 8 N.C. contacts is allowed on 9–12 pole relays.
[2] Voltage code must be specified to order these products. Refer to Table 23.97 and insert the code as shown in Table 23.98.
[3] Maximum of six 8501 Type XC4 master cartridges may be used on only 7 and 8 pole AC devices.
[4] Attachments not permitted on this relay.

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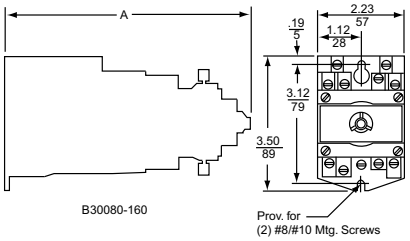
8501XO40XLV02 Latching Relay

AC Latching Relays Dimensions



Dual Dimensions: **INCHES**
Millimeters

AC Latching Relays

- Mechanical latch holds all contacts switched even after removal of power from replaceable latching coil.
- Provides sequence memory in the event of power loss. Ideal for press control, process control, and punch presses.
- Replaceable unlatch coil to switch contacts back to original state.

Table 23.94: AC Latching Relays (lots of 1)

N.O. 10 A Convertible Instantaneous Contacts	Latching Relay Type *[5]*
2	XO20XL
3	XO30XL
4	XO40XL
6	XO60XL
8	XO80XL

Table 23.95: Dimension A (See Figure at Left) and Weights

No. of Poles	Dim. A		Shipping Weight, lb
	in.	mm	
2–4	6.54	166	2.8
6–8	7.74	197	3.1

- For replacement coils, see Table 23.112.

Table 23.96: AC Contact Ratings

Type of Cartridge	V	Inductive 35% Power Factor						Resistive 75% Power Factor
		NEMA Rating	Make		Break		Continuous Amperes	Make, Break and Continuous Amperes
			A	VA	A	VA		
Standard or Overlapping	120	A600	60	7200	6	720	10	10
	240		30		3			
	480		15		1.5			
	600		12		1.2			
Master *[6]*	—	A600	Same as standard cartridge above except substitute 20 A for the continuous ampere rating					
Logic Reed	—	—	150 Vac, 150 mA, 8 W Maximum					

- For DC ratings, see Table 23.102.

Table 23.97: Voltage Codes

AC Voltages - Hz	Code
12–60	V11
24–60	V01
24–50	V12
48–60	V18
48–50	V16
120–60/110–50	V02
208–60	V08
240–60/220–50	V03
277–60	V04
480–60/440–50	V06
600–60/550–50	V07

Table 23.98: How to Order

To Order Specify:	Catalog Number		
	Class	Type	Voltage Code
• Class Number • Type Number • Voltage Code	8501	XO40	V02

Approvals for Square D NEMA Style Relays

File: E78403
CCN: NKCR

File: 060905
Class: 3211 03

IEC 60947–1

[5] Voltage code must be specified to order these products. Refer to Table 23.97 and insert the code as shown in Table 23.98.
[6] Maximum of six 8501 Type XC4 master cartridges may be used on only 7 and 8 pole AC devices.

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Square D™ NEMA Style DC Relays

DC Control Relays

8501XDO40V53 Control Relay

- Replaceable, highly reliable pure DC power plant: no economizing resistors, overlapping contacts or dual-wound coil.
- Uses the same Type XB adder decks and attachments as the AC version.
- Offers all the features of the AC relay.
- Available in up to 8 poles.
- All contact poles are usable since no overlapping contacts are needed.

Table 23.99: DC Control Relays

Normally Open 5 A Convertible Instantaneous Contacts	Control Relay Type*[7]*
0	XDO00
2	XDO20
4	XDO40
6	XDO60
8	XDO80

DC Control Relays Dimensions (in./mm)

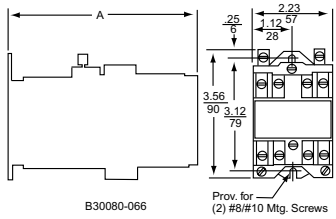

Table 23.100: Dimension A (See Figure at Left) and Weights

No. of Poles	Dim. A		Shipping Weight lb.
	in.	mm	
0–4	5.17	131	3.1
6–8	6.37	162	3.4
10–12	7.60	193	3.8

DC Timing Relays

8501XDO40XTE2V53 Timing Relay

- Easily convertible On Delay or Off Delay.
- Two adjustable timing ranges.
- Repeat accuracy well above ±10%.
- Convertible 1 N.O. and 1 N.C. timed contacts.
- Large knob for easy adjustment of time delay.
- Off Delay mode times out even after loss of power.

Table 23.101: DC Timing Relays

Timing Mode	Normally Open 5 A Convertible Instantaneous Contacts	Timed Convertible Contacts		Timing Relay*[7]*	
				0.2–60 s	5–180 s
		N.O.	N.C.	Type	Type
On Delay	0	1	1	XDO00XTE1	XDO00XTE2
	2	1	1	XDO20XTE1	XDO20XTE2
	4	1	1	XDO40XTE1	XDO40XTE2
Off Delay	0	1	1	XDO00XTD1	XDO00XTD2
	2	1	1	XDO20XTD1	XDO20XTD2
	4	1	1	XDO40XTD1	XDO40XTD2

DC Timing Relays Dimensions (in./mm)

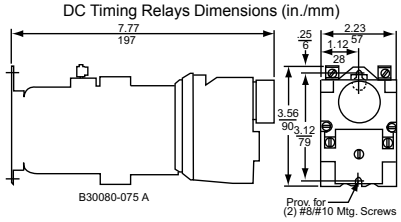

Table 23.102: DC Contact Ratings

Type of Cartridge	DC Ratings					
	Volts	Inductive			Resistive	
		NEMA Rating	Make and Break Amperes 138 VA Max.	Continuous Amperes	Make and Break Amperes	Continuous Amperes
Standard	125 250	P600	1.1 0.55	5 5	4 0.8	5 5
Overlapping	125	P150	1.1	5	4	5
Logic Reed	—	—	30 Vdc, 60 mA	—	—	—

- For AC ratings, see Table 23.96.

NOTE: Do not use any 8501 Type XC4 Master Cartridges on any DC-operated device.

[7] Voltage code must be specified to order these products. Refer to Table 23.106 and insert the appropriate code as shown in Table 23.107.

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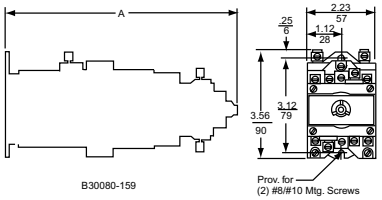
8501XDO40XDLV53 Latching Relay

DC Latching Relays Dimensions (in./mm)



8501XUDO40V53 Utility Relay

DC Latching Relays

- Mechanical latch holds all contacts switched even after removal of power from replaceable latching coil.
- Provides sequence memory in the event of power loss.
- Ideal for sequencing applications such as press control, process control and punch presses.
- Replaceable unlatch coil to switch contacts back to original state.

Table 23.103: DC Latching Relays

Normally Open 5 A Convertible Instantaneous Contacts	Latching Relay *[8]*
	Type
2	XDO20XDL
4	XDO40XDL
6	XDO60XDL
8	XDO80XDL

NOTE: Unlatch coil is rated for intermittent duty and should be connected through a N.O. contact of the relay if the input signal is maintained. Order one more N.O. contact than the application requires to use as a coil clearing contact.

Table 23.104: Dimension A (See Figure at Left) and Weights

No. of Poles	Dim. A		Shipping Weight, lb.
	in.	mm	
2–4	7.76	197	3.9
6–8	8.98	228	4.2

DC Utility Relays

Ideal for utility plant applications where reliable performance and a pure DC power plant is required. In addition to the Type XDO relay features, the Type XUDO provides:

- Up to 12 poles N.O. or N.C.
- Nominal 125 Vdc coil, capable of handling 140 Vdc continuously and picking up at 105 Vdc after having been operated at 140 Vdc continuously. Other voltages with comparable operating characteristics are available.
- Enclosed device capable of operating in 145°F ambient.

Table 23.105: DC Utility Relays

Number of 5 A Convertible Contacts		Open Type*[8]*
N.O.	N.C.	Type
4 0	0 4	XUDO40 XUDO04
8 0	0 8	XUDO80 XUDO08
12 0	0 12	XUDO1200 XUDO0012

Table 23.106: Voltage Codes—8501 XUDO and XDO Relays

DC Voltages for 8501 XUDO Relays ONLY	Code	DC Voltages for 8501 XDO Relays	Code
6	V50	6	V50
12	V51	12	V51
24	V53	24	V53
48	V56	32	V54
125	V63	48	V56
250	V67	72	V58
—	—	90	V59
—	—	115/125	V62
—	—	230/250	V66

Table 23.107: How to Order

To Order Specify:	Catalog Number		
	Class	Type	Voltage Code
• Class Number • Type Number • Voltage Code	8501	XDO40	V53

- For replacement coils, see Table 23.111.
- For UL and CSA approvals, see Square D NEMA Style AC Relays.

[8] Voltage code must be specified to order these products. Refer to Table 23.106 and insert the appropriate code as shown in Table 23.107.

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Attachments and Accessories for Square D™ NEMA Style Relays

Table 23.108: Type X™ Relays

	Description	Type
	Mechanical Latch Attachment—Mounts on any 2 through 8-pole relay (except XMO master relay). The Type XL and XDL latch attachments are identical in size and mounting provisions. The Type XLAC latch attachment has a continuous-duty-rated coil which is replaceable. **The Type XDLDC latch attachment has an intermittent–rated coil (replaceable) and should be connected through a N.O. contact of the basic relay if the input signal is maintained to the unlatch coil.** AC Latch Attachment DC Latch Attachment	XL *[9]* XDL*[9]*
	Pneumatic Timer Attachment—Mounts only on any 0 through 4-pole AC or DC relays (except XMO master relay). It provides 1 N.O. and 1 N.C. convertible timed contacts, which are the same Type XC1 cartridges used on the basic relay. Two timing ranges are available, and conversion from On Delay to Off Delay or vice versa is easy. **Off Delay** 0.2–60 seconds 5–180 seconds **On Delay** 0.2–60 seconds 5–180 seconds	XTD1 XTD2 XTE1 XTE2
	Timer Lockout Cover—Fits over the time delay adjustment knob of any Type XT timing attachment. The Lockout Cover is designed to protect the time setting against accidental adjustment. It mounts directly to the timing attachment with two included screws.	XJ1
	Adder Decks—Adder decks are used to expand the number of poles on a relay. The basic 4-pole relay can be easily converted to an 8-pole or 12-pole relay by installing one or two adder decks. The Class 8501 Type XB20 comes with 2 convertible contact cartridges and will accept 2 additional convertible contact cartridges. The Class 8501 Type XB40 comes with 4 convertible contact cartridges. The same Type XB adder deck is used for both the middle and upper decks of the AC or DC relay.	
	With 2 N.O. contact cartridges	XB20
	With 4 N.O. contact cartridges	XB40
	Contact Cartridges—The Type X relay offers 4 Types of contact cartridges. All are color–coded for visual identification of each Type.	
	Standard Cartridge—The standard cartridge, used for most applications, has a black case.	XC1
	Overlapping Cartridge—Same NEMA Type A600 AC rating as standard cartridge and a NEMA Type P150 DC rating. When it is used in the N.O. mode it will close early and when used in the N.C. mode it will open late. If two or more are used together, the N.O. contacts will close before the N.C. contacts open as the relay picks up. Overlap also occurs during dropout. Overlapping cartridge has a red case.	XC2
	May be ordered factory installed: • Substitute 1 N.O. and 1 N.C. overlapping cartridges for 2 standard cartridges. • Substitute 2 N.O. and 2 N.C. overlapping cartridges for 4 standard cartridges. • Substitute 3 N.O. and 3 N.C. overlapping cartridges for 6 standard cartridges. • Substitute 4 N.O. and 4 N.C. overlapping cartridges for 8 standard cartridges.	**Form** **Y1591** **Y1592** **Y1593** **Y1594**
	Master Cartridge—Features the same contact ratings as the Type XC1 standard cartridge except it has a 20 ampere continuous current rating instead of 10 amperes. It can be used in circuits where a master relay is required. Master cartridge has a blue case. **Maximum of 6 master cartridges may be used on any 7 and 8-pole AC relays. Do not use any master cartridges on 9-12-pole AC or any DC-operated devices. Note: If master cartridges are added to a standard relay, attachments (latch mechanism, timers, etc.) cannot be used.**	XC4
	Mounting Track—The mounting track has pre-punched mounting holes to simplify mounting the track on the control panel. The relay mounting screws are factory installed on the track so that the relays can be hung prior to tightening the screws. 9 in. long for 4 relays 18 in. long for 8 relays 27 in. long for 12 relays 36 in. long for 16 relays	XM4 XM8 XM12 XM16
	Manual Test Tool—Provides a means of manually switching the contacts of a basic relay or timing relay and holding all contacts in their switched state until the tool is removed. This simplifies the checking of control circuits without power on the coil or contacts.	XA1
	Transient Suppressor—Consists of an R-C circuit designed to suppress coil generated transients to approximately 200 percent of peak voltage. It is particularly useful when switching the Type X relay near solid state equipment. It is designed for use on coils up to 120 Vac.	XS1
	NEMA 1 Enclosure—Formed from sheet steel to provide strength and rigidity. Two conduit knockouts are located in both the top and bottom of the enclosure. The enclosure is furnished with self tapping screws for mounting the relay inside the enclosure. Accommodates a single 4 or 8-pole AC or DC relay, 12-pole AC relay, 4-pole AC latching relay, and 4-pole AC timing relay. **NOTE:** The 4-pole DC latching relay, 4-pole DC timing relay, 8-pole AC and DC latching relays and 12-pole utility auxiliary relay will not fit.	Class 9991 Type UE7

Table 23.109: Mechanical Latch Attachment Voltage Codes

AC Voltage	Code	DC Voltage	Code
24–60	V01	6	V50
24–50	V12	12	V51
120–60/110–50	V02	18	V99
208–60	V08	24	V53
240–60/220–50	V03	48	V56
277–60	V04	72	V58
480–60/440–50	V06	90	V59
600–60/550–50	V07	115/125	V62
		230/250	V66

Table 23.110: How to Order

To Order Specify:	Catalog Number	
	Class	**Type**
• Class Number • Type Number • Voltage Code for mechanical latch attachment • Form for factory installed overlapping contacts	8501	XTE1

[9] See Table 23.109.

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Table 23.111: DC Relay Coil Selection

Equipment To Be Serviced		Coil Prefix, or Class and Type	Hz	Suffix (The complete coil number consists of prefix or the Class and Type, followed by suffix.)												Coil Burden Watts
Class	Type			6 V	12 V	18 V	24 V	32 V	48 V	64 V	72 V	90 V	110 V	115/125 V	220 V	230/250 V	
8501	XD	9998 XD	—	19	28	34	37	40	46	49	52	55	—	58	—	67	18
	XDL	9998 XDL	—	19	28	34B	37B	40B	46B	49B	52B	55B	—	58B	—	67B	50
	XUD	9998 XUD	—	19	28	—	37	—	46	—	—	—	—	58 *[10]*	—	67*[11]*	16

Table 23.112: AC Relay Coil Selection

Equipment To Be Serviced		Coil Prefix or Class and Type	Suffix (The complete coil number consists of prefix or the Class and Type, followed by suffix.)												Coil Volt-Amperes	
Class	Type		—	24 V	110-115 V	120 V	208 V	220 V	240 V	277 V	380 V	440 V	480 V	550 V	600 V	In-rush	Sealed
8501	XO, XMO	9998 X *[12]*	60	23	—	44	51	52	53	55	—	—	62	—	65	148	23
			50	24	44	—	52	53	—	—	—	62	—	65	—	143	25

[10] 125 Vdc only
[11] Not dual rated—250 Vdc only
[12] To order an unlatch coil, add the letter L to the type number and the letter B to the suffix number. Example: for a 120 V 60 Hz unlatch coil, order a Class 9998 Type XL44B.

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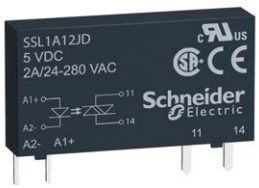
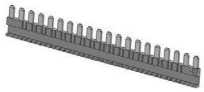


SSL1A12JD

SSLVA1



RSL Z2

RSL Z3

New!

Zelio™ SSL Relays

Zelio SSL solid state relays offer the advantages of several input and output configurations for both AC and DC switching applications. Their compact size and modular design reduces space and allows easy mounting on the socket. Key features include:

- Available with zero voltage switching for resistive load and random switching for inductive load applications.
- Socket with reverse polarity protection circuit and LED indicator for easy identification of control status.

Refer to Online Relay Configurator.

Table 23.113: Relays (sold in lots of 12)

Switching	Input Voltage	Output Voltage	Contact Configuration	Load Current Range	SPDT (1 C/O) Catalog Number
DC switching	3–12 Vdc	1–24 Vdc	SPST N.O. (1 N/O)	3.5 A	SSL1D03JD
		1–48 Vdc	SPST N.O. (1 N/O)	0.1 A	SSL1D101JD
	15–30 Vdc	1–24 Vdc	SPST N.O. (1 N/O)	3.5 A	SSL1D03BD
	16–30 Vdc	1–48 Vdc	SPST N.O. (1 N/O)	0.1 A	SSL1D101BD
	38–72 Vdc	1–24 Vdc	SPST N.O. (1 N/O)	3.5 A	SSL1D03ND
		1–48 Vdc	SPST N.O. (1 N/O)	0.1 A	SSL1D101ND
Zero voltage switching	3–12 Vdc	24–280 Vac	SPST N.O. (1 N/O)	2 A	SSL1A12JD
	15–30 Vdc	24–280 Vac	SPST N.O. (1 N/O)	2 A	SSL1A12BD
	38–72 Vdc	24–280 Vac	SPST N.O. (1 N/O)	2 A	SSL1A12ND
Random switching	3–12 Vdc	24–280 Vac	SPST N.O. (1 N/O)	2 A	SSL1A12JDR
	15–30 Vdc	24–280 Vac	SPST N.O. (1 N/O)	2 A	SSL1A12BDR
	38–72 Vdc	24–280 Vac	SPST N.O. (1 N/O)	2 A	SSL1A12NDR

Table 23.114: Sockets (sold in lots of 10)

Control Voltage	For Use with Relays	Socket Type	
		Screw Connector	Spring Terminal
		Catalog Number	Catalog Number
5 Vdc	SSL1D03JD SSL1D101JD SSL1A12JD SSL1A12JDR	SSLZVA1	SSLZRA1
24 Vdc	SSL1D03BD SSL1D101BD SSL1A12BD SSL1A12BDR	SSLZVA1	SSLZRA1
60 Vdc	SSL1D03ND SSL1D101ND SSL1A12ND SSL1A12NDR	SSLZVA2	SSLZRA2
110 Vac/Vdc	SSL1D03ND SSL1D101ND SSL1A12ND SSL1A12NDR	SSLZVA3	SSLZRA3
230 Vac/Vdc	SSL1D03ND SSL1D101ND SSL1A12ND SSL1A12NDR	SSLZVA4	SSLZRA4

Table 23.115: Accessories

Description	Compatibility	Catalog Number
ID tags (2 sheets of 64 tags)	RSL series sockets, SSL series sockets	RSLZ5
Bus jumper (10 x 20-pole jumper)		RSLZ2
Butterfly isolator (10 isolators)		RSLZ3

Approvals for SSL Relays

c UL us — File: E173076 CCN: NRNT2, NRNT8 — CSA — File: 257594 Class: 3211 07 — CE — IEC 60950–1 — RoHS Compliant

Approvals for SSLZ Sockets

c UL us — File: E172326 CCN: SWIV2 — CSA — File: 254977 Class: 3211 07 — CE — IEC 60950–1 — RoHS Compliant

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SSM1A36BD

SSM1A312BD

New!

Zelio™ SSM Relays

Zelio SSM solid state relays are ready-to-use modular relays with SCR/MOSFET outputs for greater switching density. The unique IP20 housing design and integrated heat sink with no exposed metal surface offers compactness and enhances operating conditions of the relay. SSM relays are DIN rail mounted and available with zero voltage switching for resistive load and random switching for inductive load applications. The SSM relay range comprises:

- SSM1: Single channel, single-phase relays with 6 A and 12 A ratings
- SSM2: Dual channel, single-phase relays with 6 A rating

Refer to Online Relay Configurator.

Table 23.116: SSM1 Single Channel Solid State Relays (sold in lots of 1)

Switching	Input Voltage	Ouput Voltage	Contact Configura-tion	Load Current Range	Motor Load Rating	Catalog Number
DC switching	4–32 Vdc	1–60 Vdc	SPST N.O. (1 N/O)	6 A	–	SSM1D26BD
			SPST N.O. (1 N/O)	12 A	–	SSM1D212BD
		1–100 Vdc	SPST N.O. (1 N/O)	6 A	–	SSM1D36BD
			SPST N.O. (1 N/O)	12 A	–	SSM1D312BD
Zero voltage switching	4–32 Vdc	24–280 Vac	SPST N.O. (1 N/O)	6 A	1/6 hp @ 240 Vac	SSM1A16BD
			SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A112BD
		48–600 Vac	SPST N.O. (1 N/O)	6 A	1/6 hp @ 240 Vac	SSM1A36BD
			SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A312BD
	18–36 Vac	24–280 Vdc	SPST N.O. (1 N/O)	6 A	1/6 hp @ 240 Vac	SSM1A16B7
			SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A112B7
		48–600 Vac	SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A312B7
	90–140 Vac	24–280 Vac	SPST N.O. 1 N/O)	6 A	1/6 hp @ 240 Vac	SSM1A16F7
			SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A112F7
		48–600 Vac	SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A312F7
	200–265 Vac	24–280 Vac	SPST N.O. (1 N/O)	6 A	1/6 hp @ 240 Vac	SSM1A16P7
			SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A112P7
		48–600 Vac	SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A312P7
Random switching	4–32 Vdc	24–280 Vac	SPST N.O. (1 N/O)	6 A	1/6 hp @ 240 Vac	SSM1A16BDR
			SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A112BDR
		48–600 Vac	SPST N.O. (1 N/O)	6 A	1/6 hp @ 240 Vac	SSM1A36BDR
			SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A312BDR
	18–36 Vac	24–280 Vac	SPST N.O. (1 N/O)	6 A	1/6 hp @ 240 Vac	SSM1A16B7R
			SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A112B7R
		48–600 Vac	SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A312B7R
	90–140 Vac	24–280 Vac	SPST N.O. (1 N/O)	6 A	1/6 hp @ 240 Vac	SSM1A16F7R
			SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A112F7R
		48–600 Vac	SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A312F7R
	200–265 Vac	24–280 Vac	SPST N.O. (1 N/O)	6 A	1/6 hp @ 240 Vac	SSM1A16P7R
			SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A112P7R
		48–600 Vac	SPST N.O. (1 N/O)	12 A	1/3 hp @ 240 Vac	SSM1A312P7R

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SSM2A36BD

Table 23.117: SSM2 Dual Channel Solid State Relays (sold in lots of 1)

Switching	Input Voltage	Ouput Voltage	Contact Configura-tion	Load Current Range	Catalog Number *[1]*
Zero voltage switching	4–32 Vdc	24–280 Vac	DPST N.O. (2 N/O)	6	SSM2A16BD
		48–600 Vac	DPST N.O. (2 N/O)	6	SSM2A36BD
Random switching	4–32 Vdc	24–280 Vac	DPST N.O. (2 N/O)	6	SSM2A16BDR
		48–600 Vac	DPST N.O. (2 N/O)	6	SSM2A36BDR

Approvals for SSM Relays

c UL us — File: E359576 CCN: NMFT2, NMFT8

CSA — File: 257594 Class: 3211 04

CE — IEC 60950-1

RoHS Compliant

[1] 4–pin connector for dual channel output only. Mating connector: MOLEX 050579404 or equivalent.

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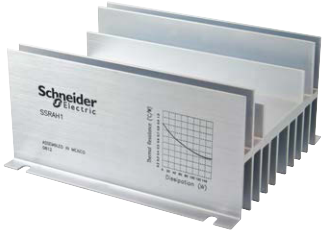
SSRPCDS25A1

SSRDCDS10A1

SSRDCDS45A1



SSRAH1

Zelio™ SSRP and SSRD Relays

Zelio SSRP and SSRD relays do not have any moving parts to wear out. Combined with vibration resistance, arc-less switching and the lack of acoustical noise, solid state relays are the ideal product for switching applications that demand reliable execution. For added reliability, the Zelio SSRP and SSRD solid state relays use Direct Copper Bonding (DCB) technology to decrease internal temperatures and improve the overall quality of the product. The SSR solid state relay range comprises:

- Relays for DIN rail mounting: SSRD
- Relays for panel mounting: SSRP

Key features include:

- Input voltage range 3–32 Vdc, 90–280 Vac
- Breaking capacities up to 125 A
- Zero voltage turn on, low EMI/RFI
- No moving parts
- Shock and vibration resistant
- No acoustical noise
- Fast response
- Arc-less switching
- Long life (>10^9 operations typical)

Refer to Online Relay Configurator.

Table 23.118: SSRP Single Channel Solid State Relays (sold in lots of 1)

Switching	Input Voltage	Ouput Voltage	Contact Configuration	Load Current Range	Catalog Number [2]
DC switching	3.5–32 Vdc	0–100 Vdc	SPST N.O. (1 N/O)	12	SSRPCDM12D5
			SPST N.O. (1 N/O)	25	SSRPCDM25D5
			SPST N.O. (1 N/O)	40	SSRPCDM40D5
Zero voltage switching	3–32 Vdc	24–280 Vac	SPST N.O. (1 N/O)	10	SSRPCDS10A1
			SPST N.O. (1 N/O)	25	SSRPCDS25A1
			SPST N.O. (1 N/O)	50	SSRPCDS50A1
	4–32 Vdc	48–530 Vac	SPST N.O. (1 N/O)	75	SSRPCDS75A2
		48–660 Vac	SPST N.O. (1 N/O)	90	SSRPCDS90A3
			SPST N.O. (1 N/O)	125	SSRPCDS125A3
	90–280 Vdc	24–280 Vac	SPST N.O. (1 N/O)	10	SSRPP8S10A1
			SPST N.O. (1 N/O)	25	SSRPP8S25A1
			SPST N.O. (1 N/O)	50	SSRPP8S50A1
		48–530 Vac	SPST N.O. (1 N/O)	75	SSRPP8S75A2
		48–660 Vac	SPST N.O. (1 N/O)	90	SSRPP8S90A3
			SPST N.O. (1 N/O)	125	SSRPP8S125A3

Table 23.119: SSRD Single Channel Solid State Relays (sold in lots of 1)

Switching	Input Voltage	Ouput Voltage	Contact Configuration	Load Current Range	Catalog Number
Zero voltage switching	90–280 Vac	24–280 Vac	SPST N.O. (1 N/O)	10	SSRDP8S10A1
			SPST N.O. (1 N/O)	20	SSRDP8S20A1
			SPST N.O. (1 N/O)	30	SSRDP8S30A1
	90–140 Vac	24–280 Vac	SPST N.O. (1 N/O)	45	SSRDF8S45A1
	4–32 Vdc	24–280 Vac	SPST N.O. (1 N/O)	10	SSRDCDS10A1
			SPST N.O. (1 N/O)	20	SSRDCDS20A1
			SPST N.O. (1 N/O)	30	SSRDCDS30A1
	3–32 Vdc	24–280 Vac	SPST N.O. (1 N/O)	45	SSRDCDS45A1

Approvals for SSRP and SSRD Relays

c UL us — File: E258297 CCN: NRNT2, NRNT8

CSA — File: 230765 Class: 3211 07

CE — IEC 60950-1

RoHS Compliant

[2] See Table 23.121 for accessories.

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SSP3A225P7

New!

Zelio™ SSP Relays

Zelio SSP solid state relays are three-phase panel mounted relays with IP20 housing. The SCR outputs allow them to be used in various power switching applications. These power relays with 25 A and 50 A current rating are EMC compliant. SSP relays are integrated with an R-C snubber circuit and TVS (Transient Voltage Suppression). They are available with zero voltage switching for resistive load and random switching for inductive load applications.

Refer to Online Relay Configurator.

Table 23.120: SSP Three-Phase Solid State Relays (sold in lots of 1)

Switching	Input Voltage	Ouput Voltage	Contact Configura-tion	Load Current Range	Motor Load Rating	Catalog Number *[3]*
Zero voltage switching	4–32 Vdc	48–530 Vac	3PST N.O. (3 N/O)	25 A	3/4 hp @ 120 Vac 1 hp @ 240 Vac 3 hp @ 480 Vac 4.4 hp @ 530 Vac	SSP3A225BD
				50 A	1.5 hp @ 120 Vac 3 hp @ 240 Vac 7.5 hp @ 480 Vac 8.8 hp @ 530 Vac	SSP3A250BD
	18–36 Vac	48–530 Vac	3PST N.O. (3 N/O)	25 A	3/4 hp @ 120 Vac 1 hp @ 240 Vac 3 hp @ 480 Vac 4.4 hp @ 530 Vac	SSP3A225B7
				50 A	1.5 hp @ 120 Vac 3 hp @ 240 Vac 7.5 hp @ 480 Vac 8.8 hp @ 530 Vac	SSP3A250B7
	90–140 Vac	48–530 Vac	3PST N.O. (3 N/O)	25 A	3/4 hp @ 120 Vac 1 hp @ 240 Vac 3 hp @ 480 Vac 4.4 hp @ 530 Vac	SSP3A225F7
				50 A	1.5 hp @ 120 Vac 3 hp @ 240 Vac 7.5 hp @ 480 Vac 8.8 hp @ 530 Vac	SSP3A250F7
	180–280 Vac	48–530 Vac	3PST N.O. (3 N/O)	25 A	3/4 hp @ 120 Vac 1 hp @ 240 Vac 3 hp @ 480 Vac 4.4 hp @ 530 Vac	SSP3A225P7
				50 A	1.5 hp @ 120 Vac 3 hp @ 240 Vac 7.5 hp @ 480 Vac 8.8 hp @ 530 Vac	SSP3A250P7
Random switching	4–32 Vdc	48–530 Vac	3PST N.O. (3 N/O)	25 A	3/4 hp @ 120 Vac 1 hp @ 240 Vac 3 hp @ 480 Vac 4.4 hp @ 530 Vac	SSP3A225BDR
				50 A	1.5 hp @ 120 Vac 3 hp @ 240 Vac 7.5 hp @ 480 Vac 8.8 hp @ 530 Vac	SSP3A250BDR
	18–36 Vac	48–530 Vac	3PST N.O. (3 N/O)	25 A	3/4 hp @ 120 Vac 1 hp @ 240 Vac 3 hp @ 480 Vac 4.4 hp @ 530 Vac	SSP3A225B7R
				50 A	1.5 hp @ 120 Vac 3 hp @ 240 Vac 7.5 hp @ 480 Vac 8.8 hp @ 530 Vac	SSP3A250B7R
	90–140 Vac	48–530 Vac	3PST N.O. (3 N/O)	25 A	3/4 hp @ 120 Vac 1 hp @ 240 Vac 3 hp @ 480 Vac 4.4 hp @ 530 Vac	SSP3A225F7R
				50 A	1.5 hp @ 120 Vac 3 hp @ 240 Vac 7.5 hp @ 480 Vac 8.8 hp @ 530 Vac	SSP3A250F7R
	180–280 Vac	48–530 Vac	3PST N.O. (3 N/O)	25 A	3/4 hp @ 120 Vac 1 hp @ 240 Vac 3 hp @ 480 Vac 4.4 hp @ 530 Vac	SSP3A225P7R
				50 A	1.5 hp @ 120 Vac 3 hp @ 240 Vac 7.5 hp @ 480 Vac 8.8 hp @ 530 Vac	SSP3A250P7R

[3] Add a T to the end of the part number to order the SSP with a thermal pad interface.

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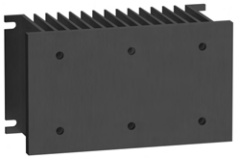
SSRHP02

SSRHP05



SSRHP10

SSRAT1

Table 23.121: Accessories

Description	Compatibility	Thermal Resistance	Catalog Number
Heat sink panel mount (lot of 10)	1 x SSP 1 x SSRP 2 x SSRP 3 x SSRP	0.2 °C/W	SSRHP02
	1 x SSP 1 x SSRP 2 x SSRP 3 x SSRP	0.5 °C/W	SSRHP05
	1 x SSP 1 x SSRP 2 x SSRP	1 °C/W	SSRHP10
	1 x SSRP 2 x SSRP	1.7 °C/W	SSRHP17
	1 x SSRP	2.5 °C/W	SSRHP25
	1 x SSRP 2 x SSRP	0.9 °C/W	SSRAH1
Heat sink DIN rail mount (lot of 1)	1 x SSP 1 x SSRP 2 x SSRP	1 °C/W	SSRHD10
Thermal pad interface (lot of 10)	SSRPP8S•••• SSRPCDS•••• SSRPCDM••••	—	SSRAT1

Approvals for SSP Relays

c UL us — File: E359576, CCN: NMFT2, NMFT8

CSA — File: 257594, Class: 3211 04

CE — IEC 60950-1

RoHS Compliant

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RE17LAMW

RE17LMBM

RE17RLMU

Zelio™ RE17 Modular Timers

The Zelio RE17 modular timer range is comprised of both 8 A relay and 0.7 A solid state outputs. Thanks to its space saving 17.5 mm design, this relay is ideal for applications that require a lot of control in a small foot print. The RE17 series is designed to attach to a 35 mm DIN rail.

- Multifunction, dual function, or single function
- Multi-range (7 selectable ranges)
- Multivoltage
- Solid state or relay output options

Table 23.122: RE17 Series Timers

Supply Voltage	Timing Ranges	Output Type	Rated Current	Functions	Function Descriptions *[1]*	Catalog Number
24–240 Vac/ Vdc	0.1 s to 100 h	SPST Solid State	0.7 A	A	Power On delay	RE17LAMW
24–240 Vac	0.1 s to 100 h	SPST Solid State	0.7 A	H	Interval	RE17LHBM
				C	Off delay with control signal	RE17LCBM
				L, Li	Asymmetrical flasher	RE17LLBM
				A, At, B, C, H, Ht, D, Di, Ac, Bw	Multi-function	RE17LMBM
24 Vdc, 24–240 Vac	0.1 s to 100 h	SPDT Relay	8 A	B	Interval with control signal	RE17RBMU
				C	Off delay with control signal	RE17RCMU
				A, At	Power on delay	RE17RAMU
				H, Ht	Interval	RE17RHMU
				L, Li	Asymmetrical flasher	RE17RLMU
				A, At, B, C, H, Ht, D, Di, Ac, Bw	Multi-function	RE17RMMU
				Ad, Ah, N, O, P, Pt, T, Tt, W	Multi-function	RE17RMXMU
				A, At, B, C, H, Ht, D, Di	Multi-function	RE17RMEMU
12 Vdc	0.1 s to 100 h	SPDT Relay	8 A	L, Li	Asymmetrical flasher	RE17RLJU
				A, At, B, C, H, Ht, D, Di, Ac, Bw	Multi-function	RE17RMJU
12–240 Vac	0.1 s to 100 h	SPDT Relay	8 A	A, At, B, C, H, Ht, D, Di, Ac, Bw	Multi-function	RE17RMMW
12–240 Vac	0.1 s to 100 h	SPDT Relay	8 A	A, At, B, C, H, Ht, D, Di, Ac, Bw	Multi-function	RE17RMMWS

Approvals for RE17 Timers

c UL us LISTED — File: E173076 CCN: NRNT, NRNT7

CSA — File: 248382 Class: 3211–06

CE — IEC 61812–1

RoHS Compliant

[1] For detailed function definitions, see Table 23.128.

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RE48ATM12MW

RE48AMH13MW

RUZC3M

RE48ASOC11AR

RE48ASOC8SOLD

RE48ASOC11SOLD

RE48ASETCOV

RE48AIPCOV

Zelio™ RE48 Panel Mount Timers

The Zelio RE48 panel mount timer range is comprised of 5 A relay outputs. The unit can be mounted either on a panel or on a DIN rail with the optional octal socket. Thanks to the large selector knob, the user can quickly and easily see the current value selected and change it if needed.

- Time unit selector knob
- Multifunction, single function, or dual function
- 1.2 second to 300 hour timing range
- Wide input voltage range
- 5 A relay outputs
- Panel-mounted or plug-in
- LED indication

Table 23.123: RE48 Series Timers

Supply Voltage	Timing Ranges	Pin Configuration	Output Type	Rated Current	Functions	Function Descriptions *[2]*	Catalog Number
24–240 Vac/Vdc	1.2 s to 300 h	8–Pin Octal	DPDT Relay	5 A	A	Power On delay	RE48ATM12MW
					A1, A2, H1, H2	Delay On Energization, Pulse-on Energization	RE48AMH13MW
24–240 Vac/Vdc	1.2 s to 300 h	11–Pin Octal	DPDT Relay	5 A	L, Li	Asymmetrical flasher	RE48ACV12MW
					A, B, C, Di	Multi-function	RE48AML12MW

Table 23.124: Sockets (sold in lots of 10)

Description	Connection	Compatibility	Catalog Number
Mixed 8–Pin DIN Rail Mountable Socket	Box lug connector, DIN rail mount	RE48ATM12MW, RE48AMH13MW	RUZC2M
Mixed 11–Pin DIN Rail Mountable Socket		RE48ACV12MW, RE48AML12MW	RUZC3M
Mixed 11–Pin Mountable Socket	Box lug connector	RE48ACV12MW, RE48AML12MW	RE48ASOC11SOLD
Mixed 8–Pin Solder Connector	Solder connectors	RE48ATM12MW, RE48AMH13MW	RE48ASOC8SOLD
Mixed 11–Pin Solder Connector	Solder connectors	RE48ACV12MW, RE48AML12MW	RE48ASOC11SOLD

Table 23.125: Accessories (sold in lots of 10)

Description	Compatibility	Catalog Number
Setting protective cover	RE48 Series Timers	RE48ASETCOV
Protective cover IP64		RE48AIPCOV

Approvals for RE48 Timers

c UL us — File: E173076 CCN: NRNT2, NRNT8

CSA — File: 248382 Class: 3211 07

CE — IEC 61812-1

RoHS Compliant

[2] For detailed function definitions, see Table 23.128.

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REXL2TM

REXL4TM

RXZE2M114M

RXZE2S114M

Zelio™ REXL Miniature Plug-In Timers

The Zelio REXL miniature plug-in timer range is comprised of DPDT and 4PDT single On-delay function timers. The unit is designed to be mounted in a socket in a panel. Thanks to the large selector knob, the user can quickly and easily see the current value selected and change it if needed. Features include:

- Miniature and plug-in (21 x 27 mm / 0.827 x 1.062 in.)
- Single function: function A = delay on energization
- Rated current at 5 A
- 7 timing ranges (0.1 s to 100 h)
- Multivoltage
- Excellent immunity to interference
- Power on and relay energized indication by 2 LEDs

Table 23.126: REXL Series Timers

Supply Voltage	Timing Ranges	Pin Configuration	Output Type	Rated Current	Functions	Function Descrip-tions *[3]*	Catalog Number
12 Vdc	0.1 s to 100 h	8-Pin Quick Connect (Blade)	DPDT Relay	5 A	A	Power On delay	REXL2TMJD
24 Vdc	0.1 s to 100 h	8-Pin Quick Connect (Blade)	DPDT Relay	5 A	A	Power On delay	REXL2TMBD
24 Vac	0.1 s to 100 h	8-Pin Quick Connect (Blade)	DPDT Relay	5 A	A	Power On delay	REXL2TMB7
120 Vac	0.1 s to 100 h	8-Pin Quick Connect (Blade)	DPDT Relay	5 A	A	Power On delay	REXL2TMF7
230 Vac	0.1 s to 100 h	8-Pin Quick Connect (Blade)	DPDT Relay	5 A	A	Power On delay	REXL2TMP7
12 Vdc	0.1 s to 100 h	14-Pin Quick Connect (Blade)	4PDT Relay	5 A	A	Power On delay	REXL4TMJD
24 Vdc *[4]*	0.1 s to 100 h	14-Pin Quick Connect (Blade)	4PDT Relay	5 A	A	Power On delay	REXL4TMBD
24 Vac *[4]*	0.1 s to 100 h	14-Pin Quick Connect (Blade)	4PDT Relay	5 A	A	Power On delay	REXL4TMB7
120 Vac	0.1 s to 100 h	14-Pin Quick Connect (Blade)	4PDT Relay	5 A	A	Power On delay	REXL4TMF7
230 Vac	0.1 s to 100 h	14-Pin Quick Connect (Blade)	4PDT Relay	5 A	A	Power On delay	REXL4TMP7

Table 23.127: Sockets (sold in lots of 10)

Contact Terminal Arrangement	Connection	For Use with Relays	Catalog Number
Mixed	Box lug connector	REXL2TM••, REXL4TM••	RXZE2M114M
Separate	Box lug connector	REXL2TM••	RXZES108M
	Box lug connector	REXL4TM••	RXZE2S114M

Approvals for REXL Timers

c UL us — File: E173076 CCN: NRNT2, NRNT8

CSA — File: 248382 Class: 3211 07

CE — IEC 61812-1

RoHS Compliant

Table 23.128: Timer Function Description

Function	Function Description *[5]*	Timer
A	Power on delay relay	RE17, RE48, REXL
A1, A2	Delay on energization	RE48
Ac	On-delay and off-delay relay with control signal	RE17
Ad	Pulse delayed relay with control signal	RE17
At	Power on delay relay (summation) with control signal	RE17
B	Interval relay with control signal	RE17, RE48
Bw	Double interval relay with control signal	RE17
C	Off-delay relay with control signal	RE17, RE48
D	Symmetrical flasher relay (starting pulse off)	RE17
Di	Symmetrical flasher relay (starting pulse on)	RE17, RE48
H	Interval relay	RE17
H1, H2	Pulse-on energization	RE48
Ht	Interval relay (summation) with control signal	RE17
L	Asymmetrical flasher relay (starting pulse off)	RE17, RE48
Li	Asymmetrical flasher relay (starting pulse on)	RE17, RE48
N	Retriggerable interval relay with control signal on	RE17
O	Retriggerable interval delayed relay with control signal on	RE17
P	Pulse delayed relay with fixed pulse length	RE17
Pt	Pulse delayed relay (summation and fixed pulse length) with control signal off	RE17
T	Bistable relay with control signal on	RE17
Tt	Retriggerable bistable relay with control signal on	RE17
W	Interval relay with control signal off	RE17

[3] For detailed function definitions, see Table 23.128.
[4] For 48 Vdc supply, additional resistor 560 ohms 2 W / 24 Vdc. For 48 Vac, additional resistor 390 ohms 4 W / 24 Vac.
[5] See catalog 9050CT0001 for timing diagrams and detailed descriptions.

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9050JCK46V20

Square D™ JCK General Purpose Plug-In Timers

Square D 9050JCK timing relays are designed to provide low-cost timing in a plug-in housing. The Types JCK11 through 59 provide ±1% repeat accuracy. The Types JCK60 and 70 offer ±0.1% repeat accuracy. These timers are directly interchangeable with many other 8 and 11 pin octal base timers.

- Up to ±0.1% repeat accuracy
- Timing from 0.05 seconds to 999 hours
- Available in 7 timing modes
- DPDT contacts (2 N.O. and 2 N.C.)
- 10 A contact rating
- Transient protected
- Hold down spring available
- Variable or fixed time delay
- Horsepower rated
- RoHS compliant

Table 23.129: Variable Time Delay

Knob Adjustable Timing Range	On Dela*[1]*	Off Delay*[2] [1]*	Off Delay Power Trigger*[1]*	Interval*[1]*	One Shot *[2][1]*	One Shot Power Trigger*[1]*	Repeat Cycle*[3] [1]*
0.1–10 seconds	JCK11	JCK21	JCK21PT	JCK31	JCK41	JCK41PT	JCK51
0.3–30 seconds	JCK12	JCK22	JCK22PT	JCK32	JCK42	JCK42PT	JCK52
0.6–60 seconds	JCK13	JCK23	JCK23PT	JCK33	JCK43	JCK43PT	JCK53
1.2–120 seconds	JCK14	JCK24	JCK24PT	JCK34	JCK44	JCK44PT	JCK54
1.8–180 seconds	JCK15	JCK25	JCK25PT	JCK35	JCK45	JCK45PT	JCK55
0.1–10 minutes	JCK16	JCK26	JCK26PT	JCK36	JCK46	JCK46PT	JCK56
0.3–30 minutes	JCK17	JCK27	JCK27PT	JCK37	JCK47	JCK47PT	JCK57
0.6–60 minutes	JCK18	JCK28	JCK28PT	JCK38	JCK48	JCK48PT	JCK58
1.2–120 minutes	JCK19	JCK29	JCK29PT	JCK39	JCK49	JCK49PT	JCK59

Table 23.130: Fixed Time Delay

Timing Mode	Type*[1][4][5]*	Timing Range (seconds)
On Delay	JCK1F(XXXX)	0.1 to 180
		181 to 3600
Off Delay *[2]*	JCK2F(XXXX)	0.1 to 180
		181 to 3600
Off Delay with Power Trigger	JCK2F(XXXX)PT	0.1 to 180
		181 to 3600
Interval	JCK3F(XXXX)	0.1 to 180
		181 to 3600
One Shot *[2]*	JCK4F(XXXX)	0.1 to 180
		181 to 3600
One Shot with Power Trigger	JCK4F(XXXX)PT	0.1 to 180
		181 to 3600
Repeat Cycle	JCK5F(XXXX)	0.1 to 180
		181 to 3600

Table 23.131: Voltage Codes

Voltage	Code
12 Vdc	V36
24 Vac/Vdc	V14
48 Vac/Vdc	V17
120 Vac/110 Vdc	V20
240–50/60 Vac	V24

Table 23.132: How to Order

To Order Specify:	Catalog Number		
	Class	Type	Voltage Code
• Class Number • Type Number • Voltage Code	9050	JCK11	V20

[1] Voltage code must be specified to order this product. Refer to the standard voltage codes listed in Table 23.131 and insert as shown in Table 23.132.
[2] Initiating contact can be up to 50 feet from the timer.
[3] Two dials are provided for independently adjustable repeat cycle timing ranges.
[4] (XXXX) denotes the timing period in seconds.
Example: Class 9050 Type JCK1F60 is an On Delay timer fixed at 60 seconds.
[5] Fixed repeat cycle timers can be supplied with the same or different On-Time and Off-Time.

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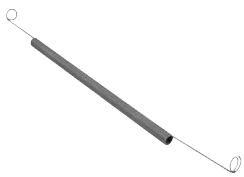
9050JCK60V14

9050JCK70V14

8501NR61

8501NR52



8501NH7

Type JCK60 and JCK70 Timers

Type JCK60

This On-Delay timer uses four push button thumbwheels to set the time delay. One switch is used for the range. The remaining three are used for the time setting.

Table 23.133: Selection

Timing Modes	Timing Ranges		Type
On Delay	0.01s 0.1s S 0.1m M 0.1h H	0.05–9.99 seconds 00.1–99.9 seconds 001–999 seconds 00.1–99.9 minutes 001–999 minutes 00.1–99.9 hours 001–999 hours	JCK60*[6]*

Type JCK70

This multifunction multirange time delay relay uses five push button thumbwheel switches. Three switches are used for the time delay, one switch is used for the timing range, and the other switch is used to select the timing mode.

Table 23.134: Selection

Timing Modes	Timing Ranges	Type
On Delay Interval Off Delay One Shot Repeat Cycle-Off*[7]* Repeat Cycle-On On/Off Delay 1 Shot Falling Edge Watchdog Trigger On Delay	Same as JCK60	JCK70*[6]*

Table 23.135: Sockets

Contact Terminal Arrangement	Connection	For Use with Relays	Sold in Lots of	Catalog Number*[8]*
Mixed*[9]*	Screw Connector	JCK11–19 JCK31–39 JCK51–59 JCK60 JCK1 F JCK3 F JCK5 F	1	8501NR51
			10	8501NR51B
		JCK21–29 JCK41–49 JCK70 JCK2F JCK4F	1	8501NR61
			10	8501NR61B
Separate*[10]*	Screw Connector	JCK11–19 JCK31–39 JCK51–59 JCK60 JCK1 F JCK3 F JCK5 F	1	8501NR52
			10	8501NR52B
		JCK21–29 JCK41–49 JCK70 JCK2F JCK4F	1	8501NR62
			10	8501NR62B

Table 23.136: Accessories (sold in lots of 10)

Description	For Use With	Sold in Lots of	Catalog Number
Metal Restraining Strap	8501NR51 sockets 8501NR52 sockets 8501NR61 sockets 8501NR62 sockets	1	8501NH7

Approvals for 9050JCK Timers

c US File: E3190 CCN: NLDX2

c UL us LISTED File: E3190 CCN: NLDX, NLDX7*[11]*

CSA File: 260367 Class: 3211 07

CE IEC 61810-1

RoHS Compliant

[6] Voltage code must be specified to order this product. Refer to the standard voltage codes listed in Table 23.131 and insert as shown in Table 23.132.
[7] The repeat cycle mode uses the same on-time and off-time.
[8] Please note that the B suffix only desginates quantities of 10 and is not printed on the socket.
[9] The inputs and outputs are mixed on both sides.
[10] The inputs and outputs are on separate sides.
[11] When used with the appropriate 8501NR socket.

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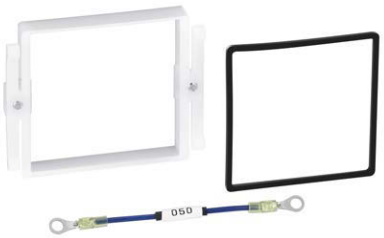
RTC48PUN1RNLU

RTCCBL

RTCCOV



RTCACC

New!

Zelio™ RTC48 Temperature Controllers

The cost-effective Zelio RTC48 temperature controllers combine simplicity, performance, and value. With the Modbus open communication option, they easily interface with solid-state relays, plug-in relays, tower lights, PLCs, and HMIs. The units' three color, 5-digit LED display intelligently adapts to any variation in the process value and can be easily read from a distance. The free configuration software simplifies setup via USB connection to any laptop or PC. These temperature controllers are indispensable in the execution of critical processes, such as in food and beverage, extrusion equipment, injection machines, mold presses, thermo-forming, and horticulture and livestock facilities. The Zelio RTC48 offer comprises a standard 48 x 48 mm (1/16-inch DIN) format and provides the optimal balance of price and functionality, featuring the desirable PID control with auto-tuning, outputs, and alarms.

Key features include:

- PID control algorithm with auto-tuning function
- Universal input types
- Adaptive display
- Modbus communication for easy data exchange with other automation products
- Optional programming cable for use with Zelio Temperature Control Soft configuration software

Table 23.137: Catalog Numbers

Input Type	Supply Voltage	Output 1	Output 2	Alarms	Communication on Modbus	Catalog Number
Thermo-couple: J, K, R, B, S, T, E, N, PL-2, C (W/Re 5-26) **RTD:** Pt100, JPt100, 3-wire system **DC Current:** 0–20 mA, 4–20 mA **DC Voltage:** 0–1 Vdc, 0–5 Vdc, 1–5 Vdc, 0–10 Vdc	110–240 Vac	Relay	–	1	–	RTC48PUN1RNHU
		SSR	–	1	–	RTC48PUN1SNHU
		Relay	–	1	RS485	RTC48PUNCRNHU
		SSR	–	1	RS485	RTC48PUNCSNHU
		Relay	Relay	1	–	RTC48PUN1RRHU
		SSR	Relay	1	–	RTC48PUN1SRHU
		Relay	–	2	–	RTC48PUN2RNHU
		SSR	–	2	–	RTC48PUN2SNHU
		Relay	Relay	1	RS485	RTC48PUNCRRHU
		SSR	Relay	1	RS485	RTC48PUNCSRHU
		Relay	SSR	1	–	RTC48PUN1RSHU
		SSR	SSR	1	–	RTC48PUN1SSHU
		Relay	SSR	1	RS485	RTC48PUNCRSHU
		SSR	SSR	1	RS485	RTC48PUNCSSHU
	24 Vac/Vdc	Relay	–	1	–	RTC48PUN1RNLU
		SSR	–	1	–	RTC48PUN1SNLU
		Relay	–	1	RS485	RTC48PUNCRNLU
		SSR	–	1	RS485	RTC48PUNCSNLU
		Relay	Relay	1	–	RTC48PUN1RRLU
		SSR	Relay	1	–	RTC48PUN1SRLU
		Relay	–	2	–	RTC48PUN2RNLU
		SSR	–	2	–	RTC48PUN2SNLU
		Relay	Relay	1	RS485	RTC48PUNCRRLU
		SSR	Relay	1	RS485	RTC48PUNCSRLU
		Relay	SSR	1	–	RTC48PUN1RSLU
		SSR	SSR	1	–	RTC48PUN1SSLU
		Relay	SSR	1	–	RTC48PUNCRSLU
		SSR	SSR	1	–	RTC48PUNCSSLU

Table 23.138: RTC48 Temperature Controller Accessories

Catalog Number	Description	For Use with Temperature Controllers
RTCCBL	USB Communications Cable	RTC48********
RTCCOV	Terminal Cover	
RTCACC	Spare Parts Pack (Gasket, Shunt and Mounting Frame)	

Approvals for RTC48 Temperature Controllers

c UL us — File: E327516 CCN: XAPX2

CSA — File: 257850 Class: 4813 02

CE — IEC 61010-1

RoHS Compliant

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REG24PTP1RHU

REG48PUN1RHU

Zelio™ REG Temperature Controllers

Zelio REG temperature controllers offer seamless interfacing with solid state relays, electromechanical relays, PLCs, variable speed drives and HMI displays make them a key component to controlling the temperature in your process.

Offer includes 3 versions:

- A 24x48 mm (1/32 DIN) cost effective solution for basic temperature control needs.
- A 48x48 mm (1/16 DIN) balanced version for optimal price and functionality.
- A 96x48 mm (1/8 DIN) full-featured version for complete performance and function.

Key features include:

- Modbus communication for easy data exchange with other automation products
- Simple parameter settings
- IP66 certification enables dust resistance
- Flash memory (saves configurations)
- Compatible with a wide range of sensors
- Advanced Functions (standard): PID, fuzzy logic, auto-tuning, soft start
- Optimized programming
  - Common software for all products in the temperature relay range (freely downloadable from www.schneider-electric.us).
  - A single cable enables connection to both a computer and PLCs.
  - Simple adjustment of parameters.
  - Saving of configurations.

Table 23.139: Zelio Temperature Controllers—24 x 48 Size — 1/32 DIN Standard

Input Type	Supply Voltage	Output 1	Output 2	Alarms	Comm. on Modbus	Catalog Number
Thermocouple: J,K,R,B,S,T, E,N,PL2, **RTD:** PT100	100/240 Vac	Relay	–	–	Yes	REG24PTP1RHU
		Relay	–	1	Yes	REG24PTP1ARHU
		SSR	–	–	Yes	REG24PTP1LHU
		SSR	–	1	–	REG24PTP1ALHU
		Analog (4-20 mA)	–	–	Yes	REG24PTP1JHU
	24 Vac/ Vdc	Relay	–	–	Yes	REG24PTP1RLU
		SSR	–	–	Yes	REG24PTP1LLU
		Analog (4-20 mA)	–	–	Yes	REG24PTP1JLU
DC Voltage: 1–5 Vdc, 0–5 Vdc, 0–10 Vdc, 2–10 Vdc, 0–100 mVdc **DC Current:** 0–20 mA, 4–20 mA	100/240 Vac	Relay	–	–	Yes	REG24PUJ1RHU
		SSR	–	–	Yes	REG24PUJ1LHU
	24 Vac/ Vdc	Relay	–	–	Yes	REG24PUJ1RLU
		SSR	–	–	Yes	REG24PUJ1LLU

Table 23.140: Zelio Temperature Controllers—48 x 48 Size — 1/16 DIN Standard

Input Type	Supply Voltage	Output 1	Output 2	Alarms	Comm. on Modbus	Catalog Number
Thermocouple: J,K,R,B,S,T, E,N,PL2, **RTD:** PT100, **DC Voltage:** 1–5 Vdc, 0–5 Vdc, 0–10 Vdc, 2–10 Vdc, 0–100 mVdc **DC Current:** 0–20 mA, 4–20 mA	100/240 Vac	Relay	–	2	Yes	REG48PUN1RHU
		Relay	–	2	–	REG48PUNL1RHU
		Relay	Relay	2	Yes	REG48PUN2RHU
		SSR	SSR	2	Yes	REG48PUN1LHU
		SSR	SSR	2	–	REG48PUNL1LHU
		SSR	Relay	2	Yes	REG48PUN2LRHU
		Analog (4-20 mA)	–	2	Yes	REG48PUN1JHU
		SSR	Analog (4-20 mA)	2	Yes	REG48PUN2LJHU
	24 Vac/ Vdc	Relay	–	2	Yes	REG48PUN1RLU
		Relay	Relay	2	Yes	REG48PUN2RLU
		Relay	–	2	Yes	REG48PUN1LLU
		SSR	Relay	2	Yes	REG48PUN2LRLU
		Analog (4-20 mA)	–	2	Yes	REG48PUN1JLU
		SSR	Analog (4-20 mA)	2	Yes	REG48PUN2LJLU

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REG96PUN1RHU

Table 23.141: Zelio Temperature Controllers—96 x 48 Size — 1/8 DIN Standard

Input Type	Supply Voltage	Output 1	Output 2	Alarms	Comm. on Modbus	Catalog Number
Thermocouple: J,K,R,B,S,T, E,N,PL2 **RTD:** PT100 **DC Voltage:** 1–5 Vdc, 0–5 Vdc, 0–10 Vdc, 2–10 Vdc, 0–100 mVdc **DC Current:** 0–20 mA, 4–20 mA	100/ 240 Vac	Relay	–	3	Yes	REG96PUN1RHU
		Relay	–	3	–	REG96PUNL1RHU
		Relay	Relay	3	Yes	REG96PUN2RHU
		SSR	–	3	Yes	REG96PUN1LHU
		SSR	–	3	–	REG96PUNL1LHU
		SSR	Relay	3	Yes	REG96PUN2LRHU
		Analog (4-20 mA)	–	3	Yes	REG96PUN1JHU
		SSR	Analog (4-20 mA)	3	Yes	REG96PUN2LJHU
	24 Vac/ Vdc	Relay	–	3	Yes	REG96PUN1RLU
		Relay	Relay	3	Yes	REG96PUN2RLU
		SSR	–	3	Yes	REG96PUN1LLU
		SSR	Relay	3	Yes	REG96PUN2LRLU
		Analog (4-20 mA)	–	3	Yes	REG96PUN1JLU
		Analog (4-20 mA)	SSR	3	Yes	REG96PUN2LJLU

Table 23.142: Temperature Controller Accessories

Description	For Use with Relays	Sold in Lots Of	Catalog Number
Bracket for mounting on DIN rail	24 x 48 mm (1/32 DIN)	4	REG24PSOC
Terminal block cover	48 x 48 mm (1/16 DIN)	2	REG48PCOV
	96 x 48 mm (1/8 DIN)	2	REG96COV

Approvals for Zelio REG Temperature Controllers

c UL us — File: E327516, CCN: XAPX2

CSA — File: 245853, Class: 4813 02

CE — IEC 61010-1

RoHS Compliant

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2/15/2017

Zelio™ Current Measurement Relays

Zelio Current Measurement Relays are designed to measure under and overcurrent conditions, without external sensors. Current measurement relays enable continuous monitoring of the operation of electrical and mechanical loads such as motors and heaters. They are DIN rail mountable and the control status is indicated by an LED.

RM17JC00MW

RM35JA31MW

RM35JA32MW

RM17JC Current Control Relay

- Monitors AC currents
- Designed to monitor overcurrent
- Equipped with an integrated current transfmormer

RM35JA Current Control Relays

- Selection between overcurrent or undercurrent
- Automatic DC or AC recognition
- Selectable memory function

Table 23.143: Zelio Current Measurement Relays

Supply Voltage	Measurement Range		Output 5 A	Width		Catalog Number
	Range[1]	Terminals		Inches	mm	
24–240 Vac/dc	2–20 A	N/A	1 C/O	0.69	17.50	RM17JC00MW
	2–20 mA	E1-M	2 C/O	1.38	35.00	RM35JA31MW
	10–100 mA	E2-M				
	50–500 mA	E3-M				
	0.15–1.5 A	E1-M				RM35JA32MW
	0.5–5 A	E2-M				
	1.5–15 A	E3-M				

Table 23.144: Output Characteristics and Measurement Circuit Characteristics

Type of Relay		RM17JC00MW	RM35JA31MW	RM35JA32MW
Setting accuracy		Plus or minus 10% of the full scale value		
Repeat accuracy (with constant parameters)		Plus or minus 0.5%		
Hysteresis		15% of the threshold setting, fixed	5 to 50% of the threshold setting, adjustable	
Time delay accuracy (with constant parameters)		N/A	Plus or minus 2%	
Time delay on pick-up		500 ms	300 ms	
Conforming to standards		NF EN 60255-6		
Ambient air temperature around the device	Storage	-40 to 158 degrees F (-40 to +70°C)		
	Operational	-4 to 122 degrees F (-20 to +50°C)		

Approvals for Zelio Current Measurement Relays

c UL us LISTED — File: E173076 CNN: NRNT, NRNT7

SP® — File: 248382 Class: 3211 07

CE — CE: 73/23/EEC and EMC 89/336/EEC

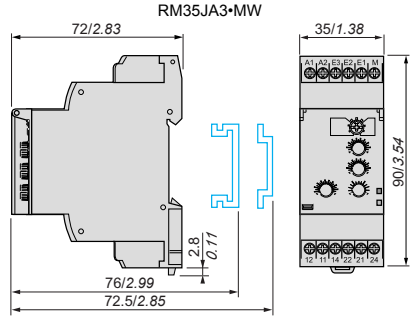
GL, C-Tick, GOST, RoHS

Approximate Dimensions

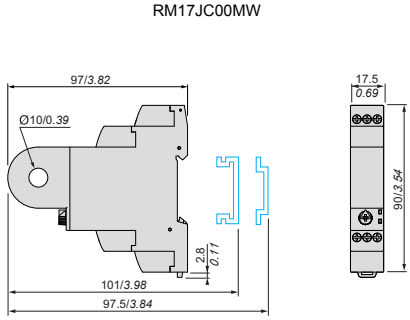
1 C/O =

2C/O =

RM35JA3•MW



RM17JC00MW



Dual Dimensions: **INCHES** Millimeters

[1] Above 15 A, a current transformer can be connected (for RM35JA3•MW). See page 57 of catalog 8430CT0601 for suggested wiring.

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RM17TG•0

RM17TE00

RM17TA00

RM35TM••MW

RM35TF30

Zelio™ Phase Measurement Relays

Zelio Phase Measurement Relays monitor their own power supply. Relay status is indicated by an LED and they are DIN rail mountable.

RM17TG•0 measurement and control relays are for monitoring of 3-phase supplies for the correct sequencing of phases L1, L2, and L3, as well as the total loss of one or more phases.

Table 23.145: 3-Phase Supply Control Relays

Supply Voltage	Detection Threshold	Output 5 A	Width		Catalog Number
			inches	mm	
208–480 Vac	<100 Vac	1 C/O	0.69	17.50	RM17TG00
208–440 Vac		2 C/O			RM17TG20

Table 23.146: Multifunction 3-Phase Supply Control Relays

Supply Voltage	Voltage Range	Output 5 A	Width		Catalog Number
			inch	mm	
208–480 Vac	Selectable voltages: 208, 220, 380, 400, 415, 440, 480	1 C/O	0.69	17.50	RM17TT00 RM17TA00 RM17TU00 RM17TE00

Table 23.147: RM17TT, RM17TA, RM17TU, and RM17TE Multifunction Control Relays monitor the following on 3-phase supplies:

Function	RM17TT	RM17TA	RM17TU	RM17TE
Sequence of phases L1, L2 and L3	Yes	Yes	Yes	Yes
Phase failure with regeneration (0.7 x selected voltage range)	Yes	Yes	Yes	Yes
Asymmetry (phase imbalance)	No	Yes	No	Yes
Undervoltage	No	No	Yes	No
Overvoltage and undervoltage	No	No	No	Yes

Table 23.148: 3-Phase Supply and Motor Temperature Control Relays

Supply Voltage	Measurement Range	Output 5 A	Width		Catalog Number
			inch	mm	
220–480 Vac	208–480 Vac	2 N.O.	1.38	35.00	RM35TM50MW RM35TM250MW

Table 23.149: RM35TM Control Relays monitor the following on 3-phase supplies:

Function	RM35TM50MW	RM35TM250MW
Sequence of phases L1, L2 and L3	Yes	Yes
Phase failure	Yes	Yes
Motor temperature via PTC probe	Yes	Yes
Selection (with or without memory)	No	Yes
Test-reset button	No	Yes

RM35TF30 measurement and control relay is for monitoring of phase sequence, phase failure, asymmetry, undervoltage and overvoltage in window mode.

Table 23.150: Multifunction 3-Phase Supply Control Relays

Supply Voltage	Measurement Range	Output 5 A	Width		Catalog Number
			inch	mm	
220–480 Vac	194–528 Vac	2 C/O	1.38	35.00	RM35TF30

Approvals for Zelio Phase Measurement Relays

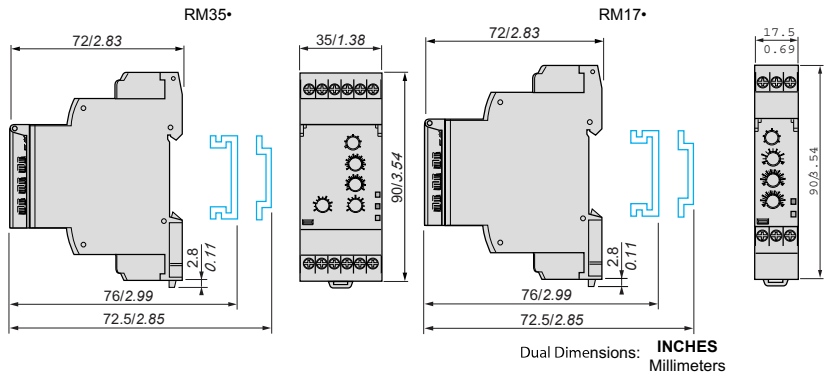
c UL us LISTED — File: E173076 CNN: NRNT, NRNT7

CSA — File: 248382 Class: 3211 07

CE — CE: 73/23/EEC and EMC 89/336/EEC

GL, C-Tick, GOST, RoHS

Approximate Dimensions



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RM17UB310

RM17UAS••

Zelio™ Voltage Measurement Relays

Zelio Voltage Measurement Relays are DIN rail mountable and relay status is indicated by an LED. Single phase and DC voltage measurement and control relays RM17UAS•• and RM17UBE•• monitor:

- Overvoltage
- Undervoltage
- Overvoltage and undervoltage
- Nominal voltages

Table 23.151: Single-phase and DC voltage control relays

Supply Voltage	Ranges Controlled	Output 5 A	Width		Catalog Number
			in.	mm	
12 Vdc	9–15 Vdc	1 C/O	0.69	17.50	RM17UAS14*[2]*
24–48 Vac/Vdc	20–80 Vac/Vdc				RM17UAS16*[2]*
110–240 Vac/Vdc	65–260 Vac/Vdc				RM17UAS15*[2]*
24–48 Vac/Vdc	20–80 Vac/Vdc				RM17UBE16*[3]*
110–240 Vac/Vdc	65–260 Vac/Vdc				RM17UBE15*[3]*

Multifunction voltage control relays RM35UA1•MW monitor both AC and DC voltages.

- Automatic Vdc or Vac recognition
- Selection between overvoltage and undervoltage

RM35UA1•MW

Table 23.152: Multifunction voltage control relays

Supply Voltage	Measurement Range		Output 5 A	Width		Catalog Number
	Range*[4]*	Terminals		in.	mm	
24–240 Vac/Vdc	0.05–0.5 V	E1-M	2 C/O	1.38	35.00	RM35UA11MW
	0.3–3 V	E2-M				
	0.5–5 V	E3-M				
	1–10 V	E1-M				RM35UA12MW
	5–50 V	E2-M				
	10–100 V	E3-M				
	15–150 V	E1-M				RM35UA13MW
	30–300 V	E2-M				
	60–600 V	E3-M				

3-phase voltage control relays monitor:

- Failure of one or more phases
- Voltage between phases
- Absence of neutral
- Voltage between phases and neutral
- Overvoltage and undervoltage

RM35UB3•••

Table 23.153: Three-phase voltage control relays

Rated 3-Phase Supply Voltage Vac	Measurement Range	Output 5 A	Width		Catalog Number
			in.	mm	
220–480 phase-phase	195–528 Vac	1 C/O + 1 C/O 1 per threshold	1.38	35.00	RM35UB330*[5]*
120–277 phase-neutral	183–528 Vac	1 C/O	0.69	17.50	RM17UB310*[5]*
120–277 phase-neutral	114–329 Vac	1 C/O + 1 C/O 1 per threshold	1.38	35.00	RM35UB3N30*[4]*

Approvals for Zelio Voltage Measurement Relays

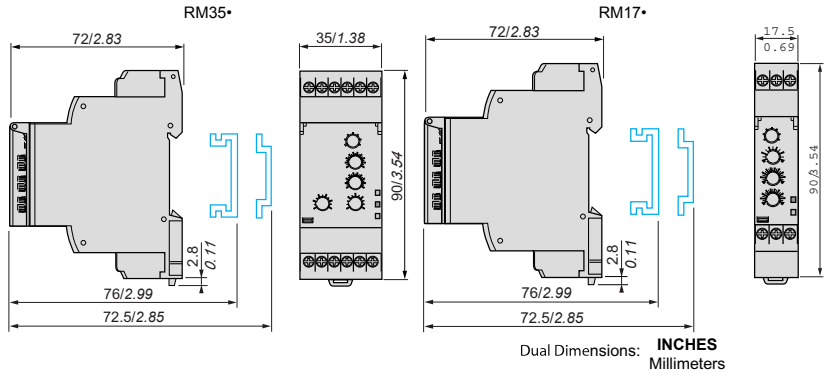
c UL us LISTED — File: E173076 CNN: NRNT, NRNT7

SA — File: 248382 Class: 3211 07

CE — CE 73/23/EEC and EMC 89/336/EEC

GL, C-Tick, GOST, RoHS

Approximate Dimensions



Dual Dimensions: **INCHES** Millimeters

1 C/O =

2 C/O =

[2] Provides overvoltage or undervoltage protection.
[3] Provides overvoltage and undervoltage protection in window mode.
[4] Provides overvoltage and undervoltage protection between phases and neutral and absence of neutral.
[5] Provides overvoltage and undervoltage protection between phases.

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RM35LM33MW

RM35LV14MW

RM79696043

LA9RM201

RM79696006

Zelio™ Level Control Relays and Zelio™ Pump Control Relays

Zelio level control relays control one or two levels with fill or empty function. The settings are protected by a sealable cover, control status is indicated by an LED, and they are DIN rail mountable. RM35LM is designed to control levels of conductive liquid, and RM35LV is designed to control levels of other materials.

Application examples for RM35LM:

- Detecting pump seal failures
- Spring, town, industrial and sea water
- Metallic salt, acid or base solutions
- Liquid fertilizers
- Non-concentrated alcohol (<40%)

Application examples for RM35LV:

- Liquids in the food-processing industry: milk, beer, coffee, etc.
- Chemically pure water
- Fuels, liquid gasses (inflammable)
- Oil, concentrated alcohol (>40%)
- Ethylene, glycol, paraffin, varnish and paints

Table 23.154: Level Control Relays

Time Delay on Crossing the Threshold	Function	Output Relay	Supply Voltage 50/60 Hz	Measurement Ranges	Catalog Number
0.1–5 seconds, 0 + 10%	Detection by resistive probes	2 C/O, 5 A	24–240 Vac/Vdc	250–5 k	RM35LM33MW
				5 k–100 k	
				50 k–1 M	
	Detection by discrete sensors	1 C/O, 5 A		—	RM35LV14MW

Table 23.155: Probes

Application	No. of probes	Operating temperature		Max. Pressure kg/cm²	Catalog Number
		°F	°C		
Recommended for drink vending machines and where installation space is limited (stainless steel)[6]	3	176	80	2	RM79696044
Suitable for boilers, pressure vessels, and under high temperature conditions (1) (304 stainless steel)[6]	1	392	25	200	RM79696014

Table 23.156: Probes

Description	Catalog Number
Protected probe for mounting by suspension, protective shell PUC (S7) Electrode: stainless steel	RM79696043
Liquid level control probe, suspended by cable, maximum operating temperature 212 °F (100 °C)[7]	LA9RM201

Table 23.157: Electrode Holders

Description	Material	Catalog Number
Electrode for use up to 662°F (350°C)	Stainless steel isolated by ceramic	RM79696006

[6] 3/8 in. BSP mounting thread with hexagonal head. Use a 24 mm spanner for tightening.
[7] 3/8 in. BSP mounting head.

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RM35BA10

1 C/O =

2 C/O =

Pump Control Relay

Zelio pump control relay RM35BA10 can operate on a single-phase or 3-phase supply. It incorporates three functions in a signal unit:

- Over and under current measurement
- Single or three phase
- Phase presence control

It has two operating modes which are designed to control a pump via two external signal inputs (Y1 Y2). These two signals are controlled by volt-free contacts. Control inputs Y1 and Y2 can be connected to:

- Level sensor
- Pressure sensor
- Level relay
- Push button

Table 23.158: Pump Control Relay

Description	Current Range Controlled	Supply Voltage	Output	Catalog Number
Pump Control Relay	1–10 A	208–480 Vac, 3 phase 230, single-phase	1 C/O 5 A	RM35BA10

Approvals for Zelio Level Control and Pump Control Relays

c UL us LISTED — File: E173076 CNN: NRNT, NRNT7

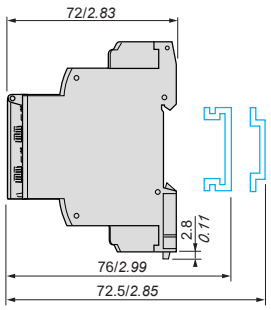
CSA — File: 248382 Class: 3211 07

CE — CE 73/23/EEC and EMC 89/336/EEC

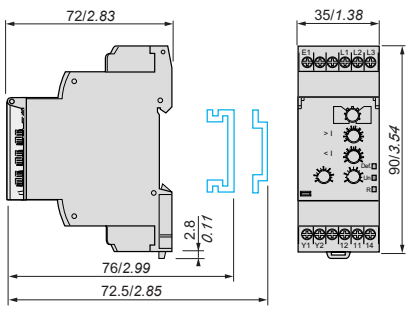
GL, C-Tick, GOST, RoHS

Approximate Dimensions (mm/in.)

RM35LM33MW, RM35LV14MW



RM35BA10



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Zelio™ Speed Control Relays, Frequency Control Relays, and Temperature Control Relays

Zelio speed control relay RM35SOMW monitors underspeed and overspeed conditions, with or without memory, with inhibition by an external contact. It operates with either N.O. or N.C. sensors. Adjustable time between impulses is 0.05 s to 10 min. Power-on inhibition time is adjustable from 0.6 to 60 s. Inhibition is controlled by an external contact. Settings are protected by a sealable cover, control status is indicated by an LED, and it is DIN rail mountable.

RM35S0MW

Table 23.159: Speed Control Relay

Function	Time Delay	Measurement Input	Supply	Out-put	Catalog Number
Under-speed	0.05 s to 10 min	3-wire PNP or NPN proximity sensor	24–240 Vac/ Vdc	1 C/O 5A	RM35S0MW
Over-speed		Namur type proximity sensor 0–30 V voltage Volt-free contact			

Zelio frequency control relay RM35HZ monitors its own supply voltage. Settings are protected by a sealable cover, control status is indicated by an LED, and it is DIN rail mountable.

RM35HZ21FM

Table 23.160: Frequency Control Relay

Function	Controlled	Supply Voltage	Output	Catalog Number
Over frequency and under frequency (50 or 60 Hz)	40–60 Hz (50 Hz) / 50–70 Hz (60 Hz)	120–277 Vac	1 C/O + 1 C/O 5 A	RM35HZ21FM

Zelio temperature control relays are designed for monitoring the temperature in elevator (lift) rooms, in compliance with directive EN81. For use with PT100 input (customer supplied). Features adjustable control, control status indicated by an LED, and is DIN rail mountable.

RM35AT•0MW

Table 23.161: Temperature Control Relays

Function	Supply Voltage	Vac	Output	Catalog Number
Over temperature 93 to 114°F (34 to 46°C)	24–240 Vac/Vdc	—	1 C/O 5 A	RM35ATL0MW
Under temperature 30 to 51°F (-1 to 11°C)		—	2 N.O. 5 A	RM35ATR5MW
Over temperature 93 to 114 °F (34 to 46°C)		208–480 Vac	2 N.O. 5 A	RM35ATW5MW
Under temperature 30 to 51°F (-1 to 11°C)				
Phase sequence				
Phase failure				

Approvals for Zelio Speed, Frequency, and Temperature Control Relays

c UL us LISTED — File: E173076 CNN: NRNT, NRNT7

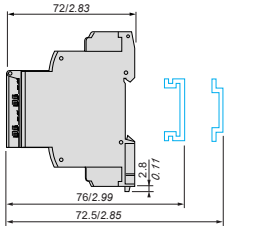
SA — File: 248382 Class: 3211 07

CE — CE: 73/23/EEC and EMC 89/ 336/EEC

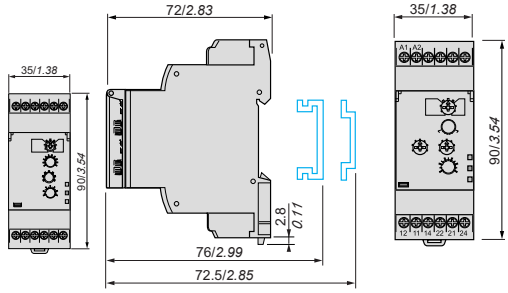
GL, C-Tick, GOST, RoHS

Approximate Dimensions (mm/in.)

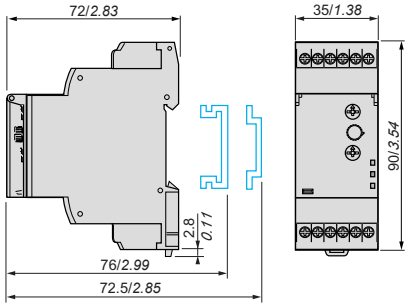
RM35S0MW



RM35HZ21FM



RM35AT••MW



1 C/O =

2 N/O =

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ABL8MEM12020

ABL8REM24030

ABL8RPS24100

ABL8WPS24200

ABL1RPM24042

ABL1RPM24100

Phaseo™ DC Power Supply

Phaseo switch mode power supplies are totally electronic and their output voltage is regulated. They offer:

- Compact size
- High degree of output voltage stability

For use with Universal power supplies, see optional function modules in catalog DIA3ED207041EN-US, which offer a set of solutions to meet the needs for continuity of service such as:

- Immunity to microbreaks
- Voltage holding during power outages
- Voltage holding during power supply equipment failure

Table 23.162: Modular, Single Phase

Input Voltage (Vac)	Output Voltage (Vdc)	Nominal Current (I)	Protection Reset	Catalog Number
100–240	5	4	Auto	ABL8MEM05040
	12	2		ABL8MEM12020
	24	0.3		ABL8MEM24003
		0.6		ABL8MEM24006
		1.2		ABL8MEM24012
		2.5		ABL7RM24025

Table 23.163: Optimum, Single Phase

Input Voltage (Vac)	Output Voltage (Vdc)	Nominal Current (I)	Protection Reset	Catalog Number
100–240	12	5	Auto	ABL7RP1205
	24	3		ABL8REM24030
		5		ABL8REM24050
	48	2.5		ABL7RP4803

Table 23.164: Universal, Single Phase

Input Voltage (Vac)	Output Voltage (Vdc)	Nominal Current (I)	Auto-Protection Reset	Catalog Number
100–120 / 200–500	24	3	Auto/Manual	ABL8RPS24030
		5		ABL8RPS24050
		10		ABL8RPS24100
100–120 / 200–240		20		ABL8RPM24200

Table 23.165: Universal, Three Phase

Input Voltage (Vac)	Output Voltage (Vdc)	Nominal Current (I)	Auto-Protection Reset	Catalog Number
380–500	24	20	Auto/Manual	ABL8WPS24200
		40		ABL8WPS24400

Table 23.166: Dedicated, Single Phase

Input Voltage (Vac)	Output Voltage (Vdc)	Nominal Current (I)	Protection Reset	Catalog Number
100–240 *[1]*	12	5	Auto	ABL1REM12050
	24	2.5		ABL1REM24025
		4.2		ABL1REM24042
100–120 / 200–240 *[2]*	24	6.2		ABL1REM24062
		10		ABL1REM24100
100–240 *[1]*	12	8.3	Auto	ABL1RPM12083
	24	4.2		ABL1RPM24042
100–120 / 200–240 *[2]*	24	6.2		ABL1RPM24062
		10		ABL1RPM24100

Approvals for Phaseo DC Power Supply

c UL us LISTED — File: E164867 CCN: NMTR, NMTR7

c TÜV us — File: E164867 CCN: NMTR2, NMTR8

CSA — File: 238438 Class: 5311-87, 5311-07

CE — RoHS Com-pliant

- SEMI F47 Compliant for most units
- For additional information, refer to Catalog DIA3ED207041EN-US.

[1] Compatible input voltage 120-370 Vdc not indicated on the product.
[2] Compatible input voltage 180-370 Vdc not indicated on the product.

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RMTJ40BD

RMTK90BD

RMPT70BD

RMPT13BD

RMCN22BD

Zelio™ Analog Interface Modules

The Zelio Analog range of converters is designed to convert signals emitted by sensors or electrical measurement devices into standard electrical signals that are compatible with automation platforms and controllers. They also allow the connection distance between a sensor and a measurement device to be increased, for example, between a thermocouple and a programmable controller

Table 23.167: Converters for Type J and K thermocouples—supply voltage 24 Vdc ± 20%, non-isolated

Type	Temperature Range		Switchable Output Signals	Catalog Number
	°F	°C		
Type J	32–302	0–150	0–10 V, 0–20 mA, 4–20 mA	RMTJ40BD
	32–572	0–300	0–10 V, 0–20 mA, 4–20 mA	RMTJ60BD
	32–1112	0–600	0–10 V, 0–20 mA, 4–20 mA	RMTJ80BD
Type K	32–1112	0–600	0–10 V, 0–20 mA, 4–20 mA	RMTK80BD
	32–2192	0–1200	0–10 V, 0–20 mA, 4–20 mA	RMTK90BD

Table 23.168: Converters for Universal Pt100 probes—supply voltage 24 Vdc ± 20%, non-isolated

Type	Temperature Range		Switchable Output Signals	Catalog Number
	°F	°C		
Pt100 2-wire, 3-wire, and 4-wire	- 40–104	- 40–40	0–10 V, 0–20 mA, 4–20 mA	RMPT10BD
	- 148–212	- 100–100	0–10 V, 0–20 mA, 4–20 mA	RMPT20BD
	32–212	0–100	0–10 V, 0–20 mA, 4–20 mA	RMPT30BD
	32–482	0–250	0–10 V, 0–20 mA, 4–20 mA	RMPT50BD
	32–932	0–500	0–10 V, 0–20 mA, 4–20 mA	RMPT70BD

Table 23.169: Converters for Optimum Pt100 probes[1]—supply voltage 24 Vdc ± 20%, non-isolated

Type	Temperature Range		Switchable Output Signals	Catalog Number
	°F	°C		
Pt100 2-wire, 3-wire, and 4-wire	- 40–104	- 40–40	0–10 V or 4–20 mA	RMPT13BD
	- 148–212	- 100–100	0–10 V or 4–20 mA	RMPT23BD
	32–212	0–100	0–10 V or 4–20 mA	RMPT33BD
	32–482	0–250	0–10 V or 4–20 mA	RMPT53BD
	32–932	0–500	0–10 V or 4–20 mA	RMPT73BD

Table 23.170: Universal Voltage/Current Converters

Type	Input Signal	Output Signal	Catalog Number
Supply voltage 24 Vdc ± 20%, non-isolated	0–10 V or 4–20 mA	0–10 V or 4–20 mA	RMCN22BD
Supply voltage 24 Vdc ± 20%, isolated	0–10 V, ± 10 V, 0–20 mA, 4–20 mA	Switchable: 0–10 V, ± 10 V, 0–20 mA, 4–20 mA	RMCL55BD
	0–50 V, 0–300 V, 0–500 V DC or AC, 50/60 Hz	Switchable: 0–10 V, 0–20 mA, 4–20 mA	RMCV60BD
	0–1.5 A, 0–5 A, 0–15 A DC or AC, 50/60 Hz	0–10 V, 0–20 mA, 4–20 mA	RMCA61BD

Approvals for Zelio Analog Interface Modules

c UL us LISTED — File: E164353 CCN: NKCR

SP — File: 044087_S_000 Class: 3211 07

CE — IEC 60947-1

RoHS Compliant

Table 23.171: How to Order

To Order Specify:	Catalog Number
• Catalog Number	RMCN22BD

[1] Converters dedicated to Zelio Logic smart relays.

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ABS2EA02EM

Solid State Interface Modules

ABS solid state relay interface modules are for discrete digital input or output control signals exchanged in automated equipment. Features include:

- High operating rate
- 5 separate character places for marking
- Silent operation
- LED indication of the control signal state
- 35 mm DIN 3 or 32 mm DIN 1 track mountable

Table 23.172: Solid State Interface Input Modules

	Input Module Catalog Number				
Input Module Catalog No.	ABS2EC01EA	ABS2EC01EB	ABS2EC01EE	ABS2EA02EF	ABS2EA02EM
Dimensions (WxDxH)[2]	Inches: 0.37 x 2.78 x 2.91			mm: 9.5 x 70.5 x 74	
Control Circuit Characteristics					
Rated Voltage US	5 Vdc	24 Vdc	48 Vdc	120/127 60Hz	230/240 60Hz
Maximum Voltage	6 (TTL)	28.8 Vdc	57.6 Vdc	140 Vac	264 Vac
Maximum Current at Us	13.6 mA	12 mA	10.5 mA	17 mA	15 mA
Internal Protection Against Reverse Polarity	Yes	Yes	Yes	N/A	N/A
Output Circuit Characteristics					
Rated Operational Voltage Ve	5 to 48 Vdc	5 to 48 Vdc	5 to 48 Vdc	5 to 48 Vdc	5 to 48 Vdc
Min./Max. Voltage	2/60 Vdc	2/60 Vdc	2/60 Vdc	2/60 Vdc	2/60 Vdc
Min./Max. Switching Current	1/50 mA	1/50 mA	1/50 mA	1/50 mA	1/50 mA
Rated Insulation Voltage	Conforming to IEC 60947-1: 300 V Conforming to IEC 0110: 250 V group C				
Approvals	UL E164353, CSA 044087_S_000, IEC 60947-1				

ABS2SA01MB

Table 23.173: Solid State Interface Output Modules

	Output Module Catalog Number			
	ABS2SC01EB — — —	— ABS2SC02EB — —	— — ABS2SA01MB —	— — — ABS2SA02MB
Dimensions (W x D x H) [2]	Inches: 0.69 x 2.78 x 2.91		mm: 17.5 x 70.5 x 74	
Control Circuit Characteristics				
Rated Voltage Us	24 Vdc	24 Vdc	24 Vdc	24 Vdc
Maximum Voltage	28.8 Vdc	28.8 Vdc	28.8 Vdc	28.8 Vdc
Maximum Current at Us	12 mA	12 mA	13.6 mA	13.6 mA
Internal Protection against reverse polarity	Yes	Yes	Yes	Yes
Output Circuit Characteristics				
Rated Operational Voltage Ve	5 to 48 Vdc	5 to 48 Vdc	24 to 240 Vac	24 to 240 Vac
Maximum Voltage	57.6 Vdc	57.6 Vdc	264 Vac	264 Vac
Internal Protection against reverse polarity	Yes	Yes	Yes	Yes
External Protection	3.15 A external fuse fast blow (Ik <= 1 kA AC and Ik <= 100 A DC)			
Rated insulation voltage	Conforming to IEC 60947-1: 300 V Conforming to VDE 0110: 250 V group C			
Approvals	UL E164353, CSA 044087_S_000, IEC 60947-1			

- For Mounting Track, see Mounting Track, End Clamps, Jumpers, Fanning Strips, page 24-19.

Table 23.174: How to Order

To Order Specify:	Catalog Number
• Catalog Number	ABS2EC01EA

[2] Dimensions mounted on DIN 3 (7.5 mm high) track.

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ABR1E411F

ABR2E112E

ABR1S111F

ABR2S102B

Electromechanical Interface Modules

ABR electromechanical relay modules are for discrete digital input or output control signals exchanged in automated equipment. Features include:

- High contact reliability
- LED indication of the control signal state
- 5 separate character places for marking
- 35 mm DIN 3 or 32 mm DIN 1 track mountable

Table 23.175: Input Modules

Coil Voltage	Options	1 N.O. Contact	1 C.O. Contact	2 N.O. Contacts
		Catalog Number	Catalog Number	Catalog Number
24 Vac/Vdc	Manual Operator and LED Indication	ABR1E118B[3]	ABR1E318B[3]	ABR1E418B[3]
48 Vac/Vdc		ABR1E118E[3]	ABR1E318E[3]	ABR1E418E[3]
110–125 Vdc		ABR1E112F[3]	ABR1E312F[3]	ABR1E412F[3]
110–127 Vac 50/60 Hz		ABR1E111F[3]	ABR1E311F[3]	ABR1E411F[3]
230–240 Vac 50/60 Hz		ABR1E111M[3]	ABR1E311M[3]	ABR1E411M[3]
230–240 Vac 50/60 Hz	Manual Operator	ABR1E101M[3]	ABR1E301M[3]	—
24 Vdc	LED Indication	ABR2E112B	—	—
48 Vdc		ABR2E112E	—	—
120–127 Vac 60 Hz		ABR2E116F	—	—
230–240 Vac 50/60 Hz		ABR2E111M	—	—
24 Vdc		—	ABR2EB312B	—

Table 23.176: Output Modules

Coil Voltage	Options	1 N.O. Contact	1 C.O. Contact	2 N.O. Contacts	1 N.C. & 1 N.O. Contact
		Catalog Number	Catalog Number	Catalog Number	Catalog Number
24 Vdc	Manual Operator	ABR1S102B[3]	ABR1S302B[3]	ABR1S402B[3]	ABR1S602B[3]
24 Vac/Vdc	Manual Operator and LED Indication	ABR1S118B[3]	ABR1S318B[3]	ABR1S418B[3]	ABR1S618B[3]
48 Vac/Vdc		ABR1S118E[3]	ABR1S318E[3]	ABR1S418E[3]	ABR1S618E[3]
110–127 Vac 50/60 Hz		ABR1S111F[3]	ABR1S311F[3]	ABR1S411F[3]	ABR1S611F[3]
24 Vdc	LED Indication	ABR2S112B	—	—	—
48 Vdc		—	ABR2SB312B	—	—
24 Vdc	—	ABR2S102B	—	—	—

Table 23.177: Coil Data: ABR1E, ABR2E

Relay		ABR1E					ABR2E			
Coil Voltage Ue	V	24 Vac/Vdc	48 Vac/Vdc	127 Vdc	127 Vac	240 Vac	24 Vdc	48 Vdc	127 Vac	240 Vac
Maximum Voltage	V	30	53	137	140	255	28.8	56	140	264
Pick-up Voltage	V	17	38	97	93	195	16.9	37.3	97	186
Minimum Sealed Current	mA	5.2	5.4	1.5	2.4	2	2	2	2.5	2.5
Maximum Sealed Current	mA	62	36	15	8	7	19.5	11	16	15

Table 23.178: Coil Data: ABR2EB, ABR1S, ABR2S, ABR2SB

Relay		ABR2EB	ABR1S				ABR2S		ABR2SB
Coil Voltage Ue	V	24 Vdc	24 Vdc	24 Vdc	48 Vac/Vdc	127 Vac	24	24	24
Maximum Voltage	V	28.8	30	30	53	140	28.8	28.8	28.8
Pick-up Voltage	V	16.9	17	17	38	83	16.9	16.9	16.9
Minimum Sealed Current	mA	2	6.6	6.2	5.4	2.4	2	2	2
Maximum Sealed Current	mA	29	62	62	36	8	28	17	29

Table 23.179: Contact Ratings

Relay		ABR1E	ABR2E	ABR2EB	ABR1S	ABR2S	ABR2SB
Rated Voltage Ue	Vac	250	115	48	250	230	48
Rated Voltage Ue	Vdc	125	100	48	125	120	48
Thermal Current Ith	A	2	1	0.05	5	5	0.05
Break Rating (AC14)	A	1	0.5	1	1	1	—
Break Rating (DC13)	A	1	1	1	1	1.5	—

Table 23.180: Dimensions

Modules	Approximate Dimensions (WxDxH)[4]	
	In.	mm
ABR1E, ABR2EB, ABR2SB	0.69 x 2.91 x 2.78	17.5 x 74 x 70.5
ABR2E	0.37 x 2.91 x 2.78	9.5 x 74 x 70.5
ABR2S1	0.47 x 2.91 x 2.78	12 x 74 x 70.5

Approvals	
ABR1E, ABR2E	UL E164353, CSA 044087_S_000, IEC 60947-1
ABR1S, ABR2S	UL E164353, CSA 044087_S_000, IEC 60947-1

- ABR1 relays are RoHS compliant.
- For Mounting Track, see page 24-19.

[3] RoHS Compliant
[4] Dimensions mounted on DIN 3 (7.5 mm high) track.

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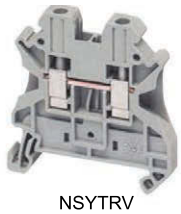
Section 24
Terminal Blocks


NSYTRV

NSYTRR

NSYTRP

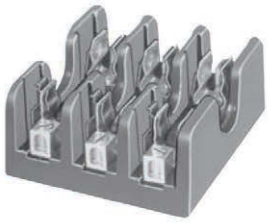
9080GR6

NSYEBCD12614

9080GCB

9080LB

9080GF6


9080FB

DZ5

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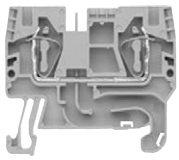
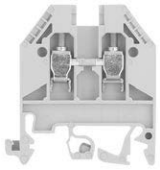
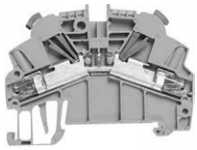
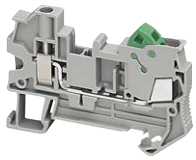
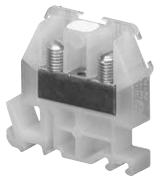
Terminal Block Panorama

Table 24.1: Product Panorama

						
Product Family		**NSYTRV**	**NSYTRR**	**NSYTRP**	**NSYTRH**	**9080G**
Type of product		IEC screw technology	IEC spring technology	IEC push-in technology	IEC hybrid (screw and insulation displacement connection)	NEMA screw technology
Mounting		DIN 3	DIN 3	DIN 3	DIN 3	DIN 3 and Square D track *[1]*
Maximum rated voltage (V)		600	600	600	600	600 *[2]*
Maximum rated current per UL (A)		285	85	30	15	255
Ambient air temperature		-40 to +266 °F (-40 to 130 °C)				-40 to +257 °F (-40 to 125 °C)
Approvals *[3]*		UL File E87739 CCN XCFR2	UL File E87739 CCN XCFR2	UL File E87729 CCN XCFR2	UL File E87729 CCN XCFR2	UL File E60616 CCN XCFR2
		CSA File 25644 Class 6228-01	CSA File 25644 Class 6228-01	CSA File 25644 Class 6228-01	CSA File 256444 Class 6228-01	CSA File 025490 Class 3211–07
Color		Gray Blue Orange Red Green White Black Green/Yellow	Gray Blue Orange Green/Yellow	Gray Blue Orange Green/Yellow	Gray Green/Yellow	Natural (White) Black Blue Green Gray Orange Red Yellow Brown

[1] 9080GK6 can be mounted directly to a panel or on Square D track.
[2] 9080GT6 is 120 V.
[3] Refer to catalogs 9080CT1301 and 9080CT9601 for a complete list of certifications.

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Passthrough

Table 24.2: Spring Passthrough Blocks

Description		Maximum Voltage	Maximum Current	Block			End Barrier[1]		
				Color	Catalog Number	Std. Pack[2]	Color	Catalog Number	Std. Pack[2]
5.2 mm (0.21 in.) wide	Two Terminals Solid or Stranded Copper Wire 28–12 AWG	600 V	20 A	Grey	NSYTRR22	50	Grey	NSYTRACR22	50
				Blue	NSYTRR22BL		Blue	NSYTRACR22BL	
				Orange	NSYTRR22AR		Grey	NSYTRACR22	
5.2 mm (0.21 in.) wide	Three Terminals Solid or Stranded Copper Wire 28–12 AWG	600 V	20 A	Grey	NSYTRR23	50	Grey	NSYTRACR23	50
				Blue	NSYTRR23BL		Blue	NSYTRACR23BL	
				Orange	NSYTRR23AR		Grey	NSYTRACR23	
5.2 mm (0.21 in.) wide	Four Terminals Solid or Stranded Copper Wire 28–12 AWG	600 V	20 A	Grey	NSYTRR24	50	Grey	NSYTRACR24	50
				Blue	NSYTRR24BL		Blue	NSYTRACR24BL	
				Orange	NSYTRR24AR		Grey	NSYTRACR24	
6.2 mm (0.24 in.) wide	Two Terminals Solid or Stranded Copper Wire 28–10 AWG	600 V	30 A	Grey	NSYTRR42	50	Grey	NSYTRACR42	50
				Blue	NSYTRR42BL		Grey	NSYTRACR42	
				Orange	NSYTRR42AR		Grey	NSYTRACR42	
6.2 mm (0.24 in.) wide	Three Terminals Solid or Stranded Copper Wire 28–10 AWG	600 V	30 A	Grey	NSYTRR43	50	Grey	NSYTRACR43	50
				Blue	NSYTRR43BL		Grey	NSYTRACR43	
6.2 mm (0.24 in.) wide	Four Terminals Solid or Stranded Copper Wire 28–10 AWG	600 V	30 A	Grey	NSYTRR44	50	Grey	NSYTRACR44	50
				Blue	NSYTRR44BL		Grey	NSYTRACR44	
8.2 mm (0.32 in.) wide	Two Terminals Solid or Stranded Copper Wire 28–8 AWG	600 V	50 A	Grey	NSYTRR62	50	Grey	NSYTRACR62	50
				Blue	NSYTRR62BL		Grey	NSYTRACR62	
8.2 mm (0.32 in.) wide	Three Terminals Solid or Stranded Copper Wire 24–8 AWG	600 V	50 A	Grey	NSYTRR63	50	Grey	NSYTRACR63	50
10.2 mm (0.40 in.) wide	Two Terminals Solid or Stranded Copper Wire 16–6 AWG	600 V	66 A	Grey	NSYTRR102	50	Grey	NSYTRACRR102	50
				Blue	NSYTRR102BL		Grey	NSYTRACRR102	
12.2 mm (0.48 in.) wide	Two Terminals Solid or Stranded Copper Wire 16–4 AWG	600 V	85 A	Grey	NSYTRR162	50	Grey	NSYTRACR162	50
				Blue	NSYTRR162BL		Grey	NSYTRACR162	

File: E87739 CCN: XCFR2

File: 256444 Class: 6228-01

RoHS Compliant

For track and accessories, see Mounting Track and End Clamps, page 24-15.

[1] One end-barrier is required for each assembly of like blocks.
[2] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

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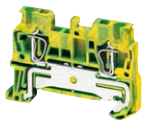
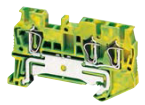
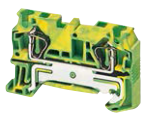
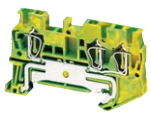
Grounding

Table 24.3: Spring Grounding Blocks

Description		Block			End Barrier [3]		
		Color	Catalog Number	Std. Pack [4]	Color	Catalog Number	Std. Pack [4]
 5.2 mm (0.21 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 28–12 AWG	Green / Yellow	NSYTRR22PE	50	Grey	NSYTRACR22	50
 5.2 mm (0.21 in.) wide	Grounding Block Three Terminals Solid or Stranded Copper Wire 28–12 AWG	Green /Yellow	NSYTRR23PE	50	Grey	NSYTRACR23	50
5.2 mm (0.21 in.) wide	Grounding Block Four Terminals Solid or Stranded Copper Wire 28–12 AWG	Green /Yellow	NSYTRR24PE	50	Grey	NSYTRACR24	50
 6.2 mm (0.24 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 28–10 AWG	Green /Yellow	NSYTRR42PE	50	Grey	NSYTRACR42	50
 6.2 mm (0.24 in.) wide	Grounding Block Three Terminals Solid or Stranded Copper Wire 28–10 AWG	Green /Yellow	NSYTRR43PE	50	Grey	NSYTRACR43	50
6.2 mm (0.24 in.) wide	Grounding Block Four Terminals Solid or Stranded Copper Wire 28–10 AWG	Green /Yellow	NSYTRR44PE	50	Grey	NSYTRACR44	50
8.2 mm (0.32 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 24–8 AWG	Green / Yellow	NSYTRR62PE	50	Grey	NSYTRACR62	50
10.2 mm (0.40 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 16–6 AWG	Green /Yellow	NSYTRR102PE	50	Grey	NSYTRACR102	50
12.2 mm (0.48 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 16–4 AWG	Green /Yellow	NSYTRR162PE	50	Grey	NSYTRACR162	10

File: E87739 CCN: XCFR2

File: 256444 Class: 6228-01

RoHS Compliant

For track and accessories, see Mounting Track and End Clamps, page 24-15.

[3] One end-barrier is required for each assembly of like blocks.
[4] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

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Double and Triple Deck, Grounding, Component Carriers, Blade Isolators

Table 24.4: Spring Double and Triple Deck Passthrough

Description		Max. Voltage	Max. Current [5]	Block			End Barrier [6]		
				Color	Catalog Number	Std. Pack [7]	Color	Catalog Number	Std. Pack [7]
5.2 mm (0.21 in.) wide	Double Deck Block, Two Terminals In and Two Out, Solid or Stranded Copper Wire, 28–12 AWG	600 V	20 A	Grey	NSYTRR24D	50	Grey	NSYTRACRE24	50
				Blue	NSYTRR24DBL		Grey	NSYTRACRE24	
6.2 mm (0.24 in.) wide	Double Deck Block, Two Terminals In and Two Out, Solid or Stranded Copper Wire, 28–10 AWG	600 V	30 A	Grey	NSYTRR44D	50	Grey	NSYTRACRE44	50
				Blue	NSYTRR44DBL		Grey	NSYTRACRE44	
5.2 mm (0.21 in.) wide	Triple Deck Block, Three Terminals In and Three Out, Solid or Stranded Copper Wire, 28–12 AWG	600 V	20 A	Grey	NSYTRR26T	50	Grey	NSYTRACRE26	50
				Blue	NSYTRR26TBL		Grey	NSYTRACRE26	

Table 24.5: Spring Grounding Double Deck

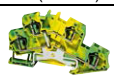
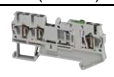
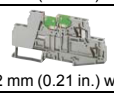
Description		Block			End Barrier [6]		
		Color	Catalog Number	Std. Pack [7]	Color	Catalog Number	Std. Pack [7]
5.2 mm (0.21 in.) wide	Grounding Block, Two Terminals In and Two Out, Solid or Stranded Copper Wire, 28–12 AWG	Green/Yellow	NSYTRR24DPE	50	Grey	NSYTRACRE24	50
 6.2 mm (0.24 in.) wide	Grounding Block, Two Terminals In and Two Out, Solid or Stranded Copper Wire, 28–10 AWG	Green/Yellow	NSYTRR44DPE	50	Grey	NSYTRACRE44	50

Table 24.6: Spring Component Carriers

Description		Max. Voltage	Max. Current [5]	Color	Catalog Number	Std. Pack [7]	End Barrier [6]		
							Color	Catalog Number	Std. Pack [7]
5.2 mm (0.21 in.) wide	Component Carrier, Two Terminals, Solid or Stranded Copper Wire, 28–12 AWG	300 V	16 A	Grey	NSYTRR22TB	50	Grey	NSYTRACR23	50
	For fuse 5 x 20 mm	Depends on fuse or diode used		Black	NSYTRASF520	10	Not required		
	For fuse 5 x 20 mm 110–250 V LED				NSYTRASF520M	10			
	For fuse 5 x 20 mm 12–30 V LED				NSYTRASF520B	10			
	For component			Grey	NSYTRASV1	10			
	With 1N4007 diode				NSYTRASV2	10			
5.2 mm (0.21 in.) wide	Component Carrier, One Terminal In and Two Out, Solid or Stranded Copper Wire, 28–12 AWG	300 V	16 A	Grey	NSYTRR23TB	50	Grey	NSYTRACR24	50
	For fuse 5 x 20 mm	Depends on fuse or diode used		Black	NSYTRASF520	10	Not required		
	For fuse 5 x 20 mm 110–250 V LED				NSYTRASF520M	10			
	For fuse 5 x 20 mm 12–30 V LED				NSYTRASF520B	10			
	For component			Grey	NSYTRASV1	10			
	With 1N4007 diode				NSYTRASV2	10			

Table 24.7: Spring Blade Isolators

Description		Max. Voltage	Max. Current [5]	Block			End Barrier [6]		
				Color	Catalog Number	Std. Pack [7]	Color	Catalog Number	Std. Pack [7]
5.2 mm (0.21 in.) wide	Blade Isolator, Two Terminals, Solid or Stranded Copper Wire, 28–12 AWG	600 V	16 A	Grey	NSYTRR22SC	50	Grey	NSYTRACR23	50
				Orange	NSYTRR22SCAR		Grey	NSYTACR23	
 5.2 mm (0.21 in.) wide	Blade Isolator, Three Terminals, Solid or Stranded Copper Wire, 28–12 AWG	600 V	16 A	Grey	NSYTRR23SC	50	Grey	NSYTACR24	50
				Orange	NSYTRR23SCAR		Grey	NSYTACR24	
 5.2 mm (0.21 in.) wide	Blade Isolator, Two Terminals In and Two Out, Solid or Stranded Copper Wire, 28–12 AWG	300 V	10 A	Grey	NSYTRR24SCD	50	Not required for this block.		

File: E87739 CCN: XCFR2

File: 256444 Class: 6228-01

RoHS Compliant

For track and accessories, see Mounting Track and End Clamps, page 24-15.

[5] These maximum current values assume the use of insulated copper conductors with 167 °F (75 °C) temperature rating and are calculated based on NEC Article 310, Table 310-16. In most cases this value is the maximum ampacity of the wire which has the greatest current carrying capacity. The actual allowable current for a particular application depends on the size, insulation class, and other characteristics of the wire used. The UL ratings are shown. The CSA rating may be higher or lower. Refer to the catalog for CSA ratings.

[6] One end-barrier is required for each assembly of like blocks.

[7] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

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Miniature Spring Passthrough and Grounding

Table 24.8: Miniature Spring Passthrough DIN Rail Mounting

Description		Maximum Voltage	Maximum Current [8]	Block			End Barrier [9]		
				Color	Catalog Number	Std. Pack [10]	Color	Catalog Number	Std. Pack [10]
5.2 mm (0.21 in.) wide	Two Terminals Solid or Stranded Copper Wire 28–12 AWG Mount on DIN Rail 15 x 7.2 mm	600 V	20 A	Grey	NSYTRR22M	50	Grey	NSYTRACRM22	50
				Blue	NSYTRR22MBL		Grey	NSYTRACRM22	
10.4 mm (0.41 in.) wide	Four Terminals Solid or Stranded Copper Wire 28–12 AWG Mount on DIN Rail 15 x 7.2 mm	600 V	20 A	Grey	NSYTRR24M	50	Grey	NSYTRACRM22	50
				Blue	NSYTRR24MBL		Grey	NSYTRACRM22	

Table 24.9: Miniature Spring Grounding Type

Description		Block			End Barrier [9]		
		Color	Catalog Number	Std. Pack [10]	Color	Catalog Number	Std. Pack [10]
5.2 mm (0.21 in.) wide	Grounding Block, Two Terminals, Solid or Stranded Copper Wire 28–12 AWG Mount on DIN Rail 15 x 7.2 mm	Green/Yellow	NSYTRR22MPE	50	Grey	NSYTRACRM22	50

Table 24.10: Miniature Spring Passthrough Direct Mounting and for Micro-Perforated Mounting Plates

Description		Maximum Voltage	Maximum Current [8]	Block			End Barrier [9]		
				Color	Catalog Number	Std. Pack [10]	Color	Catalog Number	Std. Pack [10]
5.2 mm (0.21 in.) wide	Direct Mounting (Flange) Two TerminalsSolid or Stranded Copper Wire 28–12 AWG	600 V	20 A	Grey	NSYTRR22MF	50	Grey	NSYTRACRM22	50
				Blue	NSYTRR22MFBL		Grey	NSYTRACRM22	
				Grey	NSYTRR22MFF [11]		Grey	NSYTRACRM22 or NSYTRACRMF22 [11]	
10.4 mm (0.41 in.) wide	Direct Mounting (Flange) Four TerminalsSolid or Stranded Copper Wire 28–12 AWG	600 V	20 A	Grey	NSYTRR24MF	50	Grey	NSYTRACRM22	50
				Blue	NSYTRR24MFBL		Grey	NSYTRACRM22	
				Grey	NSYTRR24MFF [11]		Grey	NSYTRACRM22 or NSYTRACRMF22 [11]	
5.2 mm (0.21 in.) wide	For Micro-Perforated Mounting Plates Two TerminalsSolid or Stranded Copper Wire 28–12 AWG	600 V	20 A	Grey	NSYTRR22MP	50	Grey	NSYTRACRM22	50
				Blue	NSYTRR22MPBL		Grey	NSYTRACRM22	
10.4 mm (0.41 in.) wide	For Micro-Perforated Mounting Plates Four TerminalsSolid or Stranded Copper Wire 28–12 AWG	600 V	20 A	Grey	NSYTRR24MP	50	Grey	NSYTRACRM22	50
				Blue	NSYTRR24MBL		Grey	NSYTRACRM22	

File: E87739, CCN: XCFR2 File: 256444, Class: 6228-01 RoHS Compliant For track and accessories, see Mounting Track and End Clamps, page 24-15.

[8] These maximum current values assume the use of insulated copper conductors with 167 °F (75 °C) temperature rating and are calculated based on NEC Article 310, Table 310-16. In most cases this value is the maximum ampacity of the wire which has the greatest current carrying capacity. The actual allowable current for a particular application depends on the size, insulation class, and other characteristics of the wire used. The UL ratings are shown. The CSA rating may be higher or lower. Refer to the catalog for CSA ratings.
[9] One end-barrier is required for each assembly of like blocks.
[10] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.
[11] With flange. Can only be used at the end of a group of terminals.

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Passthrough and Grounding

Table 24.11: Screw Type Passthrough Blocks

Description		Maximum Voltage	Maximum Current [12]	Block			End Barrier [13]		
				Color	Catalog Number	Std. Pack [14]	Color	Catalog Number	Std. Pack [14]
5.2 mm (0.21 in.) wide	Two Terminals Solid or Stranded Copper Wire 26–12 AWG	600 V	20 A	Grey	NSYTRV22	50	Grey	NSYTRAC22	50
				Blue	NSYTRV22BL		Blue	NSYTRAC22BL	
				Orange	NSYTRV22AR		Grey	NSYTRAC22	
				Red	NSYTRV22RD		Grey	NSYTRAC22	
				White	NSYTRV22WH		Grey	NSYTRAC22	
6.2 mm (0.24 in.) wide	Two Terminals Solid or Stranded Copper Wire 26–10 AWG	600 V	00 A	Grey	NSYTRV42	50	Grey	NSYTRAC22	50
				Blue	NSYTRV42BL		Blue	NSYTRAC22BL	
				Orange	NSYTRV42AR		Grey	NSYTRAC22	
				Red	NSYTRV42RD		Grey	NSYTRAC22	
				Green	NSYTRV42GN		Grey	NSYTRAC22	
				White	NSYTRV42WH		Grey	NSYTRAC22	
				Black	NSYTRV42BK		Grey	NSYTRAC22	
8.2 mm (0.32 in.) wide	Two Terminals Solid or Stranded Copper Wire 24–8 AWG	600 V	50 A	Grey	NSYTRV62	50	Grey	NSYTRAC22	50
				Blue	NSYTRV62BL		Blue	NSYTRAC22BL	
10.2 mm (0.40 in.) wide	Two Terminals Solid or Stranded Copper Wire 20–6 AWG	600 V	65 A	Grey	NSYTRV102	50	Grey	NSYTRAC22	50
				Blue	NSYTRV102BL		Blue	NSYTRAC22BL	
12.2 mm (0.48 in.) wide	Two Terminals Solid or Stranded Copper Wire 16–4 AWG	600 V	85 A	Grey	NSYTRV162	50	Grey	NSYTRAC162	50
				Blue	NSYTRV162BL		Grey	NSYTRAC162	
16 mm (0.63 in.) wide	Two Terminals Solid or Stranded Copper Wire 14–1/0 AWG	600 V	150 A	Grey	NSYTRV352	50	Not required for these blocks.		
				Blue	NSYTRV352BL				
20 mm (0.79 in.) wide	Two Terminals Solid or Stranded Copper Wire 6–1/0 AWG	600 V	150 A	Grey	NSYTRV502	50	Not required for these blocks.		
				Blue	NSYTRV502BL				

Table 24.12: Screw Type Grounding Blocks

Description		Block			End Barrier [13]		
		Color	Catalog Number	Std. Pack [14]	Color	Catalog Number	Std. Pack [14]
5.2 mm (0.21 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 26–12 AWG	Green/Yellow	NSYTRV22PE	50	Grey	NSYTRAC22	50
6.2 mm (0.24 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 26–10 AWG	Green/Yellow	NSYTRV42PE	50	Grey	NSYTRAC22	50
8.2 mm (0.32 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 24–8 AWG	Green/Yellow	NSYTRV62PE	50	Grey	NSYTRAC22	50
10.2 mm (0.40 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 20–6 AWG	Green/Yellow	NSYTRV102PE	50	Grey	NSYTRAC22	50
12.2 mm (0.48 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 16–4 AWG	Green/Yellow	NSYTRV162PE	50	Grey	NSYTRAC162	50
16 mm (0.63 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 14–1/0 AWG	Green/Yellow	NSYTRV352PE	50	Not required for this block.		
20 mm (0.79 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 6–1/0 AWG	Green/Yellow	NSYTRV502PE	50	Not required for this block.		

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For track and accessories, see page 24-15.

[12] These maximum current values assume the use of insulated copper conductors with 167 °F (75 °C) temperature rating and are calculated based on NEC Article 310, Table 310-16. In most cases this value is the maximum ampacity of the wire which has the greatest current carrying capacity. The actual allowable current for a particular application depends on the size, insulation class, and other characteristics of the wire used. The UL ratings are shown. The CSA rating may be higher or lower. Refer to the catalog for CSA ratings.
[13] One end-barrier is required for each assembly of like blocks.
[14] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

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Lug/Lug, Double and Triple Deck Passthrough, Grounding

Table 24.13: Passthrough, Lug/Lug, and Lug/Clamp

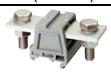
Description			Block				Partition Cover		
			Maximum Current[15]	Color	Catalog Number	Std. Pack [16]	Color	Catalog Number	Std. Pack [16]
20.3 mm (0.80 in.) wide	Passthrough Solid or Stranded Copper Wire 4–3/0 AWG	Screw thread M8 Maximum Voltage–600 V	192 A	Grey	NSYTRV702	10	Not required for this block.		
40 mm (1.58 in.) wide	Lug to Lug Solid or Stranded Copper Wire 2–4/0 AWG	Screw thread M12 Maximum Voltage–600 V	230 A	Grey	NSYTRV952BB	10	Grey	NSYTRAC952	10
40 mm (1.58 in.) wide	Solid or Stranded Copper Wire 2–4/0 AWG	Screw thread M12 Maximum Voltage–600 V	230 A	Grey	NSYTRV952BC	10	Grey	NSYTRAC952	10
 46 mm (1.81 in.) wide	Lug to Lug Solid or Stranded Copper Wire 2–300 AWG/kcmil	Screw thread M12 Maximum Voltage–600 V	285 A	Grey	NSYTRV1502BB	10	Grey	NSYTRAC952	10

Table 24.14: Screw Type Double and Triple Deck Passthrough

Description		Maximum Voltage	Maximum Current[15]	Block			End Barrier [17]		
				Color	Catalog Number	Std. Pack [16]	Color	Catalog Number	Std. Pack [16]
6.2 mm (0.24 in.) wide	Double Deck, One Pole, Three Terminals Solid or Stranded Copper Wire 26–10 AWG	150 V	30 A	Grey	NSYTRV43	50	Grey	NSYTRAC23	50
				Blue	NSYTRV43BL		Grey	NSYTRAC23	
6.2 mm (0.24 in.) wide	Double Deck, One Pole, Four Terminals Solid or Stranded Copper Wire 26–10 AWG	150 V	30 A	Grey	NSYTRV44	50	Grey	NSYTRAC24	50
				Blue	NSYTRV44BL		Grey	NSYTRAC24	
5.2 mm (0.21 in.) wide	Double Deck, Two Poles, Four Terminals Solid or Stranded Copper Wire 26–12 AWG	600 V	20 A	Grey	NSYTRV24D	50	Grey	NSYTRACE24	50
				Blue	NSYTRV24DBL		Grey	NSYTRACE24	
6.2 mm (0.24 in.) wide	Double Deck, Two Poles, Four Terminals Solid or Stranded Copper Wire 26–10 AWG	600 V	30 A	Grey	NSYTRV44D	50	Grey	NSYTRACE24	50
				Blue	NSYTRV44DBL		Grey	NSYTRACE24	
5.2 mm (0.21 in.) wide	Triple Deck, Three Poles, Six Terminals Solid or Stranded Copper Wire 26–10 AWG	600 V	20 A	Grey	NSYTRV26T	50	Grey	NSYTRACE26	50

Table 24.15: Screw Type Grounding Double Deck

Description		Block			End Barrier [17]		
		Color	Catalog Number	Std. Pack [16]	Color	Catalog Number	Std. Pack [16]
6.2 mm (0.24 in.) wide	Grounding Block, One Pole, Three Terminals Solid or Stranded Copper Wire 26–12 AWG	Green/Yellow	NSYTRV43PE	50	Grey	NSYTRAC23	50
6.2 mm (0.24 in.) wide	Grounding Block, One Pole, Four Terminals Solid or Stranded Copper Wire 26–12 AWG	Green/Yellow	NSYTRV44PE	50	Grey	NSYTRAC24	50
5.2 mm (0.21 in.) wide	Grounding Block, One Pole, Four Terminals Solid or Stranded Copper Wire 26–12 AWG	Green/Yellow	NSYTRV24DPE	50	Grey	NSYTRACE24	50
6.2 mm (0.24 in.) wide	Grounding Block, One Pole, Four Terminals Solid or Stranded Copper Wire 26–10 AWG	Green/Yellow	NSYTRV44DPE	50	Grey	NSYTRACE24	50

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RoHS Compliant

For track and accessories, see page 24-15.

[15] These maximum current values assume the use of insulated copper conductors with 167 °F (75 °C) temperature rating and are calculated based on NEC Article 310, Table 310-16. In most cases this value is the maximum ampacity of the wire which has the greatest current carrying capacity. The actual allowable current for a particular application depends on the size, insulation class, and other characteristics of the wire used. The UL ratings are shown. The CSA rating may be higher or lower. Refer to the catalog for CSA ratings.

[16] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

[17] One end-barrier is required for each assembly of like blocks.

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Blade Isolators, Component Carriers, Fused, Measuring, Grounding

Table 24.16: Screw Type Blade Isolators

Description		Maximum Voltage	Maximum Current [18]	Block			End Barrier [19]		
				Color	Catalog Number	Std. Pack [20]	Color	Catalog Number	Std. Pack [20]
6.2 mm (0.24 in.) wide	Blade Isolator Two Terminals Solid or Stranded Copper Wire 26–10 AWG	600 V	16 A	Grey	NSYTRV42SC	50	Not required for this block.		
				Grey with Test Points	NSYTRV42ST				
				Orange with Test Points	NSYTRV42STAR				
6.2 mm (0.24 in.) wide	Blade Isolator Double Deck Four Terminals Solid or Stranded Copper Wire 26–10 AWG	300 V	30 A	Grey	NSYTRV42SCD	50	Grey	NSYTRACE24	50

Table 24.17: Screw Type Component Carrier

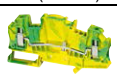
Description		Maximum Voltage	Maximum Current [18]	Color	Catalog Number	Std. Pack [20]	End Barrier [19]
6.2 mm (0.24 in.) wide	Component Carrier Two Terminals Solid or Stranded Copper Wire 26–10 AWG	600 V	16 A	Grey	NSYTRV42TB	50	Not required for this block
	For fuse 5 x 20 mm	Depends on fuse or diode used		Black	NSYTRASF520	10	Not required
	For fuse 5 x 20 mm 110–250 V LED				NSYTRASF520M	10	
	For fuse 5 x 20 mm 12–30 V LED				NSYTRASF520B	10	
	For component			Grey	NSYTRASV1	10	
	With 1N4007 diode				NSYTRASV2	10	

Table 24.18: Fused Terminal Blocks

Description			Color	Catalog Number	Std. Pack [20]	End Barrier [19]		
						Color	Catalog Number	Std. Pack [20]
12 mm (0.47 in.) wide	Fuse Block For G-fuse cartridge 5x20 mm Solid or Stranded Copper Wire 24–6 AWG Maximum Voltage 300 V Maximum Current 20 A[18]	Without Indicator Lamp	Black	NSYTRV162SF	50	Not required for this block.		
8.2 mm (0.32 in.) wide	Lever-Type Fuse For G-fuse cartridge 5x20 mm Solid or Stranded Copper Wire 26–10 AWG Maximum Voltage 600 V Maximum Current 12 A[18]	Without Indicator Lamp	Black	NSYTRV42SF5	50	Not required for this block.		
		With Light Indicator, 12–30 V AC/DC[21]	Black	NSYTRV42SF5LD	50			
		With Light Indicator, 110–250 V AC/DC[21]	Black	NSYTRV42SF5LA	50			
10.2 mm (0.40 in.) wide	Lever-Type Fuse For G-fuse cartridge 6.3x32 mm Solid or Stranded Copper Wire 26–8 AWG Maximum Voltage 600 V Maximum Current 10 A[18]	Without Indicator Lamp	Black	NSYTRV42SF6	50	Not required for this block.		
		With Light Indicator, 12–30 V AC/DC[21]	Black	NSYTRV42SF6LD	50			
		With Light Indicator, 110–250 V AC/DC[21]	Black	NSYTRV42SF6LA	50			

These measuring transducer terminal blocks with screw connection technology are characterized by easy operation and clarity. All switching statuses are clearly visible. The extensive range of flexible accessories saves cost and time when executing transducer test circuit tasks.

Table 24.19: Measuring and Grounding Terminal Blocks

Description		Maximum Voltage	Maximum Current [18]	Block			End Barrier [19]		
				Color	Catalog Number	Std. Pack [20]	Color	Catalog Number	Std. Pack [20]
8.2 mm (0.32 in.) wide	Blade Isolator Double Deck Solid or Stranded Copper Wire 24–8 AWG	600 V	30 A	Grey	NSYTRV62TTD	50	Grey	NSYTRACT22	50
8.2 mm (0.32 in.) wide	Passthrough Two Terminals Solid or Stranded Copper Wire 24–8 AWG	600 V	30 A	Grey	NSYTRV62TT	50			
 8.2 mm (0.32 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 24–8 AWG	N/A	N/A	Green/ Yellow	NSYTRV62TTPE	50			

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RoHS Compliant

For track and accessories, see Mounting Track and End Clamps, page 24-15.

[18] These maximum current values assume the use of insulated copper conductors with 167 °F (75 °C) temperature rating and are calculated based on NEC Article 310, Table 310-16. In most cases this value is the maximum ampacity of the wire which has the greatest current carrying capacity. The actual allowable current for a particular application depends on the size, insulation class, and other characteristics of the wire used. The UL ratings are shown. The CSA rating may be higher or lower. Refer to the catalog for CSA ratings.
[19] One end-barrier is required for each assembly of like blocks.
[20] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.
[21] When voltage is applied within the minimum and maximum limits, the LED will illuminate.

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Miniature Passthrough and Hybrid Passthrough

Table 24.20: Screw Type Miniature Passthrough

Description		Maximum Voltage	Maximum Current [22]	Block			End Barrier [23]		
				Color	Catalog Number	Std. Pack [24]	Color	Catalog Number	Std. Pack [24]
5.2 mm (0.21 in.) wide	Two Terminals Solid or Stranded Copper Wire 24–12 AWG Mount on DIN rail, 5 x 5 mm	600 V	20 A	Grey	NSYTRV22M	50	Grey	NSYTRACM22	50
				Blue	NSYTRV22MBL		Grey	NSYTRACM22	
6.2 mm (0.24 in.) wide	Two Terminals Solid or Stranded Copper Wire 24–10 AWG Mount on DIN rail, 5 x 5 mm	600 V	30 A	Grey	NSYTRV42M	50	Grey	NSYTRACM22	50
				Blue	NSYTRV42MBL		Grey	NSYTRACM22	

Table 24.21: Screw Type Miniature Grounding Blocks

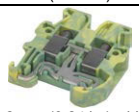
Description		Block			End Barrier [23]		
		Color	Catalog Number	Std. Pack [24]	Color	Catalog Number	Std. Pack [24]
5.2 mm (0.21 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 24–12 AWG Mount on DIN rail, 5 x 5 mm	Green/Yellow	NSYTRV22MPE	50	Grey	NSYTRACM22	50
 6.2 mm (0.24 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 24–10 AWG Mount on DIN rail, 5 x 5 mm	Green/Yellow	NSYTRV42MPE	50	Grey	NSYTRACM22	50

Table 24.22: Hybrid Blocks—Screw and Insulation Displacement Connection (IDC) Passthrough

Description		Maximum Voltage	Maximum Current [22]	Block			End Barrier [23]		
				Color	Catalog Number	Std. Pack [24]	Color	Catalog Number	Std. Pack [24]
5.2 mm (0.21 in.) wide	Two Terminals Solid or Stranded Copper Wire 24–16 AWG	600 V	10 A	Grey	NSYTRH12	50	Grey	NSYTRACH12	50
5.2 mm (0.21 in.) wide	Three Terminals Solid or Stranded Copper Wire 24–16 AWG	600 V	10 A	Grey	NSYTRH13	50	Grey	NSYTRACH13	50
6.2 mm (0.24 in.) wide	Three Terminals Solid or Stranded Copper Wire 20–14 AWG	600 V	15 A	Grey	NSYTRH22	50	Grey	NSYTRACH22	50

Table 24.23: Hybrid Grounding Block—Screw and Insulation Displacement Connection (IDC) Passthrough

Description		Block			End Barrier [23]		
		Color	Catalog Number	Std. Pack [24]	Color	Catalog Number	Std. Pack [24]
5.2 mm (0.21 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 24–16 AWG	Green/Yellow	NSYTRH12PE	50	Grey	NSYTRACH12	50

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For track and accessories, see Mounting Track and End Clamps, page 24-15.

[22] These maximum current values assume the use of insulated copper conductors with 167 °F (75 °C) temperature rating and are calculated based on NEC Article 310, Table 310-16. In most cases this value is the maximum ampacity of the wire which has the greatest current carrying capacity. The actual allowable current for a particular application depends on the size, insulation class, and other characteristics of the wire used. The UL ratings are shown. The CSA rating may be higher or lower. Refer to the catalog for CSA ratings.

[23] One end-barrier is required for each assembly of like blocks.

[24] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

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Passthrough and Grounding

Push-in technology terminal blocks feature simple handling and direct, tool-free connections. When pushing in solid wires or wires with ferrules, the contact spring is automatically opened and ensures the required pressure force aginst the current bar.

Table 24.24: Push-in Passthrough Blocks

Description		Maximum Voltage	Maximum Current [25]	Block			End Barrier [26]		
				Color	Catalog Number	Std. Pack [27]	Color	Catalog Number	Std. Pack [27]
5.2 mm (0.21 in.) wide	Two Terminals Solid or Stranded Copper Wire 24–12 AWG	600 V	20 A	Grey	NSYTRP22	50	Grey	NSYTRACR22	50
				Blue	NSYTRP22BL		Blue	NSYTRACR22BL	
				Orange	NSYTRP22AR		Grey	NSYTRACR22	
5.2 mm (0.21 in.) wide	Three Terminals Solid or Stranded Copper Wire 24–12 AWG	600 V	20 A	Grey	NSYTRP23	50	Grey	NSYTRACR23	50
				Blue	NSYTRP23BL		Blue	NSYTRACR23BL	
				Orange	NSYTRP23AR		Grey	NSYTRACR23	
5.2 mm (0.21 in.) wide	Four Terminals Solid or Stranded Copper Wire 24–12 AWG	600 V	20 A	Grey	NSYTRP24	50	Grey	NSYTRACR24	50
				Blue	NSYTRP24BL		Blue	NSYTRACR24BL	
6.2 mm (0.24 in.) wide	Two Terminals Solid or Stranded Copper Wire 24–10 AWG	600 V	30 A	Grey	NSYTRP42	50	Grey	NSYTRACR42	50
				Blue	NSYTRP42BL		Grey	NSYTRACR42	
6.2 mm (0.24 in.) wide	Three Terminals Solid or Stranded Copper Wire 24–10 AWG	600 V	30 A	Grey	NSYTRP43	50	Grey	NSYTRACP43	50
				Blue	NSYTRP43BL		Grey	NSYTRACP43	
6.2 mm (0.24 in.) wide	Four Terminals Solid or Stranded Copper Wire 24–10 AWG	600 V	30 A	Grey	NSYTRP44	50	Grey	NSYTRACP44	50
				Blue	NSYTRP44BL		Grey	NSYTRACP44	

Table 24.25: Push-in Grounding Blocks

Description		Block			End Barrier [26]		
		Color	Catalog Number	Std. Pack [27]	Color	Catalog Number	Std. Pack [27]
5.2 mm (0.21 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 24–12 AWG	Green/Yellow	NSYTRP22PE	50	Grey	NSYTRACR22	50
5.2 mm (0.21 in.) wide	Grounding Block Three Terminals Solid or Stranded Copper Wire 24–12 AWG	Green/Yellow	NSYTRP23PE	50	Grey	NSYTRACR23	50
5.2 mm (0.21 in.) wide	Grounding Block Four Terminals Solid or Stranded Copper Wire 24–12 AWG	Green/Yellow	NSYTRP24PE	50	Grey	NSYTRACR24	50
6.2 mm (0.24 in.) wide	Grounding Block Two Terminals Solid or Stranded Copper Wire 24–10 AWG	Green/Yellow	NSYTRP42PE	50	Grey	NSYTRACR42	50
6.2 mm (0.24 in.) wide	Grounding Block Three Terminals Solid or Stranded Copper Wire 24–10 AWG	Green/Yellow	NSYTRP43PE	50	Grey	NSYTRACP43	50
6.2 mm (0.24 in.) wide	Grounding Block Four Terminals Solid or Stranded Copper Wire 24–10 AWG	Green/Yellow	NSYTRP44PE	50	Grey	NSYTRACP44	50

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RoHS Compliant

For track and accessories, see Mounting Track and End Clamps, page 24-15.

[25] These maximum current values assume the use of insulated copper conductors with 167 °F (75 °C) temperature rating and are calculated based on NEC Article 310, Table 310-16. In most cases this value is the maximum ampacity of the wire which has the greatest current carrying capacity. The actual allowable current for a particular application depends on the size, insulation class, and other characteristics of the wire used. The UL ratings are shown. The CSA rating may be higher or lower. Refer to the catalog for CSA ratings.

[26] One end-barrier is required for each assembly of like blocks.

[27] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

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Double Deck Passthrough, Blade Isolators, Component Carriers

Table 24.26: Push-in Double Deck Passthrough and Grounding Terminal Blocks

Description		Maximum Voltage	Maximum Current [28]	Block			End Barrier [29]		
				Color	Catalog Number	Std. Pack [30]	Color	Catalog Number	Std. Pack [30]
5.2 mm (0.21 in.) wide	Double Deck Passthrough Four Terminals Solid or Stranded Copper Wire 26–12 AWG	600 V	20 A	Grey	NSYTRP24D	50	Grey	NSYTRACRE24	50
				Blue	NSYTRP24DBL		Grey	NSYTRACRE24	
5.2 mm (0.21 in.) wide	Double Deck Grounding Block Four Terminals Solid or Stranded Copper Wire 26–12 AWG	N/A	N/A	Green/Yellow	NSYTRP24DPE	50	Grey	NSYTRACRE24	50

Table 24.27: Push-in Blade Isolators

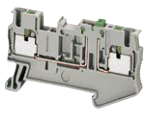
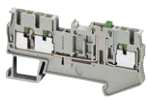
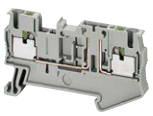
Description		Maximum Voltage	Maximum Current [28]	Block			End Barrier [29]		
				Color	Catalog Number	Std. Pack [30]	Color	Catalog Number	Std. Pack [30]
 5.2 mm (0.21 in.) wide	Blade Isolator Two Terminals Solid or Stranded Copper Wire 26–12 AWG	300 V	20 A	Grey	NSYTRP22SC	50	Grey	NSYTRACPK22	50
 5.2 mm (0.21 in.) wide	Blade Isolator Three Terminals Solid or Stranded Copper Wire 26–12 AWG	300 V	20 A	Grey	NSYTRP23SC	50	Grey	NSYTRACPK23	50
5.2 mm (0.21 in.) wide	Blade Isolator Four Terminals Solid or Stranded Copper Wire 26–12 AWG	300 V	20 A	Grey	NSYTRP24SC	50	Grey	NSYTRACPK24	50

Table 24.28: Push-In Type Component Carriers

Description		Maximum Voltage	Maximum Current [28]	Color	Catalog Number	Std. Pack [30]	End Barrier [29]		
							Color	Catalog Number	Std. Pack [30]
 5.2 mm (0.21 in.) wide	Component Carrier Two Terminals Solid or Stranded Copper Wire 26–12 AWG	300 A	20 A	Grey	NSYTRP22TB	50	Grey	NSYTRACPK22	50
	For fuse 5 x 20 mm	Depends on fuse or diode used		Black	NSYTRASF520	10	Not required		
	For fuse 5 x 20 mm 110–250 V LED				NSYTRASF520M	10			
	For fuse 5 x 20 mm 12–30 V LED				NSYTRASF520B	10			
	For component			Grey	NSYTRASV1	10			
	With 1N4007 diode				NSYTRASV2	10			
6.2 mm (0.24 in.) wide	Component Carrier Two Terminals Solid or Stranded Copper Wire 24–12 AWG	300 A	20 A	Grey	NSYTRP42TB	50	Grey	NSYTRACR42	50
	For fuse 5 x 20 mm	Depends on fuse or diode used		Black	NSYTRASF520	10	Not required		
	For fuse 5 x 20 mm 110–250 V LED				NSYTRASF520M	10			
	For fuse 5 x 20 mm 12–30 V LED				NSYTRASF520B	10			
	For component			Grey	NSYTRASV1	10			
	With 1N4007 diode				NSYTRASV2	10			

File: E87739 CCN: XCFR2

File: 256444 Class: 6228-01

RoHS Compliant

For track and accessories, see Mounting Track and End Clamps, page 24-15.

[28] These maximum current values assume the use of insulated copper conductors with 167 °F (75 °C) temperature rating and are calculated based on NEC Article 310, Table 310-16. In most cases this value is the maximum ampacity of the wire which has the greatest current carrying capacity. The actual allowable current for a particular application depends on the size, insulation class, and other characteristics of the wire used. The UL ratings are shown. The CSA rating may be higher or lower. Refer to the catalog for CSA ratings.

[29] One end-barrier is required for each assembly of like blocks.

[30] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

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Linergy Marking Accessories

Table 24.29: Markers

Description	Marking	Catalog Number	Std Pack[31]
Black horizontal markings on white background For 5.2 mm (0.21 in.) wide blocks Lateral sides for NSYTRV terminal blocks Central shaft for NSYTRR / NSYTRP / NSYTRH terminal blocks	1 to 10	NSYTRAB510	10
	11 to 20	NSYTRAB520	10
	21 to 30	NSYTRAB530	10
	31 to 40	NSYTRAB540	10
	41 to 50	NSYTRAB550	10
	51 to 60	NSYTRAB560	10
	61 to 70	NSYTRAB570	10
	71 to 80	NSYTRAB580	10
	81 to 90	NSYTRAB590	10
	91 to 100	NSYTRAB5100	10
	1 to 100	NSYTRAB51100	1
	L1, L2, L3, N, PE	NSYTRAB5L1N	10
Black horizontal markings on white background For 6.2 mm (0.24 in.) wide blocks Lateral sides for NSYTRV terminal blocks Central shaft for NSYTRR / NSYTRP / NSYTRH terminal blocks	1 to 10	NSYTRAB610	10
	11 to 20	NSYTRAB620	10
	21 to 30	NSYTRAB630	10
	31 to 40	NSYTRAB640	10
	41 to 50	NSYTRAB650	10
	51 to 60	NSYTRAB660	10
	61 to 70	NSYTRAB670	10
	71 to 80	NSYTRAB680	10
	81 to 90	NSYTRAB690	10
	91 to 100	NSYTRAB6100	10
	1 to 100	NSYTRAB61100	1
	L1, L2, L3, N, PE	NSYTRAB6L1N	10
Black horizontal markings on white background For 8.2 mm (0.32 in.) wide blocks Lateral sides for NSYTRV terminal blocks Central shaft for NSYTRR / NSYTRP / NSYTRH terminal blocks	1 to 10	NSYTRAB810	10
	11 to 20	NSYTRAB820	10
	21 to 30	NSYTRAB830	10
	31 to 40	NSYTRAB840	10
	41 to 50	NSYTRAB850	10
	51 to 60	NSYTRAB860	10
	61 to 70	NSYTRAB870	10
	71 to 80	NSYTRAB880	10
	81 to 90	NSYTRAB890	10
	91 to 100	NSYTRAB8100	10
	1 to 100	—	—
	L1, L2, L3, N, PE	—	—
Flat markers Black horizontal markings on white background Lateral sides for NSYTRV terminal blocks Central shaft for NSYTRR / NSYTRP / NSYTRH terminal block	1 to 10	NSYTRAB1010	10
	11 to 20	NSYTRAB1020	10
	21 to 30	NSYTRAB1030	10
	31 to 40	NSYTRAB1040	10
	41 to 50	NSYTRAB1050	10
	51 to 60	NSYTRAB1060	10
	61 to 70	NSYTRAB1070	10
	71 to 80	NSYTRAB1080	10
	81 to 90	NSYTRAB1090	10
	91 to 100	NSYTRAB10100	10
	1 to 100	—	—
	L1, L2, L3, N, PE	—	—
Flat markers Black horizontal markings on white background For 5.2 mm (0.21 in.) wide blocks Lateral sides for NSYTRV terminal blocks Central shaft for NSYTRR / NSYTRP / NSYTRH terminal blocks	1 to 10	NSYTRABF510	10
	11 to 20	NSYTRABF520	10
	21 to 30	NSYTRABF530	10
	31 to 40	NSYTRABF540	10
	41 to 50	NSYTRABF550	10
	51 to 60	—	—
	61 to 70	—	—
	71 to 80	—	—
	81 to 90	—	—
	91 to 100	—	—
	1 to 100	—	—
	L1, L2, L3, N, PE	—	—
Flat markers Black horizontal markings on white background For 6.2 mm (0.24 in.) wide blocks Lateral sides for NSYTRV terminal blocks Central shaft for NSYTRR / NSYTRP / NSYTRH terminal block	1 to 10	NSYTRABF610	10
	11 to 20	NSYTRABF620	10
	21 to 30	NSYTRABF630	10
	31 to 40	NSYTRABF640	10
	41 to 50	NSYTRABF650	10
	51 to 60	—	—
	61 to 70	—	—
	71 to 80	—	—
	81 to 90	—	—
	91 to 100	—	—
	1 to 100	—	—
	L1, L2, L3, N, PE	—	—

NOTE: Refer to catalog 9080CT1301 for additional labeling options.

[31] For blocks 12.2 mm (0.48 in.) or wider, the strip must be broken and the individual marking characters used.

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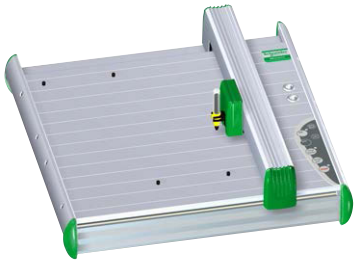

NSYTRAPLOT

Linergy Labeling System

This high-speed plotting device enables custom marking of Linergy IEC terminal block labels.

- A flexible plotter tht labels marking elements quickly and easily
- Rugged construction in stylish aluminum
- Easy-to-change fixtures to suit a variety of marking elements
- Auto calibration, no adjustment necessary
- Includes NSYTRA BMP1/ BMP2 adapter plates, 0.25 and 0.35 black pens, Spacial print software, power supply, connecting cable, and user manual.

Table 24.30: Blank Markers

Description		Catalog Number	Std. Pack
Blank marking cards for 5.2 mm (0.21 in.) wide blocks	72 characters (6 strips)	NSYTRABPV5	10
	Plotter adapter for marking cards	NSYTRABMP1	1
Blank marking cards for 6.2 mm (0.24 in.) wide blocks	60 characters (6 strips)	NSYTRABPV6	10
	Plotter adapter for marking cards	NSYTRABMP1	1
Blank marking cards for 8.2 mm (0.32 in.) wide blocks	42 characters (6 strips)	NSYTRABPV8	10
	Plotter adapter for marking cards	NSYTRABMP1	1
Blank flat marking cards for 5.2 mm (0.21 in.) wide blocks	60 characters (6 strips)	NSYTRABFPV5	10
	Plotter adapter for marking cards	NSYTRABMP2	1
Blank flat marking cards for 6.2 mm (0.24 in.) wide blocks	60 characters (6 strips)	NSYTRABFPV6	10
	Plotter adapter for marking cards	NSYTRABMP2	1

RoHS Compliant

NOTE: Refer to catalog 9080CT1301 for additional labeling options.

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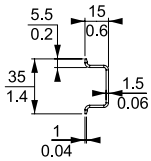
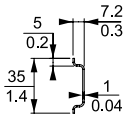
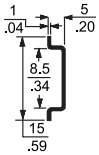


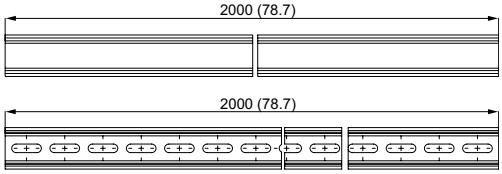
NSYSDR200D
and NSYSDR200



NSYSDR200BD
and NSYSDR200B



NSYSTRAD155



Mounting Track and End Clamps

Table 24.31: DIN 3 Track—78.74 inches (2 meter) length

Description	Length		Catalog Number	Std. Pack [1]
	In.	mm		
DIN 3				
Symmetrical rail 35x15 mm depth, 1.5 mm thick galvanized steel, Prepunched	78.74	2000	NSYSDR200D	20
Symmetrical rail 35x15 mm depth, 1.5 mm thick galvanized steel, No mounting holes	78.74	2000	NSYSDR200	20
Symmetrical rail 35x7.2 mm depth, 1 mm thick galvanized steel, Prepunched	78.74	2000	NSYSDR200BD	20
Symmetrical rail 35x7.2 mm depth, 1 mm thick galvanized steel, No mounting holes	78.74	2000	NSYSDR200B	20
DIN 2				
Symmetrical rail 15x5 mm depth, 1 mm thick galvanized steel, Prepunched	78.74	2000	NSYTRADR155	5
End Clamps				
Plastic clip-on end clamp for 35 mm DIN 3 track	0.21	5.2	NSYTRAAB35	50
Plastic clip-on end clamp with screw for 35 mm DIN 3 track	0.37	9.5	NSYTRAABV35	50
Plastic clip-on end clamp for 15 mm DIN 2 track	0.21	5.2	NSYTRAAB15	50
Polycarbonate end clamp for 35 mm DIN 3 track	0.31	8	9080MHA10	50
RoHS Compliant				

SQUARE D
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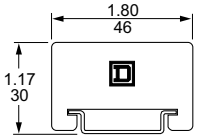
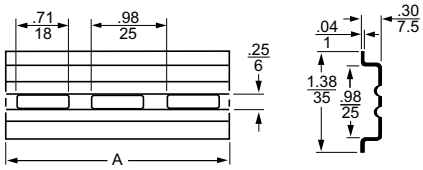


9080MHA10



9080MH3**

Table 24.32: DIN 3 Track – Various Lengths

Description		Length		Class 9080 Type	Std. [1] Pack
		In.	mm		
Symmetrical rail 35 x 7.5 mm (1.38 in. x 0.295 in.) in compliance with EN 50022 standard (DIN 46277-3).	Galvanized steel, no mounting holes	3	0.08	9080MH203	10
		4	0.10	9080MH204	
		5	0.13	9080MH205	
		6	0.15	9080MH206	
		7	0.18	9080MH207	
		8	0.20	9080MH208	
		9	0.23	9080MH209	
		10	0.25	9080MH210	
		11	0.28	9080MH211	
		12	0.30	9080MH212	
		13	0.33	9080MH213	
		14	0.36	9080MH214	
		15	0.38	9080MH215	
		16	0.41	9080MH216	
		17	0.43	9080MH217	
		18	0.46	9080MH218	
		19.68	500	9080MH220	
		39.37	1000	9080MH239	
		78.74	2000	9080MH279	
	Galvanized steel, prepunched	3	0.08	9080MH303	
		4	0.10	9080MH304	
		5	0.13	9080MH305	
		6	0.15	9080MH306	
		7	0.18	9080MH307	
		8	0.20	9080MH308	
		9	0.23	9080MH309	
		10	0.25	9080MH310	
		11	0.28	9080MH311	
		12	0.30	9080MH312	
		13	0.33	9080MH313	
		14	0.36	9080MH314	
		15	0.38	9080MH315	
		16	0.41	9080MH316	
		17	0.43	9080MH317	
		18	0.46	9080MH318	
		19.68	500	9080MH320	
		39.37	1000	9080MH339	
		78.74	2000	9080MH379	
High rise track	Aluminum	39.37	1000	9080MH439	2

[1] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

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Selection Guide

Table 24.33: Type G Selection Guide

Description		Maximum Voltage	Maximum Current *[1]*	Blocks			End Barriers *[2]*		Blocks per ft	Maximum Wire Combinations	
				Color	Type	Std. Pack *[3]*	Type	Std. Pack *[3]*		Copper Wire (stranded or solid)	
	Solderless Box Lug for #22 to #8 AWG wire. Mounts on standard 9080GH track or 35 mm DIN 3 track. Fingersafe per DIN 57470.	600 V	60 A	Natural	GR6	50	GM6B	10	34	1 **#8** 1 **#10** 1–3 **#12** 1–4 **#14**	1–4 **#16** 1–5 **#18** 1–8 **#20** 1–10 **#22**
				Black	GRB6		GMB6B				
				Blue	GRL6		GML6B				
				Green	GRG6		GMG6B				
				Gray	GRE6		GME6B				
				Orange	GRS6		GMS6B				
				Red	GRR6		GMR6B				
				Yellow	GRY6		GMY6B				
				Brown	GRN6		GMN6B				
	Similar to a 9080GR6 except with a 9080GH91 banana test plug adapter installed. Fingersafe per DIN 57470.	600 V	60 A	Natural	GR6T	50	GM6B	10			
	Solderless Box Lug for #22 to #10 AWG wire. Can be mounted directly to a panel or can be mounted on 9080GH track.	600 V	40 A	Natural	GK6	50	GK6B	50	34	1–4 **#16** 1 **#10** 1–2 **#12** 1–2 **#14**	1–4 **#16** 1–5 **#18** 1–8 **#20** 1–10 **#22**
				Black	GKB6						
				Blue	GKL6						
				Green	GKG6						
				Gray	GKE6						
				Orange	GKS6						
				Red	GKR6						
				Yellow	GKY6						
	High Density Solderless Box Lug for #22 to #10 AWG wire. Mounts on standard 9080GH track or 35 mm DIN 3 track. Fingersafe per DIN 57470.	600 V	30 A	Natural	GM6	50	GM6B	10	51	1 **#10** 1 **#12** 1 **#14** 1–2 **#16**	1–2 **#18** 1–5 **#20** 1–8 **#22** 1–2 **#16**
				Black	GMB6		GMB6B				
				Blue	GML6		GML6B				
				Green	GMG6		GMG6B				
				Gray	GME6		GME6B				
				Orange	GMS6		GMS6B				
				Red	GMR6		GMR6B				
				Yellow	GMY6		GMY6B				
				Brown	GMN6		GMN6B				
	Solderless Box Lug for #18 to #4 AWG wire. Mounts on standard 9080GH track or 35 mm DIN 3 track.	600 V	85 A	Natural	GC6	50	GC6B	10	28	1 **#4** 1 **#6** 1–2 **#8** 1–4 **#10**	1–5 **#12** 1–6 **#14** 1–6 **#16** 1–8 **#18**
	Solderless Box Lug for #12 to #1/0 AWG wire. Mounts on standard 9080GH track or 35 mm DIN 3 track.	600 V	170 A	Natural	GD6	10	GD6B	10	17	1 **1/0** 1 **#1** 1 **#2** 1–2 **#4**	1–3 **#6** 1–5 **#8** 1–6 **#10** 1–7 **#12**
	Solderless Box Lug for #6 AWG to 250 kcmil wire. *[4]* Mounts on standard 9080GH track or 35 mm DIN 3 track.	600 V	255 A	Natural	GE6	10	None Required		10	1 250 kcmil *[4]* 1 **4/0** 1 **3/0** 1 **2/0** 1 **1/0**	1 **#1** 1 **#2** 1 **#4** 1 **#6**

File: E60616 CCN: XCFR2

File: 025490 Class:3211– 07

RoHS Compliant

For standard or custom assemblies, see Terminal Block Assemblies, page 24-18.
For mounting track and accessories, see Mounting Track, End Clamps, Jumpers, Fanning Strips, page 24-19.
For DIN 3 track and end clamps, see Mounting Track and End Clamps, page 24-15.

Table 24.34: How to Order

To Order Specify	Catalog Number	
	Class	Type
• Class Number	9080	GR6
• Type Number		

[1] These maximum current values assume the use of insulated copper conductors with 75 °C (167 °F) temperature rating,temperature rating, and are calculated based on NEC Article 310, Table 310-16. In most cases this value is the maximum ampacity of that wire or combination of wires (as listed in the above table) which has the greatest current carrying capacity. The actual allowable current for a particular application depends on the number, size, insulation class, and other characteristics of the wires used. The lower of the UL and CSA ratings are shown.
[2] One end-barrier is required for each assembly of like blocks.
[3] Orders must specify standard package quantity or multiples of that quantity.
[4] Terminals are tin plated, making them suitable for use with either copper or aluminum wire.

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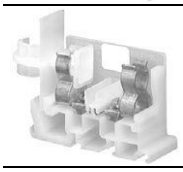
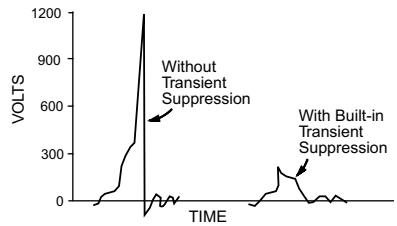
Selection Guide

Table 24.35: Type G Selection Guide

Description		Maximum Voltage	Maximum Current [5]	Blocks		End Barriers [6]		Blocks per ft	Maximum Wire Combinations	
				Type	Std. Pack [7]	Type	Std. Pack [7]		Copper Wire (stranded or solid)	
	Self-Lifting Pressure Wire Connector for #18 to #12 AWG wire. Mounts on standard 9080GH track or 35 mm DIN 3 track.	600 V	40 A	GP6	50	GP6B	10	32	1 or 2 1 or 2 1 or 2 1 or 2	#12 #14 #16 #18
	Flat Terminal Connector for #22 to #12 AWG wire. Screws are #6-32 x 5/16 in. for ring or spade lugs, 5/16 in. wide maximum. Mounts on standard 9080GH track or 35 mm DIN 3 track. Fingersafe per DIN 57470.	600 V	40 A	GA6	50	GP6B	10	32	1 or 2 Conductors Per Screw #12–22	
	Circuit Isolating Switch [8] with self-lifting pressure connectors for #18 to #10 AWG wire. Mounts on standard 9080GH track or 35 mm DIN 3 track.	600 V	30 A	GG6	10	GF6B	10	16	1 1 1 1–4 1–4	#10 #12 #14 #16 #18
	Slip-on Connectors for #22 to #12 AWG wire. Tabs accept 0.250 x 0.032 in. slip-on connectors Mounts on standard 9080GH track or 35 mm DIN 3 track.	600 V	20 A	GS6	10	GF6B	10	16	1–2 1–2 1–2 1–2 1–2 1–2	#12 #14 #16 #18 #20 #22
	Transient Voltage Suppressors [9] with box lug connectors for #18 to #10 AWG wire. Mounts on standard 9080GH track or 35 mm DIN 3 track. See the figure below.	120 V	—	GT6	5	GT6B	10	24	1 1 1 1–2 1–4	#10 #12 #14 #16 #18
	Fuse Block for 13/32 in. Dia. x 1-1•2 in. ferrule fuse with self-lifting pressure connectors. Fuse puller is included as standard. Fuses are not included. Mounts on standard 9080GH track or 35 mm DIN 3 track. Fingersafe per DIN 57470.	600 V	30 A	GF6	10	GF6B	10	16	1 1 1 1–4 1–4	#10 #12 #14 #16 #18
	Fuse Puller [10]	—	—	GH63	50	N/A		N/A	N/A	
	Blown Fuse Indicator/ Pullers are neon pilot lights which plug on to the fuse in a standard Type GF6 fuse block.	120–240 V	—	GLP3	10	N/A		N/A	N/A	
		277–600 V	—	GLP6	10	N/A		N/A		



Transient supression

For standard or custom assemblies, see Terminal Block Assemblies, page 24-18.
For mounting track and accessories, see Mounting Track, End Clamps, Jumpers, Fanning Strips, page 24-19.
For DIN 3 track and end clamps, see Mounting Track and End Clamps, page 24-15.

Table 24.36: How to Order

To Order Specify	Catalog Number	
	Class	Type
• Class Number	9080	GP6
• Type Number		

Terminal Blocks:
File: E60616
CCN: XCFR2
File: 025490
Class: 3211–07
RoHS Compliant

Blown Fuse Indicator:
File: E63698
CCN: JDV5
File: 025490
Class: 3211–07
RoHS Compliant

[5] These maximum current values assume the use of insulated copper conductors with 75 ºC (167 ºF) temperature rating, and are calculated based on NEC Article 310, Table 310-16. In most cases this value is the maximum ampacity of that wire or combination of wires (as listed in the above table) which has the greatest current carrying capacity. The actual allowable current for a particular application depends on the number, size, insulation class, and other characteristics of the wires used. The lower of the UL and CSA ratings are shown.
[6] One end-barrier is required for each assembly of like sections.
[7] Orders must specify standard package quantity or multiples of that quantity.
[8] Not intended to make or break a live circuit. Power must be disconnected from the circuit before operation of the switch.
[9] Modules have RC circuitry for suppressing transient voltage, generated when opening a coil circuit, to approximately 200% of the peak line voltage, when used with 120 V coils. Type GT6 is suitable for use with Square D Class 8501 Type X, K, R and C relays or Square D Type S starters and contactors, Sizes 00-2.
[10] Fuse puller is supplied as standard with Class 9080 Type GF6 fuse block. The 9080GH63 is a replacement fuse puller.

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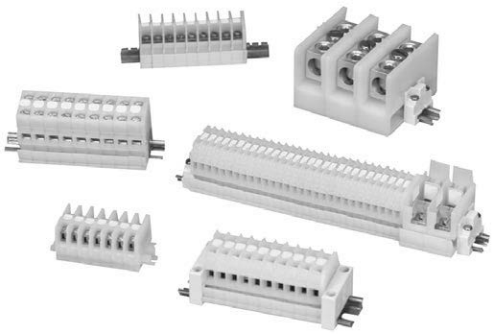

Terminal Block Assemblies

Standard Terminal Block Assemblies

The assemblies listed in the table below consist of 6 ft (two 3 ft lengths packaged together) of terminal blocks. The terminal blocks are mounted on snap-off mounting track, which can be easily broken every 5/16 in. Every tenth terminal block is marked to aid in counting off the proper number of terminal blocks. After adding the proper end barrier and a slip-in end clamp to the blocks that were broken off, the custom assembly is ready for installation.

Table 24.37: Standard Terminal Block Assemblies

Description	Type
Assembly of 188 Type GA6	GA6188BC
Assembly of 204 Type GR6	GR6204BC
Assembly of 94 Type GF6	GF694BC
Assembly of 296 Type GM6	GM6296BC
Assembly of 188 Type GP6	GP6188BC

Custom Terminal Block Assemblies

Order an assembly built as required for the application. As standard, custom assemblies use 9080GH mounting track with screw on end clamps. Other options are available from the table below.

One terminal block type: The number of blocks in the assembly is added to the end of the catalog number of the desired block. Example: an assembly of **25** 9080GR6 blocks would be **9080GR625**.

More than one terminal block type in an assembly: A detailed drawing or sketch of the desired assembly must accompany the order.

Table 24.38: Custom Terminal Block Assembly Options

Option	Suffix	Example
Substitute slip-in end clamps	**C**	9080GR625C
Substitute snap-off channel	**B**	9080GR625BC *[11]*
For direct mount assembly of 9080GK6 blocks	**D**	9080GK67D
Add a blank vinyl marking strip	**M**	9080GR625M
Add pre-marked (1–25 only) marking strip	**MPO**	9080GR625MPO
Mount on 35 mm DIN 3 track instead of 9080GH track	**T**	9080GR625T

Table 24.39: How to Order

To Order Specify	Catalog Number	
	Class	Type
• Class Number		
• Type Number	9080	GA612

[11] The 9080GH10 screw-on end clamp is **not** recommended for use with snap-off channel. It is recommended that the 9080GH11 slip-in end clamp be used. Therefore, when the suffix **B** is used, it should be followed by the suffix **C**.

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Mounting Track, End Clamps, Jumpers, Fanning Strips

Table 24.40: 3/4 in. Mounting Track

	Style	Length (in.)	Type	Std. Pack *[12]*
Standard Track	Standard Track	3	GH103	5
		4	GH104	5
		5	GH105	5
		6	GH106	5
		7	GH107	5
		8	GH108	5
		9	GH109	5
		10	GH110	5
		11	GH111	5
		12	GH112	5
		13	GH113	5
		14	GH114	5
		15	GH115	5
		16	GH116	5
		17	GH117	5
		18	GH118	5
		36	GH136	5
		48	GH148	5
		72	GH172	5
Snap-Off Track	Snap-Off Track	36	GH236	20
		48	GH248	20
		72	GH272	20
High Rise	High Rise	36	GH336	2

NOTE: For additional track and appropriate end clamps, see Mounting Track and End Clamps, page 24-15.

Table 24.41: End Clamps, Jumpers, and Fanning Strips

Description		Type	Std. Pack *[12]*
End Clamps			
	Screw-on End Clamp (Not recommended for use on snap-off mounting track)	GH10	50
	Slip-in End Clamp (Not for use with 9080 GE6, GK6 blocks)	GH11	50
Jumpers			
	2-pole jumper for GM6	GH700	20
	6-pole jumper for GM6	GH710	10
	2-pole jumper for GK6, GR6	GH72	20
	6-pole jumper for GK6, GR6	GH73	10
	2-pole jumper for GC6	GH74	10
	6-pole jumper for GC6	GH75	10
	2-pole jumper for GD6	GH76	10
	6-pole jumper for GD6	GH77	10
	2-pole jumper for GA6, GP6	GH78	10
	6-pole jumper for GA6, GP6	GH79	10
Fanning Strips			
	Snap-together fanning strip section for GK6, GR6 blocks	GH52	10

[12] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

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Marking Accessories

Table 24.42: Marking and Additional Accessories

Description		Type	Std. Pack *[13]*
	25 ft blank vinyl marking strip	GH220	1
Vinyl marking strip numbered 1-25	For GK6, GR6	GH21	5
	For GA6, GP6	GH22	5
	For GM6	GH230	5
	Blank pin-feed marking tabs—6 x 20 (total 120) marking tabs for GD6, GR6, and GT6 blocks	GH200	20
	Pre-marked 01 to 50 (2 sets) plus 20 various marking tabs (total 120 marking tabs) for GD6, GR6, and GT6 blocks	GH210	5
	Marking strip end plug for GK6, GR6, GM6, GA6, GP6, GC6, GD6, GE6, and GT6 blocks	GH60	50
	Transition barrier between GK6 and all other G blocks	GH61	50
	Cover for GR6 or GR6T blocks	GH62	50
	Banana test plug for GR6T block	GH90	10
	Test plug adapter for GR6T block (included as standard with GR6T)	GH91	50
	Angle bracket kit—for mounting 9080GH or MH track to panel at 45° angle. Includes 2 brackets and hardware for mounting the track to the brackets	MH82	1

Table 24.43: How to Order

To Order Specify	Catalog Number	
	Class	Type
• Class Number	9080	GH10
• Type Number		

[13] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

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GCB100

Thermal-Magnetic Circuit Protectors

Table 24.44: 9080GCB Thermal-Magnetic Circuit Protectors

Maximum Current *[1]*	Internal Resistance Ω	Maximum Voltage	Catalog Number
0.1	133	250 Vac 65 Vdc	GCB01
0.5	6.6		GCB05
0.8	2.55		GCB08
1.0	1.97		GCB10
1.2	1.22		GCB12
1.5	0.86		GCB15
2.0	0.49		GCB20
2.5	0.31		GCB25
3.0	0.20		GCB30
4.0	0.10		GCB40
5.0	0.08		GCB50
7.0	0.03		GCB70
10.0	<0.02	125 Vac 65 Vdc	GCB100
15.0	<0.02		GCB150

Table 24.45: Inrush Ratio Correction Table

NOTE: For resistive loads, use inrush correction factor of 1.0.

Inrush Ratio	1:1 to 1:4	1:5	1:6	1:7	1:8
Factor	1.3	1.4	1.5	1.6	1.7

Table 24.46: Ambient Temperature Correction Table

Ambient Temperature	70ºF (21.1ºC)	100ºF (37.8ºC)	120ºF (48.9ºC)	140ºF (60ºC)	160ºF (71.1ºC)	180ºF (82.2ºC)	200ºF (93.3ºC)
Factor	1.0	1.1	1.2	1.3	1.4	1.5	1.6

Table 24.47: Tripping Times in Seconds at 70 ºF (21.1 ºC)

NOTE: When several protectors are channel mounted adjacent to each other, the "no trip" current will be 80% of rated current at 70 ºF.

Percent Rated Current	100%	200%	300%	400%	500%	600%	1000%	2000% and greater
Tripping Time (s)	no trip	10–40	38	1.5–9	0.8–6	0.003–4	0.003–2	Max. 0.02

Selection

To properly select a Class 9080 Type GCB circuit protector, follow these steps:

- Determine the inrush correction factor from Table 24.45.
- Determine the temperature correction factor from Table 24.46.
- Determine the sealed current of the load that is being protected.
- Multiply the sealed current by the two correction factors and choose the closest circuit protector.

NOTE: Choosing a circuit protector with a value lower than the calculated value might cause nuisance tripping, while choosing the larger might provide a protector that will not properly protect the load .

File: E233026
CCN:QVNU2

File: 025490
Class: 3211–07

Example: Solenoid with sealed current of 0.75 A, an inrush ratio of 1:6, and in an ambient temperature of 85ºF: 0.75 x 1.5 x 1.05 = 1.18. Choose the 1.2 A protector.

Tripping Time: Tripping time of the circuit protector is determined from Table 24.47. Divide the circuit protector value by the temperature correction factor from Table 24.46 to determine actual rated current referenced in Table 24.47.

Table 24.48: How to Order

To Order Specify	Catalog Number	
	Class	Type
• Class Number	9080	GH10
• Type Number		

[1] These maximum current values assume the use of insulated copper conductors with 167 ºF (75 ºC) temperature rating and are calculated based on NEC Article 310, Table 310-16. In most cases this value is the maximum ampacity of the wire which has the greatest current carrying capacity. The actual allowable current for a particular application depends on the size, insulation class, and other characteristics of the wire used. The UL ratings are shown. The CSA rating may be higher or lower. Refer to the catalog for CSA ratings.

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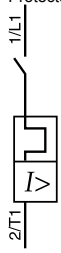
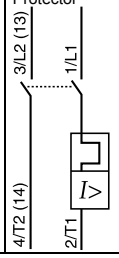
GB2CB06

GB2CD

Thermal-Magnetic Circuit Protectors

Table 24.49: GB2 Thermal-Magnetic Circuit Protectors

Description	Max. Voltage	Thermal Rating	Catalog Number *[1]*	Description	Max. Voltage	Thermal Rating	Catalog Number *[1]*
One pole Thermal Magnetic Circuit Protector 	300 Vac	0.5 A	GB2CB05	Two pole Thermal Magnetic Circuit Protector 	300 Vac	0.5 A	GB2CD05
		1 A	GB2CB06			1 A	GB2CD06
		2 A	GB2CB07			2 A	GB2CD07
		3 A	GB2CB08			3 A	GB2CD08
		4 A	GB2CB09			4 A	GB2CD09
		5 A	GB2CB10			5 A	GB2CD10
		6 A	GB2CB12			6 A	GB2CD12
		8 A	GB2CB14			8 A	GB2CD14
		10 A	GB2CB16			10 A	GB2CD16
		12 A	GB2CB20			12 A	GB2CD20

File: E113720
CCN:QVNU2

File: 081630
Class: 3215–30

IEC 157-1
VDE 0660

[1] Must order in multiples of 6.

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- Finger safe from the front, for isolation of live parts
- Up to 760 A, to meet a wide range of application needs
- Short-Circuit Current Rating up to 100 kA with fuses, not limited by the 10 kA default
- Panel or 35 mm DIN rail mount, for application flexibility
- Gangable to create multipole configurations
- Flexible stranded wire compliant, expands usability
- The UL Listed blocks meet feeder circuit spacing requirements.
- For the short-circuit current ratings, wire classes, tightening torques, dimensions, and more, see the catalog.

NSYEBAD11611

NSYEBAD12611

NSYEBAP13618

NSYEBP2

Enclosed Power Distribution Blocks

Table 24.50: Power Distribution Blocks with AL Lugs (accepts CU or AL conductors)

Wire Range		Mounting	Current Rating	Type
Line Side	Load Side			
CU (1) 14–2 AWG (2.5–35 mm²)	CU (1) 14–2 AWG (2.5–35 mm²)	35 mm DIN rail or panel mount	CU 115A	NSYEBAD11611
CU (1) 14–2 AWG (2.5–35 mm²)	CU (4) 14–10 AWG (2.5–6 mm²)	35 mm DIN rail or panel mount	CU 115A	NSYEBAD11614
CU (1) 14 AWG–3/0 (2.5–70 mm²) AL (1) 6 AWG–3/0	CU (1) 14 AWG–3/0 (2.5–70 mm²) AL (1) 6 AWG–3/0	35 mm DIN rail	CU 200 A AL 155 A	NSYEBAD12611
CU (1) 14 AWG–3/0 (2.5–70 mm²) AL (1) 6 AWG–3/0	CU (1) 14 AWG–3/0 (2.5–70 mm²) AL (1) 6 AWG–3/0	Panel mount	CU 200 A AL 155 A	NSYEBAP12611
CU (1) 14 AWG–3/0 (2.5–70 mm²) AL (1) 6 AWG–3/0	CU (4) 14–2 AWG (2.5–35 mm²) AL (4) 6–2 AWG	35 mm DIN rail	CU 200 A AL 155 A	NSYEBAD12614
CU (1) 14 AWG–3/0 (2.5–70 mm²) AL (1) 6 AWG–3/0	CU (4) 14–2 AWG (2.5–35 mm²) AL (4) 6–2 AWG	Panel mount	CU 200 A AL 155 A	NSYEBAP12614
CU (1) 6 AWG–400 kcmil (16–185 mm²) CU (1) 14 AWG–3/0 (2.5–70 mm²) AL (1) 6 AWG–400 kcmil AL (1) 6 AWG–3/0	CU (8) 14–2 AWG (2.5–35 mm²) AL (8) 6–2 AWG	35 mm DIN rail	CU 335 A AL 270 A	NSYEBAD13618
CU (1) 6 AWG–400 kcmil (16–185 mm²) CU (1) 14 AWG–3/0 (2.5–70 mm²) AL (1) 6 AWG–400 kcmil AL (1) 6 AWG–3/0	CU (8) 14–2 AWG (2.5–35 mm²) AL (8) 6–2 AWG	Panel mount	CU 335 A AL 270 A	NSYEBAP13618
CU (2) 6 AWG–250 kcmil (16–120 mm²) AL (2) 6 AWG–250 kcmil	CU (2) 6 AWG–250 kcmil (16–120 mm²) AL (2) 6 AWG–250 kcmil	35 mm DIN rail	CU 510 A AL 410 A	NSYEBAD25622
CU (2) 6 AWG–250 kcmil (16–120 mm²) AL (2) 6 AWG–250 kcmil	CU (2) 6 AWG–250 kcmil (16–120 mm²) AL (2) 6 AWG–250 kcmil	Panel mount	CU 510 A AL 410 A	NSYEBAP25622
CU (2) 4 AWG–500 kcmil (25–240 mm²) AL (2) 4 AWG–500 kcmil	CU (2) 4 AWG–500 kcmil (25–240 mm²) AL (2) 4 AWG–500 kcmil	Panel mount	CU 760 A AL 620 A	NSYEBAD27622
CU (2) 4 AWG–500 kcmil (25–240 mm²) AL (2) 4 AWG–500 kcmil	CU (8) 14 AWG–2/0 (2.5–50 mm²) AL (8) 6 AWG–2/0 kcmil	Panel mount	CU 760 A AL 620 A	NSYEBAP27628

Table 24.51: Power Distribution Blocks with CU Lugs (accepts only CU conductors)

Wire Range		Mounting	Current Rating	Type
Line Side	Load Side			
CU (1) 14 AWG–3/0 (2.5–70 mm²)	CU (1) 14 AWG–3/0 (2.5–70 mm²)	35 mm DIN rail	CU 200 A	NSYEBCD12611
CU (1) 14 AWG–3/0 (2.5–70 mm²)	CU (1) 14 AWG–3/0 (2.5–70 mm²)	Panel mount	CU 200 A	NSYEBCP12611
CU (1) 14 AWG–3/0 (2.5–70 mm²)	CU (4) 14–2 AWG (2.5–35 mm²)	35 mm DIN rail	CU 200 A	NSYEBCD12614
CU (1) 14 AWG–3/0 (2.5–70 mm²)	CU (4) 14–2 AWG (2.5–35 mm²)	Panel mount	CU 200 A	NSYEBCP12614
CU (1) 6 AWG–400 kcmil (16–185 mm²) CU (1) 14 AWG–3/0 (2.5–70 mm²)	CU (8) 14–2 AWG (2.5–35 mm²)	35 mm DIN rail	CU 335 A	NSYEBCD13618
CU (1) 6 AWG–400 kcmil (16–185 mm²) CU (1) 14 AWG–3/0 (2.5–70 mm²)	CU (8) 14–2 AWG (2.5–35 mm²)	Panel mount	CU 335 A	NSYEBCP13618
CU (2) 6 AWG–250 kcmil (16–120 mm²)	CU (2) 6 AWG–250 kcmil (16–120 mm²)	35 mm DIN rail	CU 510 A	NSYEBCD25622
CU (2) 6 AWG–250 kcmil (16–120 mm²)	CU (2) 6 AWG–250 kcmil (16–120 mm²)	Panel mount	CU 510 A	NSYEBCP25622
CU (2) 4 AWG–500 kcmil (25–240 mm²)	CU (8) 14 AWG–2/0 (2.5–50 mm²)	Panel mount	CU 760 A	NSYEBCP27628

Table 24.52: Terminal Plugs (for plugging unused openings)

Plug Size	For use with	Type
2 AWG	NSYEB**13618	NSYEBP2
2/0	NSYEB**13618, NSYEB**27628	NSYEBP20
250 kcmil	NSYEB**25622	NSYEBP250
400 kcmil	NSYEB**13618	NSYEBP400
500 kcmil	NSYEBAP27622, NSYEB**27628	NSYEBP500

UL E323110 QPQS
All except
NSYEB***13618 and
NSYEB***25622

File: 70361
Class: 6228-01

RoHS Compliant

UL E60616 XCFR2
NSYEB***13618
NSYEB***25622

CE Marked

UL 94V-0 flammability rating

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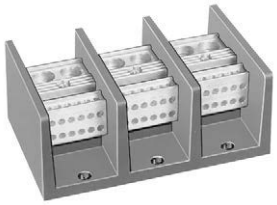

LBA365212

LBA161104

LBC165212

Open Power Distribution Blocks

Table 24.53: Aluminum Power Distribution Blocks

Lug Wire Range *[1]*		Aluminum *[2]*		
Main	Branch	One Pole Type	Two Pole Type	Three Pole Type
(1) #14–2/0	(1) #14–2/0	LBA162101	LBA262101	LBA362101
(1) #6–350 kcmil	(1) #6–350 kcmil	LBA163101	LBA263101	LBA363101
(1) #4–600 kcmil	(1) #4–600 kcmil	LBA164101	N/A	LBA364101
(2) #4–350 kcmil	(2) #4–350 kcmil	LBA165202	LBA265202	LBA365202
(2) #6–500 kcmil	(2) #4–500 kcmil	LBA1652021	LBA2652021	LBA3652021
(1) #14–2/0	(4) #14–4	LBA162104	LBA262104	LBA362104
(1) #14–2/0	(6) #14–4	N/A	N/A	LBA362106
(1) #6–400 kcmil	(4) #14–2	LBA163104	LBA263104	LBA363104
(1) #6–400 kcmil	(6) #14–2	LBA163106	LBA263106	LBA363106
(1) #6–400 kcmil	(8) #14–2	LBA164108	LBA264108	LBA364108
(1) #4–500 kcmil	(6) #14–2/0	LBA165106	LBA265106	LBA365106
(1) #4–500 kcmil	(12) #14–2	LBA165112	LBA265112	LBA365112
(2) #14–2/0	(6) #14–4	LBA163206	LBA263206	LBA363206
(2) #6–500 kcmil	(8) #14–2/0	LBA165208	LBA265208	LBA365208
(2) #6–500 kcmil	(12) #14–4	LBA165212	LBA265212	LBA365212

Table 24.54: Miniature Aluminum Power Distribution Blocks

Lug Wire Range *[1]*		Aluminum *[2]*		
Main	Branch	One Pole Type	Two Pole Type	Three Pole Type
(1) #14–2	(1) #14–2	LBA161101	N/A	LBA361101
(1) #14–2	(4) #18–10	LBA161104	LBA261104	LBA361104

Table 24.55: Copper Power Distribution Blocks

Lug Wire Range *[1]*		Copper *[3]*		
Main	Branch	One Pole Type	Two Pole Type	Three Pole Type
(1) #18–1/0	(1) #18–1/0	LBC162101	N/A	LBC362101
(1) #6–250 kcmil	(1) #6–250 kcmil	LBC163101	N/A	LBC363101
(1) #14–2/0	(4) #14–4	LBC162104	LBC262104	LBC362104
(1) #4–500 kcmil	(6) #14–2	LBC163106	LBC263106	LBC363106
(2) #14–2/0	(6) #14–4	LBC163206	LBC263206	LBC363206
(2) #4–500 kcmil	(8) #14–2/0	LBC165208	N/A	LBC365208
(2) #6–500 kcmil	(12) #14–2	LBC165212	N/A	LBC365212

File: E60616
CCN: XCFR2

File: 70361
Class: 6228-01

RoHS Compliant

Table 24.56: Clear Plastic Covers (0.045 in. thick)

For LBA Type*[4]*	Type	Dim. A	Dim. B
Note: There are no covers for miniature blocks.			
LBA162..., LBC162	LB21	1.062	2.750
LBA262..., LBC262	LB22	1.875	2.750
LBA362..., LBC362 *[5]*	LB23	2.688	2.750
LBA163..., LBC163	LB31	1.782	3.813
LBA263..., LBC263	LB32	3.313	3.813
LBA363.... LBC363	LB33	4.844	3.813
LBA164...	LB41	2.125	4.563
LBA264...	LB42	4.000	4.563
LBA364...	LB43	5.875	4.563
LBA165..., LBC165	LB51	2.719	5.313
LBA265..., LBC265	LB52	5.656	5.313
LBA365..., LBC365	LB53	8.375	5.313

Table 24.57: How to Order

To Order Specify	Catalog Number
• Class Number	9080
• Type Number	LBA162101

Application Information

Voltage Rating-Class B and C–600 V

Blocks are rated based on NEC Table 310-16 using 167 °F (75 °C) wire

Aluminum blocks are tin-plated high conductive aluminum. Copper blocks are tin-plated high conductive copper.

Housing material:

- Miniature Blocks are made from high impact thermoplastic rated at 257 °F (125 °C) max. and –40 °F (–40 °C) min.
- Full Size Blocks are made from general purpose phenolic rated at 302 °F (150 °C) max. and –40 °F (-40 °C) min.

All blocks have a flammability rating of UL 94V-0.

For the short-circuit current ratings and dimensions, see catalog **9080CT9603**.

[1] Lugs suitable for use with 75 °C (167 °F) conductors.
[2] Aluminum blocks will accept either aluminum or copper conductors.
[3] Copper blocks will accept copper conductors only.
[4] These covers must be ordered in multiples of 5. Each cover comes with two self-tapping screws.
[5] Will not work on a 9080LBA362106 block.

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FB2221

FB3221R

Application Information

Clip material:

- All 30 and 60 A fuse clips are copper alloy tin plated.
- All 100 and 200 A fuse clips are one piece aluminum with copper spring tin plated.
- All Class H, R and J fuses are standard with reinforced fuse clips.

Lug termination:

- All 30 A blocks have pressure wire connectors.
- All 60, 100 and 200 A blocks have box lug connectors.

Fuseholders and Track Adapter

Table 24.58: 250 V—Classes H and R

Rating (A) *[1]*	No. of Poles	Class H Type	Class R *[2][3]* Type	Lug Wire Range
30*[4]*	1	FB1211	FB1211R	#14–10 Cu
	2	FB2211	FB2211R	
	3	FB3211	FB3211R	
60*[4]*	1		FB1221R	#14–2 Cu or Al
	2		FB2221R	

Table 24.59: 600 V—Classes H and R

Rating (A) *[1]*	No. of Poles	Class H Type	Class R*[2][3]* Type	Lug Wire Range
30*[5]*	1	FB1611		#14–10 Cu
	2	FB2611	FB2611R	
	3	FB3611	FB3611R	
60*[5]*	1		FB1621R	#14–2 Cu or Al
	3		FB3621R	
100*[5]*	3		FB3631R	#6–2/0 Cu or Al

Table 24.60: 600 V Series—Miniature Fuse Dimension (13/32 x 1-1/2 in.)

Rating (A) *[1]*	No. of Poles	Type M Type	Class CC*[2][3]* Type	Lug Wire Range
30*[4]*	1	FB1611M	FB1611CC	#14–10 Cu
	2	FB2611M	FB2611CC	
	3	FB3611M	FB3611CC	

Table 24.61: 600 V—Class H Only (Copper Only)

Rating (A) *[1]*	No. of Poles	Class H Type	Lug Wire Range
30*[5]*	1	FB1611	#14–10 Cu
	2	FB2611	
	3	FB3611	
100*[5]*	3	FB3631C	#6–2/0 Cu

Table 24.62: 600 V—Class J

Rating (A) *[1]*	No. of Poles	Class J*[2]* Type	Lug Wire Range
30*[5]*	2	FB2611J	#2–14 AWG Cu—Al
	3	FB3611J	
60*[5]*	2	FB2621J	#2–14 Cu—Al
	3	FB3621J	

Table 24.63: Track Adapter

Description		Type	Std. Pack *[6]*
	35 mm DIN 3 Track Adapter For 9080 FB*211, FB*211R, FB*611M, and FB*611CC Fuseholders	FBDIN3	100

Table 24.64: Fuse Sizes—(Diameter x Length)

A	Class of Fuse			
	Class H/R—300 V	Class H/R—600 V	Class M/CC—600 V	Class J—600 V
30	9/16 x 2 in.	13/16 x 5 in.	13/32 x 1-1/2 in.	13/16 x 2-1/4 in.
60	13/16 x 3 in.	1-1/16 x 5-1/2 in.	N/A	1-1/16 x 2-3/8 in.
100	1 x 7-7/8 in.	1 x 7-7/8 in.	N/A	N/A
200	1-1/2 x 7-1/8 in.	1-3/4 x 9-5/8 in.	N/A	N/A

	File: E40747 CCN: IZLT2	Type M fuseholders
	File: E40747 CCN: IZLT	Types H, R, J, and CC
	File: 70360 Class: 6225–01	

Flammability rating of all FB fuse blocks is UL 94V-0. RoHS Compliant

Table 24.65: How to Order

To Order Specify	Catalog Number
• Class Number	9080
• Type Number	FB1211

[1] Specified wire ranges are based on 167 °F (75 °C) wire. Wires with temperature ratings other than 167 °F (75 °C) are approved while observing NEC Article 310 wire tables for allowable ampacities of insulated conductors.
[2] Class R, J and CC fuse blocks are tested and approved for 200,000 AIC in accordance with UL 512.
[3] Class R and CC fuseholders accept current limiting Class R & CC fuses only.
[4] Base is high impact thermoplastic—maximum operating temperature 257 °F (125 °C).
[5] Base is general purpose phenolic—maximum operating temperature 302 °F (150 °C).
[6] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.

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DFCC1 (Left) and DFCC3V (Right)

Modular Fuseholders

Table 24.66: Modular Fuse Holders, TeSys DF *[1]*

Rated Thermal Current	Type of Fuse	Composition	Blown Fuse Indicator	Standard Pack Quantity	Catalog Number
30 A	Class CC	1 Pole	No	1 Pole	DFCC1
			Yes		DFCC1V
		2 Pole	No	2 Pole	DFCC2
			Yes		DFCC2V
		3 Pole	No	3 Pole	DFCC3
			Yes		DFCC3V

File: E310269, CCN: IZLT

[1] For additional fuse holders and information, refer to Catalog 9080CT0801.

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With and Without Marking Flags, Dual Wire

Conform to NF C 63-023 Standard **Mark and terminate wires simultaneously**	Strip the wire, insert it into the cable end and crimp it. Up to 7 markers can be used.

DZ5CE005

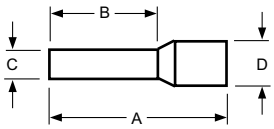
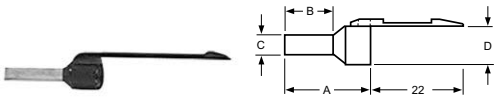


Table 24.67: Without Marking Flag

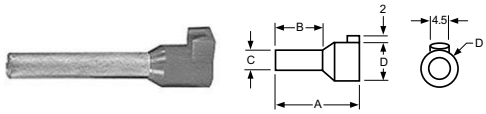
Wire Size		Sleeve color	Dimensions (mm)				Catalog Number *[1][2]*	Std. Pack *[3]*
AWG	mm²		A	B	C	D		
26	0.25	Yellow	11	6.2	1.2	2.2	DZ5CE002L6	1000
			13	8.2			DZ5CE002	
24	0.34	Green	11	6.2			DZ5CE003L6	
			13	8.2			**DZ5CE003**	
22	0.50	White	11	6.2	1.4	3	DZ5CE005L6*[4]*	
			13	8.2			**DZ5CE005***[4]*	
			16.8	12			DZ5CE005L12	
20	0.75	Blue	11	6.2	1.6	3.1	DZ5CE007L6*[4]*	
			13	8.2			**DZ5CE007***[4]*	
18	1.00	Red	11.5	6.2	1.8	3.4	DZ5CE010L6*[4]*	
			13.5	8.2			**DZ5CE010***[4]*	
			16.8	12			DZ5CE010L12	
16	1.50	Black	11.5	6.2	2.1	4	DZ5CE015L6*[4]*	
			13.5	8.2			**DZ5CE015***[4]*	
			22.8	17.7			DZ5CE0153*[4]*	
14	2.00	Yellow	14.5	8.2	2.35	4.2	**DZ5CE020**	
14	2.50	Gray	14.5	8.2	2.7	4.6	**DZ5CE025***[4]*	
			24	17.7			DZ5CE0253*[4]*	
12	4.00	Orange	17.3	9.8	3.3	5.5	**DZ5CE042***[4]*	
			25.5	17.5			DZ5CE043*[4]*	
10	6.00	Green	20	11.5	3.95	7	DZ5CE062	100
			26	17.5			DZ5CE063	



DZ5CA007

Table 24.68: With Marking Flag

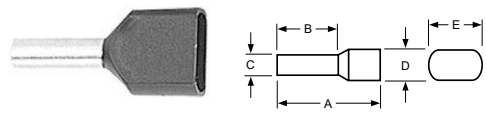
26	0.25	Yellow	13	8.2	1.2	2.2	DZ5CA002	1000
24	0.34	Green					DZ5CA003	
22	0.50	White			1.4	3	DZ5CA005*[4]*	
20	0.75	Blue			1.6	3.1	**DZ5CA007***[4]*	
18	1.00	Red	13.5		1.8	3.4	DZ5CA010*[4]*	
16	1.50	Black			2.1	4	**DZ5CA015***[4]*	
14	2.50	Gray	14.5		2.7	4.6	DZ5CA025*[4]*	



DZ5CA042

Table 24.69: Marking Flag Optional *[5]*

12	4.00	Orange	19.5	11.5	3.3	5.5	**DZ5CA042***[4]*	1000
			25.5	17.5	3.3	5.5	DZ5CA043*[4]*	
10	6.00	Green	20	11.5	3.95	7	**DZ5CA062**	100
			26	17.5	3.95	7	**DZ5CA063**	
8	10.00	Brown	21.5	12	4.95	8.4	**DZ5CA102**	
			27	17.5	4.95	8.4	DZ5CA103	
6	16.00	White	23.5	12	6.35	9.8	**DZ5CA162**	
			29	17.5	6.35	9.8	**DZ5CA163**	
4	25.00	Black	30	17.5	8.15	12	**DZ5CA253**	
2	35.00	Red	30	16	9	13.5	DZ5CA352	20
			39	25	9	13.5	DZ5CA353	
0	50.00	Blue	36	20	11	15.7	DZ5CA502	
			41	25	11	15.7	DZ5CA503	



AZ5DE010

Table 24.70: Dual Wire Cable Ends

			A	B	C	D	E		
22	0.50	White	13	8	1.4	2.5	4.7	AZ5DE005	500
20	0.75	Blue			1.6	2.8	5.0	AZ5DE007	
18	1.00	Red	13.5		1.8	3.4	5.4	AZ5DE010	
16	1.50	Black			2.1	3.6	6.6	AZ5DE015	
14	2.50	Gray	24	10	2.7	4.2	7.8	AZ5DE025	250

RoHS Compliant

[1] **Bold faced** catalog numbers are stocked in the United States.
[2] CE Marked.
[3] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.
[4] These catalog numbers are UL Component Recognized (File E164872 CCN ZMMT2) provided the AT1PA crimping tool is used to crimp the cable end.
[5] Will accept an AR1SC03 cable marker.

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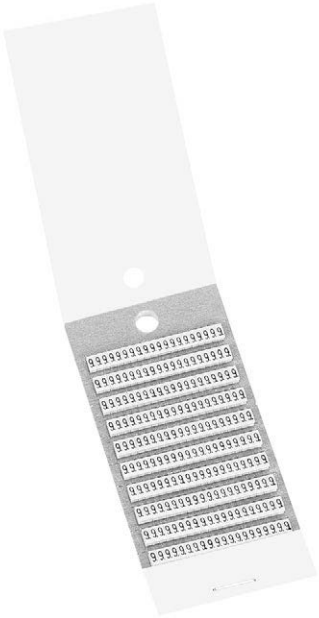
AR1SC01

AR1SC02

AR1SC03



AR1MA019

Cable End Markers and Tools

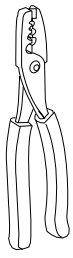
Table 24.71: Cable End Markers & Accessories

Style	Catalog Number	Std. Pack [6]
Adjustable collar type marker holder for #14 to #2 wire	AR1SC01	100
Clip-on marker holder for #18 to #16 wire (7 markers max.)	AR1SC02	
Cable end marker tags for DZ5CA042 to DZ5CA253	AR1SC03	
Card of 200 yellow markers with black numeral 0 thru 9	AR1MA01 [7]	1
Card of 200 yellow markers with black letters A thru Z	AR1MB01 [7]	1
Card of 200 black markers with a white 0 marked on them	AR1MC010	200
Card of 200 brown markers with a white 1 marked on them	AR1MC011	200
Card of 200 red markers with a black 2 marked on them	AR1MC012	200
Card of 200 orange markers with a black 3 marked on them	AR1MC013	200
Card of 200 yellow markers with a black 4 marked on them	AR1MC014	200
Card of 200 green markers with a black 5 marked on them	AR1MC015	200
Card of 200 blue markers with a black 6 marked on them	AR1MC016	200
Card of 200 violet markers with a black 7 marked on them	AR1MC017	200
Card of 200 gray markers with a black 8 marked on them	AR1MC018	200
Card of 200 white markers with a black 9 marked on them	AR1MC019	200
Card of 200 blank yellow markers	AR1MA0196	1
Card of 200 blank green markers	AR1MA0197	1
Card of 200 yellow markers with a black + marked on them	AR1MA0198	1
Card of 200 yellow markers with a black—marked on them	AR1MA0199	1
Complete set of numeral markers 0 thru 9, plus one card each of the "+" "-", yellow blanks, and green blanks/one AT1PA1 positioning tool. Each kit has 200 of each item.	AR1MA01	1
Complete set of letter markers A thru Z, plus one card each of the "+" "-", yellow blanks, and green blanks/one AT1PA1 positioning tool. Each kit has 200 of each item.	AR1MB01	1

Table 24.72: Cable End Tools

Description	Catalog Number
Cable end marker positioning tool	AT1PA1
Automatic stripping and cutting tool for 0.8 mm to 4 mm cable, adjustable stripping length	AT1PA7
Crimping tool for cable ends 0.5 mm^2 to 16 mm^2	AT1PA2
Crimping tool for cable ends 10 mm^2 to 35 mm^2	AT1PA4
Organizing case for cable ends—holds stripping tool and cable ends (not supplied)	AT1HB2

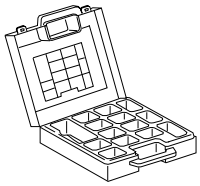
AT1PA1



AT1PA2

AT1PA4

AT1PA7



AT1HB2

[6] Orders must specify the standard package quantity (Std. Pack) or multiples of that quantity.
[7] Complete the catalog number by adding the number or letter desired.
Examples: AR1 MA015 is a card of 200 yellow markers with a black 5 marked on them.
R1 MB01T is a card of 200 yellow markers with a black T marked on them.

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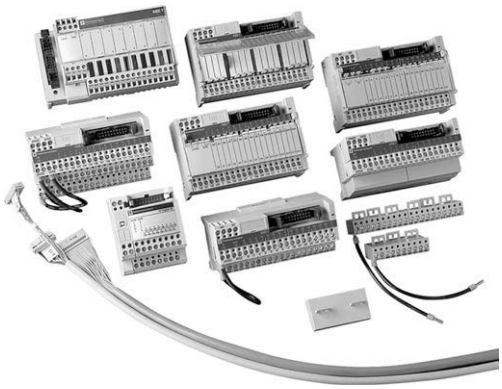


TELEFAST™ 2 Prewired Connection System

The TELEFAST 2 system is a set of products for the rapid connection of I/O modules (24 Vdc discrete, analog and counters) to Various control circuit components. These components act as a substitute for screw terminal blocks, remotely locating and partly eliminating the single wire connections. The system connects only to channels with HE10 and SUB-D connectors, or to standard terminal blocks with a cabled connector.

Variations within the listing of modules include those with and without relays (electromechanical and solid state), analog and counter modules, and special function modules.

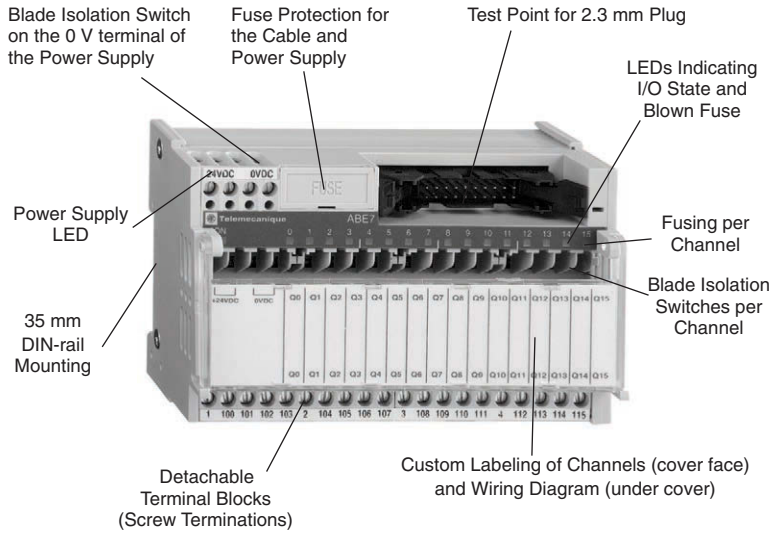
Pre-wired cables available allow you to connect directly to:

- Schneider Electric (Modicon™ family)
  - Premium PAC
  - TSX Micro PLC
  - TSX Series 7
  - Twido PLC
  - Quantum PAC
  - Compact
  - April S5000/7000
  - NUM1020/1060-M340 PAC-M580 PAC-M221 PLC
- Siemens
  - S7 – 200/300/400
  - S5 – 95U to 155U
- Allen-Bradley
  - SLC500

In addition, other accessories include:

- I/O simulators
- Continuity blocks
- Label marking software
- Splitter bases (16, 23, and 32 channels)
- Mounting kits
- Detachable terminal strips
- Wiring pass-through connectors
- Fuses

Advantys Telefast 2 Product Features



NOTE: Not all features are available on all modules.

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Section 25

Machine Safety Products

XPS Safety Relay

XPSMC Safety Controller

XPSMF Safety PLC

XUSL Light Curtain

XCSDM Non-Contact Safety Interlock Switches

XY2 Cable Pull Switches

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- Safety Relays—XPS 25-2
- Safety Controllers—XPSMC 25-2
- Safety PLCs—XPSMF 25-2
- Light Curtains—XUSL 25-2
- Safety Interlock Switches—XCS 25-2
- Non-Contact Safety Interlock Switches—XCSDM 25-2
- Safety Limit Switches—XCS 25-2
- Cable Pull Switches—XY2 25-2
- Other products for use in safety-related systems 25-2

Architectures for Safety Related Solutions 25-3

- XPS Safety Relays 25-3
- XPSMC Safety Controllers 25-3
- XPSMF Safety PLCs 25-3

Preventa™ XPS Safety Relays 25-4

- For Monitoring Safety Functions 25-4
  - XPS Safety Relays 25-4
  - XPSMC Safety Controllers 25-4

Preventa™ XPS Safety PLCs 25-5

- For Monitoring Safety Functions 25-5
  - XPSMF Safety PLCs 25-5

Light Curtains 25-5

- For point of operation or perimeter guarding 25-5
  - XUSL Light Curtains 25-5
  - XUSL2E and XUSL4E 2-Box Light Curtains 25-5

Safety Interlock Switches 25-6

- Safety Interlock Switch Products 25-6
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Safety Switches 25-7

- Safety Limit and Cable Pull Switches 25-7
  - Safety Limit Switches 25-7
  - Cable Pull Switches For Emergency Stop Operation 25-8

Introduction

Many different architectures for safety related solutions are available in Schneider Electric's product offering, from safety relays to safety PLCs. The architecture can determine what SIL level or performance level can be achieved with the safety related solution. Various architectures may have inherent benefits such as simple selection or increased levels of diagnostics, but their cost effectiveness can depend on the size and complexity of the safety related system and the features and functions required.

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Safety Relays—XPS

To tie the whole safety system together, XPS safety relays are used to monitor the safety inputs, outputs, and feedback from the system to determine when the system is safe to start and when the system should be shut down.

Safety Controllers—XPSMC

Safety controllers are used in applications where multiple safety relays would be required to control the safety-related system, or where the interaction between the individual safety relays would require significant inter-wiring. The simple-to-use software allows the user to easily develop the safety-related control system, providing a cost effective solution.

Safety PLCs—XPSMF

Safety PLCs are used where the safety-related solution is complicated, or where there are a greater number of safety inputs or outputs required. They are also used where safety inputs and outputs need to be distributed around the machine or production area.

Light Curtains—XUSL

Some machine operations may not allow gates or guards to be used, and other applications require high visibility of the process or easy accessibility. For these applications, XUSL light curtains may be the best choice and are available in many protected heights, minimum object sensitivities, and configurations.

Safety Interlock Switches—XCS

To protect operators, maintenance, and other personnel, safety systems may require the interlocking of mechanical gates or guards. We provide both locking and non-locking mechanical XCS safety interlock switches in many body styles and contact arrangements.

Non-Contact Safety Interlock Switches—XCSDM

For certain applications, such as food and beverage, no contact between the safety interlock switch and its actuating key is desired, so we provide several different types of XCSDM non-contact safety interlock switches.

Safety Limit Switches—XCS

In some applications, the position of components is important to the safety of the machine. Devices such as safety interlocks or light curtains are impractical. These applications are ideal for safety limit switches. They can also be used on gates and guards to verify a closed position or a fully open or overtravel position.

Cable Pull Switches—XY2

In most applications, emergency stopping is required to shut the machine down in case an emergency or problem arises. Where an individual emergency stop is required, the XB4/XB5 emergency stop push buttons are available in various types, sizes, and nameplates. On large machines or conveyors, a high number of emergency stop operators may need to be installed. As more individual e-stop buttons are required, using an XY2 cable pull switch becomes a more economical solution based on ease of use, installation time, and cost effectiveness.

Other products for use in safety-related systems

We offer many other products that are suitable for use in safety-related circuits, such as:

- XB4/XB5 emergency stop push buttons—See Section 19, XB4–XB5 Common Operators, page 19-8
- XV tower lights—See Section 19, XVC Tower Lights and Accessories, page 19-118
- TeSys contactors and relays—See Section 18, Contactors and Relays, page 18-2
- Limit switches with positive/direct opening N.C. contacts—See Section 21, Limit Switches, page 21-2

All of the machine safety products in this section are designed to work together to allow you to meet your various safety requirements. When properly applied, these products will allow you to meet SIL 3 per IEC 61508, Category 4 per ISO 13849-1, and performance level “e” per ISO 13849-1, and help you meet domestic and international safety requirements, standards, and codes.

The following pages give an overview of our wide offering of machine safety products. **MKTED208051EN-US Rev. 02** gives a detailed description of our offering, including safety PLCs, safety controllers, safety relays, safety interlocks, light curtains, safety interlocks, non contact safety interlocks, and cable pull switches. This catalog also provides additional information on domestic and international safety standards and codes, and additional information to help you develop safety systems for the protection of personnel.

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XPS Safety Relays

Many different architectures for safety related solutions are available in Schneider Electric's product offering, from safety relays to safety PLCs. The architecture can determine what SIL level or performance level can be achieved with the safety related solution. Various architectures may have inherent benefits such as simple selection or increased levels of diagnostics, but their cost effectiveness can depend on the size and complexity of the safety related system and the features and functions required. Some of the features and benefits of these various architectures are:

XPS Safety Relays

- Local diagnostics (LEDs)
- Remote diagnostics (solid-state outputs)
- Plug-in connectors simplify maintenance
- Select only the safety functions needed
- Simple installation
- Simple replacement
- Proven electromechanical reliability
- No software to learn or use

XPSMC Safety Controllers

XPSMC Safety Controller

- Simplicity and flexibility
  - 16 or 32 inputs and 10 safety outputs
  - A wide library of predefined and certified safety functions
  - User-friendly software configuration
  - Reduced wiring
  - Only one product to install and implement
- Local and remote diagnostics via serial link to PC or PLC
  - Reduced implementation time and downtime
  - Reduced troubleshooting time

XPSMF Safety PLCs

XPSMF Safety PLC

- Increased productivity because of:
  - Reduced machine down time
  - Reduced overall engineering costs incurred during installation and maintenance
  - Reduced system complexity by having a single network solution instead of many
- XPS-MF will simplify the entire system by:
  - Saving space
  - Reducing wiring
  - Increasing overall system flexibility by use of programming and device placement (network capability)
  - Providing complex diagnostics (network capability)
  - Saving time and money due to reduced maintenance
- SafeEthernet protocol

Table 25.1: Maximum Levels of the Architectures for Safety Related Functions

	Category 4 and Performance Level "e" per ISO 13849–1	SIL 3 per IEC 61508
XPS Safety Relays	Yes	No
XPSMC Safety Controllers	Yes	Yes
XPSMF Safety PLCs	Yes	Yes

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XPS Safety Relay

XPS Safety Relays

XPS safety relays monitor various safety inputs, start sequences, and feedback from starters and relays to allow machinery operation only when all safety controls are in their appropriate state and are functioning properly. Inputs can be from emergency stop push buttons, cable pull switches, limit switches, light curtains, safety interlock switches, or two hand control stations.

XPS safety relays give users increased functionality and flexibility when designing equipment to meet safety requirements and standards in the U.S., for the European Safety Directive, IEC safety requirements and meet Category 4 of EN/ISO 13849-1. Most devices can be configured for single or dual channel inputs, and for either monitored start, non-monitored start, or automatic start. Removable wiring terminals or non-removable wiring terminals are available on most module types.

The XPS product family complements our broad safety product offering with modules for many specific safety functions and applications, as well as devices for use in general types of applications. There are even devices whose safety functions can be configured at the time of installation.

Preventa XPS Includes the Following Types of Safety Relay Modules:

- Specific purpose modules such as limit switch monitoring, zero speed, timing, two-hand control, press control, and others
- Multifunctional configurable devices with multiple sets of inputs whose functions can be configured from 15 pre-defined functions, allowing greater flexibility and functionality
- Broad range of devices for emergency stop applications
- Expansion modules to increase the number of safety outputs
- Many devices compatible with light curtains

Features and Benefits

- LEDs are provided to indicate power, input, output, and feedback loop status.
- Solid state outputs provide compatibility with system controllers for diagnostics, troubleshooting, and correct system operation.
- Most devices are available with either removable or non-removable terminals.
- Most devices are available with a monitored start function to detect welded contacts or incorrect status in the start function and also to detect tampering with the start circuit.
- Dual voltage devices are available for use with either 120 V or 24 V power to reduce your inventory and increase flexibility.

XPSMC Safety Controller

XPSMC Safety Controllers

The XPSMC safety controllers can be used for monitoring all of the different safety tasks for your applications in one safety controller. All of the functions of the various safety relays are built into the hardware and software. The XPSMC safety controllers meet SIL 3 per IEC 61508, Category 4 per EN/ISO 13849-1, and performance level “e” per EN/ISO 13849-1. The associated configuration software makes development of the safety solution simple, using drag and drop techniques to configure the safety system. Detailed diagnostics provide an in depth overview of the status of the inputs and outputs.

Features and Benefits

- 16 or 32 Safety inputs
- Safety outputs
  - Six safety semiconductor outputs
  - Two safety relay outputs, with two relay contacts each (for a total of four relay outputs)
  - One output for muting indicators
- Control outputs
  - Eight control outputs are used to supply the safety inputs in order to detect incorrect wiring or short circuits in the wiring.

Configuration Software

- The wide device library of certified safety related functions simplifies the development of safety applications.

Diagnostics with PC and Software

Using the simple to use XPSMCWIN software, the configuration can be developed without special training.

- Using the diagnostics mode, the XPSMCWIN software provides an exhaustive overview about the status of the safety functions.
- The status of the inputs, the safety devices and the outputs are indicated by various colored indicators.

Diagnostics with LEDs in the Front Cover

- 6 LEDs indicate the status of the controller.
- 8 LEDs indicate the status of the safety outputs.
- 16 or 32 LEDs indicate the status of the safety inputs.
- Input/output errors are indicated by blinking of the corresponding LED.

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XPSMF PLC

XPSMF Safety PLCs

The XPSMF Safety PLCs are programmable logic controllers that can be interfaced with the machine control system to meet US, EN, and IEC safety requirements. All XPSMF Safety PLCs meet the requirements of SIL 3 per IEC 61508, Category 4 and performance level “e” per ISO 13849-1. The XPSMF can perform all of the various safety functions required in today’s machinery. These functions can be programmed by using one or more pre-defined and certified function blocks (CFB) or by creating your own configuration and function blocks.

Features and Benefits

- Increased productivity because of:
  - Reduced machine down time
  - Reduced overall engineering costs incurred during installation and maintenance
  - Reduced system complexity by having a single network solution instead of many
- Saving space, reducing complexity
  - Reducing wiring
  - Increasing overall system flexibility by use of programming and device placement (network capability)
  - Providing complex diagnostics (network capability)
  - Saving time and money due to reduced engineering and maintenance

Hardware

- Certified to SIL 3 per IEC 61508, Category 4 ISO 13849-1, and performance level “e” per ISO 13849 -1, UL/CSA
- Each Safety PLC contains two processors (redundancy)
- SafeEthernet protocol
- Standard bus communication using Ethernet
- 2 or 4 RJ45 connection points (depending on version)
- Connect hardware in any orientation
- LED diagnostics on PLC housing
- Removable terminals
- Compact range contain DIN rail attachment simplifying installation

XUSL Light Curtains

XUSL Type 2 and 4 light curtains provide point of operation protection for large areas without the need for gates or guards. They allow excellent visibility of the machine or process and free access to the machine while providing protection for personnel. Light curtains are made up of an array of infrared light beams to form a protected area. Whenever one or more of the light beams is broken, the light curtain sends a stop signal to the machine safety control circuit.

XUSL2E and XUSL4E light curtains for point of operation safeguarding are available in either single or multiple segment configurations. Choose the one that best meets your application requirements. These versions are available in either 14 mm or 30 mm minimum object sensitivity (MOS).

Slim and rugged design results in an esthetically pleasing small mounting footprint suitable for aggressive environments.

Telemecanique Sensors
www.tesensors.com

Two Box Light Curtains

XUSL2E and XUSL4E 2-Box Light Curtains

Two box light curtains are ideal for installations where it is desirable to mount and wire only two components, transmitter and receiver. These devices are self-contained and the receiver provides the safety outputs.

Features and Benefits

- 14 and 30 mm minimum object sensitivity (MOS)
- 14 mm MOS protection heights:160 - 1810 mm (6.3 - 71.3 in.)
- 14 mm MOS sensing range: 6.0 m (19.68 ft.)
- 30 mm MOS protection heights: 160 - 1810 mm (6.3 - 71.3 in.)
- 30 mm MOS sensing range: 8 m or 20 m (26.2 or 65.6 ft.)
- 29 x 31.5 mm housing size (1.1 x 1.2 in.)
- 24 Vdc supply voltage
- Female connector cables sold separately (5 m, 10 m, 15 m, and 30 m)
- Cascadable devices available - up to 3 segments

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XCSA Safety Interlock Switch

XCSMP

XCS Safety Interlock Switches

For Gate or Guard Interlocking

XCS safety interlock switches verify that the doors, gates, or guards are closed before a process which could be harmful to personnel can start up. The hazards to personnel can be mechanical, electrical, hydraulic, pneumatic, chemical, or thermal. The various sizes and shapes of safety interlock switches are designed for a wide variety of applications. These mechanical devices have two components: a switch and an actuating key. When the gate or guard is closed, the actuating key attached to the gate or guard is inserted into the switch, closing the safety contacts, allowing the machine to be started. When the gate or guard is opened, the actuating key is removed from the switch, and the safety interlock switch contacts open.

XCS safety interlock switches are designed to meet demanding requirements in the US and Europe, as well as the rest of the world. The flexibility of the XCS line allows one XCS device to perform the same functions as several competitor's devices. This means that fewer XCS devices may be required to cover your needs.

Specifically designed for the protection of machine operators, maintenance and other personnel, the XCS switches can be used in a wide range of applications where a gate, door or guard is a part of the safety
related system.

Features and Benefits

- Simple, rapid installation saves time and labor
- Device flexibility reduces stock requirements
- Wide variety of body styles, contact arrangement, and operators meet a variety of application requirements
- Bodies available in metal or plastic
- Switches are interchangeable between new and older devices, as well as with competitor's devices
- A variety of actuating keys are suitable for all applications
- Pre-wired devices and many connector options available to make wiring and installation easier

The Following Types of Safety Interlocks are Available:

- Non-locking
- Locking with push button or key release
- Locking by electrical solenoid
- Rotary shaft operation, for use on hinges of doors
- Rotary lever for hinged guards
- Pre-wired compact body

XCSDM Non-Contact Safety Interlock Switches

For Non-Contact Gate or Guard Interlocking

XCSDM non-contact safety interlock switches are designed for the same functions as mechanical safety interlock switches. The difference is that the non-contact safety interlock switches are magnetically coded devices and require no contact between the switch and coded magnet. This is a benefit where door or guard mis-alignment is an issue, or where the machine designer does not want to use a mechanical device.

Benefits of Non-contact Devices:

- Food, beverage and pharmaceutical applications require that no contaminants be trapped in or around devices.
- Non-contact devices have no inherent operating force and are well-suited for applications such as lightweight or plexiglass doors, where cracking or breakage is prevalent with standard mechanical safety interlock switches.
- Wash down applications where a standard mechanical safety interlock switch would be more difficult to clean, especially in the actuating key receptacle.
- Where small size is critical or a slim profile is desired

Features and Benefits of XCSDMC, XCSDMP, and XCSDMR

- Tolerates gate or guard alignment problems
- Wider temperature range for a plastic bodied device than any competitor's products
- Multiple coded-magnet approach directions allow for maximum flexibility of mounting options
- Suitable for Category 4 safety circuits when used with a safety relay or safety controller.
- Available with or without LEDs
- Connector and cabled versions available

Features and Benefits of XCSDM3 and XCSDM4

- Meets SIL 2 and 3 per IEC 61508, Category 3 and 4 per EN 954-1 and EN/ISO 13849-1 and performance level "e" per EN/ISO 13849-1 without the need for a safety relay or safety controller
- Connector and cabled versions available
- Multicolor LEDs for diagnostics and status
- Multiple coded-magnet approach directions allow for maximum flexibility of mounting options

XCSDMP

XCSDM4

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XCS Safety Limit Switch

Safety Limit Switches

XCS Safety Limit Switches

Preventa XCS safety limit switches are used in machine safety systems for a wide variety of safety related functions, including end of travel notification, overtravel indication, safety related positioning of machinery/tooling or component parts, as well as interlocking gates and guards. They are often used in conjunction with safety interlock switches for mechanical and electrical redundancy on doors and guards.

Features and Benefits

- Meet US and European safety standards requiring that switches used in safety related applications have positive opening contacts
- Tamper resistant covers over mounting screw and head adjustment to reduce potential for tampering
- Red color allows easy visibility and identification of safety related limit switches
- Two body styles available:
  - Compact, pre-wired with cable
  - Compact, with conduit entry

XCSP/XCSD Safety Limit Switches

The XCSP (plastic body) and XCSD (metal body) safety limit switches are identical in size and features. The only difference is the enclosure and conduit entry. XCSP and XCSD safety limit switches are for use in safety related applications including end of travel notification, overtravel indication, safety related positioning of machinery/tooling or component parts, as well as interlocking gates and guards.

Features and Benefits

- Positive opening contacts standard in all devices
- Snap acting contacts
- Slow make/slow break contacts
- Several head types available
- Metal and Plastic body styles available
- Several conduit types available
- Tamper resistant cover

XCSM Safety Limit Switches

The XCSM safety limit switches come pre-wired in multiple lengths of electrical cable for simplified installation. The XCSM safety limit switches are for use in safety related applications including end of travel notification, overtravel indication, safety related positioning of machinery/tooling or component parts, as well as interlocking gates and guards.

Features and Benefits

- Positive opening contacts standard in all devices
- Snap acting contacts
- Slow make/slow break contacts
- Several head types available
- Plastic body
- Pre-wired in various cable lengths
- Tamper resistant cover

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XY2 Cable Pulls

Cable Pull Switches
For Emergency Stop Operation
XY2 Cable Pull Switches

XY2 cable pull switches provide emergency stop signaling at any point along a cable up to 230 feet in length. This is preferable to installing many individual emergency stop push button stations along a conveyor or around the machine, providing a more cost effective solution. Typical applications include conveyor systems, packaging, textiles, transfer machines, presses, woodworking equipment and paint lines.

Operation is based on the taut cable principle. The cable must be tight and have appropriate tension applied to set or reset the switch. Once cable tension has been set, the device will open the N.C. control contacts if either the cable is pulled or if it becomes slack due to stretching or breakage of the cable.

Normal stop versions are used where a momentary, non-emergency signal is required at any point along a cable.

Features and Benefits

- Cable lengths: XY2CE 230 ft.; XY2CH and XY2CJ 98 ft.
- Emergency stop versions (available in XY2CE, XY2CH, and XY2CJ)
  - The N.C. contact opens the control circuit and mechanically latches, and will remain latched in the open position until an operator manually resets it
  - Emergency stop versions have positive/direct opening contacts as standard
  - Device will not reset if out of adjustment
- Normal stop versions (available in XY2CE and XY2CH)
  - Normal stop versions are used where a momentary, non-emergency signal is required
  - Normal stop versions do not latch contacts open or include positive opening contacts
  - Normal stop versions are provided with snap action contacts for momentary stop
- 230 ft. maximum cable length
- Adjustable tripping force
- Available with 2 N.O. and 2 N.C. contacts
- 98 ft. maximum cable length
- Two viewing windows to aid in adjusting the switch
- Manual tripping force adjustment
- Adjustment indicator
- Traction force indicator
- Available with 2 N.O. and 2 N.C. contacts
- 98 ft. maximum cable length
- Left, right, straight cable mount
- UL NSID certified for emergency stop
- 2 NC and 1 NO contacts

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Section 26

AC Drives and Soft Starters

Altivar™ 212

Altivar™ 312

Altivar™ 61

Altivar™ 71

Altistart™ 22
Soft Starters

Altistart™ 48
Soft Starters

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Overview of Altivar™ 12 / 312 / 32

Type of Motor Control		Simple Machines		Complex Machines
Key Application/Market Segment		• Conveyors • Mixers • Gate control • Machine movement	• Small pumps and fans • Positive displacement pumps • Material handling	• Material working • Material handling • Packaging • Gapping, Palletizing • Forming, Embossing • Hoisting
Drives		**Altivar™ 12**	**Altivar™ 312**	**Altivar™ 32**
Distribution voltage ranges for 50/60 Hz line supply		Single-phase 100 V to 120 V Single-phase 200 V to 240 V Three-phase 200 V to 230 V	Single-phase 200 V to 240 V Three-phase 200 V to 240 V Three-phase 380 V to 500 V Three-phase 525 V to 600 V	Single-phase 200 V to 240 V Three-phase 380 V to 500 V
Horsepower ratings for three-phase motors		1/4 hp to 1 hp, 115 V/230 V single-phase input 1/4 hp to 3 hp, 208 V/230 V single-phase input 1/4 hp to 5hp, 208V/230 V	1/4 hp to 3 hp, 208 V/230 V single-phase input 1/4 hp to 20 hp, 208 V/230 V 1/2 hp to 20 hp, 400 V/480 V 1 hp to 20 hp, 525 V/600 V	1/4 hp to 3 hp, 200 V/240 V 1/2 hp to 20 hp, 380 V/500 V
Drives	Output frequency	0.5 Hz to 400 Hz	0.5 Hz to 500 Hz	0.1 Hz to 599 Hz
	Type of Control			
	Asynchronous motor	Sensorless flux vector control Kn2 quadratic ratio for pump and fan	Sensorless flux vector control, volts per hertz, Energy saving ratio	Sensorless flux vector without speed feedback, volts/hertz (2 or 5 point or quadratic)
	Synchronous motor	—	—	Permanent magnet motor control without speed feedback
	Transient overtorque	150% to 170% of nominal motor torque	170% to 200% of the nominal motor torque	150% nominal for 60 seconds, 200% nominal for 2 seconds
Functions Number of Functions		40	50	>150 + ATV Logic
Number of I/O	Analog inputs	1	3	3
	Analog outputs	1	1	1
	Logic inputs	4	6	6 + Safe Torque Off input
	Logic/Relay outputs	1 L.O., 1 N.O./1 N.C. relay contacts	2: 1 N.O./1 N.C. + 1 N.O. relay contacts	1 L.O., 1 N.O./1 N.C., 1 N.O.
Communication	Integrated	Modbus™	Modbus™ and CANOpen	Modbus™ and CANOpen
	Available as an option	—	• DeviceNet • Profibus DP • CANOpen Daisy Chain • Ethernet TCP/IP (gateway) • FIPIO (gateway)	• CANOpen Daisy Chain • DeviceNet • Profibus DP V1 • Ethernet TCP/IP • PROFINET
Other Option Cards		—	—	—
Enclosure Rating		IP20	IP20, Type 1 with optional kit, Type 12 available with ATV31C	IP20
Standards and Certifications		EC/EN 61800-5-1, IEC/EN 61800-3 (Environments 1 and 2, categories C1 and C3) CE, UL, CSA, C-Tick, NOM, GOST	EN 50178, EN 61800-3, EN 55011 - EN 55002: class A, class B with option, C-TICK, UL, N998, CE, CSA	IEC/EN 61800-5-1, IEC 61800-3 (1 and 2, category C2) IEC/EN 61508 SIL 1 UL508C, CSA, C-Tick, NOM, GOST, CE

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Overview of Altivar™ 71 / 900

Type of Motor Control		Complex, High-power Machines	
Key Application/Market Segment		• Material handling • High performance movement and regulation • Lifts, cranes, hoists • Extruders, shredders • Presses	• Material handling • Artificial lift • High performance movement and regulation • Lifts, cranes, hoists • Extruders, shredders • Presses • Positive displacement pumps
Drives		**Altivar™ 71**	**Altivar™ Process 900** *New!*
Distribution voltage ranges for 50/60 Hz line supply		Single-phase 230 V to 240 V Three-phase 200 V to 240 V Three-phase 380 V to 480 V Three-phase 500 V to 690 V	Three-phase 200 V to 240 V
Horsepower ratings for three-phase motors		1 hp to 30 hp, 208 V/230 B single-phase input 1/2 hp to 100 hp, 200 V/230 V 1 hp to 1800 hp, 400 V/480 V 2 hp to 2100 hp, 575 V/690 V	1 hp to 100 hp, 208 V/230 V 1 hp to 250 hp, 400 V/480 V
Drives	Output frequency	0.5 Hz to 599 Hz up to 50 hp 0.5 Hz to 500 Hz from 50 hp to 700 hp	0.5 Hz to 599 Hz
	Type of Control		
	Asynchronous motor	Sensorless flux vector control (with or without sensor), volts per hertz ratio (2 or 5 points), ENA system, synchronous motor vector control with or without speed feedback	Voltage vector control, currrent vector control closed loop, 5-segment V/F profile, energy saving, synchronous reluctance motor
	Synchronous motor	Vector control with or without speed feedback	Open loop synchronous motor, closed-loop synchronous motor, open-loop synchronous motor variable torque
	Transient overtorque	220% of the nominal motor torque for 2 seconds 170% for 60 seconds	Normal duty:
Functions Number of Functions		> 150	45+
Number of I/O	Analog inputs	2-4	3–5
	Analog outputs	—	2
	Logic inputs	6-20	8–14
	Logic/Relay outputs	2-4	3–6
	Safety function inputs	—	2
Communication	Integrated	Modbus™ and CANopen	Modbus™ and Ethernet IP /Modbus TCP dual port
	Available as an option	-Profibus DP [V1] - DeviceNet - Modbus TCP/IP - EtherNet/IP and Modbus/TCP Dual port - Interbus S - Modbus/Uni-Telway - Modbus Plus	- CANopen: Daisy Chain RJ45, Sub-D and screw terminals - ProfiNet - Profibus DP V1 - DeviceNet - EtherCAT
Other Option Cards		Encoder interface cards, I/O extension cards, IMC programmable card	I/O extension cards, Encoder input cards, Resolver input cards
Enclosure Rating		IP20, Type 1 with optional kit	Type 1
Standards and Certifications		IEC/EN 61800-5-1, IEC/EN 61800-3 (environments 1 and 2, C1 to C3), EN 55011, EN 55022, IEC/EN 61000-4-2/4-3/4-4/4-5/4-6/4-11,CE, UL, CSA, DNV, C-TICK, NOM 117, GOST, ABS	UL 508C, UL File E116875, CSA, TUV, REACH, UL50, EN/IEC 61800-3, EN/IEC 61800-3 environment 1 category C2, EN/IEC 61800-3 environment 2 category C3, EN/IEC 61800-5-1, IEC 61000-3-12, IEC 60721-3, IEC 61508

Overview of Altivar™ 212 / 61 / 600

Type of Motor Control	Centrifugal Pumps and Fans		Pumps and Fans
Key Application/Market Segment	• Pumps • Fans		• Pumps • Fans • General purpose applications in: – Water & Wastewater – Oil & Gas – Mineral, Mining & Metals – Food & Beverage
Drives	**Altivar™ 212**	**Altivar™ 61**	**Altivar™ Process 600** *New!*

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Type of Motor Control		Centrifugal Pumps and Fans		Pumps and Fans
Distribution voltage ranges for 50/60 Hz line supply		Three-phase 200 V to 240 V Three-phase 380 V to 480 V	Single-phase 230 V to 240 V Three-phase 200 V to 240 V Three-phase 380 V to 480 V Three-phase 500 V to 690 V	Three-phase 200 V to 240 V Three-phase 380 V to 480 V
Horsepower ratings for three-phase motors		1 hp to 40 hp, 208 V/230 V 1 hp to 100 hp, 400 V/480 V	1 hp to 30 hp, 208 V/230 V single-phase input 1 hp to 125 hp, 208 V/230 V 1 hp to 1800 hp, 400 V/480 V 2 hp to 2500 hp, 575 V/690 V	1 hp to 100 hp, 208 V/230 V 1 hp to 250 hp, 400 V/480 V
Drives	Output frequency	0 Hz to 200 Hz	0.5 Hz to 1000 Hz up to 50 hp 0.5 Hz to 500 Hz from 50 hp to 900 hp	0.1 Hz to 500 Hz
	Type of Control			
	Asynchronous motor	Volts per hertz or sensorless flux vector control	Volts per hertz ratio (2 or 5 points) or sensorless flux vector control, energy-saving ratio	Voltage/frequency: quadratic, 2 point or 5 points, or optimized for energy savings
	Synchronous motor	Permanent magnet motor control without speed feedback	Vector control without speed feedback	Vector control for permanent magnet motors
	Transient overtorque	Transient overload: 110% of the nominal drive current for 60 seconds	170% of the nominal motor torque for 2 seconds 110% for 60 seconds	Normal Duty: 130% of the nominal motor torque for 2 seconds 110% for 60 seconds Heavy Duty: 170% of the nominal motor torque for 2 s 150% for 60 s
Functions Number of Functions		50	> 100	>30 pump dedicated functions, additional for fan and material handling applications
Number of I/O	Analog inputs	2	2-4	3-5
	Analog outputs	1	—	2
	Logic inputs	3	6-20	6-12
	Logic/Relay outputs	2: 1 N.O./1 N.C. and 1 N.O. relay contacts	2-4	3-6
	Safety function inputs	—	—	2
Communication	Integrated	Modbus™, Apogee P1, BACnet, Metasys® N2	Modbus™ and CANopen	Modbus/TCP, Modbus serial link
	Available as an option	- LonWorks	- Apogee FLN (P1) - BACnet - Modbus/Uni-Telway - LonWorks - EtherNet/IP and Modbus/TCP Dual port - Modbus Plus - Interbus S - DeviceNet - Profibus DP [V1] - Metasys N2	- EtherNet/IP and Modbus/TCP Dual port - CANopen: Daisy Chain RJ45, Sub-D and screw terminals - ProfiNet - Profibus DP V1 - DeviceNet
Other Option Cards		—	I/O extension cards, IMC programmable card, multi-pump cards	I/O extension cards
Enclosure Rating		IP20, Type 1 with optional kit, Type 12 @460 Vac	IP20, Type 1 with optional kit, Type 12 @460 Vac	Type 1
Standards and Certifications		EN 50178, IEC/EN 61800-3, EN 55011, 55022: class A, class B with option, CE, UL, C-TICK, N998, UL 1995 Plenum-rated AHRI Certified	IEC/EN 61800-5-1, IEC/EN 61800-3 (environments 1 and 2, C1 to C3), EN 55011, EN 55022, UL 1995 Plenum-rated, IEC/EN 61000-4-2/4-3/4-4/4-5/4-6/4-11, CE, UL, CSA, DNV, C-TICK, NOM 117, GOST, ABS	UL 508C, UL File E116875, CSA, TUV, REACH, UL50, EN/IEC 61800-3, EN/IEC 61800-3 environment 1 category C2, EN/IEC 61800-3 environment 2 category C3, EN/IEC 61800-5-1, IEC 61000-3-12, IEC 60721-3, IEC 61508

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Overview of Altistart™ 01 / 22 / 48

Type of Motor Control		Simple Machines	Normal-duty Machines	Heavy-duty Machines
Key Application/Market Segment		• Conveyors • Mixers • Gate control • Machine movement • Small pumps and fans • Positive displacement pumps	• Pumps • Fans • Turbines • Compressors • Conveyors • Conveyor belts • Lifting screws • Escalators	• Pumps • Fans • Punch presses • Band saws • Crushers • Centrifuges • Conveyors (high inertia loads)
Soft Starters		**Altistart™ 01** 	**Altistart™ 22** 	**Altistart™ 48**
Distribution voltage ranges for 50/60 Hz line supply		Single-phase 110 V to 480 V Three-phase 110 V to 690 V	Three-phase 208 to 600 Vac	Three-phase 230 V to 415 V Three-phase 208 V to 690 V
Horsepower ratings for three-phase motors		1/4 hp to 2 hp 115 V/230 V 1/2 hp to 30 hp, 208 V/230 V 1/2 hp to 60 hp, 400 V/480 V 30 hp to 75 hp, 575 V/600 V	3 hp to 500 hp	3 hp to 1200 hp
Drives	Output frequency	Equals input frequency	—	Equals input frequency
	Type of Control:	Reduced voltage start	Controlled starting and stopping, via voltage and torque	Reduced voltage start Reduced voltage start and torque control stop
	Asynchronous motor			
	Synchronous motor	—	—	—
	Typical starts per hour rating	—	6	10
Functions Number of Functions		1	29	36
Number of I/O	Analog inputs	—	1 PTC probe	1 PTC probe
	Logic inputs	3	3	4
	Relay outputs	1	2 (N.O./N.C)	1
Communication	Integrated	—	Embedded Modbus	Modbus
	Available as an option	Combined with TeSys™ U-Line self-protected starter	—	• DeviceNet • Ethernet TCP/IP • Fipio • Profibus DP V1
Other Option Cards		—	—	—
Enclosure Rating		IP20	IP00, IP20	IP20
Standards and Certifications		EC/EN 60947-4/2, C-Tick, CSA, UL, CE, CCC	UL, CSA, CE, GOST, C-TICK, CCC, and RoHS directive	EC/EN 60947-4/2, EMC class A and B, DNV, C-Tick, GOST, CCIB, NOM, UL, CE, CCC, CSA

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Overview of SFlex, Enclosed 22, Enclosed 48

Type of Motor Control	Adjustable Speed Drives Commercial HVAC & Retrofits	Soft Starters Commercial	North America Enclosed Soft Starters
Key Application/Market Segment	• Pumps • Fans	• Pumps • Fans • Conveyors • Centrifuges	• Agitators • Mixers • Grinders • Crushers
Packaged Products	**S-Flex (Altivar™ 212)** 	**Enclosed 22** 	**Enclosed 48** Integrated controls protected within enclosures, optimized with disconnect means, circuit breakers, push buttons, selector switches, control logic, communication and miscellaneous options designed to meet application requirements.
Distribution voltage ranges for 50/60 Hz line supply	208 Vac, 240 Vac, 480 Vac	208 Vac, 230 Vac, 460 Vac, 575 Vac	208 Vac, 240 Vac, 480 Vac, 600 Vac
Horsepower ratings for three-phase motors	**Variable torque** 1 hp to 40 hp, 200 V/230 V 1 hp to 100 hp, 460 V	**Type 1 and Type 12** 3 hp to 150 hp, 208 V 5 hp to 200 hp, 230 V 10 to 400 hp, 460 V 15 to 500 hp, 575 V **Type 3R or 50˚C Rated:** 3 hp to 125 hp, 208 V 5 hp to 150 hp, 230 V 10 to 400 hp, 460 V 15 to 500 hp, 575 V	**Type 1, Type 12 and Type 3R** 3 hp to 200 hp, 208 V 5 hp to 250 hp, 230 V 10 hp to 500 hp, 480 V 15hp to 600 hp, 575 V
Configurable options	**Configurable product** Drive with isolation/bypass Non-bypass Drive input disconnect switch Line contactor Communication options	Basic shunt tip Full featured shunt trip non-reversing isolation Reversion isolation Integral Full Voltage Bypass	**Customizable products** Non-reversing Reversing Shunt Trip Extensive options
Enclosure ratings	Type 1 general purpose	Type 1 general purpose Type 12 industrial use (Dust-Tight/Drip-Tight) Type 3R outdoor use	Type 1 general purpose Type 12 dust/drip proof Type 3R outdoor service entrance
Communication	• Modbus RJ45 (included as standard) • BACnet (embedded) • LonWorks (option card) • Metasys N2 (embedded) • APOGEE FLN (P1) (embedded)	• Modbus (embedded)	Modbus (native) Modbus Plus Ethernet TCP/IP (gateway) DeviceNet (gateway)
Standards and Certifications	UL 508C, Seismic qualification ICC ES AC156 acceptance test protocol	Service Entrance Rating, UL Listed per UL 508 under category NKJH, Conforms to applicable NEMA ICS, NFPA, and IEC standards, Manufactured under ISO9001 standards, Factory modification E10 provides Canadian cUL certification per C22.2, No.14, Seismic qualification	UL 508, cUL/CSA, Seismic qualification ICC ES AC156 acceptance test protocaol, ABS

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Eflex, Altivar Outdoor 61/71, PowerGard 61/71

	North America Drive Systems		
Key Application/Market Segment	- Commercial - Industrial HVAC - Pumps - Fans	- Oil and Gas - Rod Pump controls, PCP controls - ESP controls, HPS controls - Irrigation	- Water Waste Water - Industrial , strategic accounts - Process control applications - Fans
	Eflex 	**Altivar Outdoor 61/71** *New!* 	**PowerGard 61/71**
Brief Description	Featuring the ATV61 which is a robust, industrial-grade enclosed solution for healthcare and industrial plant floor, pump and fan applications.	Featuring the ATV61/71 drive providing an array of power and automation options from 20hp to 350hp to meet your application needs. The Altivar Outdoor is a UL Type 3R rated drive designed for pumping solutions in outdoor environments, especially oil & gas.	Featuring the ATV61/71 drive providing an ideal solution for installations specifying compliance with IEEE 519-2014 guidelines for harmonic mitigation.
Special Features	- Built to conform to International Building Code (IBC) and ASCE seismic standards for ground and roof-level installations. - Available with isolation/bypass - 100,000 amps SCCR	- Door-on-door - 50 °C rated - Optional cold weather option - Wide array of options available - Quick lead time	- Clean power technology - Optional barriered bypass - Optional integrated bypass - Optional reduced voltage bypass - Optional soft start bypass - Aluminum transformer standard - Copper transformer as option
Enslosure Ratings	Nema Type 1, Type 12/12K, Type 3R outdoor	Nema Type 3R Outdoor	UL Type 1, UL Type 1 w/fan filters
Power Range	Variable torque: - 1–100 hp, 460 V - 1–50 hp, 208/230 V	Variable torque: 20–350 hp, 460 V Constant torque: 20–250 hp, 460 V	Variable torque: 50–500 hp, 460 V Constant torque: 40–450 hp, 460 V
Distribution voltage ranges for 50/60 Hz line supply	208/230 Vac, 480 Vac	480 Vac	480 Vac
Standards / Certifications	- UL 508C - Seismic qualification ICC ES AC 156 acceptance test protocol - Manufactured under ISO 9001 standards - Service entrance available UL type 3R - Plenum rated per UL508C	- UL Listed per UL 508A - Conforms to applicable NEMA ICS, NFPA, & IEC standards - Service entrance rated - Manufactured under ISO 9001 standards	- UL 508C, cUL - Seismic qualification ICC ES AC 156 acceptance test protocol - Manufactured under ISO 9001 standards - IEEE 519 compliant solution

Contact your local Schneider Electric Field Office for further information

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Altivar Plus 61/71, Altivar 660 Process, Altivar 1260

	North America Drive Systems		
Key Applications and Market Segment	- Water Waste Water - Oil and Gas - Mining Minerals and Metals	- Water Waste Water - Oil and Gas - Mining Minerals and Metals - Food and Beverage	Pump, fan, and compressors for: - Water Waste Water - Oil and Gas - Mining Minerals and Metals
	Altivar Plus 61/71	**Altivar 660 Process Drive Systems** *New!*	**Altivar 1260 Medium Voltage Drive** *New!*
Brief Description	Featuring the ATV61/71 drive providing a robust, packaged solution. Altivar Plus are pre-engineered, ready to use solutions in highly efficient designs.	The Altivar 660 Process System provides a wide range of fully tested and ready to connect drive solution. Starting from a compact pre engineered system to a fully engineered complex solution.	The Altivar 1260 combines the latest vector control strategies with the control of 3-level inverters using proven semiconductor technologies commanded via fiber optic cables. Engineered from the inside-out to reduce harmful grid harmonics and put less stress on motor bearings and insulation.
Special Features	Compact design to save space Swiveling control panel Ease of maintenance (inverter slides out) Multiple options available 100,000 amps SCCR	Compact design to save space Dynamic QR Codes 50° C option available Pump curves embedded Multiple options available Process control embedded Embedded web server	Low component count 24/36 pulse rectifier (AFE option available) with 3-level NPC inverter utilizing medium voltage IGBT's. Standard output sine wave filter delivers a motor friendly waveform which allows long cable lengths and use with standard duty motors. Close-coupled or separately located rectifier transformer Easy to navigate local human-machine-interface (HMI) plus a web application for remote monitoring and control Front access with easy to maintain slide out power modules Integrated UPS for control backup Powerful central processor (CPU) with imbedded programmable controller (PLC) Modular and scalable architecture
Enclosure Ratings	UL Type 12	UL Type 1, UL Type 12, UL Type 3R	NEMA Type 1 (IP21)
Power Range	ATV61 > 125-900 hp 460 V / 125-800 hp 575 V ATV71 > 125-700 hp 460 V / 125-700 hp 575 V	208/340 V / 460 V Type 1: 1–60 hp / 1–1100 hp Type 2: 1–60 hp / 1–1100 hp Type 3R: 1–60 hp / 1–125 hp	Top forced air cooling **Frame x1** up to 2,400 hp **Frame x2** 2,500 to 4,800 hp **Frame x3** 4,900 to 6,500 hp
Distribution voltage ranges for 50/60 Hz line supply	480 Vac, 600 Vac	208/240 Vac, 480 Vac, 600 Vac	4,160 Vac, 3 phase, 60 HZ (drive input) **NOTE:** Primary side of rectifier transformer can accommodate other voltages
Standards / Certifications	UI/cUL Listed per UL508A IEEE519 Compliant (harmonic filter required) Conforms to applicable NEMA ICS, NFPA, & IEC standards Manufactured under ISO 9001 standards	UI/cUL Listed per UL508A IEEE519 Compliant (harmonic filter required) Conforms to applicable NEMA ICS,NFPA, & IEC standards Service entrance available Manufactured under ISO 9001 standards	UL/cUL listed per UL347 IEEE 519 Compliant (24 pulse DFE) Conforms to applicable ANSI / IEEE & IEC standards Manufactured under ISO 9001 standards

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ATV212HU15N4

ATV212W075N4

ATV212HU30M3X

ATV212HD37N4

Altivar™ 212 Drives

The Altivar 212 drive is for use with three-phase asynchronous motors for variable torque pump and fan applications. Select the Altivar 212 drive using the motor nameplate voltage, the full load ampere rating and the table below. The Altivar 212 drive includes 3 logic inputs, 2 analog inputs, 1 analog output, and 2 relay outputs (with 1 NO and 1 NO/NC contacts). The Altivar 212 drive includes an integrated 4 digit, 7 segment LED display with a 7 button keypad and includes an RJ45 Modbus port plus a four-screw terminal block for BACnet, Modbus, Metasys N2 and Apogee P1 communication protocols. LonWorks™ is available in an option card.

Table 26.1: Altivar™ 212 Selection

AC Input Line Voltage	Three-Phase Motor Power [1]		Continuous Output Current	Enclosure Rating		
				IP 20[2] Open Style Product	Type 1 Conduit Kit Purchase ATV212 and Conduit Kit for Type 1 Installation	Type 12 / IP54[3]
	HP	kW	A [1]	Catalog Number	Catalog Number	Catalog Number
200/240 Vac -15%, +10% Three-Phase	1	0.75	4.6	ATV212H075M3X	VW3A31814	—
	2	1.5	7.5	ATV212HU15M3X	VW3A31814	—
	3	2.2	10.6	ATV212HU22M3X	VW3A31814	—
	4	3	13.7	ATV212HU30M3X	VW3A31815	—
	5	4	18.7	ATV212HU40M3X	VW3A31815	—
	7.5	5.5	24.2	ATV212HU55M3X	VW3A31816	—
	10	7.5	32	ATV212HU75M3X	VW3A31816	—
	15	11	46.2	ATV212HD11M3X	VW3A31817	—
	20	15	61	ATV212HD15M3X	VW3A31817	—
	25	18.5	74.8	ATV212HD18M3X	VW3A31817	—
	30	22	88	ATV212HD22M3X	VW3A9206	—
	40	30	117	ATV212HD30M3X	VW3A9208	—
380/480 Vac -15%, +10% Three-Phase	1	0.75	2.2	ATV212H075N4	VW3A31814	ATV212W075N4
	2	1.5	3.7	ATV212HU15N4	VW3A31814	ATV212WU15N4
	3	2.2	5.1	ATV212HU22N4	VW3A31814	ATV212WU22N4
	4	3	7.2	ATV212HU30N4	VW3A31815	ATV212WU30N4
	5	4	9.1	ATV212HU40N4	VW3A31815	ATV212WU40N4
	7.5	5.5	12	ATV212HU55N4	VW3A31815	ATV212WU55N4
	10	7.5	16	ATV212HU75N4	VW3A31816	ATV212WU75N4
	15	11	22.5	ATV212HD11N4	VW3A31816	ATV212WD11N4
	20	15	30.5	ATV212HD15N4	VW3A31817	ATV212WD15N4
	25	18.5	37	ATV212HD18N4	VW3A31817	ATV212WD18N4
	30	22	43.5	ATV212HD22N4S	VW3A31817	—
	30	22	43.5	ATV212HD22N4	VW3A9206	ATV212WD22N4
	40	30	58.5	ATV212HD30N4	VW3A9206	ATV212WD30N4
	50	37	79	ATV212HD37N4	VW3A9207	ATV212WD37N4
	60	45	94	ATV212HD45N4	VW3A9207	ATV212WD45N4
	75	55	116	ATV212HD55N4	VW3A9208	ATV212WD55N4
	100	75	160	ATV212HD75N4	VW3A9208	ATV212WD75N4

UL File E116875, CSA 2278406, Plenum rated per UL 508C for UL 1995 installations. NOM, CE

[1] These horsepower, wattage and continuous ampere ratings apply to the default switching frequency and maximum 40 °C ambient. Refer to the installation manual for derating curves as a function of switching frequency, ambient temperature, and mounting conditions.
[2] IP20 Altivar 212 drives can be installed as UL Type 1 with an optional conduit box by following the instructions in the Installation Manual.
[3] For ATV212W... drives with Class B EMC filter, add the letter “C” to the end of the standard catalog number.

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VW3A1101

VW3A1101
VW3A1102
VW3A1103
VW3A1104R10

VW3A8121

LonWorks Option Card
VW3A21212

Altivar™ 212 Accessories

Table 26.2: Altivar 212 Options and Accessories

	Description	For Use on Drives	Catalog Number
User Interface Options			
Remote LCD Display Keypad	8 line, 24 characters per line, plain text, 8 keys, rotary wheel, 60 °C IP54 rated	Altivar 212, 312, 32 Altivar 61 & 71	VW3A1101 *[4]*
Remote LCD Keypad Mounting Accessories	IP54 rated kit for remote mounting LCD keypad on enclosure door. Clear plastic door for use with VW3A1102 for IP65 rating and tamper resistant. Female / Female right angle RJ45 adaptor, to connect cable and keypad. *[5]*	VW3A1101	VW3A1102 *[4]*
		VW3A1102	VW3A1103 *[4]*
		VW3A1101	VW3A1105 *[4]*
	Remote LCD Keypad Mounting Cables — Equipped with two RJ45 connectors 1 meter length	VW3A1101	VW3A1104R10 *[6]*
	3 meter length	VW3A1101	VW3A1104R30 *[6]*
	5 meter length	VW3A1101	VW3A1104R50 *[6]*
	10 meter length	VW3A1101	VW3A1104R100 *[6]*
Multi-loader	Use to copy configurations between like drives, PC Soft, or SoMove PC Software	Altivar 12, 212, 312 32, 61, 71, & Altistart 22	VW3A8121
Potentiometer	Operator, mounting collar, 2.5 kilohm, ½ watt potentiometer	Altivar 212	ATVPOT25K
Software			
Altivar and Altistart Programming Cable	For use with the iPad Configuration App. 30–pin Mobile to RS-485 Converter Cable	Altivar 12, 312, 212, SFLEX, Altistart 22, 48	VW3A8151R20U
SoMove	This software enables the user to configure, set, debug and organize maintenance task for the complete Altivar product line and the Altistart 22 and Altistart 48 soft starters. It can also be used to customize the integrated display terminal menus. It can be used with a direct connection or a Bluetooth® wireless connection. Free download www.schneider-electric.us		
USB/RS485 cable: equipped with USB connector and RJ45 connector		Altivar & Altistart	TCSMCNAM3M002P *[6]*
Universal Bluetooth Interface			TCSWAAC13FB
Communication Option			
LonWorks Communication Card Option	Provides a four-screw terminal block for connecton to LonWorks network. Install in place of standard control board that comes mounted in the Altivar 212 drive. The I/O count is reduced to 3LI, 1 AI and 1 NO/NC relay	Altivar 212	VW3A21212
Mounting Kit			
DIN Rail Mounting Kit	For installation on 35 mm wide DIN rail	Altivar 212H075M3X... U22M3X Altivar 212H075N4... U22N4	VW3A31852

[4] IP20 Altivar 212 drives can be installed as UL Type 1 with an optional conduit box by following the instructions in the installation manual.
[5] Not required if using VW3A1102.
[6] For ATV212W... drives with Class B EMC filter, add the letter “C” to the end of the standard catalog number.

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Altivar™ 312 Drives

The Altivar 312 mid-featured AC drive is designed to make industrial and commercial machines more energy efficient while simplifying its integration into a single control system architecture.

With the highest overtorque and the only drive with a remote graphic keypad in its class, the Altivar 312 mini-drive is ideally suited to the needs of material handling, packaging, food and beverage, and other OEM machines. It also comes standard with integrated communications port for Modbus and CANopen networks, optional cards available for CANopen Daisy Chain, DeviceNet, and Profibus DP, and gateways can be used for Modbus TCP/IP and FIPIO.

Table 26.3: Altivar™ 312 Selection

Input Line Voltage	Three-Phase Motor Power *[7]*		Open Drives *[8]*	
	HP	kW	Continuous Output Current A	Catalog Number
208/230 Vac Single-Phase	0.25	0.18	1.5	ATV312H018M2
	0.5	0.37	3.3	ATV312H037M2
	0.75	0.55	3.7	ATV312H055M2
	1	0.75	4.6	ATV312H075M2
	1.5	1.1	6.9	ATV312HU11M2
	2	1.5	8	ATV312HU15M2
	3	2.2	11	ATV312HU22M2
208/230 Vac Three-Phase	0.25	0.18	1.5	ATV312H018M3
	0.5	0.37	3.3	ATV312H037M3
	0.75	0.55	3.7	ATV312H055M3
	1	0.75	4.8	ATV312H075M3
	1.5	1.1	6.9	ATV312HU11M3
	2	1.5	8	ATV312HU15M3
	3	2.2	11	ATV312HU22M3
	4	3	13.7	ATV312HU30M3
	5	—	17.5	ATV312HU40M3
	7.5	5.5	27.5	ATV312HU55M3
	10	7.5	33	ATV312HU75M3
	15	11	54	ATV312HD11M3
	20	15	66	ATV312HD15M3
400/480 Vac Three-Phase	0.5	0.37	1.5	ATV312H037N4
	0.75	0.55	1.9	ATV312H055N4
	1	0.75	2.3	ATV312H075N4
	1.5	1.1	3	ATV312HU11N4
	2	1.5	4.1	ATV312HU15N4
	3	2.2	5.5	ATV312HU22N4
	4	3	7.1	ATV312HU30N4
	5	—	9.5	ATV312HU40N4
	7.5	5.5	14.3	ATV312HU55N4
	10	7.5	17	ATV312HU75N4
	15	11	27.7	ATV312HD11N4
	20	15	33	ATV312HD15N4
575/600 Vac Three-Phase *[9]*	1	0.75	1.7	ATV312H075S6
	2	1.5	2.7	ATV312HU15S6
	3	2.2	3.9	ATV312HU22S6
	5	3.7/4.0	6.1	ATV312HU40S6
	7.5	5.5	9	ATV312HU55S6
	10	7.5	11	ATV312HU75S6
	15	11	17	ATV312HD11S6
	20	15	22	ATV312HD15S6

[7] These horsepower, wattage, and continuous ampere ratings apply to 4 kHz switching frequency and maximum 50 °C ambient. Refer to the installation manual for derating curves as a function of switching frequency, ambient temperature, and mounting conditions.
[8] Open type Altivar 312 Drives can be installed as UL Type 1 with optional conduit box when following instructions in the installation manual.
[9] A minimum 3% line reactor is required on all 575 V drive installations.

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Altivar™ 312 Options and Accessories

Table 26.4: Altivar™ 312 Options and Accessories

	Description	For Use on Drives	Catalog Number
Software			
SoMove™	This software enables the user to configure, set, debug and organize maintenance task for the complete Altivar product line and the Altistart 22 and Altistart 48 soft starters. It can also be used to customize the integrated display terminal menus. It can be used with a direct connection or a Bluetooth® wireless connection. Free download www.schneider-electric.us		
User Interface Kits			
USB to RJ45 Adaptor Kit	For use in connecting to a PC with a USB port	Advantys™ OTB, Altistart™ motor starters, Altivar series incl. HMI, Altivar controller	TCSMCNAM3M002P
Remote Keypad Options and Accessories	Remote Keypad Display (IP54)	ATV312, ATV12	VW3A1006
	Remote Keypad Display (IP65)	ATV312, ATV12	VW3A1007
	Remote Keypad Display and Mounting Kit	ATV312	VW3A31101
	Remote Keypad Display	ATV312, ATV61, ATV71	VW3A1101 *[10]*
Cable for remote mounting LCD graphic keypad. RJ-45 connector on each end.	1 meter	Any ATV61, Any ATV71	VW3A1104R10
	3 meters	Any ATV61, Any ATV71	VW3A1104R30
	5 meters	Any ATV61, Any ATV71	VW3A1104R50
	10 meters	Any ATV61, Any ATV71	VW3A1104R100
Communication Options	Profibus	ATV312	VW3A31207
	CANopen Daisy Chain	ATV312	VW3A31208
	DeviceNet	ATV312	VW3A31209
Potentiometer	Operator, mounting collar, 2.5 kilohm, ½ watt potentiometer	Altivar 312	ATVPOT25K

NOTE: Refer to Catalog MKTED211041EN-US for communication cables.

Table 26.5: Configuration Tools

Description	Part Number	For Use on Drives
Altivar and Altistart Programming Cable: For use with the iPad Configuration App. 30-Pin Mobile to RS-485 Converter Cable	VW3A8151R20U	Altivar 12, 312, 212, SFLEX, Altistart 22, 48
Universal Bluetooth Interface	TCSWAAC13FB	All
Simple Loader: to transfer configuration between like drives. For use with the Altivar product line.	VW3A8120	ATV12, ATV312, ATV32, ATV61 and ATV71
Multi-loader: to copy a configuration from a drive or from SoMove via an SD card, and transferring to another drive or to a PC	VW3A8121	ATV12, ATV312, ATV212, ATV32, ATV61, ATV71 and ATS22

Table 26.6: Options—Field Installed Kits

	Description		For Use on Drives	Catalog Number
DIN Rail Mount Kit	DIN Rail Mounting Plate for 35 mm wide DIN rail		ATV312H018M2, ATV312H037M2, ATV312H055M2, ATV312H075M2, ATV312H018M3, ATV312H037M3, ATV312H055M3, ATV312H075M3	VW3A9804
			ATV312HU11M2, ATV312HU15M2, ATV312HU11M3, ATV312HU15M3, ATV312HU22M3, ATV312H037N4, ATV312H055N4, ATV312H075N4, ATV312HU11N4, ATV312HU15N4, ATV312H075S6, ATV312HU15S6	VW3A9805
Conduit Entrance Kit	Multiple knockout sizes Installation of conduit entrance kit and retention of vent cover on top of drive controller provides the ATV31 with UL Type 1 rating.		ATV312H018M2, ATV312H037M2, ATV312H055M2, ATV312H075M2	VW3A31812
			ATV312H018M3, ATV312H037M3, ATV312H055M3, ATV312H075M3	VW3A31811
			ATV312HU11M3, ATV312HU15M3	VW3A31813
			ATV312HU11M2, ATV312HU15M2, ATV312HU22M3, ATV312H037N4, ATV312H055N4, ATV312H075N4, ATV312HU11N4, ATV312HU15N4, ATV312H075S6, ATV312HU15S6	VW3A31814
			ATV312HU22M2, ATV312HU30M3, ATV312HU40M3, ATV312HU22N4, ATV312HU30N4, ATV312HU40N4, ATV312HU22S6, ATV312HU40S6	VW3A31815
			ATV312HU55M3, ATV312HU75M3, ATV312HU55N4, ATV312HU75N4, ATV312HU55S6, ATV312HU75S6	VW3A31816
			ATV312HD11M3, ATV312HD15M3, ATV312HD11N4, ATV312HD15N4, ATV312HD11S6, ATV312HD15S6	VW3A31817
Line Reactors	230/460 V		See Price Guide 8800PL9701.	
	575 V	Open Style	ATV312H075S6	RL00202
			ATV312HU15S6	RL00403
			ATV312HU22S6	
			ATV312HU40S6	RL00803
			ATV312HU55S6	RL00802
			ATV312HU75S6	RL01202
			ATV312HD11S6	RL01802
			ATV312HD15S6	RL02502
		Enclosed (Type 1)	ATV312H075S6	RL00212
			ATV312HU15S6	RL00413
			ATV312HU22S6	
			ATV312HU40S6	RL00813
			ATV312HU55S6	RL00812
			ATV312HU75S6	RL01212
			ATV312HD11S6	RL01812
			ATV312HD15S6	RL02512
Fan Kit	Installation of the fan kit enables the drive to operate in higher ambient temperatures. The fan mounts on the drive. Consult the product catalog for more information.		ATV61/71HD18M3X...HD22M3X, ATV61/71HD22N4	VW3A9404
			ATV61/71HD30N4...HD37N4	VW3A9405
			ATV61/71HD30M3X...HD45M3X	VW3A9406
			ATV61/71HD45N4...HD75N4	VW3A9407

[10] Refer to 26-14 for remote mounting kit and IP65 option for this keypad.

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Altivar™ 61 Three-Phase Drives

Table 26.7: Selection

	Input Line Voltage	Variable Torque' Three-Phase Motor Power HP	Variable Torque' Three-Phase Motor Power kW	Variable Torque' Continuous Output Current A	Catalog Number with LCD Keypad (Stocked) [11]	Catalog Number to have ATV61 and Type 1 conduit \entry kit shipped as one line item. Field installation required (Packaged as kit at warehouse).	Catalog Number with LED Keypad (Non-stocked)
	208/240 Vac Three Phase	1	0.75	4.8	ATV61H075M3 [12][13]	ATV61H075M3T1 [13]	ATV61H075M3Z
		2	1.5	8	ATV61HU15M3 [12][13]	ATV61HU15M3T1 [13]	ATV61HU15M3Z
		3	2.2	11	ATV61HU22M3 [12][13]	ATV61HU22M3T1 [14]	ATV61HU22M3Z
		4	3	13.7	ATV61HU30M3 [12][13]	ATV61HU30M3T1 [13]	ATV61HU30M3Z
		5	4	17.5	ATV61HU40M3 [12][13]	ATV61HU40M3T1 [14]	ATV61HU40M3Z
		7.5	5.5	27.5	ATV61HU55M3 [12][13]	ATV61HU55M3T1 [13]	ATV61HU55M3Z
		10	7.5	33	ATV61HU75M3 [12][13]	ATV61HU75M3T1 [14]	ATV61HU75M3Z
		15	11	54	ATV61HD11M3X [12][15][13]	ATV61HD11M3XT1 [15][13]	ATV61HD11M3XZ [15]
		20	15	66	ATV61HD15M3X [12][15][13]	ATV61HD15M3XT1 [15][13]	ATV61HD15M3XZ [15]
		25	18	75	ATV61HD18M3X [12][15][13]	ATV61HD18M3XT1 [15][13]	—
		30	22	88	ATV61HD22M3X [12][15][13]	ATV61HD22M3XT1 [15][13]	—
		40	30	120	ATV61HD30M3X [12][15][13]	ATV61HD30M3XT1 [12][16]	—
		50	37	144	ATV61HD37M3X [12][15][13]	ATV61HD37M3XT1 [15][13]	—
		60	45	176	ATV61HD45M3X [12][15][13]	ATV61HD45M3XT1 [15][13]	—
		75	55	221	ATV61HD55M3X [15][16][13]	ATV61HD55M3XT1 [12][16]	—
		100	75	285	ATV61HD75M3X [15][16][13]	ATV61HD75M3XT1 [15][13]	—
		125	90	359	ATV61HD90M3X [15][16][13]	ATV61HD90M3XT1 [15][13]	—
	400/480 Vac Three Phase	1	0.75	2.3	ATV61H075N4 [12][13]	ATV61H075N4T1 [14]	ATV61H075N4Z
		2	1.5	4.1	ATV61HU15N4 [12][13]	ATV61HU15N4T1 [14]	ATV61HU15N4Z
		3	2.2	5.8	ATV61HU22N4 [12][13]	ATV61HU22N4T1 [14]	ATV61HU22N4Z
		4	3	7.8	ATV61HU30N4 [12][13]	ATV61HU30N4T1 [13]	ATV61HU30N4Z
		5	4	10.5	ATV61HU40N4 [12][13]	ATV61HU40N4T1 [14]	ATV61HU40N4Z
		7.5	5.5	14.3	ATV61HU55N4 [12][13]	ATV61HU55N4T1 [13]	ATV61HU55N4Z
		10	7.5	17.6	ATV61HU75N4 [12][13]	ATV61HU75N4T1 [13]	ATV61HU75N4Z
		15	11	27.7	ATV61HD11N4 [12][13]	ATV61HD11N4T1 [14]	ATV61HD11N4Z
		20	15	33	ATV61HD15N4 [12][13]	ATV61HD15N4T1 [13]	ATV61HD15N4Z
		25	18	41	ATV61HD18N4 [12][13]	ATV61HD18N4T1 [13]	ATV61HD18N4Z
		30	22	48	ATV61HD22N4 [12][13]	ATV61HD22N4T1 [14]	ATV61HD22N4Z
		40	30	66	ATV61HD30N4 [12][13]	ATV61HD30N4T1 [13]	ATV61HD30N4Z
		50	37	79	ATV61HD37N4 [12][13]	ATV61HD37N4T1 [14]	ATV61HD37N4Z
		60	45	94	ATV61HD45N4 [12][13]	ATV61HD45N4T1 [14]	ATV61HD45N4Z
		75	55	116	ATV61HD55N4 [12][13]	ATV61HD55N4T1 [14]	ATV61HD55N4Z
		100	75	160	ATV61HD75N4 [12][13]	ATV61HD75N4T1 [14]	ATV61HD75N4Z
		125	90	179	ATV61HD90N4 [16][13]	ATV61HD90N4T1 [14]	—
		150	110	215	ATV61HC11N4 [16][13]	ATV61HC11N4T1 [14]	—
		200	130	259	ATV61HC13N4 [16][13]	ATV61HC13N4T1 [14]	—
		250	160	314	ATV61HC16N4 [16][13]	ATV61HC16N4T1 [14]	—
		350	220	427	ATV61HC22N4 [16][13]	ATV61HC22N4T1 [13]	—
		400	250	481	ATV61HC25N4 [16][17][18]	ATV61HC25N4T1 [14]	—
		500	315	616	ATV61HC31N4 [16][18]	—	—
		600	400	759	ATV61HC40N4 [16][18]	—	—
		700	500	941	ATV61HC50N4 [16][18]	—	—
		900	630	1188	ATV61HC63N4 [16][18]	—	—

[11] When ordering replacements for Square D™ brand E-Flex™, MCC and M-Flex™ enclosed drive controllers containing the Altivar 61 drive, identify the replacement catalog number by referring to the applicable instruction manual, the side nameplate on power converter, or using the graphic keypad (menu 1.11 identification).

[12] Option to have product treated for increased protection for dusty and corrosive environments. This product is not stocked. On 1 hp to 10 hp at 230 Vac 3 phase and up to 100 hp at 460 V, add "S337" to the end of the catalog number. On 15 hp to 60 hp at 230 Vac 3 phase, add "337" to the end of the catalog number. With this option, exposed copper is tinned, circuit boards are conformal coated in critical areas and plastics are treated to better withstand the corrosive nature of certain oils. This option is standard on 55 kW/75 hp @ 230 Vac 3 phase and higher and 90 kW/125 hp @ 460 Vac and higher .

[13] These products can be ordered with LonWorks® or BACnet communication option card shipped as one line item. Field installation required. Add "LW" to the end of the part number to receive a LonWorks option card. Add "BN" to the end of the part number to receive a BACnet option card.

[14] These products can be ordered with LonWorks® or BACnet communication option card shipped as one line item. Field installation required. Add "LW" to the end of the part number to receive a LonWorks option card. Add "BN" to the end of the part number to receive a BACnet option card.

[15] Product does not contain an EMC filter.

[16] Product ships with a DC choke that must be field mounted. A 5% line reactor may be purchased and installed in place of the DC choke. Add "D" to the end of the catalog number to receive just the AC drive.

[17] These products can be ordered with LonWorks® or BACnet communication option card shipped as one line item. Field installation required. Add "LW" to the end of the part number to receive a LonWorks option card. Add "BN" to the end of the part number to receive a BACnet option card.

[18] These products do not contain a dynamic braking transistor. A separate transistor must be added for applications requiring dynamic braking.

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Table 26.8: 26.8: Altivar 61 Selection (continued)

Input Line Voltage	Variable Torque			Catalog Number with LCD Keypad (Stocked)
	Three-Phase Motor Power		Continuous Output Current	
	HP	kW	A	
500/600 Vac Three Phase	3	2.2	3.9	ATV61HU22S6X *[19] [20]*
	4	3	5.8	ATV61HU30S6X *[19] [20]*
	5	4	6.1	ATV61HU40S6X *[19] [20]*
	7.5	5.5	9	ATV61HU55S6X *[19] [20]*
	10	7.5	11	ATV61HU75S6X *[19] [20]*
575/690 Vac Three Phase	15	15	17	ATV61HD15Y *[19]*
	20	18.5	22	ATV61HD18Y *[19]*
	25	22	27	ATV61HD22Y *[19]*
	30	30	32	ATV61HD30Y *[19]*
	40	37	41	ATV61HD37Y *[19]*
	50	45	52	ATV61HD45Y *[19]*
	60	55	62	ATV61HD55Y *[19]*
	75	75	77	ATV61HD75Y *[19]*
	100	90	99	ATV61HD90Y *[19]*
	125	110	125	ATV61HC11Y *[19] [21]*
	150	132	150	ATV61HC13Y *[19] [21]*
	—	160	180	ATV61HC16Y *[19] [21]*
	200	200	220	ATV61HC20Y *[19] [21]*
	250	250	290	ATV61HC25Y *[19] [21] [22]*
	350	315	355	ATV61HC31Y *[19] [21] [22]*
	450	400	420	ATV61HC40Y *[19] [21] [22]*
	550	500	543	ATV61HC50Y *[19] [21] [22]*
	700	630	675	ATV61HC63Y *[19] [21] [22]*
	800	800	840	ATV61HC80Y *[19] [21] [22]*

[19] Conformal coating is standard.
[20] Product does not contain EMC filter.
[21] An AC 5% line reactor is mandatory.
[22] These products do not contain a dynamic braking transistor. A separate transistor must be added for applications requiring dynamic braking.

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Altivar™ 61 Single-Phase Drives

In an application where it is necessary to use a 240 V single-phase input for a 3-phase motor, the drive must be derated; therefore, the power listed on the drive nameplate will be higher than the power rating on the motor nameplate.

For more information on wire and line reactor sizing, refer to *Altivar 61 and 71 Supplementary Ratings* (30072-451-38) and Price Guide 8800PL9701 for line reactor selection and pricing.

Table 26.9: Altivar 61 Selection and Pricing

Input Line Voltage	With A 3% Line Reactor			Without A 3% Line Reactor			Catalog Number with LCD Keypad	Catalog Number for ATV61 drive and Type 1 conduit entry kit shipped as one line item. Field installation required (packaged as kit at warehouse).	Catalog Number with LED Keypad (Non-stocked)
	Motor Power		Continuous Output Current	Motor Power		Continuous Output Current			
	HP	kW	A	HP	kW	A			
208/ 240 Vac Single Phase	—	—	—	0.5	0.37	3	ATV61H075M3 *[23][24]*	ATV61H075M3T1 *[25]*	ATV61H075M3Z *[23]*
	—	—	—	1	0.75	4.8	ATV61HU15M3 *[23][24]*	ATV61HU15M3T1 *[24]*	ATV61HU15M3Z *[26]*
	—	—	—	2	1.5	8	ATV61HU22M3 *[23][24]*	ATV61HU22M3T1 *[24]*	ATV61HU22M3Z *[23]*
	—	—	—	3	2.2	11	ATV61HU30M3*[23][24]*	ATV61HU30M3T1*[24]*	ATV61HU30M3Z *[23]*
	—	3	13.7	—	—	—	ATV61HU40M3*[23][24]*	ATV61HU40M3T1 *[24]*	ATV61HU40M3Z *[23]*
	5	4	17.5	—	—	—	ATV61HU55M3 *[23][24]*	ATV61HU55M3T1 *[24]*	ATV61HU55M3Z *[23]*
	7.5	5.5	27.5	5	4	17.5	ATV61HU75M3 *[23][24]*	ATV61HU75M3T1 *[26][24]*	ATV61HU75M3Z *[23]*
	10	7.5	33	7.5	5.5	27.5	ATV61HD15M3X *[23][24]*	ATV61HD15M3XT1 *[24]*	ATV61HD15M3XZ *[23]*
	—	—	—	10	7.5	33	ATV61HD18M3X *[23][24]*	ATV61HD18M3XT1 *[24]*	—
	15	11	54	—	—	—	ATV61HD22M3X *[23][24]*	ATV61HD22M3XT1 *[24]*	—
	20	15	66	15	11	54	ATV61HD30M3X *[23][24]*	ATV61HD30M3XT1 *[25]*	—
	25	18	75	20	15	66	ATV61HD37M3X *[23][24]*	ATV61HD37M3XT1 *[25]*	—
	30	22	88	25	18	75	ATV61HD45M3X*[23][24]*	ATV61HD45M3XT1*[25]*	—

[23] Option to have product treated for increased protection for dusty and corrosive environments. This product is not stocked. On 0.5 hp to 5 hp at 230 Vac single phase, add “S337” to the end of the catalog number. On 7.5 hp to 25 hp at 230 Vac single phase, add “337” to the end of the catalog number. With this option, exposed copper is tinned, circuit boards are conformal coated in critical areas and plastics are treated to better withstand the corrosive nature of certain oils.

[24] Product does not contain an EMC filter.

[25] Product does not contain an EMC filter.

[26] Option to have product treated for increased protection for dusty and corrosive environments. This product is not stocked. On 0.5 hp to 5 hp at 230 Vac single phase, add “S337” to the end of the catalog number. On 7.5 hp to 25 hp at 230 Vac single phase, add “337” to the end of the catalog number. With this option, exposed copper is tinned, circuit boards are conformal coated in critical areas and plastics are treated to better withstand the corrosive nature of certain oils.

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Altivar 71 Single-Phase

In an application where it is necessary to use a 240 V single-phase input for a 3-phase motor, the drive must be derated; therefore, the power listed on the drive nameplate will be higher than the power rating on the motor nameplate.

For more information on wire and line reactor sizing, refer to Altivar 61 and 71 Supplementary Ratings (30072-451-38).

Table 26.10: Altivar 71 Selection

Input Line Voltage	With A 3% Line Reactor			Without A 3% Line Reactor			Catalog Number with LCD Keypad *[27]*	Catalog Number to have ATV71 and Type 1 conduit entry kit shipped as one line item. Field installation required (Packaged as kit at warehouse).	Catalog Number with LED Keypad (Non-stocked)
	Motor Power		Continuous Output Current	Motor Power		Continuous Output Current			
	HP	kW	A	HP	kW	A			
208/240 Vac Single Phase	—	—	—	0.5	0.37	3	ATV71H075M3 *[28]*	ATV71H075M3T1	ATV71H075M3Z *[28]*
	—	—	—	1	0.75	4.8	ATV71HU15M3 *[28]*	ATV71HU15M3T1	ATV71HU15M3Z *[28]*
	—	—	—	2	1.5	8	ATV71HU22M3 *[28]*	ATV71HU22M3T1	ATV71HU22M3Z *[28]*
	—	—	—	3	2.2	11	ATV71HU30M3 *[28]*	ATV71HU30M3T1	ATV71HU30M3Z *[28]*
	—	3	13.7	—	—	—	ATV71HU40M3 *[28]*	ATV71HU40M3T1	ATV71HU40M3Z *[28]*
	5	4	17.5	—	—	—	ATV71HU55M3 *[28]*	ATV71HU55M3T1	ATV71HU55M3Z *[28]*
	7.5	5.5	27.5	5	4	17.5	ATV71HU75M3 *[28]*	ATV71HU75M3T1	ATV71HU75M3Z *[28]*
	10	7.5	33	7.5	5.5	27.5	ATV71HD15M3X *[28] [29]*	ATV71HD15M3XT1 *[29]*	ATV71HD15M3XZ *[28]*
	—	—	—	10	7.5	33	ATV71HD18M3X *[28] [29]*	ATV71HD18M3XT1 *[29]*	—
	15	11	54	—	—	—	ATV71HD22M3X *[28] [29]*	ATV71HD22M3XT1 *[29]*	—
	20	15	66	15	11	54	ATV71HD30M3X *[28] [29]*	ATV71HD30M3XT1 *[29]*	—
	25	18	75	20	15	66	ATV71HD37M3X *[28] [29]*	ATV71HD37M3XT1 *[29]*	—
	30	22	88	25	18	75	ATV71HD45M3X *[28] [29]*	ATV71HD45M3XT1 *[29]*	—

[27] These products can be ordered with LonWorks® or BACnet communication option card shipped as one line item. Field installation required. Add “LW” to the end of the part number to receive a LonWorks option card. Add “BN” to the end of the partnumber to receive a BACnet option card.

[28] Option to have product treated for increased protection for dusty and corrosive environments. This product is not stocked. On 0.5 hp to 5 hp at 230 Vac single phase, add “S337” to the end of the catalog number. On 7.5 hp to 25 hp at 230 Vac single phase, add “337” to the end of the catalog number. With this option, exposed copper is tinned, circuit boards are conformal coated in critical areas and plastics are treated to better withstand the corrosive nature of certain oils.

[29] Product does not contain an EMC filter.

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Altivar 71 Three-Phase

LCD Keypad

LED Keypad

Table 26.11: Altivar 71 Selection

Input Line Voltage	Constant Torque			[30]	Catalog Number ATV71 drive and Type 1 conduit entry kit	Catalog Number with LED Keypad (Non-stocked)
	Three-Phase Motor Power		Continuous Output Current			
	HP	kW	A			
208/240 Vac Three Phase	0.5	0.37	3	ATV71H037M3 *[31]*	ATV71H037M3T1	ATV71H037M3Z
	1	0.75	4.8	ATV71H075M3 *[31]*	ATV71H075M3T1	ATV71H075M3Z
	2	1.5	8	ATV71HU15M3 *[31]*	ATV71HU15M3T1	ATV71HU15M3Z
	3	2.2	11	ATV71HU22M3 *[31]*	ATV71HU22M3T1	ATV71HU22M3Z
	4	3	13.7	ATV71HU30M3 *[31]*	ATV71HU30M3T1	ATV71HU30M3Z
	5	4	17.5	ATV71HU40M3 *[31]*	ATV71HU40M3T1	ATV71HU40M3Z
	7.5	5.5	27.5	ATV71HU55M3 *[31]*	ATV71HU55M3T1	ATV71HU55M3Z
	10	7.5	33	ATV71HU75M3 *[31]*	ATV71HU75M3T1	ATV71HU75M3Z
	15	11	54	ATV71HD11M3X *[31][32]*	ATV71HD11M3XT1 *[32]*	ATV71HD11M3XZ *[32]*
	20	15	66	ATV71HD15M3X *[31][32]*	ATV71HD15M3XT1 *[32]*	ATV71HD15M3XZ *[32]*
	25	18	75	ATV71HD18M3X *[31][32]*	ATV71HD18M3XT1 *[32]*	—
	30	22	88	ATV71HD22M3X *[31][32]*	ATV71HD22M3XT1 *[32]*	—
	40	30	120	ATV71HD30M3X *[31][32]*	ATV71HD30M3XT1 *[32]*	—
	50	37	144	ATV71HD37M3X *[31][32]*	ATV71HD37M3XT1 *[32]*	—
	60	45	176	ATV71HD45M3X *[31][32]*	ATV71HD45M3XT1 *[32]*	—
	75	55	221	ATV71HD55M3X *[32][33][34]*	ATV71HD55M3XT1 *[32]*	—
	100	75	285	ATV71HD75M3X *[32][33][34]*	ATV71HD75M3XT1 *[32]*	—

Table 26.12: Altivar™ 71 Selection

	Input Line Voltage	Constant Torque			Catalog Number with LCD Keypad (Stocked)	Catalog Number to have ATV71 drive and Type 1 conduit entry kit shipped as one line item. Field installation required (Packaged as kit at warehouse).	Catalog Number with LED Keypad (Non-stocked)
		Three-Phase Motor Power		Continuous Output Current			
		HP	kW	A			
	400/480 Vac Three Phase	1	0.75	2.3	ATV71H075N4 *[35] [36]*	ATV71H075N4T1	ATV71H075N4Z
		2	1.5	4.1	ATV71HU15N4 *[35] [36]*	ATV71HU15N4T1	ATV71HU15N4Z
		3	2.2	5.8	ATV71HU22N4 *[35] [36]*	ATV71HU22N4T1	ATV71HU22N4Z
		4	3	7.8	ATV71HU30N4 *[35] [36]*	ATV71HU30N4T1	ATV71HU30N4Z
		5	4	10.5	ATV71HU40N4 *[35] [36]*	ATV71HU40N4T1	ATV71HU40N4Z
		7.5	5.5	14.3	ATV71HU55N4 *[35] [36]*	ATV71HU55N4T1	ATV71HU55N4Z
		10	7.5	17.6	ATV71HU75N4 *[35] [36]*	ATV71HU75N4T1	ATV71HU75N4Z
		15	11	27.7	ATV71HD11N4 *[35] [36]*	ATV71HD11N4T1	ATV71HD11N4Z
		20	15	33	ATV71HD15N4 *[35] [36]*	ATV71HD15N4T1	ATV71HD15N4Z

[30] Also possible for use with a synchronous motor. Add “383” to the end of the catalog number.

[31] Option to have product treated for increased protection for dusty and corrosive environments. This product is not stocked. On 0.5 hp to 10 hp at 230 Vac 3 phase and up to 100 hp at 460 V, add “S337” to the end of the catalog number. On 15 hp to 60 hp at 230 Vac 3 phase, add “337” to the end of the catalog number. With this option, exposed copper is tinned, circuit boards are conformal coated in critical areas and plastics are treated to better withstand the corrosive nature of certain oils. This option is standard on 55 kW/75 hp @ 230 Vac 3 phase and higher & 90 kW/125 hp @ 460 Vac and higher .

[32] Product does not contain an EMC filter.

[33] Product ships with a DC choke that must be field mounted. A 5% line reactor may be purchased and installed in place of the DC choke. Add “D” to the end of the catalog number to receive just the AC drive.

[34] Conformal coating is standard.

[35] Option to have product treated for increased protection for dusty and corrosive environments. This product is not stocked. Up to 100 hp at 460 V, add “S337” to the end of the catalog number. With this option, exposed copper is tinned, circuit boards are conformal coated in critical areas and plastics are treated to better withstand the corrosive nature of certain oils. This option is standard on 90 kW/125 hp @ 460 Vac and higher.

[36] Also possible for use with a synchronous motor. Add “383” to the end of the catalog number and multiply the listed price by 1.2 to obtain new price.

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Table 26.12 Altivar™ 71 Selection (cont'd.)

	Input Line Voltage	Constant Torque			Catalog Number with LCD Keypad (Stocked)	Catalog Number to have ATV71 drive and Type 1 conduit entry kit shipped as one line item. Field installation required (Packaged as kit at warehouse).	Catalog Number with LED Keypad (Non-stocked)
		Three-Phase Motor Power		Continuous Output Current			
		HP	kW	A			
ATV71HC31Y ATV71HC28N4		25	18	41	ATV71HD18N4 *[37] [38]*	ATV71HD18N4T1	ATV71HD18N4Z
		30	22	48	ATV71HD22N4 *[37] [38]*	ATV71HD22N4T1	ATV71HD22N4Z
		40	30	66	ATV71HD30N4 *[37] [38]*	ATV71HD30N4T1	ATV71HD30N4Z
		50	37	79	ATV71HD37N4 *[37] [38]*	ATV71HD37N4T1	ATV71HD37N4Z
		60	45	94	ATV71HD45N4 *[37] [38]*	ATV71HD45N4T1	ATV71HD45N4Z
		75	55	116	ATV71HD55N4 *[37] [38]*	ATV71HD55N4T1	ATV71HD55N4Z
		100	75	160	ATV71HD75N4 *[37] [38]*	ATV71HD71N4T1	ATV71HD75N4Z
		125	90	179	ATV71HD90N4 *[39] [38]*	ATV71HD90N4T1	—
		150	110	215	ATV71HC11N4 *[39] [38]*	—	—
		200	130	259	ATV71HC13N4 *[39] [38]*	—	—
		250	160	314	ATV71HC16N4 *[39] [38]*	—	—
		300	200	387	ATV71HC20N4 *[39] [38] [40]*	—	—
		400	250	481	ATV71HC25N4 *[39] [38] [40]*	—	—
		450	280	550	ATV71HC28N4 *[39] [38] [40]*	—	—
		500	310	616	ATV71HC31N4 *[39] [38] [40]*	—	—
		600	400	759	ATV71HC40N4 *[39] [38] [40]*	—	—
		700	500	941	ATV71HC50N4 *[39] [38] [40]*	—	—
	500/600 Vac Three Phase	2	1.5	2.7	ATV71HU15S6X *[41]*	—	—
		3	2.2	3.9	ATV71HU22S6X *[41]*	—	—
		4	3	5.8	ATV71HU30S6X *[41]*	—	—
		5	4	6.1	ATV71HU40S6X *[41]*	—	—
		7.5	5.5	9	ATV71HU55S6X *[41]*	—	—
		10	7.5	11	ATV71HU75S6X *[41]*	—	—
	575/690 Vac Three Phase	15	15	17	ATV71HD15Y *[41]*	—	—
		20	18.5	22	ATV71HD18Y *[41]*	—	—
		25	22	27	ATV71HD22Y *[41]*	—	—
		30	30	32	ATV71HD30Y *[41]*	—	—
		40	37	41	ATV71HD37Y *[41]*	—	—
		50	45	52	ATV71HD45Y *[41]*	—	—
		60	55	62	ATV71HD55Y *[41]*	—	—
		75	75	77	ATV71HD75Y *[41]*	—	—
		100	90	99	ATV71HD90Y *[41]*	—	—
		125	110	125	ATV71HC11Y *[41] [42]*	—	—
		150	132	150	ATV71HC13Y *[41] [42]*	—	—
		175	160	180	ATV71HC16Y *[41] [42]*	—	—
		200	200	220	ATV71HC20Y *[41] [42] [40]*	—	—
		250	250	290	ATV71HC25Y *[41] [42] [40]*	—	—
		350	315	355	ATV71HC31Y *[41] [42] [40]*	—	—
		450	400	420	ATV71HC40Y *[41] [42] [40]*	—	—
		550	500	543	ATV71HC50Y *[41][42] [40]*	—	—
		700	630	675	ATV71HC63Y *[41] [42] [40]*	—	—

[37] Option to have product treated for increased protection for dusty and corrosive environments. This product is not stocked. Up to 100 hp at 460 V, add “S337” to the end of the catalog number. With this option, exposed copper is tinned, circuit boards are conformal coated in critical areas and plastics are treated to better withstand the corrosive nature of certain oils. This option is standard on 90 kW/125 hp @ 460 Vac and higher.

[38] Also possible for use with a synchronous motor. Add “383” to the end of the catalog number and multiply the listed price by 1.2 to obtain new price.

[39] Product ships with a DC choke that must be field mounted. A 5% line reactor may be purchased and installed in place of the DC choke. Add “D” to the end of the catalog number to receive just the AC drive.

[40] These products do not contain a dynamic braking transistor. A separate transistor must be added for applications requiring dynamic braking.

[41] Conformal coating is standard.

[42] An AC 5% line reactor is mandatory.

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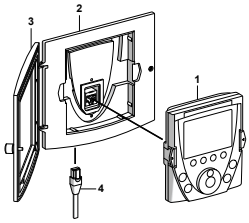
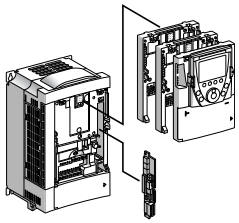
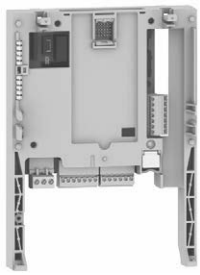


LCD Keypad Mounting Kits


Option Card Assembly


I/O Option Card

Communication Option Card

Incremental Encoder Interface Option Card

Altivar™ 61 / 71 Options

Table 26.13: Options—Field Installed

Description			For Use on Drives	Catalog No.
Operator Interface	LCD graphic keypad: IP54 rating		any ATV61 any ATV71	VW3A1101
	Remote mounting kit: includes bezel and mounting hardware			VW3A1102
	Door for use with remote mount kit for IP65 rating			VW3A1103
	Cable for remote mounting LCD graphic keypad RJ-45 connector on each end	1 meter		VW3A1104R10
		3 meters		VW3A1104R30
		5 meters		VW3A1104R50
		10 meters		VW3A1104R100
	RJ-45 female—female adaptor to connect LCD keypad and cable. Not required if using VW3A1102.			VW3A1105
	Operator, mounting collar, 2.5 kilohm, ½ watt potentiometer		Altivar 61	ATVPOT25K
SoMove™ Software	This software enables the user to configure, set, debug and organize maintenance task for the complete Altivar product line and the Altistart 22 and Altistart 48 soft starters. It can also be used to customize the integrated display terminal menus. It can be used with a direct connection or a Bluetooth® wireless connection. Free download www.schneider-electric.us			
	USB/RS485 cord set (equipped with RJ45 socket)		Altivar AC drives Altistart™ 48 TeSys™ U-line	TCSMCNAM3M002P
For Wireless Connection	Modbus™ to Bluetooth® Gateway and RS-485 converter		any ATV61 any ATV71	VW3A8114
I/O Adaptor	115 Vac logic input adaptor adapts 7 logic inputs for use with user supplied 115 Vac signals		any ATV61 any ATV71	VW3A3101
I/O Extension Option Cards	Basic I/O option card—4 logic inputs, 2 logic outputs, 1 Form C relay output, an input for PTC motor probes, a 24 Vdc output, and a 10 Vdc output		any ATV61 any ATV71	VW3A3201
	Extended I/O option card—contains all the I/O on the Basic I/O option card plus 2 analog inputs, 2 analog outputs, 1 pulse input			VW3A3202
CANopen Adapter	This adaptor connects to the RJ-45 port and provides a 9–pin male SUB–D connector conforming to the CANopen standard (CIA DRP 303–1)		any ATV61 any ATV71	VW3CANA71
CANopen Connector	9-pin female SUB–D with line terminator (can be disabled). 180º cable outlet CAN–H, CAN–L, CAN–GND connection		any ATV61 any ATV71	VW3CANKCDF180T
Incremental Encoder Interface Option Cards	with RS-422 outputs, 5 Vdc		any ATV71	VW3A3401
	with RS-422 outputs, 15 Vdc			VW3A3402
	with open collector outputs, 12 Vdc			VW3A3403
	with open collector outputs, 15 Vdc			VW3A3404
	with push–pull outputs, 12 Vdc			VW3A3405
	with push–pull outputs, 15 Vdc			VW3A3406
	with push–pull outputs, 24 Vdc			VW3A3407
	Resolver			VW3A3408 *[43]*
	Universal with SinCos, SinCos Hiperface®, SinCos EnDat® or SSI output			VW3A3409 *[43]*
	Incremental with RS422 outputs and encoder emulation			VW3A3411 *[43]*
Communication Option Cards	Modbus / Uni-Telway™ card		any ATV61 any ATV71	VW3A3303
	Ethernet IP/Modbus TCP-IP daisy chain card			VW3A3320
	Interbus® S card			VW3A3304
	Profibus DP card			VW3A3307
	PROFINET card			VW3A3327
	Powerlink card			VW3A3321
	EtherCAT card			VW3A3326
	Profibus DPv1 card			VW3A3307S371
	DeviceNet™ card			VW3A3309
	LonWorks® card		any ATV61	VW3A3312
	Metasys® N2 card			VW3A3313
	Apogee® FLN P1 card			VW3A3314
	BACnet card			VW3A3315
IMC Option Card	ATV IMC drive controller card *[44]*		—	VW3A3521
Controller Inside Option Card	Programmable option card, conforms with IEC61131–3 programming standard.		any ATV61 any ATV71	VW3A3501 *[45]*
Water Solutions Control Card	This option card contains a variety of pre-programmed functions and features to manage multi–pump installations.		any ATV61 any ATV71	VW3A3503 *[45]*
Simple Loader	Using RJ45 port connections, the configurations of a drive can be downloaded then uploaded to compatible drive.		ATV31, ATV61, and ATV71	VW3A8120

[43] For use with the ATV71H...383 drive ONLY.
[44] SoMachine is required to use this product.
[45] The drive cannot support the VW3A3503 water solutions card and the VW3A3501 controller inside option card simultaneously.

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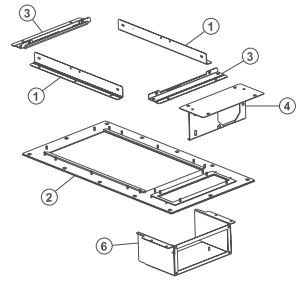
Table 26.14: 26.14: Options—Field Installed (continued)

Description		For Use on Drives	Catalog No.
Flange Kit  VW3A9506	Kit includes: a metal frame, seals, mounting hardware, and a bracket to mount the fan kit so the fan can be accessed from the front of the drive template. Kit used to mount the heatsink of the drive outside of an enclosure.	ATV61/71H037M3...HU15M3	VW3A9501
		ATV61/71H075N4...HU22N4	
		ATV61/71HU22M3...HU40M3	VW3A9502
		ATV61/71HU30N4...HU40N4	
		ATV61/71HU55M3	VW3A9503
		ATV61/71HU55N4, HU75N4	
		ATV61/71HU75M3	VW3A9504
		ATV61/71HD11N4	
		ATV61/71HD11M3X..HD15M3X	VW3A9505
		ATV61/71HD15N4, HD18N4	
		ATV61/71HD18M3X..HD22M3X	VW3A9506
		ATV61/71HD22N4, ATV61/71HU30Y...HD30Y	
		ATV61/71HD30N4, HD37N4	VW3A9507
		ATV61/71HD30M3X..HD45M3X	VW3A9508
		ATV61/71HD45N4...HD75N4, ATV61/71HD37Y...HD90Y	VW3A9509
		ATV61HD55M3X...HD75M3X ATV61HD90N4...HC11N4	VW3A9510
		ATV71HD55M3X, ATV71HD90N4	
		ATV61HD90M3X, ATV61HC13N4	VW3A9511
		ATV71HD75M3X, ATV71HC11N4	
		ATV61HC16N4, ATV61HC20Y, ATV61/71HC11Y...HC16Y, ATV71HC13N4	VW3A9512
		ATV61HC22N4, ATV71HC16N4	VW3A9513
		ATV61HC25N4…HC31N4 ATV61HC40Y ATV61/71HC25Y, HC31Y ATV71HC20N4...HC28N4 ATV71HC20Y	VW3A9514
		ATV61HC25N4…HC31N4 with VW3A7101 braking transistor ATV61HC40Y ATV61/71HC25Y, HC31Y ATV71HC20N4...HC28N4 with VW3A7101 braking transistor ATV71HC20Y	VW3A9515
Type 1 Conduit Kit	Kit includes: a metal box with conduit knockouts. The kit provides conduit landing when wall mounting the drive.	ATV61/71H037M3...HU15M3	VW3A9201
		ATV61/71H075N4...HU22N4	
		ATV61/71HU22M3...HU40M3	VW3A9202
		ATV61/71HU30N4...HU40N4	
		ATV61/71HU55M3	VW3A9203
		ATV61/71HU55N4, HU75N4	
		ATV61/71HU75M3	VW3A9204
		ATV61/71HD11N4	
		ATV61/71HD11M3X..HD15M3X	VW3A9205
		ATV61/71HD15N4, HD18N4	
		ATV61/71HD18M3X..HD22M3X	VW3A9206
		ATV61/71HD22N4	
		ATV61/71HU30Y...HD30Y	
		ATV61/71HD30N4, HD37N4	VW3A9207
		ATV61/71HD30M3X..HD45M3X	VW3A9217
		ATV61/71HD45N4..HD75N4	VW3A9208
		ATV61/71HD37Y...HD90Y	
		ATV61HD55M3X...HD75M3X ATV61HD90N4...HC11N4	VW3A9209
		ATV71HD55M3X, ATV71HD90N4, ATV61HC11N4	
		ATV61HD90M3X, ATV61HC13N4	VW3A9210
		ATV71HD75M3X, ATV71HC11N4	
		ATV61HC16N4, ATV71HC13N4	VW3A9211
		ATV61/71HC11Y...HC16Y	
		ATV61HC20Y	
		ATV61HC22N4, ATV71HC16N4	VW3A9212
		ATV61HC25N4...ATV61HC31N4 ATV71HC20N4...HC28N4	VW3A9213
		ATV71HC20Y	
		ATV61/71HC25Y, HC31Y	
		ATV61HC40Y	
		ATV61HC25N4...HC31N4 with VW3A7101 braking transistor ATV71HC20N4...HC28N4 with VW3A7101 braking transistor	VW3A9214
		ATV71HC20Y	
		ATV61/71HC25Y, HC31Y	
		ATV61HC40Y	
Profibus Option Card Cover	Type 1 cover for Profibus Option Card	230 V Drive controllers / 480 V Drive controllers	
		ATV61H•••• *[46]* / ATV71H•••• / ATV61H•••• / ATV71H••••	
		075M3 / 037M3 / 075N4 / 075N4	VW3A9201PF
		U15M3 / 075M3 / U15N4 / U15N4	
		— / U15M3 / U22N4 / U22N4	
		U22M3 / U22M3 / U30N4 / U30N4	VW3A9292PF
		U30M3 / U30M3 / U40N4 / U40N4	
		U40M3 / U40M3 / — / —	
		U55M3 / U55M3 / U55N4 / U55N4	VW3A9203PF
		— / — / U75N4 / U75N4	
		U75M3 / U75M3 / D11N4 / D11N4	VW3A9204PF
		D11M3X / D11M3X / D15N4 / D15N4	VW3A9205PF
		D15M3X / D15M3X / D18N4 / D18N4	

[46] The symbol "•" indicates the part of the number that varies with controller size or rating.

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Altivar Process 630

New!

Altivar™ Process 630

Table 26.15: Altivar Process 630 Selection

Input Line Voltage	Normal Duty [47]			Heavy Duty [48]			Catalog Number
	Three-phase Motor Power [49]		Continuous Output Current [50]	Three-phase Motor Power [49]		Continuous Output Current [50]	
	HP	kW	A	HP	kW	A	
208/240 Vac Three Phase	1	0.75	4.6	0.5	0.37	3.3	ATV630U07M3
	2	1.5	8	1	0.75	4.6	ATV630U15M3
	3	2.2	11.2	2	1.5	8	ATV630U22M3
	4	3.0	13.7	3	2.2	11.2	ATV630U30M3
	5	4.0	18.7	4	3	13.7	ATV630U40M3
	7.5	5.5	25.4	5	4	18.7	ATV630U55M3
	10	7.5	32.7	7.5	5.5	25.4	ATV630U75M3
	15	11	46.8	10	7.5	32.7	ATV630D11M3
	20	15	63.4	15	11	46.8	ATV630D15M3
	25	18.5	78.4	20	15	63.4	ATV630D18M3
	30	22	92.6	25	18.5	78.4	ATV630D22M3
	40	30	123	30	22	92.6	ATV630D30M3
	50	37	149	40	30	123	ATV630D37M3
	60	45	176	50	37	149	ATV630D45M3
	75	55	211	60	45	176	ATV630D55M3
	100	75	282	75	55	211	ATV630D75M3
400/480 Vac Three Phase	1	0.75	2.2	0.5	0.37	1.5	ATV630U07N4
	2	1.5	4	1	0.75	2.2	ATV630U15N4
	3	2.2	5.6	2	1.5	4	ATV630U22N4
	4	3	7.2	3	2.2	5.6	ATV630U30N4
	5	4	9.3	4	3	7.2	ATV630U40N4
	7.5	5.5	12.7	5	4	9.3	ATV630U55N4
	10	7.5	16.5	7.5	5.5	12.7	ATV630U75N4
	15	11	23.5	10	7.5	16.5	ATV630D11N4
	20	15	31.7	15	11	23.5	ATV630D15N4
	25	18.5	39.2	20	15	31.7	ATV630D18N4
	30	22	46.3	25	18.5	39.2	ATV630D22N4
	40	30	61.5	30	22	46.3	ATV630D30N4
	50	37	74.5	40	30	61.5	ATV630D37N4
	60	45	88	50	37	74.5	ATV630D45N4
	75	55	106	60	45	88	ATV630D55N4
	100	75	145	75	55	106	ATV630D75N4
	125	90	173	100	75	145	ATV630D90N4
	150	110	211	125	90	173	ATV630C11N4
	200	130	250	150	110	180	ATV630C13N4
	250	160	302	200	132	240	ATV630C16N4

Table 26.16: Accessories

Description			Catalog Number
Operator Interface	Graphic keypad		VW3A1111
	Door Mounting kit for graphic keypad, Type 12		VW3A1112
	Remote mounting kit RJ45 connector, IP65		VW3A1115
	Cable for remote mounting LCD graphic keypad	1 meter	VW3A1104R10
		3 meters	VW3A1104R30
		5 meters	VW3A1104R50
		10 meters	VW3A1104R100
Wireless Connection	Wifer Wi-Fi Module		TCSEGWB13FA0
I/O Extension Option Cards	Digital and Analog I/O extension module		VW3A3203
	Output Relays extension module		VW3A3204
Communication Option Cards	Ethernet/IP Modbus TCP dual port		VW3A3720
	PROFINET		VW3A3627
	PROFIBUS DPv1 option card		VW3A3607
	DeviceNet option card		VW3A3609
	CANopen	2x RJ45 Daisy Chain	VW3A3608
		SUB-D	VW3A3618
		Screw terminal	VW3A3628
External Heat Sink Mounting Kit	Frame 1		NSYPTDS1
	Frame 2		NSYPTDS2
	Frame 3		NSYPTDS3
	Frame 4		NSYPTDS4
	Frame 5		NSYPTDS5
	Wall Mount kit		NSYAEFPFPTD
Replacement Cooling Fan Kit	Frame 1		VX5VPS1001
	Frame 2		VX5VPS2001
	Frame 3		VX5VPS3001
	Frame 4		VX5VPS4001
	Frame 5		VX5VPS5001

[47] Normal duty applications requiring an overload up to 110% for 60 seconds. Also known as variable torque loads.
[48] Heavy duty applications requiring an overload up to 150% for 60 seconds. Also known as constant torque loads.
[49] These values are given for a nominal switching frequency of 4 kHz up to ATV630D45N4, or 2.5 kHz for ATV630D55N4...D90N4 for use in continuous operation. The switching frequency is adjustable from 1...16 kHz for all ratings. Above 2.5 or 4 kHz (depending on the rating), the drive will automatically reduce the switching frequency in the event of an excessive temperature rise. For continuous operation above the nominal switching frequency, derate the nominal drive current (see the derating curves on our website www.schneider- electric.com).
[50] Typical value for the indicated motor power and for the maximum prospective line Isc.

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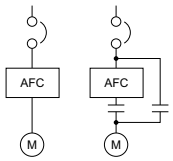
S-Flex 212 Enclosed Drive Controller Type 1 Rated +14 to +104 °F (-10 to +40 °C)



Variable Torque AC Drive—208 V, 230 V, and 460 V Ratings

The S-Flex enclosed drive features the Altivar 212 drive and provides 100 KAIC rating for commercial pump and fan applications.

The S-Flex is an economical package that includes a circuit breaker disconnect and option bypass contactors, drive input disconnect switch or line contactor.

The S-Flex is rated as a NEMA Type 1 enclosure an ideal for use in residential high rise and mixed-use buildings, commercial office buildings, schools and campus environments.

All S-Flex 212 Enclosed Drives are supplied with:

- Altivar™ 212 power converter
- Square D™ circuit breaker disconnect (Power Fuses for 460 V version only)
- UL 508C coordinated short circuit rating for 100,000 A
- Adjustable Frequency Controller-Off-Bypass selector switch
- Local/Remote configurable on controller
- Power On red LED
- Bypass Run green LED
- Fire/Freezestat interlock for Adjustable Frequency Drive and Bypass mode
- Form C Adjustable Frequency Controller fault auxiliary contact
- Modbus RJ-45 communication port
- Smoke Purge Function
- Bypass Run Auxiliary Contact
- Drive Run Auxiliary Contact
- Full Voltage Bypass Power Circuit with overload relay
- 120 Vac fused control power transformer

Table 26.17: Output Amperes

HP	208 V	230 V	460 V
1	4.8	4.2	2.1
2	7.8	6.8	3.4
3	11	9.6	4.8
5	17.5	15.2	7.6
7.5	25.3	22	11
10	32.2	28	14
15	48.3	42	21
20	62.1	54	27
25	78.2	68	34
30	92	80	40
40	120	104	52
50	—	—	65
60	—	—	77
75	—	—	96
100	—	—	124

Table 26.18: S-Flex™ 212 Enclosed Drive Controller Selection

Input Line Voltage	HP	kW	Output Current A	Catalog Number
208 Vac Three-phase	1	0.75	4.8	SFD212CG2YB07D07
	2	1.5	7.8	SFD212DG2YB07D07
	3	2.2	11	SFD212EG2YB07D07
	5	4	17.5	SFD212FG2YB07D07
	7.5	5.5	25.3	SFD212GG2YB07D07
	10	7.5	32.2	SFD212HG2YB07D07
	15	11	48.3	SFD212JG2YB07D07
	20	15	62.1	SFD212KG2YB07D07
	25	18.5	78.2	SFD212LG2YB07D07
	30	22	92	SFD212MG2YB07D07
	40	30	120	SFD212NG2YB07D07
460 Vac Three-phase	1	0.75	2.1	SFD212CG4YB07D07
	2	1.5	3.4	SFD212DG4YB07D07
	3	2.2	4.8	SFD212EG4YB07D07
	5	4	7.6	SFD212FG4YB07D07
	7.5	5.5	11	SFD212GG4YB07D07
	10	7.5	14	SFD212HG4YB07D07
	15	11	21	SFD212JG4YB07D07
	20	15	27	SFD212KG4YB07D07
	25	18.5	34	SFD212LG4YB07D07
	30	22	40	SFD212MG4YB07D07
	40	30	52	SFD212NG4YB07D07
	50	37	65	SFD212PG4YB07D07
	60	45	77	SFD212QG4YB07D07
	75	55	96	SFD212RG4YB07D07
	100	75	124	SFD212SG4YB07D07

Table 26.19: Additional Catalog Configurations Available Using Product Selector
Example:SFD212CG3YA06X07 (bold text in selection table below)

TYPE (01)	HP (02)	Enclosure (03)	Voltage (04)	Power Circuit (05)	Communication Options (06)	Misc Options (07)
SFD212	**C = 1 hp** D = 2 hp E = 3 hp F = 5 hp G = 7.5 hp H = 10 hp J = 20 hp K= 20 hp L = 30 hp N = 40 hp P = 50 hp (460 V only) Q = 60 hp (460 V only) R = 75 hp (460 V only) S = 100 hp (460 V only)	**G = Type 1 General Purpose**	2 = 208 Vac **3 = 230 Vac** 4 = 460 Vac	W = Without Bypass **Y = Full Voltage Bypass**	**A06 = BACnet Setup** B06 = LonWorks® Card C06 = Metasys® N2 Setup D06 = Apogee™ P1 Setup N06 = Modbus *[1]*	A07 = Drive Input Disconnect *[2]* B07 = Line Contactor *[2]* S07 = Seismic Certification D07 = Full Text Keypad **X07 = AC Line Reactor**

Table 26.20: Accessories

Description		Catalog Number
Software		
SoMove™	This software enables the user to configure, set, debug and organize maintenance task for the complete Altivar product line and the Altistart 22 and Altistart 48 soft starters. It can also be used to customize the integrated display terminal menus. It can be used with a direct connection or a Bluetooth® wireless connection. Free download www.schneider-electric.us	
User Interface Kits		
USB to RJ45 Adaptor Kit (For use in connecting to a PC with a USB port)		TCSMCNAM3M002P
EZ-M Mounting Channel, 72 in. length		EZM72MC
Altivar and Altistart Programming cable for iPad 30–Pin mobile to RS-485 Converter, 2 meters		VW3A8151R20U

NOTE: See the Instruction Bulletin for set up instructions.

[1] Default selection. For Modbus control, see the Instruction manual.
[2] Options A07 Drive Input disconnect and B07 line contactor are available only when a full voltage bypass option Y is selected. Options A07 and B07 are mutually exclusive.

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Altistart™ 22 Soft Starters

The Altistart 22 is designed for commercial and normal duty industrial applications, it uses both voltage and torque control to provide a soft start and soft stop for there-phase asynchronous motors between 17 A and 590 A. The conformal-coated, printed circuit boards provide enhanced resistance to harsh environments, increasing the service life of installations and lowering maintenance costs.

Select the Altistart 22 soft starter using the nameplate full-load ampere rating of the motor and the table below. The horsepower ratings are for reference only.

Table 26.21: ATS22 Selection *[1]*

208 V	230 V	400 kW	460 V	575 V	Rated A	Softstart Reference *[2]* or *[3]*	Dimensions (inches)			Frame Size
							W	H	D	
3	5	5.5	10	15	17	ATS22D17S6,S6U	5.1	9.8	6.6	A
7.5	10	11	20	25	32	ATS22D32S6,S6U	5.1	9.8	6.6	A
— *[4]*	15	18.5	30	40	47	ATS22D47S6,S6U	5.1	9.8	6.6	A
15	20	22	40	50	63	ATS22D62S6,S6U	5.7	10.9	8.1	B
20	25	30	50	60	75	ATS22D75S6,S6U	5.7	10.9	8.1	B
25	30	37	60	75	88	ATS22D88S6,S6U	5.7	10.9	8.1	B
30	40	45	75	100	110	ATS22C11S6,S6U	5.9	13	9	C
40	50	55	100	125	140	ATS22C14S6,S6U	5.9	13	9	C
50	60	75	125	150	170	ATS22C17S6,S6U	5.9	13	9	C
60	75	90	150	200	210	ATS22C21S6,S6U	8.1	15.6	11.8	D
75	100	110	200	250	250	ATS22C25S6,S6U	8.1	15.6	11.8	D
100	125	132	250	300	320	ATS22C32S6,S6U	8.1	15.6	11.8	D
125	150	160	300	350	410	ATS22C41S6,S6U	8.1	15.6	11.8	D
150	—	220	350	400	480	ATS22C48S6,S6U	11.9	16.8	13.4	E
—	200	250	400	500	590	ATS22C59S6,S6U	11.9	16.8	13.4	E

Table 26.22: Maximum Number of Starts/Stops per hour

Catalog Number	Number of starts/Stops per Hour
ATS22D17S6U...D88S6U	6 (up to 10 with optional fan)
ATS22C11S6U...C17S6U	4 (up to 10 with optional fan)
ATS22C21S6U...C59S6U	4 (comes with fan)

Altistart 22 Options: Fans and Accessories

Table 26.23: Accessories Selection

Description		Length	Catalog Number
Software			
SoMove™	This software enables the user to configure, set, debug and organize maintenance task for the complete Altivar product line and the Altistart 22 and Altistart 48 soft starters. It can also be used to customize the integrated display terminal menus. It can be used with a direct connection or a Bluetooth® wireless connection. Free download www.schneider-electric.us		
User Interface Kits			
Cable	USB/RS485 cord set (equipped with RJ45 socket)		TCSMCNAM3M002P
Remote Keypadad	IP54/NEMA® 12 keypad		VW3G22101
	IP65 keypad		VW3G22102 *[5]*
Remote Keypad Cords Equipped with 2 RJ45 Connectors	3 FT length		VW3A1104R10
	9 FT length		VW3A1104R30
Modbus Serial Link Connection via splitter box and RJ45 connectors	Modbus™ splitter box (with 10 RJ45 Connectors)		LU9GC3
	Cordsets for Modbus serial link (with 2 RJ45 connectors	.3 m	VW3A8306R03
		1 m	VW3A8306R10
		3 m	VW3A8306R30
	Modbus T-junction boxes (with integrated cables)	.3 m	VW3A8306TF03
		1 m	VW3A8306TF10
	RJ45 Line Terminators (Sold in lots of 2)		VW3A8306RC
Altivar and Altistart Programming Cable	30-Pin mobile to RS-485 converter	2 m	VW3A8151R20U

Table 26.24: Fans Selection

Power Supply Voltage For Control	For Use On Altistart	Catalog Number
The ATS22C21S6,S6U..C59S6,S6U units come with an integrated fan. The ATS22D17S6,S6U..C17S6,S6U units are ventilated by means of natural ventilation. For more demanding applications, such as those with a greater number of starts, the Altistart 22 range offers fans as an option. The fans are powered by the Altistart 22 unit and attach to the back of the device. The fan's noise level is less than 60 dBA.		
220 V	ATS22D17..D47S6	VW3G22400
	ATS22D62..D88S6	VW3G22401
	ATS22C11..C17S6	VW3G22402
110 V	ATS22D17..D47S6U	VW3G22U400
	ATS22D62..D88S6U	VW3G22U401
	ATS22C11..C17S6U	VW3G22U402

[1] Motor full load amperate (FLA) must not exceed the ampere ratings of the soft starter.
[2] S6 = 208–600 line voltage, 220 V control voltage
[3] S6U = 208–600 line voltage, 110 V control voltage
[4] Value not indicated when there is no corresponding standardized motor.
[5] A remote keypad cord set is required.

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Altistart™ 48 Soft Starters

The Altistart 48 soft starter combines ease of selection with simple installation and high motor control performance. With its exclusive motor Torque Control System, the Altistart 48 helps eliminate uncontrolled motor acceleration and deceleration, a problem inherent with standard voltage—ramp soft starters. The Altistart 48 includes features to help with motor and machine protection and is available for motors ranging from 208 to 575 volts. In addition to a built–in display and programming terminal, a remote keypad option and programming software is available to ease integration and commissioning. The Altistart 48 has a built–in Modbus™ port and is offered with serial communication gateways to such popular networks as Ethernet and DeviceNet™.

Open Style Soft Starters 50–60 Hz, Three-Phase, 690 V Maximum

The Altistart 48 soft starter must be selected using the table below, based on nameplate full load ampere rating of the motor. The horsepower ratings shown in table are for reference only.

Table 26.25: Altistart 48 Selection *[6]*

Standard Duty (Low Inertia Loads) *[7]* Maximum Horsepower					Altistart Soft Starters	
208 V	230 V	400 V (kW)	460 V	575 V	Rated A	Catalog Number
3	5	5.5	10	15	17	ATS48D17Y
5	7.5	7.5	15	20	22	ATS48D22Y
7.5	10	11	20	25	32	ATS48D32Y
10	—	15	25	30	38	ATS48D38Y
—	15	18.5	30	40	47	ATS48D47Y
15	20	22	40	50	62	ATS48D62Y
20	25	30	50	60	75	ATS48D75Y
25	30	37	60	75	88	ATS48D88Y
30	40	45	75	100	110	ATS48C11Y
40	50	55	100	125	140	ATS48C14Y
50	60	75	125	150	170	ATS48C17Y
60	75	90	150	200	210	ATS48C21Y
75	100	110	200	250	250	ATS48C25Y
100	125	132	250	300	320	ATS48C32Y
125	150	160	300	350	410	ATS48C41Y
150	—	220	350	400	480	ATS48C48Y
—	200	250	400	500	590	ATS48C59Y
200	250	315	500	600	660	ATS48C66Y
250	300	355	600	800	790	ATS48C79Y
350	350	400	800	1000	1000	ATS48M10Y
400	450	500	1000	1200	1200	ATS48M12Y

Table 26.26: Altistart 48 Options

Description		Catalog Number
Software		
SoMove™	This software enables the user to configure, set, debug and organize maintenance task for the complete Altivar product line and the Altistart 22 and Altistart 48 soft starters. It can also be used to customize the integrated display terminal menus. It can be used with a direct connection or a Bluetooth® wireless connection. Free download www.schneider-electric.us	
User Interface Kits		
Remote Keypad Display Mounting Kit, including: Keypad with 3–character 7–segment display IP65 cover and seal, mounting screws, and 3 meter cable to connect keypad display to Altistart 48		VW3G48101
Cover for power terminals—Set of 6 for ATS48C14Y and ATS48C17Y		LA9F702
Cover for power terminals—Set of 6 for ATS48C21Y, ATS48C25Y, and ATS48C32Y		LA9F703
Modbus Ethernet Gateway		TSXETG100
DeviceNet Gateway		LUFP9
Profibus DP Gateway		LUFP7
FIPIO™ Gateway		LUFP1
1/3 meter connection cable (RJ–45 to RJ–45)		VW3A8306R03
1 meter connection cable (RJ–45 to RJ–45)		VW3A8306R10
3 meter connection cable (RJ–45 to RJ–45)		VW3A8306R30
1/3 meter splitter cable (For RJ—45 daisy chain connection)		VW3A8306TF03
1 meter splitter cable (For RJ–45 daisy chain connection)		VW3A8306TF10
RJ45 terminator (2 per package)		VW3A8306RC
Modbus hub (Eight RJ–45 ports)		LU9GC3
USB to RJ45 Adaptor Kit For use in connecting to a PC with a USB port		TCSMCNAM3M002P
Size M10 Bolt Kit		W808780210111
Size M12 Bolt Kit		W808780220111
Altivar and Altistart Programming Cable. For use with the iPad Configuration App. 30-Pin Mobile to RS-485 Converter Cable		VW3A8151R20U

[6] Motor full load amperage (FLA) must not exceed the ampere rating of the soft starter.
[7] Low Inertia—Connected motor load inertia equal or less than 10 times motor rotor inertia.
High Inertia—Connected motor load inertia greater than 10 times motor rotor inertia.

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Enclosed Altistart™ 22 Motor Controllers

Enclosed Altistart 22 (ATS22) solid-state combination motor controllers are a pre-engineered, integrated solution for reduced voltage starting and soft stopping of standard three-phase asynchronous induction (squirrel cage) motors. The Enclosed 22 controllers consist of a disconnect means and an ATS22 softstarter in a stand-alone enclosure. Enclosed 22 controllers integrate the ATS22 softstart technology into a combination package for application requirements up to 400 hp at 460 V.

- 3–150 hp, 208 V
- 5–200 hp, 230 V
- 10–400 hp, 460 V
- 15–500 hp, 575V

Table 26.27: Catalog Number Description

Field	Digit	Characteristic	Description
—	—	Controller Class	8638 = Fused Disconnect *[1]* 8639 = Circuit Breaker Disconnect
01	1–3	Controller Style	22F = Altistart 22 with Class J Fuse Clips and Molded Case Switch *[1]* 22T = Altistart 22 with PowerPact Motor Circuit Protector 22U = Altistart 22 with PowerPact Thermal-Magnetic Circuit Breaker
02	4	Horsepower	A = 3 hp B = 5 hp C = 7.5 hp D = 10 hp E = 15 hp F = 20 hp G = 25 hp H = 30 hp J = 40 hp K = 50 hp L = 60 hp M = 75 hp N = 100 hp P = 125 hp Q = 150 hp R=200 hp S= 250 hp T= 300 hp U=350 hp W= 400 hp X= 500 hp
03	5	Enclosure Type	G = UL Type 1 General Purpose A = UL Type 12K Industrial Use, Dust-Tight/Drip-Tight H = UL Type 3R Outdoor Use
04	6	Voltage	2 = 208 Vac 3 = 230 Vac 4 = 460 Vac 5 = 575 Vac
05	7	Power Circuit	B = Basic Shunt Trip S = Full-Featured Shunt Trip N = Non-Reversing Isolation R = Reversing Isolation Y = Integral Full-Voltage Bypass
06	8–10	Control Options *[2] [3]*	A06 = Start-Stop Pushbuttons B06 = Forward-Off-Reverse C06 = Hand-Off-Auto (HOA) Selector Switch D06 = Stop-Run Selector Switch E06 = Hand-Auto Selector Switch/Start-Stop Pushbuttons
07	11–13	Pilot Device Options *[2] [3]*	A07 = Run Light (Red), Off Light (Green) B07 = Push-to-Test Run Light (Red), Push-to-Test Off Light (Green) C07 = Run Light (Red), Off Light (Green), Tripped Light/Reset (Yellow) D07 = PTT Run Light (Red), PTT Off Light (Green), Tripped Light/ Reset (Yellow)
08	14–16	Metering Options	B08 = Elapsed Run Time Meter *[3]*
09	17–19	Miscellaneous Options	A10 = Floor Mounting Kit *[4]* B10 = Additional 150 VA *[5]* C10 = Power-Up On Delay Relay*[6]* D10 = Emergency Stop Pushbutton *[5]* E10 = cUL Label *[7]* F10 = Auxiliary Run Mode Contacts G10 = Auxiliary FB Bypass Contacts *[8]* H10 = Auxiliary Auto Mode Contacts *[9]* J10 = Auxiliary Trip Indication Contacts L10 = ID Engraved Nameplate *[5]* M10 = 10 Spare Terminal Blocks *[5]* P10 = Permanent Wire Markers *[5]* R10 = MOV-Surge Arrestor *[5]* U10 = Omit Door-Mounted Keypad Display *[10]* X10 = 50 °C Operation Y10 = Seismic qualification label Z10 = Service Entrance Rating *[7] [11]* 910 = American Recovery and Reinvestment Act (ARRA) Option

Table 26.28: Catalog Number Example: 863922UCG4BA06A07

Field							
—	1	2	3	4	5	6	7
8639	22U	C	G	4	B	A06	A07
Controller Class	PowerPact™ Thermal- Magnetic Circuit Breaker	7.5 hp	Type 1 General Purpose	460 Vac	Basic Shunt Trip	Start-Stop Pushbutton	Run Light (Red), Off Light (Green

[1] This option is not selectable with power circuit option B05.
[2] Select only one option.
[3] To omit, do not include a selection in the catalog number.
[4] This option is available only for enclosure size D.
[5] This option is not selectable with power circuit option B05
[6] This option is not selectable with power circuit option B05. This option is valid only with the following control options: C06, D06, or E06.
[7] Options E10 and Z10 cannot be used together.
[8] This option is not selectable with power circuit option B05. The contacts are available only when power circuit option Y05 is selected.
[9] The contacts are not available when power circuit option R05 is selected. This option is valid only with the following control options: C06, D06, or E06.
[10] If you select option U10, you must separately order the remote keypad (VW3G22101) and cable (VW3A1104R30) to commission the softstarter. Refer to the *ATS22 User Manual*, BBV51330, for serial communication programming and control capabilities.
[11] Options E10 and Z10 cannot be ordered together.

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Control Options (pick one)

Mod A06	Start/Stop push buttons
	Provides black start and red stop push buttons (3-wire control scheme).
Mod B06	Forward-Off-Reverse selector switch
	Provides three-position selector switch to select between forward, off and reverse. Uses 2-wire control.
Mod C06	Hand-Off-Auto selector switch
	Provides a three-position selector switch, 2-wire control scheme.
Mod D06	Stop-Run selector switch
	Provides a two-position selector switch.
Mod E06	Hand-Auto selector switch and Start/Stop push buttons
	Provides a two-position selector switch and start/stop push buttons (3-wire control).

Pilot Light Cluster Options (pick one)

Mod A07	Pilot light cluster #1
	Consists of red “RUN” and green “OFF” pilot lights. Provides standard red “RUN (ON)” and green “OFF” pilot lights for status annunciation.
Mod B07	Pilot light cluster #2
	Consists of red “RUN” (push-to-test) and green “OFF” (push-to-test) pilot lights. Provides push-to-test type red “RUN (ON)” and standard green “OFF” pilot lights for status annunciation.
Mod C07	Pilot light cluster #3
	Consists of red “RUN”, green “OFF” and yellow “FAULT” pilot lights. Provides standard red “RUN (ON)” green “OFF” and yellow “FAULT” pilot lights for status annunciation.
Mod D07	Pilot light cluster #4
	Consists of red “RUN (ON)” (push-to-test), green “OFF” (push-to-test) and yellow “FAULT” (push-to-reset) pilot lights. Provides push-to-test type red “RUN (ON)” standard green “OFF”, and push-to-reset type yellow “FAULT” for status annunciation.

Meter Display Options (pick one)

Mod BO8	Elapsed time meter
	Provides a seven-digit analog, non-resettable elapsed run time meter. Not available on Type 3R Enclosures

Miscellaneous Options (multiple compatible options may be selected

Mod A10	Floor mounting kit
	Only available for size D enclosures.
Rules: Available for power options S05, N05, R05, Y05.	
Mod B10	150 VA additional control power capacity
	Provides 150 VA additional control VA capacity for customer use.

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Information and Selection of AC Drives

For information and selection, contact your nearest Schneider Electric sales office or visit our website:

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Technical Support for AC Drives

Drive Product Support Group

For support and assistance, contact the Drive Product Support Group. The Drive Product Support Group is staffed from 8:00 am until 8:00 pm Eastern time to assist with product selection, start–up, and diagnosis of product or application problems.
EMERGENCY Technical phone support is available 24 hours a day, 365 days a year.

Toll Free:	888–778–2733
E–mail:	drive.products.support@schneider–electric.com
Fax:	919–217–6508

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Toll Free:	(888–778–2733)

Customer Training for AC Drives

Schneider Electric offers a variety of instructor-led, skill enhancing and technical product training programs for customers. For a complete list of drives/soft starter training with dates, locations, and pricing, please call:

Phone:	978-975-9306
Fax:	978-975-2821

Packaged Product Documentation for AC Drives

Standard Documentation

Each adjustable frequency drive or soft starter shipped includes one set of instruction bulletins. Each set of instruction bulletins includes installation, start–up, troubleshooting and wiring diagram information. Separate Approval and/or Record Drawings are not included.

Approval and Record Drawings

All factory orders for enclosed drives and soft starters come with factory supplied user drawings and are identified by a factory order number. The factory supplied drawing set typically includes:

- Enclosure outline drawing
- Power elementary drawing
- Control elementary drawing
- Interconnection drawing

These drawings are also available in DWG, DXF, IGS, Microcad and PDF formats upon customer request.

Product Literature

To view or download product literature, visit the Schneider Electric web site:

www.schneider-electric.us

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Section 27

Automation Products

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Magelis GTU Univeral Panels

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Programmable Controllers

Modicon™ Zelio™ Logic Controller

To meet the demand for applications that require more flexibility than a simple relay, timer or counter, but are too small or simple for the smallest Nano PLC, the new generation of Zelio Logic smart relays are now available. Designed to accept and control outputs just like a relay, Zelio Logic features dual language capability, using either Function Block Diagram (FBD) or Ladder Logic Programming (LL), and can easily be programmed by using either the front panel or by utilizing ZelioSoft software. This new generation of Zelio Logic smart relays provides customers with considerable gains from the design stage to the monitoring of their applications, due to its simplicity and flexibility.

More information is available at www.schneider-electric.com or in catalog DIA3ED2111202EN.

Modicon M221 PLC

Providing “Best in Class” performance for compact machine automation, the Modicon M221 PLC features intuitive machine programming using SoMachine Basic software, ready-to-use applications and standard function blocks. Its flexible and scalable machine control allows you to easily upgrade to higher performance platforms when necessary. With Ethernet, USB and serial ports, the Modicon M221 PLC provides optimum connectivity for simplified machine integration and maintenance.

Catalog Number	Description	Inputs	Outputs	Supply Volts
TM221C16R	Compact PLC 16 I/O Relay	9 Digital, 2 Analog	7 Relay	120 AC
TM221C24R	Compact PLC 24 I/O Relay	14 Digital, 2 Analog	10 Relay	120 AC
TM221C40R	Compact PLC 40 I/O Relay	24 Digital, 2 Analog	16 Relay	120 AC
TM221CE16R	Ethernet Compact PLC 16 I/O Relay	9 Digital, 2 Analog	7 Relay	120 AC
TM221CE16T	Ethernet Compact PLC 16 I/O PNP Transistor	9 Digital, 2 Analog	7 PNP	24 DC
TM221CE24R	Ethernet Compact PLC 24 I/O Relay	14 Digital, 2 Analog	10 Relay	120 AC
TM221CE24T	Ethernet Compact PLC 24 I/O PNP Transistor	14 Digital, 2 Analog	10 PNP	24 DC
TM221CE40R	Ethernet Compact PLC 40 I/O Relay	24 Digital, 2 Analog	16 Relay	120 AC
TM221CE40T	Ethernet Compact PLC 40 I/O PNP Transistor	24 Digital, 2 Analog	16 PNP	24 DC
TM221ME16R	Ethernet Modular PLC 16 I/O Relay	8 Digital, 2 Analog	8 Relay	24 DC
TM221ME16T	Ethernet Modular PLC 16 I/O PNP Transistor	8 Digital, 2 Analog	8 PNP	24 DC

Modicon M241 PLC

Designed for high-performance compact machines, incorporating speed and position control functions–the Modicon M241 PLC features a dual core processor–that provides tremendous processing power and memory size for complex applications. Machine programming is highly intuitive using SoMachine software, function blocks and ready-to-use applications. And, the M241 PLC’s simplified motor control integration and wiring allow for quick start-up and commissioning.

Catalog Number	Description	Inputs	Outputs	Supply Volts
TM241CE24R	Ethernet PLC 24 I/O Relay	14 Digital	4 PNP, 6 Relay	24 dc
TM241CE24T	Ethernet PLC 24 I/O PNP Transistor	14 Digital	10 PNP	24 dc
TM241CE40R	Ethernet PLC 40 I/O Relay	24 Digital	4 PNP, 12 Relay	24 dc
TM241CE40T	Ethernet PLC 40 I/O PNP Transistor	24 Digital	16 PNP	24 dc
TM241CEC24R	Ethernet CANopen PLC 24 I/O Relay	14 Digital	4 PNP, 6 Relay	24 dc
TM241CEC24T	Ethernet CANopen PLC 24 I/O PNP Transistor	14 Digital	10 PNP	24 dc

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Modicon™ M251 PLC

The Modicon M251 PLC provides innovative, high-performance solutions for modular machines and distributed architectures with line control. Its intuitive SoMachine software, ready-to-use applications and function blocks allow you to optimize your programming time. And, its flexible and scalable machine control allows you to change the PLC hardware type to fit the application, using the same programming across the range. The M251 PLC allows you to stay connected everywhere via Ethernet, wireless access, web servers and remote visualization… simplifying machine integration and maintenance. Its integrated Ethernet switch - on a separate channel from the machine control network - allows data exchange with other machines and system networks, while keeping the machine control on a dedicated high-performance local network.

Catalog Number	Description	Com 1	Com 2	Supply Volts
Modicon M251 Programmable Logic Controllers. I/O not included. Refer to TM3 I/O expansion module selection to increase I/O count.				
TM251MESE	Dual Channel Ethernet PLC	Dual Port Ethernet	Ethernet as Master	24 dc
TM251MESC	Ethernet and CANopen PLC	Dual Port Ethernet	CANopen as Master	24 dc

Catalog Number	Description
TM3 I/O Expansion Modules for M221, M241, M251 PLCs. Up to 7 modules per PLC. Add TM3XTRA1 + TM3XREC1 to add 8-14 TM3 modules. Additional TM3 modules are available.	
TM3AI4	I/O Module 4 Analog Inputs
TM3AI8	I/O Module 8 Analog Inputs
TM3AM6	I/O Module 4 Analog Inputs and 2 Analog Outputs
TM3AQ2	I/O Module 2 Analog Outputs
TMA3Q4	I/O Module 4 Analog Outputs
TMA3DI16	I/O Module 16 Inputs
TM3DI8	I/O Module 8 Inputs
TM3DI8A	I/O Module 8 Inputs 120 Vac
TM3DM8R	I/O Module 8 IO Relays
TM3DQ16R	I/O Module 16 Outputs Relays
TM3DQ16T	I/O Module Outputs Transistor PNP
TM3DQ8R	I/O Module 8 Outputs Relays
TM3DQ8T	I/O Module Outputs Transistor PNP
TM3TI4	I/O Module 4 Inputs Temperature
TM3TI8T	I/O Module 8 Inputs Temperature
TM3XTRA1	I/O Expansion Transmitter for 8–14 TM3 Modules
TM3XREC1	I/O Expansion Receiver for 8–14 TM3 Modules

Modicon™ M258 PLC

The Modicon M258 logic controller is a compact, high-performance and fully expandable PLC. It forms a part of Flexible Machine Control approach, a key component of Machine Struxure, which brings you maximum flexibility and ensures the most optimized control solution. This PLC is designed for machine manufacturers (OEMs) focusing on applications such as packaging, conveying and storage, textiles and woodworking, etc. It offers high-performance solutions for speed control, counting, axis control, and communication functions. The Modicon M258 logic controller's dual-core processor provides extremely high performance. Core 1 is dedicated exclusively to managing program tasks and offers the maximum resources for real-time execution of the application code. Core 2 is dedicated to executing communication tasks, which have no impact on the application performance.
More information is available at **www.schneider-electric.com**.

Altivar™ IMC Integrated Controller Card

The Altivar IMC integrated controller card forms a part of Flexible Machine Control approach, a key component of MachineStruxure, which brings you maximum flexibility and ensures the most optimized control solution. The Altivar IMC integrated controller card VW3 A3521S0 is a compact optimized solution developed for Altivar 61 and 71 variable speed drives. When equipped with the ATV IMC card, Altivar 61 and 71 drives become controllers capable of meeting the needs of machine manufacturers (OEMs) in applications such as textiles, hoisting, pumping or woodworking, etc. The Altivar IMC integrated controller card VW3 A3521S0 is configured and programmed using SoMachine software (see page 27-10). The expansion capability of the Altivar IMC card is based on Schneider Electric's "Flexible Machine Control" concept. The Altivar IMC card boosts the expansion capability of machines and allows us to meet the OEM market's requirements in terms of performance, simplicity of use and openness.

More information is available at www.schneider-electric.com or in catalog MKTED2140202EN.

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Programmable Controllers

SoMachine™ Software Suite

SoMachine is the OEM solution software for developing, configuring and commissioning the entire machine in a single software environment, including logic, motion control, HMI and related network automation functions. SoMachine allows you to program and commission all the elements in Schneider Electric's Flexible and Scalable Control platform, the comprehensive solution-oriented offer for OEMs, which helps you achieve the most optimized control solution for each machine's requirements. Flexible and Scalable Control platforms include:

Controllers:

- HMI controllers: SCU, XBT GC, XBT GT/GK CANopen
- Logic controllers: Modicon M238, M241, M251, and M258
- Motion Controller Modicon LMC 058 and LMC 078
- Integrated Controller Card Altivar IMC
- TM2, TM3, TM4, TM5 and TM7 offers

HMI:

- HMI Magelis graphic panels: Magelis STO, STU, GTO, GTU, GT/GK

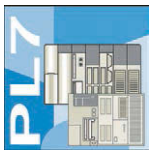
SoMachine is a professional, efficient, and open software solution for integrating Vijeo™ Designer. It also integrates the configuring and commissioning tool for motion control devices. It features all six IEC 61131-3 languages, integrated field bus configurators, expert diagnostics and debugging, as well as outstanding capabilities for maintenance and visualization.

More information is available at www.schneider-electric.com or in catalog MKTED2140202EN.

Modicon™ TSX Micro™ PLC

Compact and cost-efficient, this mid-range PLC boasts the power and flexibility OEMs find most desirable. Optional integrated safety relays, half-size I/O and web-enabled modules provide seamless connection to supervisory maintenance systems plus minimize real estate. PCMCIA memory cards preserve your investment when expanding. Communication options include Ethernet and ASi for global access using Open standards. More details are available at More information is available at www.schneider-electric.com or in catalog **MKTED204012EN.**

PL7™ Application Software



PL7 application software complies with the IEC 61131 standard for programming software. PL7 can be programmed in four IEC languages including two text-based editors (Structured Text and Instruction List), and two graphic-based editors (Sequential Function Chart and Ladder Diagram). PL7 software promotes productivity by using structured programming, which increases reusability, while reducing maintenance costs, and can be used to program both the Micro PLC and the Premium PAC. More information is available at **www.schneider-electric.com**.

Modicon™ Unity Momentum PLC

The small footprint and open architecture of the Momentum PLC product line make it extremely versatile for a variety of automation applications. The Unity Momentum PLC is ideal for PC-based control, distributed control, distributed I/O, and traditional, standalone PLC control. The Momentum PLC product line includes I/O bases and communication adapters that are interchangeable and snap together to deliver optimal flexibility throughout the control system life cycle. Using Ethernet as its communications backbone, the Modicon Unity Momentum CPU delivers all the performance benefits of real-time control. The open architecture of the Unity Momentum CPU makes it a universal controller for distributed I/O, compatible with many of the major fieldbus and control network environments. An integral Ethernet port in the Unity Momentum CPU allows users to perform a wide range of functions over Ethernet, including data acquisition, peer-to-peer communications, and I/O scanning. Embedded web pages enable the use of a standard web browser to read status and diagnostic information from the processor. The Unity Momentum CPU not only seamlessly connects I/O and other control devices via open standards; it delivers the performance of a full function, realtime controller for stand-alone and distributed system configurations in one moneysaving unit. Additional information can be found at **www.schneider-electric.com**.

Twido™ Nano™

The Twido Nano PLC is a feature-rich ultra-compact controller designed especially for small control systems. Flexible, affordable, and adaptable, Twido makes it easy to build just the right control solution for your customer's application. Offering software with graphical development, the Twido Nano PLC makes it easy to create, configure, and manage applications. Communication options include CANopen, Ethernet TCP/IP, Modbus, and ASi.
More information is available in catalog **DIA3ED2090202EN**.

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Modicon M340™ PAC

Our latest midrange PAC is the most integrated ever! Highly requested by industrial OEMs and end users, the all-power-inside concept boasts high-performance processing and small size to create a system that provides flexibility beyond any before. With up to three built-in CPU communication ports, large memory options, sixty-four channel high-density modules, and embedded web servers, the Modicon M340 is a powerful solution for industrial OEMs and end users demanding more productivity in their PACs. The Modicon M340 PAC supports advanced communications such as enhanced Ethernet/IP which support Ethernet/IP, Modbus TCP/IP, and daisy chain loop communications on the same four-port, rack mounted switch module. It will also support DNP3.0 in serial or Ethernet in a rack-mounted RTU module. The Modicon M340 PAC is programmed with Unity Pro software, which allows users to dramatically reduce setup time and effort with features like drag 'n drop CANopen bus setup and standard IEC 61131–3 language selection. Designers gain fast, easy and efficient startups. More details are found on our website or in the latest Modicon M340 catalogs and brochures. More details are available at

www.schneider-electric.com.

Modicon M580™ ePAC

The Modicon M580 ePAC (Ethernet Programmable Automation Controllers) features openness, flexibility, robustness and sustainability. The M580 ePAC is designed with an Ethernet backbone to optimize connectivity and communications. The microprocessor has three native Ethernet ports on the chip. Schneider Electric collaborated with the supplier to design the microprocessor, and in 2013 the supplier agreed to provide the microprocessor for 20 years, helping to protect customers' long-term investments. The powerful processors offer high levels of computation for complex networked communication, display and control applications. The M580 ePAC is designed for cybersecurity. It has an Achilles Level 2 certification. Achilles Level 2 certification by Wurldtech is considered to be the best cybersecurity certification available for PACs. The M580 has other advanced embedded cyber security features that are defined by IEC 62443. This includes, but is not limited to the ability to disable unused services, control of remote access to the PAC and integrity checks of Unity Pro executable files. The M580 ePAC supports X80 common I/O modules which can be easily integrated into its architecture. More details are available at **www.schneider-electric.com**.

Modicon Premium™ PAC

Ideally suited for discrete manufacturing, complex OEM applications as well as municipality and infrastructure applications, this cost-effective PAC line features integrated functions such as weighing, interpolated motion control, and process loops. Using the built-in Ethernet port, user-customized web page capabilities, and a range of popular open-standard fieldbus connections, the Modicon Premium enables seamless communication with enterprise systems providing low-cost remote maintenance diagnostics. More details are available at **www.schneider-electric.com**.

Modicon Quantum™ PAC

The Modicon Quantum PAC is our high-end, full function PLC designed for high I/O count industrial applications that require high performance such as Pharmaceutical, Petrochemical, Food and Beverage, Automotive, and others. Quantum also offers true bumpless hot standby. Quantum processors can be programmed with Unity Pro software, and can also support legacy 984 ladder logic programs in the LL984 Unity Pro editor by simply importing the legacy application program. Concept™ application software and ProWORX™ 32 application software are also supported on the Quantum platform. The Unity Quantum's onboard memory can exceed 3 Mbytes, and can have more than 7 Mbytes of extended memory on a PCMCIA card for data and application storage combined. It can also provide over 8 Mbytes of data storage alone. The Quantum PLC also offers Safety PAC versions certified for use in up to SIL3 applications. This includes both standard and hot standby capability as well as redundant I/O. It programs with Unity Pro XLS. The SIL3 offer stresses both high reliability as well as high availability. More details are available at www.schneider-electric.com. Information about the SIL3 Quantum is available in brochure 8000BR0808R03/10.

Unity™ Pro Application Software

Unity Pro software for application development is compliant with IEC 61131-3. It includes the five IEC editors and an LL984 editor to support imported 984 ladder logic from legacy hardware. Unity Pro is compatible with all Industrial midrange and high-end controllers including Modicon Momentum, M340, Premium, M580 and Quantum PACs. Unity Pro provides a collaborative automation environment that enables individuals and teams to work together more effectively, reducing the cost of developing and managing automation solutions. Unity Pro XLS software is used to program the SIL3 Quantum as well as all other Unity-based platforms. Since one software package can program all the platforms, it greatly simplifies development and support issues. It integrates commercial IT technologies like Ethernet, VBA, XML and hyperlinks within the traditional control framework to enable customers to reduce the cost of automating both discrete and batch control applications. More details are available at www.schneider-electric.com, or in brochure 8000BR0935R0210.

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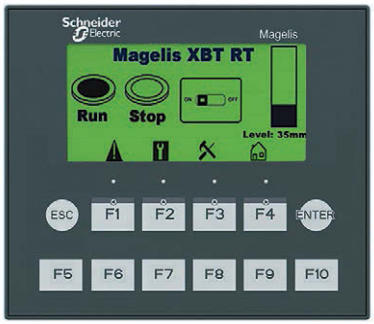
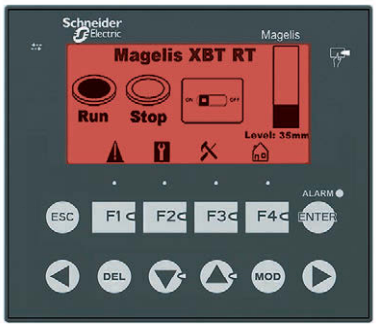
HMI Products

Magelis™ Small Panels HMI Products

The Magelis XBTN, XBTR, XBTRT, STO and STU Small Panels have been specifically designed to satisfy the requirement for panels that are compact and easy to use. These terminals are easy to configure, and they work seamlessly with other Schneider Electric equipment to provide a complete automation solution, dedicated to simple or compact machines.





Magelis XBT N/R/RT

The Magelis XBTN/R/RT small HMI are an ideal solution for simple machines. The XBTN and XBTR models can accommodate up to four lines of twenty characters and are available with a tri-color backlight (green/orange/red). The XBTRT models have a semi-graphical display with resistive touch screen. All models have customizable function keys.

Key features of the Magelis XBTN/R/RT:

- Monochrome alphanumeric display
- Tri-color backlight available on some models (green/orange/red)
- Semi-graphical display and touch screen on the XBTRT models
- Serial communication port for PLC connection
- Powered by 5 Vdc from PLC terminal port or 24 Vdc externally
- Operating temperature: 32—151 °F (0—55 °C)
- Configured by Vijeo Designer Lite
- IP65, NEMA 4X (outdoor use), XBTN/R only
- Certifications include CE, cULus, Class 1 Div 2

Catalog Number	Screen Type	Keys	Touch Screen	Supply Voltage	Com Port
XBTN200	2x20 Alphanumeric LCD with Green Backlight	4 fixed + 4 customizable	—	5 Vdc (PLC Port)	RS232C/RS485 (RJ45)
XBTN400	4x20 Alphanumeric Matrix LCD (122x32) with Green Backlight	4 fixed + 4 customizable	—	5 Vdc (PLC Port)	RS232C/RS485 (RJ45)
XBTN401	4x20 Alphanumeric Matrix LCD (122x32) with Green/Orange/ Red Backlight	4 fixed + 4 customizable	—	24 Vdc (external)	RS232C/RS485 (SUB-D 25)
XBTN410 *[1]*	4x20 Alphanumeric Matrix LCD (122x32) with Green Backlight	4 fixed + 4 customizable	—	24 Vdc (external)	RS232C/RS485 (SUB-D 25)
XBTNU400	4x20 Alphanumeric Matrix LCD (122x32) with Green Backlight	4 fixed + 4 customizable	—	24 Vdc (external)	RS232C/RS485 (SUB-D 25)
XBTR400	4x20 Alphanumeric Matrix LCD (122x32) with Green Backlight	8 fixed + 12 customizable	—	5 Vdc (PLC Port)	RS232C/RS485 (SUB-D 25)
XBTR410	4x20 Alphanumeric Matrix LCD (122x32) with Green Backlight	8 fixed + 12 customizable	—	24 Vdc (external)	RS232C/RS485 (SUB-D 25)
XBTR411	4x20 Alphanumeric Matrix LCD (122x32) with Green/Orange/ Red Backlight	8 fixed + 12 customizable	—	24 Vdc (external)	RS232C/RS485 (SUB-D 25)
XBTRT500	Semi-graphical Matrix LCD (198x80) with Green Backlight	2 fixed + 10 customizable	Yes	5 Vdc (PLC Port)	RS232C/RS485 (RJ45)
XBTRT511	Semi-graphical Matrix LCD (198x80) with Green/Orange/ Red Backlight	2 fixed + 10 customizable	Yes	24 Vdc (external)	RS232C/RS485 (RJ45)

[1] Preloaded with application for connection to Tesys model U motor starter.

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Magelis STO

The Magelis STO is a compact, panel-mounted HMI that bring a cost-effective solution to machine builders. With its touch screen, 3.4 inch monochrome display, and multi-color backlight options, it is a great fit for small, compact or simple machines.

Key features of the Magelis STO:

- 3.4 inch monochrome (200x80 pixel) STN LCD display with multi-color backlight
- Resistive touch screen
- One USB v2.0 host type A port + one USB v2.0 mini-B port
- Serial or Ethernet communication port
- Powered by 24 Vdc
- Operating temperture: 32—151 °F (0—55 °C)
- Configured by Vijeo Designer
- IP65, NEMA 4X (indoor use)
- Certifications include CE, cULus, Class 1 Div 2

Catalog Number	Backlight Colors	Com Port	Ethernet
HMISTO501	White, Pink, Red	RS232C for Zelio *[2]* (removable terminal block)	—
HMISTO511	Green, Orange, Red	RS232C/RS485 (RJ45)	—
HMISTO512	White, Pink, Red	—	Ethernet (RJ45)
HMISTO531	White, Pink, Red	RS232C/RS485 (RJ45)	—
HMISTO532	White, Pink, Red	—	Ethernet (RJ45)

Magelis STU

The Magelis STU is a compact HMI that is mounted using a 22 mm diameter hole - similar to a push button. This helps reduce overall cost by minimizing the labor for installing the HMI. The STU is a cost-effective solution for machine builders.

Key features of the Magelis STU:

- 3.5 or 5.7 inch TFT color display, QVGA (320 x 240)
- Resistive touch screen
- One USB v2.0 host-type A port + one USB v2.0 mini-B port
- Serial and Ethernet communication ports
- Powered by 24 Vdc
- Operating temperature: 32–122°F (0–50°C)
- Configured by Vijeo Designer
- IP65, NEMA 4X (indoor use)
- Certifications include CE, cULus, Class 1 Div. 2, Marine

Catalog Number	Screen Size	Com Port	Ethernet
HMISTU655	3.5 in. TFT Color (320x240)	RS232C/RS485 (RJ45)	Ethernet (RJ45)
HMISTU855	7.5 in. TFT Color (320x240)	RS232C/RS485 (RJ45)	Ethernet (RJ45)

[2] Enables direct communication with the Zelio Logic SR2/SR3 range of controllers.

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HMI Products

Magelis SCU Small HMI Controllers

The ultra-compact range of Magelis SCU small HMI controllers are part of Schneider Electric's Flexible Machine Control concept, a key element in MachineStruxure™. The Magelis SCU HMI Controllers product offer brings together Human Machine Interface and control functions within a single product. This reduces the amount of equipment required and the associated costs throughout the life cycle of the machine. It is mounted using a 22 mm diameter hole, which considerably simplifies installation.

Key features of the Magelis SCU:

- 3.5 or 5.7 inch TFT color display, QVGA (320 x 240)
- Resistive touch screen
- One USB v2.0 host type A port + one USB v2.0 mini-B port
- Serial, Ethernet and CANopen communication ports
- Removable terminal blocks for I/O connections
- Powered by 24 V dc
- Operating temperature: 32–122°F (0–50°C)
- Configured by SoMachine
- IP65 NEMA 4X (indoor use)
- Certifications include CE, cULus, Class 1 Div. 2

Catalog Number	Screen Size	Digital Inputs	High Speed Counter Inputs	Digital Relay Outputs	Pulse Train Outputs	Analog Inputs	Temperature Inputs	Analog Outputs
HMISCU6A5	3.5 in.	14	2	8	2	—	—	—
HMISCU6B5	3.5 in.	6	2	6	2	2	2	2
HMISCU8A5	5.7 in.	14	2	8	2	—	—	—
HMISCU8B5	5.7 in.	6	2	6	2	2	2	2

See catalog DIA5ED2130505EN for more information.

Magelis Advanced Panels HMI Products

The Magelis Advanced Panels are touch screen HMIs that are designed for the most demanding industrial applications. Choose between several platforms and screen sizes for the best cost and performance to suit your needs.

Magelis GTO Optimized Panels

The Magelis GTO Optimized Panels are ideal for OEMs that need a cost-effective solution with enough functionality for demanding applications. The GTO's build-in connectivity includes serial ports, Ethernet, and USB. Via Ethernet, they support a Web server, FTP, e-mail, and remote access from a PC, smart phone, or tablet applications. The panels are designed for industrial environments. A stainless steel version is available that is resistant to high-pressure cleaning (conforming to DIN 40050–9).
Key features of the Magelis GTO:

- TFT color LCD display with 50,000 hour backlight
- Resistive analog touch screen
- One USB v2.0 host type A port + one USB v2.0 mini-B port
- Powered by 244 V dc
- Configured by Vijeo Designer
- IP65, NEMA 4X (indoor use), IP66K for Stainless Steel models
- Certifications include CE, cULus, Class 1 Div. 2, Marine

See Catalog DIA5ED2130616EN for more information.

Catalog No.	Screen Size	Stain-less Steel	Fun-ction Keys	Com Ports	Ether-net	SD Card Socket	Operating Temp
HMIGTO1300	3.5 in. QVGA (320x240)	—	Yes	2 Ports	—	—	32—131 °F (0—55 °C)
HMIGTO1310	3.5 in. QVGA (320x240)	—	Yes	1 Port	1 Port	Yes	32—131 °F (0—55 °C)
HMIGTO2300	5.7 in. QVGA (320x240)	—	—	2 Ports	—	—	32—131 °F (0—55 °C)
HMIGTO2310	5.7 in. QVGA (320x240)	—	—	2 Ports	1 Port	Yes	32—131 °F (0—55 °C)
HMIGTO2315	5.7 in. QVGA (320x240)	Yes	—	2 Ports	1 Port	Yes	32—131 °F (0—55 °C)
HMIGTO3510	7.0 in. WVGA (800x480)	—	Yes	2 Ports	1 Port	Yes	32—131 °F (0—55 °C)
HMIGTO4310	7.5 in. VGA (640x480)	—	—	2 Ports	1 Port	Yes	32—131 °F (0—55 °C)
HMIGTO5310	10.4 in. VGA (640x480)	—	—	2 Ports	1 Port	Yes	32—131 °F (0—55 °C)
HMIGTO5315	10.4 in. VGA (640x480)	Yes	—	2 Ports	1 Port	Yes	32—131 °F (0—55 °C)
HMIGTO6310	12.1 in. SVGA (800x600)	—	—	2 Ports	1 Port	Yes	32—131 °F (0—55 °C)
HMIGTO6315	12.1 in. SVGA (800x600)	Yes	—	2 Ports	1 Port	Yes	32—131 °F (0—55 °C)

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Magelis XBTGH Handheld HMI

The Magelis XBTGH is a handheld HMI that enables operator mobility around a machine. It is ideal for machine setup and troubleshooting as well as normal operation.
Key Features of the Magelis XBTGH:

- 5.7 in. color TFT LCD display, VGA (640 x 480), 50,000 hour backlight
- Resistive analog touch screen
- Eleven programmable function keys with customizable labels + one enable button
- Emergency stop button with two NC safety contacts and one NO auxiliary contact
- Key switch for turning the HMI on/off
- Three-position grip switch to signal that the operator is ready
- Designed to be held by one hand
- Integrated stylus for touch screen operation
- Connectivity includes one serial port, one Ethernet port, and one USB Type A port

Catalog Number	Description
XBTGTH2460	Handheld HMI with E-stop button
XBTGTH2460B	Handheld HMI without E-stop button
XBTZGJBOX	Junction box for handheld HMI
XBTZGHL3	3 meter cable for handheld HMI
XBTZGHL10	10 meter cable for handheld HMI
XBTZGHL20	20 meter cable for handheld HMI

New!

Magelis GTU Universal Panels

The Magelis GTU Universal Panels are a high performance HMI product range designed with the uniqueness of modularity that allows you to select and assemble the best combination of display unit and CPU module for the application requirements. Magelis GTU features operator efficiency, simplified installation and flexibility that fits almost any system. This product range includes: display modules (Advanced and Smart) and CPU box modules (Premium and Open).

Key features of the Magelis GTU:

Premium Box CPU Module:

- Magelis proprietary OS
- SD Card for OS and application
- Second SD Card socket for user data
- 2x USB 2.0 (Type A) and 1x USB 2.0 (mini-B)

Open Box CPU Module:

- Window Embedded 7 OS
- CFast Card for OS and application
- SD and CFast Card sockets for user data
- 3x USB 2.0 (Type A) and 1x USB 2.0 (mini-B)
- DVI-D output for external monitor

CPU Box Type	Catalog Number	Operating System	Video Out	Com Ports	Ether-net	USB 2.0 Ports	Memory Card Socket
Premium Box	HMIG3U	Magellis Proprietary OS	—	2 Ports	2 Ports	2x (Type A) 1x (mini-B)	1x SD for system (included) 1x SD socket for user data
Open Box	HMIG5U	Windows Embedded 7	DVI-D	2 Ports	2 Ports	3x (Type A) 1x (mini-B)	1x CFast for system (included) 1x CFast socket for user data 1x SD socket for user data

Common Features:

- Modular design, any combination of display module and CPU box
- Two serial and two Ethernet ports for communications
- Powered by 12....24 Vdc
- Operating temperature: 32–140°F (0–60°C)
- Configured by Vijeo Designer
- IP66/67, NEMA 4X (indoor use)
- Certifications include: CE, cULus, Class 1 Div. 2, Marine

Smart Display Module:

- 16M color TFT LCD display (4:3 format)
- Resistive analog touch screen, multi-touch capable
- Front panel USB 2.0 ports, 1x (Type A) and 1x (mini-B)
- Sensor for automatic backlight brightness control

Advanced Display Module:

- 262k color TFT LCD display (16:9 format)
- Resistive analog touch screen, single touch

Display Type	Catalog No.	Screen Size	Front USB Ports	Brightness Sensor	Built-in Wireless LAN	Multi-touch Capable *[3]*
Smart Display (4:3) 16 M Colors	HMIDT542	10.4 in. SVGA (800x600)	Yes	Yes	—	Yes
	HMIDT642	12. 1 in. XGA (1024x768)	Yes	Yes	—	Yes
	HMIDT643	12.1 in. XGA (1024x768)	Yes	Yes	Yes	Yes
	HMIDT732	15.0 in. XGA (1024x768)	Yes	Yes	—	Yes
Advanced Display (16:9) 262k Colors	HMIDT351	7.0 in. WVGA (800x480)	—	—	—	—
	HMIDT551	10.1 in. WVGA (1280x800)	—	—	—	—
	HMIDT651	12.1 in. WVGA (1280x800)	—	—	—	—

[3] Projects created in Vijeo Designer do not support multi-touch.

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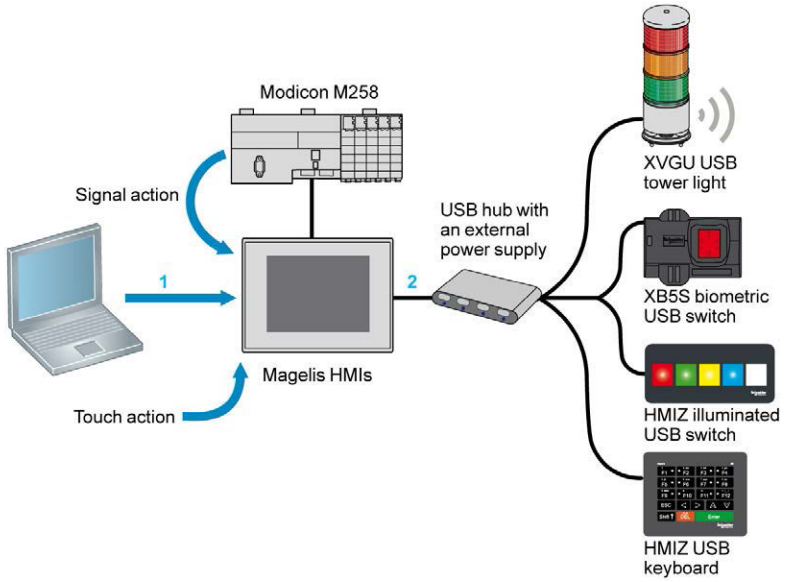
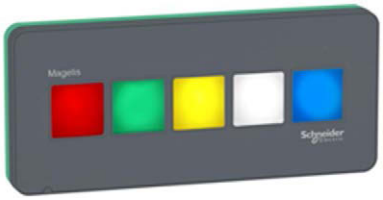
USB Accessories for Magelis HMI Terminals



The USB accessories for Magelis are designed to expand the selection range of user applications by offering value-added/differentiated HMI solutions. These innovative USB accessories can be easily installed and operated with HMI terminals.



Illuminated Switch Panel

The illuminated USB switch is uniquely designed for easy visualization and quick acknowledgement of alarm (wide view angle and brightness). This switch with tactile feedback can also be used as function keys in HMI applications that involve repetitive operations in dirty environments. This keeps the touch panel clean and protected by avoiding continuous finger contact.

Key features of the Illuminated USB Switch:

- Five programmable switches with tactile feedback
- Programmable six-color LED illumination per switch
- Connect to the Magelis HMI via USB
- Mount to the panel through a 22 mm hole
- Powered by the HMI via the USB cable
- Configured in Vijeo Designer
- IP65, NEMA 4X (indoor use)
- Certifications include CE, cULus, Class 1 Div. 2
  Catalog Number: HMIZRA1
  See Catalog DIA5ED2130901EN for more information.

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Keyboard Panel

The USB Keyboard is designed for flexible mounting and easy configuration. The tactile keys are suited for HMI applications with repetitive operations or dirty environments (oil, dust). Functionality of the HMI can be extended with external function keys, status indicator LEDs and both numeric and text data entry.

Key features of the USB Keyboard:

- Twenty-key membrane keyboard with tactile feedback
- Includes twelve programmable keys with integrated LEDs
- Connect to the Magelis HMI via USB
- Mount to the panel through a 22 mm hole
- Powered by the HMI via the USB cable
- Configured in Vijeo Designer
- IP65, NEMA 4X (indoor use)
- Certifications include CE, cULus, Class 1 Div. 2
  Catalog Number: HMIZKB1

  See Catalog DIA5ED2130901EN for more information.

Biometric Switch

The XB5S Biometric USB Switch of the Harmony® XB5S product range controls and secures access to systems and machines by checking users' authorization through fingerprint recognition.

Key features of the Harmony XB5S Biometric Switch:

- Register up to 200 users, two fingerprints per user
- Connect to the Magelis HMI via USB
- Mount to the panel through a 22 mm hole
- Powered by external 24 V dc source
- IP65
- Certifications include CE, cULus
  Catalog Number: XB5S5B2L2

  See Catalog DIA5ED2130901EN for more information.

Tower Light

The monolithic USB tower lights of the Harmony XVGU product range have multi-color LEDs that are unique and simple-to-use. The states and patterns are directly set and modified in the HMI application. The XVGU tower lights provide long distance indication of the operating status or sequences of a machine or installation, both visually by illuminated signaling units with 360° visibility, and audibly by a buzzer.

Key features of the Harmony XVGU USB Tower Light:

- Unique one-piece LED tower design, 60 mm
- Three transparent signaling layers
- Two-tone buzzer with three level volume control and four colors
- Variety of signal patterns (flashing/non-flashing lights)
- Power and signaling managed by the HMI
- Installation options (on direct base or tube plate)
  Catalog Number: XVGU3SHAV (100 mm length pole with mounting base

  Catalog Number: XVGU3SWV (direct base mounting)

  See Catalog DIA5ED2130901EN for more information.

Magelis™ Industrial PC Products

Magelis Panel PC

The Magelis Panel PC is a family of panel-mounted all-in-one industrial PCs, certified for automation applications.
Features of the Magelis Panel PCs:

- TFT color LCD display, available in 10.4, 12.1, 15.0, and 19.0 in. screen sizes
- Resistive analog touch screen
- Stainless steel models available
- Variety of CPUs and performance levels
- Options for mass storage (HDD, SDD, memory card, DVD-RW, RAID)
- Variety of Windows operating systems options
- Options for add-in card slots
- Communication options including COM ports, Ethernet, and USB
- Fanless models available
- Supply power, 100...240 V ac or 24 V dc with option for battery back-up
- Vijeo Designer Run-time trial mode pre-installed
- IP65, NEMA 4X (indoor use)
- Certifications inlcude CE, cULus, Class 1 Div. 2

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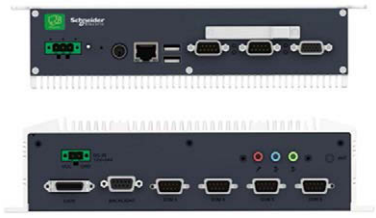
HMI Products

Magelis Box PC

The Magelis Box PC is a family of wall-mounted, Industrial PCs certified for automation applications. The Box PC interfaces seamlessly with a Magelis Display Industrial Monitor.

Key features of the Magelis Box PC:

- Variety of CPUs and performance levels
- Options for mass storage (HDD, SDD, memory card, DVD-RW, RAID)
- Variety of Windows operating system options
- Options for add-in card slots
- Communication options including COM ports, Ethernet and USB
- Fanless models available
- Supply power: 24 V dc with option for battery backup



New!

Magelis Simple Box PC

The Magelis S-Box PC is a simpler, more basic alternative to the Magelis Box PC. This cost effective, tested, and validated solution is suitable for repetitive machines and infrastructure applications. These low-maintenance PCs provide a high level of connectivity in a compact design. Remote monitoring capability gives you peace of mind that the system is performing as desired.

Key features of the Magelis S-Box PC:

- CPU options, ATOM N270 (single core) or ATOM N2600 (dual core)
- No moving parts (fanless, solid state disks)
- Windows operating systems options
- Mini PCIe slot for option cards
- Communication options including COM ports, Ethernet, and USB
- DC power supply
- Remote system monitor utility included
- Vijeo Designer Run-time trial mode pre-installed
- Certifications include CE, cULus

The Magelis S-Box PCs are available as catalog items, with pre-configured features such as CPU, RAM, storage type, operating system, and other options. For more information and a list of available catalog numbers, please www.schneider-electric.com.

See Catalog DIA5ED2140501EN for more information.

New!

Magelis Rack PC

Magelis Rack PC easily installs into standard 19 inch racks in control room applications. Choose between several platforms for the best cost and performance to suit your needs. The Rack PC can serve as an engineering and SCADA server or an operator station. Supported software includes: Vijeo Designer, Run-time, Vijeo Citect, and PlantStruxure PES Distributed Control System.

Key features of the Magelis Rack PC:

- Available in 2U and 4U form factors
- Variety of CPUs and performance levels
- Options for mass storage (HDD, SDD, memory card, DVD-RW, RAID)
- Hot swap drive trays
- Options for add-in card slots
- Windows operating systems options
- Mini PCIe slot for option cards
- Communication options including COM ports, Ethernet, and USB
- Redundant power supply option
- Remote system monitoring utility included
- Vijeo Designer Run-time trial mode pre-installed
- Certifications include CE, cULus

Magelis Rack PCs are available as catalog items, with pre-configured features such as CPU, RAM, storage type, operating system, and other options. For more information and a list of available catalog numbers, please visit www.schneider-electric.com.

See Catalog DIA5ED2140501EN for more information.

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New!

Magelis iDisplay Industrial Multi-Touch Monitor

The next generation of Magelis iDisplays feature multi-touch monitors enabling the operator to use common gestures such as swiping and pinching in industrial applications. They also provide updated connectivity to seamlessly connect to a Magelis Box PC, Rack PC (or third party PC) via DVD-D (for video) and USB (for touch screen.

Key features of the Magelis iDisplay:

- TFT LCD display, 16M colors, XGA (1024 x 768), 4:3 format
- 50,000 hour backlight
- Resistive analog touch screen, multi-touch supported
- Panel mount or VESA mount
- DVI-D video input from host PC
- USB connection to host PC for touch screen interface
- Front panel USB v2.0 host type A port for keyboard, mouse, or memory stick, etc.
- Powered by 12–24 V dc
- Operating temperature: 32–140°F (0–60°C)
- IP66/67, NEMA 4X (indoor use)
- Certifications include CE, cULus, Class 1 Div. 2, Marine
  Catalog Numbers: HMIDID64DTD1(12.1 in. display); HMIDID73DTD1(15.0 in. display)

See Catalog DIA5ED2140501EN for more information.

Vijeo Designer HMI Software

Vijeo™ Designer

Vijeo Designer is the configuration software for creating operator interface applications for Magelis HMI's and Industrial PCs. It is the ideal design tool for the simplest control application right up to the most complex HMI installations. It offers advanced script functions, recipe management, alarm management, data management, remote access, e-mail and multi-protocol connectivity.
Vijeo Designer features a screen graphics editor, including simple objects, a library of animated opjects (bar graphs, meters, charts and tanks), and preconfigured advanced objects (buttons, lamps, numeric and message displays and enumerated lists).
Vijeo Designer has advanced communication support for Schneider Electric products. It also includes drivers for several third-party PLCs and devices.

Catalog Number	Description
VJDSNDTGSV62M	Single license
VJDSUDTGAV62M	Single license, with transfer cable
VJDGNDTGSV63M	Group license, three stations
VJDTNDTGSV62M	Team license, ten stations
VJDFNDTGSV62M	Facility license, unlimited stations for one site
VJDSNRTMPC	Run-time license for a Magelis iPC

Visit www.schneider-electric.com for the latest versions and catalog numbers.
See Catalog DIA5ED2130614EN for more information.

Vijeo Designer Intelligent Data Services

The Intelligent Data Services (IDS) add-on for Vijeo Designer is a powerful, flexible and innovative software, fully compliant with FDA 21 CFR PART 11. It provides full traceability of the process, enables process variables to be monitored, and allows tracking of all operator actions. IDS software is easily accessible from any Web browser, enabling data collection via Ethernet, providing dashboards and reports generation.

Catalog Number *[1]*	Description
VJDSNTRCKV62M	IDS run-time license, single station
VJDSNTRPRV62M	IDS report printing add-on
VJDSNTRPKV62M	IDS report printing add-on with run-time license

See Catalog DIA5ED2130614EN for more information.

Vijeo Design'Air

Vijeo Design'Air is an HMI application for Android and iOS tablets and smartphones. This feature enables you to remotely connect to a Magelis HMI terminal over a WiFi network and have a graphical view of the HMI terminal on your tablet and smartphone.

During the design phase, you have the ability to set the HMI terminal to be detectable by Vijeo Design'Air. You can secure access to the HMI by requiring user authentication during login. You can also configure the HMI's accessibility level to view only or full control. In this configuration, the HMI terminal acts as the server, while the tablet or smartphone acts as the client. The server and client communicate over a WiFi wireless, 3G, 4G, or LTE network.
After a connection is established, you can use some of the functionalities of tablets and smartphones to remotely interact with the HMI terminal. For example, you can perform touch or swipe actions to start or stop a process or to navigate between screens. You can also use pinch action to zoom in and out of a screen for better viewing.

Download Vijeo Design'Air from Google Play® or the App Store® in iTunes®.

[1] 62=current version number.

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See Catalog DIA5ED2130614EN for more information.

Vijeo Design'Air Plus

Vijeo Design'Air Plus is a feature in Vijeo Designer and application for Android and iOS tablets and smartphones. Vijeo Design'Air Plus enables you to create a tablet/smartphone project specifically for the tablet or smartphone display size. At runtime, an operator can access the user application to display data and control automation processes on the tablet or smartphone.
You can use Vijeo Designer's drawing tools to create and edit a visual representation of the automation process. You can draw shapes and parts (such as rectangles, arcs, and pies), Toolchest parts (such as numeric displays, switches, and bar graphs), use the gradient feature to enhance the color of the drawn objects, and set up an Alarm Panel for remote alarm monitoring.
Vijeo Design'Air Plus provides operators with the capability to select a user application, and on successful login, download and launch the tablet/smartphone application. The operator can view and monitor an automation process, and for example, change values in numeric displays and string displays. In the Alarm Panel, the operator can monitor and acknowledge alarms.
Download Vijeo Design'Air Plus from Google Play® or the App Store® in iTunes®.
See Catalog DIA5ED2130614EN for more information.

Vijeo Citect SCADA Software

SCADA Expert Vijeo Citect, is the operating and monitoring component of PlantStruxure™, the new Process Automation system of Schneider Electric. With powerful visualization capabilities and operational features, it delivers actionable insight faster, enabling operators to respond quickly to process disturbances and thereby increase their effectiveness. SCADA Expert Vijeo Citect is now part of StruxureWare, the brand name identifying Schneider Electric's various software applications and suites to drive business performance while conserving enterprise resources. SCADA Expert Vijeo Citect can be tailored to a wide array of industry rigors and demands, and continuously seeks to meet the increasing requirements of emerging industry sectors. Many of the world's leading organizations successfully utilize SCADA Expert Vijeo Citect, as it meets their specific industry needs.

Vijeo Historian

Plant Operation Vijeo Historian, is the information management component of PlantStruxure™ architecture. It comprises the historian and portal functionalities of the solution, enabling you to accurately store data while connecting your production and business systems through its active data transfers and simple, easy-to-use reporting. Plant Operation Vijeo Historian is now part of StruxureWare. StruxureWare is the brand name identifying Schneider Electric's various software applications and suites to drive business performance while conserving enterprise resources.

Modicon OTB

The open and modular new Modicon OTB distributed I/O system offers an ideal solution for IP20 distributed input/output requirements. Users can create I/O islands managed by a master controller, via a fieldbus or communcication network. It includes three communication bases for the various types of fieldbus: CANopen™ , Ethernet TCP/IP, or Modbus™ RS 485 serial. Discrete or analog I/O is available.
More information is available in catalog DIA3ED2040801EN-US.

Modicon STB

The Modicon STB is a highly modular distributed I/O platform, integrated wiring solution, and power management system that delivers effective and targeted control. With an open network adaptable to most major field buses, a flexible "island" I/O structure, and simple configuration via the STBSUP1000 software, Modicon STB is the right choice. The Modicon STB distributed I/O can also be configured directly from Unity™ Pro application software. More information is available at **www.schneider-electric.com**.

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Modicon Telefast™ ABE7 Sub-bases, IP20

The Modicon Telefast ABE7 pre-wired system enables connection and adaptation of control signals of industrial PLC cards that are fitted with HE10 connectors. It rationalizes cabling by replacing PLC terminals and traditional terminal blocks—thus improving simplicity and economy. More information is available at **www.schneider-electric.com**.

Modicon Telefast ABE9 Passive Splitter Boxes, IP67

Modicon Telefast ABE9 splitter boxes eliminate long and difficult cable runs by avoiding the use of intermediate junction boxes. Due to their modularity and size, they are perfect for the requirements of your varying applications. More information is available at **www.schneider-electric.com**.

Modicon TM7 I/O Blocks, IP67

Compact and flexible, the TM7 IP67 I/O Blocks allow connection of sensors and actuators at the heart of processes or machines in severe environments. The wide range of modules provides solutions to match your exact needs. It includes connectivity to CANopen. More information is available at www.schneider-electric.com, or in catalog MKTED211041EN.

Modicon Momentum™ Distributed I/O and PLC

The small footprint and open architecture of the Momentum PLC product line make it extremely versatile for a variety of automation applications. The Momentum PLC is ideal for PC-based control, distributed control, distributed I/O, and traditional, standalone PLC control. Momentum PLC options and accessories include: I/O bases, processor adapters, option adapters and communication adapters that are interchangeable and snap together to deliver optimal flexibility throughout the control system lifecycle. Using Ethernet as its communications backbone, the Modicon Momentum M1E Processor delivers all the performance benefits of real-time control. The open architecture of the M1E processor makes it a universal controller for distributed I/O, compatible with many of the major fieldbus and control network environments. An integral Ethernet port in the M1E allows users to perform a wide range of functions over Ethernet, including data acquisition, peer-to-peer communications, and I/O scanning. Five embedded web pages enable the use of a standard web browser to read status and diagnostic information from the processor. The most recent addition to the Momentum product offer is the Momentum M1E ConneXium switch. This model combines the power and functionality of the M1E processor with the communication versatility of four Modbus Ethernet TCP/IP ports. The award winning M1E not only seamlessly connects I/O and other control devices via open standards; it delivers the performance of a full function, real-time controller for stand-alone and distributed system configurations in one money-saving unit. Additional information can be found at **www.schneider-electric.com** or in catalog **MKTED205061EN.**

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Ethernet TCP/IP Products

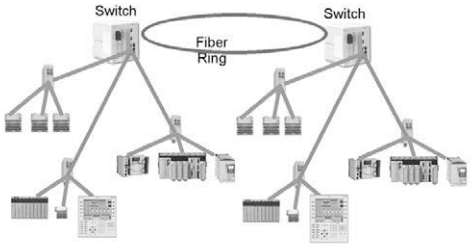
The recognition of Ethernet TCP/IP, both in organizations and on the internet, has made it the communication standard of today. Its wide use is leading to a reduction in connection costs, increased performance and the addition of new functions, which all combine to ensure its durability.
Ethernet TCP/IP meets the connection requirements of every application:

- Twisted pair copper cables for simplicity and low cost
- Optical fiber for immunity to interference and for long distances
- Communication redundancy, inherent in the IP (internet protocol)
- Remote point-to-point access via the telephone network or the Internet for the cost of a local call

Ethernet TCP/IP, a truly open technology, supports all types of communication:

- Web pages
- File transfer
- Industrial messaging

With its high speed, the network no longer limits the performance of the application. The architecture can evolve without any difficulty. The products or devices remain compatible, ensuring the long-term durability of the system.
More information on Ethernet and Ethernet Products is available in catalog MKTED208054EN-US.



ConneXium™ Ethernet Products

The ConneXium line of networking products offers a complete range of Ethernet switches (managed and unmanaged), hubs, transceivers, gateways, cabling, and diagnostic monitoring software for demanding industrial environments. With fiber and redundant capabilities, along with advanced filtering and security features, ConneXium products improve the performance and security of the network. More details can be found at **www.schneider-electric.com**.

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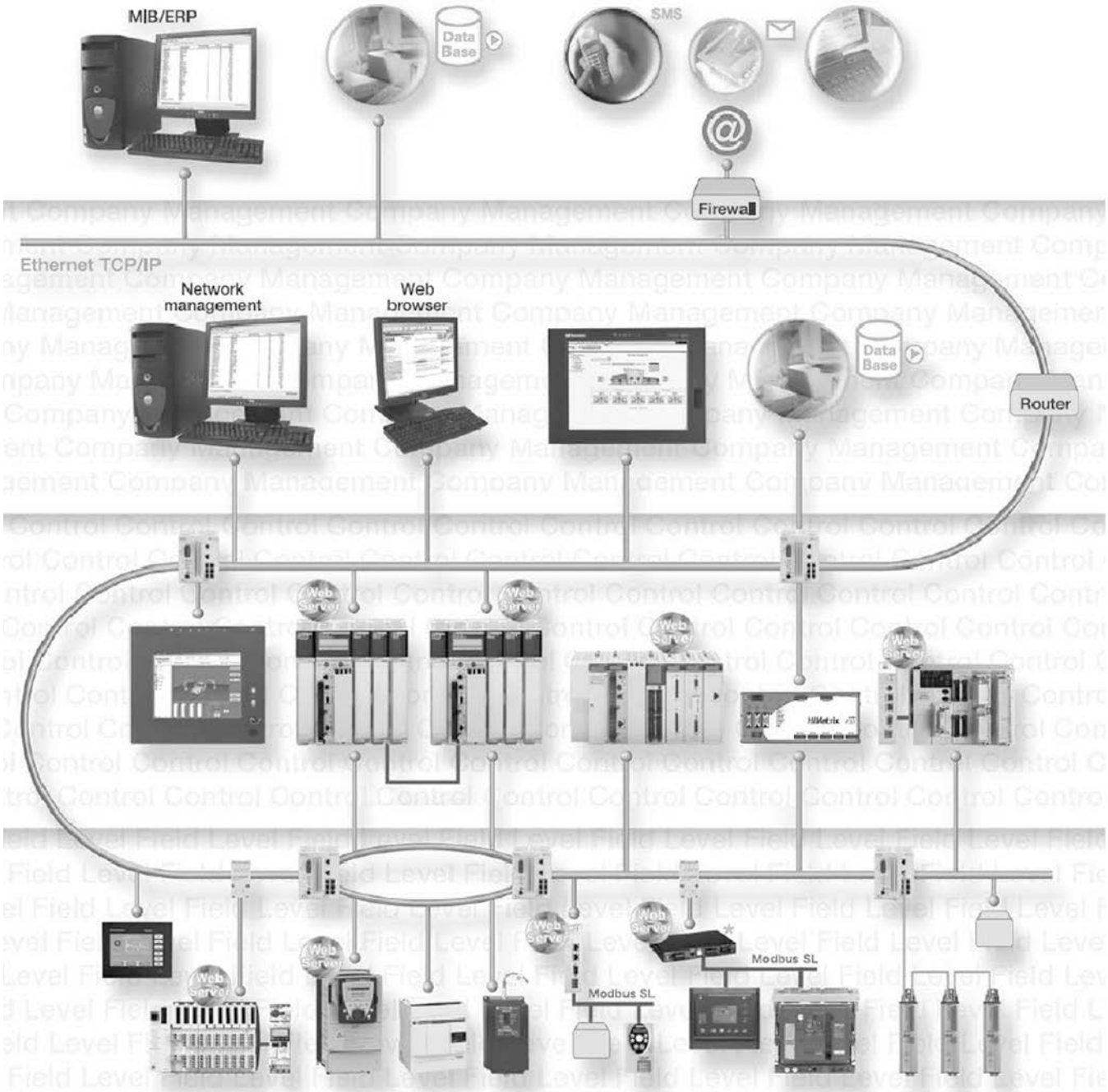
Transparent Ready™ Solutions

Transparent Ready products cover solutions in Industrial automation to electrical Distribution, and are based on universal Ethernet TCP/IP and Web technologies. They provide seamless communication between plant floor devices, like PLCs, drives, and MCCs, with corporate business systems. Use of the open Modbus TCP/IP and EtherNet/IP protocols that are the leading industrial Ethernet protocols, broadens the scope of dedicated machine diagnostics to remote management. Choosing Transparent Ready means opting for flexible, open automation architectures. More details can be found at **www.schneider-electric.com**.



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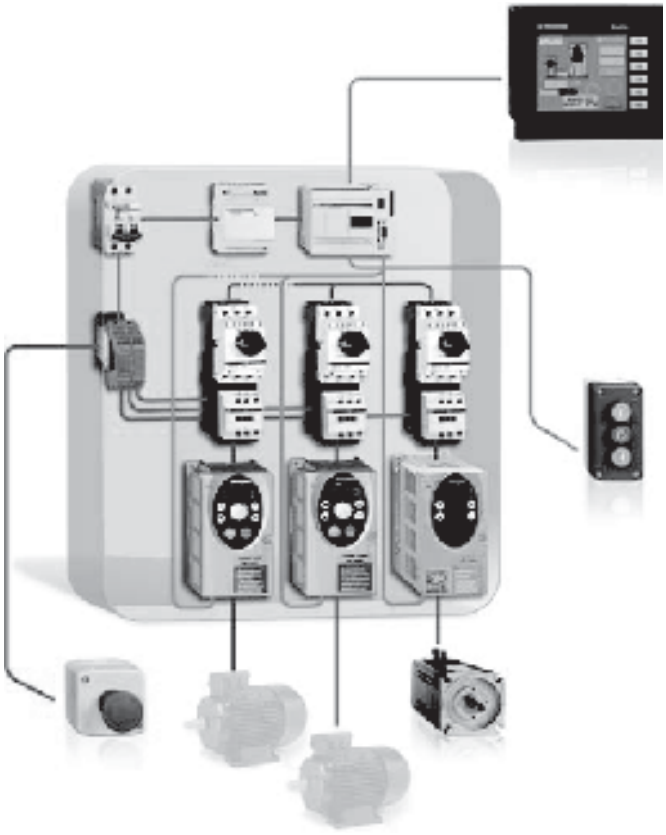
CANopen Network Products

CANopen is an open network that is supported by over 400 companies world wide and promoted by CAN in Automation. CANopen is standardized in the EN50325-4 and in ISO15745-2 for its device description.

The main reason for using a network is the performance and the flexibility to adapt the network exactly to the requirements of the application. CANopen provides a unique feature for the adaptation of the data transmission. Based on the producer/consumer model, CANopen allows for a data transmission broadcast, peer-to-peer, change-of-state and cyclic communication. This means it transmits data only when required or on a specified time base. Process data objects can be individually configured. Parameters can be changed at runtime.

CANopen combines ease of installation with inexpensive devices. CANopen provides an integrated equipotential bounding in the cable. Therefore, an additional cable or stranded copper ribbon to achieve the same potential on all network devices is not necessary. Installation costs are heavily reduced.

More information on CANopen and CANopen Products is available in catalog MKTED208054EN-US.



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Lexium 23 Plus

Lexium ILM62

Lexium 32

Lexium ILA / ILS / ILE

Lexium 52 / 62

Lexium 32i

Lexium™ Motion Control Products

Complete Motion Offer: Schneider Electric provides a complete and scalable motion product ratnge with outstanding servo control loops for virtually all kinds of machines. Choose from a wide range of linear motion and robotic products with the capacity for customization and third party motors.

Simplicity: Our motion products are designed for maximum simplicity over the entire machine lifecycle to reduce cost and make your machine processes even more productive. They're easy to integrate into your machine environments through standard software tools, motion libraries, and application function blocks.

Openness: Our products supports standardized motion interfaces: CANopen, CANmotion, Profibus, DeviceNet, Ethernet IP, EtherCAT, Ethernet Powerlink, Modbus TCP, and Pulse Train. This allows you to efficiently design machines which can easily be integrated to your customer's automation architectures.

Safety: Safe Torque Off (STO) function is embedded in the drives. Advanced safety functions: Safe Stop (SS1, SS2), Safety Limited Speed (SLS), or Safe Operating Stop (SOS) are available options. With superior performance in the market and embedded safety, our wide range of motion products supports standardized motion interfaces to assist integration.

Higher Performance: If you need even more performance, Schneider Electric's PacDrive offer is your product of choice. With its centralized system architecture, PacDrive is the ideal solution for controlling a broad range of servo-driven production and packaging machines, as well as material handling equipment.

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HVAC/R Controllers

Schneider Electric Modicon M171 Programmable Solution

Modicon M171 logic controller: best-in-class for scalability and energy efficiency, dedicated for HVAC/R and pumping applications. Designed to meet customer's needs by reducing time-to-market, reducing costs, improving machine efficiency, and simplifying integration. Reduce overall time-to-market with our application experts, pre-developed proven architectures, and existing applications (libraries, applicaion function blocks, and baseline examples). Reduce costs through our optimized platforms, embedded webserver, and scalable platforms. Improve overall machine efficiency with integration of variable speed drives, Coefficient of Performance monitoring, and remote interface capabilities. Simplify equipment integration and maintenance through a wide choice of connectivity options scalable to small and large applications, along with an embedded webserver interface.

The M171 programmable platform consists of the **SoMachine™ HVAC** software suite, **M171O**, and **M171P**, a complete range from simple and compact through complex and BMS connected applications.

Key accessories include the plug-in communication modules to facilitate integration with Building Management Systems in residential, commercial, and industrial end-user applications, along with I/O expansion modules, and a variety of remote user interface devices.

SoMachine HVAC

Modicon M171 integrated software development suite allows for intuitive management of every step in the process: developing the application, programming and servicing controllers, configuring communication networks, design of user interface and web pages, and full de-bug and simulation capabilities. Software languages are compliant with IEC 61131-3 programming standards, including Structured Text, Function Block Diagram, Ladder, Instruction List, and Sequential Flow Chart.

M171O

The **Modicon M171** optimized logic controller for simple and compact machines is the smallest programmable controller on the market, offering termendous versatility. Packaging comes standard in either a 4-DIN or 32x74 mm panel mount option, with or without the user interface. Power input can be specified with either 12–24 V or 100–240 Vac, depending on the model. The controller features up to twenty-two I/O, including three analog outputs and five analog inputs. One I/O expansion module and two remote user interface devices can be added to expand capabilities.

M171P

The **Modicon M171** performance logic controller for complex and BMS connectable machines provides more processing power, I/Os, connectivity, and an embedded webserver. Packaging comes standard 8 DIN rail-mounted configuration with or without the display and in an alternative Panel mount version, ideally for distributed control systems or as a centralized gateway device. Designed with integrated RS-485 and CAN ports, a conectivity module can be added to expand capabilities with Modbus RTU and TCP, BACnet MSTP and IP, HTTP, CAN, and Modbus ACSII. Power input can be specified to operate with 24 Vac/Vdc or 48 Vdc. The controller features up to twenty-seven I/O, including five analog outputs and six analog inputs. Up to twelve I/O expansion modules and two remote user interface terminals can be added to meet almost any application need.

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Section 28

Universal Enclosures

Spacial Steel Enclosures

Thalassa Polyester Enclosures

Ventilation Systems with Filters

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Spacial™ Steel Enclosures

Metal enclosures and boxes

From our small boxes to large modular floor-standing enclosures, with the Spacial range you can find the optimal fit for your applications. Our extensive range of easy-to-use accessories helps you save time during your projects.

Select between steel or stainless steel to better suit the installation environment. In our stainless-steel offer you can find the optimal solution where cleanliness or protection in highly corrosive environments are required.

Steel: Indoor non-clean industrial environment

The environment in industrial plants can subject electric and electronic components to dust, splashing oil, and impacts. Such environments require a range of enclosures that are suited to harsh conditions yet are easy to install.

- **Universal range**, for industry.
- **EMC (electromagnetic compatibility) range**, against electromagnetic disturbances (treated with Aluzinc).

304L - 316L stainless steel: Demanding industrial environment

Food and beverage, pharmaceutical, petrochemical, and infrastructure industries have particularly demanding hygiene and corrosion resistance requirements. Our Spacial range is available in two grades of stainless steel:

- **304L stainless steel**, for resistance to corrosion and ease of cleaning (often used in food production environments).
- **316L stainless steel, also known as "marine stainless steel,"** for very high resistance to corrosion (used in saline or chlorinated environments).
- **Range of ATEX enclosures**, for potentially explosive atmospheres.

Product family names:

Spacial S3DC: *Steel wall-mounting enclosures*
Spacial SM: *Compact metal enclosures*
Spacial SF: *Modular metal enclosures*
Spacial S3X: *Stainless-steel wall-mounting enclosures*
Spacial SMX: *Stainless-steel monobloc floor-standing enclosures*
Spacial SFX: *Stainless-steel modular enclosures*

Thalassa™ Polyester Enclosures

Insulated enclosures and boxes

Without the right protection, harsh environments can expose your installation to chemicals or other substances.

Developed to help protect your equipment in outdoor applications or harsh conditions, our Thalassa offer ranges from boxes to floor-standing enclosures made from fiberglass reinforced polyester.

Our Thalassa industrial boxes in ABS or polycarbonate are strong, easy to install, and designed to be used in highly demanding environments.

Insulating polyester and plastic materials (ABS, polycarbonate): Outdoor infrastructures and severe industrial environments

Outdoor infrastructures and electrical installations are exposed to direct sunlight, rain, saline mist, extreme temperatures, oil splashes, chemical and corrosive agents, and are in contact with the public.

- **Universal range**, for industry.
- **Range of ATEX enclosures**, for potentially explosive atmospheres.

Product family names:

Thalassa PLM: *Polyester wall-mounting enclosures*
Thalassa PLA: *Polyester floor-standing enclosures*

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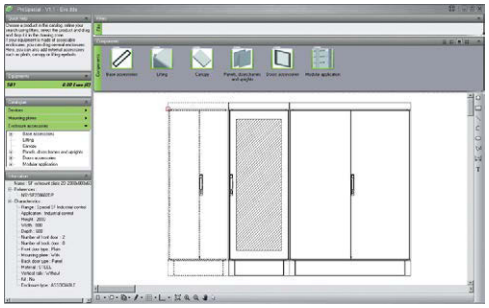
ClimaSys™ Thermal Management System

Thermal Management

Preserving and keeping the right temperature inside your enclosure is vital for maximizing the average service life of your installed devices. With our ClimaSys offer you can find the right solution, be it ventilation, cooling or heating, including control units for temperature, humidity and much more.

Product family names:

ClimaSys CV: *Ventilation systems*
ClimaSys CR: *Insulated resistance heaters*
ClimaSys CC: *Thermal control*



Our Software Suite

Spacial.pro

Spacial.pro allows you to make switchboard proposals based on the standard Spacial™ offer. A full project with several sets of switchboards is quoted in minutes, with automatic creation of the bill of material and 2D drawings for front and side views.

ProClima

Calculate the right choice for your thermal management requirements, according to the environment and the electrical/electronic devices installed inside the enclosure.

Spacial.ref and Thalassa.ref

These digital rules assist you in selecting the appropriate components for your application from our extensive product range. The tool automates product and accessory selection to help save you time and money.

NEMA and UL Enclosure Ratings

Table 28.1: NEMA and UL Enclosure and Component Ratings

Enclosures		Type of protection *[1]*												
		1	2	3	3R	3S	4	4X	5	6	6P	12	12K	13
Steel wall-mounting enclosures	S3DC	●	●	● *[2]*	● *[2]*		● *[2]*	● *[2]*				● *[3]*	● *[3]*	● *[3]*
	CRN	●	● *[2]*	● *[2]*	● *[2]*		● *[2]*		● *[2]*			●		●
Stainless-steel wall-mounting enclosures	S3X	●	● *[2]*	● *[2]*	● *[2]*		● *[2]*	● *[2]*	● *[2]*			●	● *[3]*	● *[2]*
Steel floor-standing enclosures	SM	●	● *[2]*	● *[2]*	● *[2]*		● *[2]*		● *[2]*			●	●	● *[2]*
Steel modular enclosures	SF	●										●	●	
Stainless-steel floor-standing enclosures	SMX	●	● *[2]*	● *[2]*	● *[2]*		● *[2]*	● *[2]*	● *[2]*			●	●	● *[2]*
Stainless-steel modular enclosures	SFX	●										●	●	
Thermoplastic boxes	TBS - TBP	●		●		●	●	●						
Polyester modular boxes	PLS	●	●	●	●	●	●	●				●		●
Polyester wall-mounting enclosures	PLM	●	●	●	●	●	●	●				●		●
Polyester floor-standing enclosures	PLA	●	●	● *[2]*	● *[2]*		● *[2]*	● *[2]*	● *[2]*			●		●

Components		Type of protection *[1]*												
		1	2	3	3R	3S	4	4X	5	6	6P	12	12K	13
Ventilation system	CV											●	●	
Thermal regulation system	CC											●	●	

UL Listing

Table 28.2: UL File Numbers for Enclosures

Standard Enclosure Type	UL File Number
NSYSM	E103582
NSYSF	E80264
NSYSMX	E103582
NSYSFX	UL Certification pending
NSYSCRN	E103582
NSYSCRNG	E80264
NSYS3DC	E80264
NSYS3X	E103582
NSYSPLA	E103582
NSYSPLM	E103582

[1] In some ranges the classification depends on the model and version. The detailed protection types are indicated in the UL certifications.
[2] 1 door
[3] 2 doors

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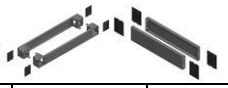
Steel Floor-Standing Enclosures

Table 28.3: Spacial Steel Floor-Standing Enclosures

Height: mm (in)	Width: mm (in)	Depth: mm (in)	# Doors	NSYSM Welded [1]	NSYSF Modular [1]		Accessories, Floor-Standing Enclosures			
				Without mounting plate	Without mounting plate	2 Side panels	Mounting plate	Cable-gland plate, 1 entry	Plinth height 100 mm (3.9 in)	
									Front/back	Sides
										
1200 (47.2)	600 (23.6)	400 (15.7)	1	—	NSYSF12640	NSY2SP124	NSYMP126	NSYEC641	NSYSPF6100	NSYSPS4100
1200 (47.2)	600 (23.6)	600 (23.6)	1	—	NSYSF12660	NSY2SP126	NSYMP126	NSYEC661	NSYSPF6100	NSYSPS6100
1200 (47.2)	800 (31.5)	300 (11.8)	1	NSYSM12830	—	—	NSYMP128	—	NSYSPF8100	NSYSPS3100
1200 (47.2)	800 (31.5)	400 (15.7)	1	—	NSYSF12840	NSY2SP124	NSYMP128	NSYEC841	NSYSPF8100	NSYSPS4100
1200 (47.2)	800 (31.5)	600 (23.6)	1	—	NSYSF12860	NSY2SP126	NSYMP128	NSYEC861	NSYSPF8100	NSYSPS6100
1200 (47.2)	1000 (39.4)	300 (11.8)	2	NSYSM1210302D	—	—	NSYMP1210	—	NSYSPF10100	NSYSPS3100
1200 (47.2)	1200 (47.2)	400 (15.7)	2	NSYSM1212402D	—	—	NSYMP1212	—	NSYSPF12100	NSYSPS4100
1400 (55.1)	600 (23.6)	300 (11.8)	1	NSYSM14630	—	—	NSYMP146	—	NSYSPF6100	NSYSPS3100
1400 (55.1)	600 (23.6)	400 (15.7)	1	NSYSM14640	NSYSF14640	NSY2SP144	NSYMP146	NSYEC641	NSYSPF6100	NSYSPS4100
1400 (55.1)	800 (31.5)	300 (11.8)	1	NSYSM14830	—	—	NSYMP148	—	NSYSPF8100	NSYSPS3100
1400 (55.1)	800 (31.5)	400 (15.7)	1	NSYSM14840	NSYSF14840	NSY2SP144	NSYMP148	NSYEC841	NSYSPF8100	NSYSPS4100
1400 (55.1)	1000 (39.4)	400 (15.7)	2	NSYSM1410402D	—	—	NSYMP1410	—	NSYSPF10100	NSYSPS4100
1400 (55.1)	1200 (47.2)	400 (15.7)	2	NSYSM1412402D	—	—	NSYMP1412	—	NSYSPF12100	NSYSPS4100
1600 (63.0)	600 (23.6)	300 (11.8)	1	NSYSM16630	—	—	NSYMP166	—	NSYSPF6100	NSYSPS3100
1600 (63.0)	600 (23.6)	400 (15.7)	1	NSYSM16640	—	—	NSYMP166	—	NSYSPF6100	NSYSPS4100
1600 (63.0)	600 (23.6)	600 (23.6)	1	—	NSYSF16660	NSY2SP166	NSYMP166	NSYEC661	NSYSPF6100	NSYSPS6100
1600 (63.0)	600 (23.6)	800 (31.5)	1	—	NSYSF16680	NSY2SP168	NSYMP166	NSYEC681	NSYSPF6100	NSYSPS8100
1600 (63.0)	800 (31.5)	300 (11.8)	1	NSYSM16830	—	—	NSYMP168	—	NSYSPF8100	NSYSPS3100
1600 (63.0)	800 (31.5)	400 (15.7)	1	NSYSM16840	—	—	NSYMP168	—	NSYSPF8100	NSYSPS4100
1600 (63.0)	800 (31.5)	600 (23.6)	1	—	NSYSF16860	NSY2SP166	NSYMP168	NSYEC861	NSYSPF8100	NSYSPS6100
1600 (63.0)	800 (31.5)	800 (31.5)	1	—	NSYSF16880	NSY2SP168	NSYMP168	NSYEC881	NSYSPF8100	NSYSPS8100
1600 (63.0)	1000 (39.4)	300 (11.8)	2	NSYSM1610302D	—	—	NSYMP1610	—	NSYSPF10100	NSYSPS3100
1600 (63.0)	1000 (39.4)	400 (15.7)	2	NSYSM1610402D	—	—	NSYMP1610	—	NSYSPF10100	NSYSPS4100
1600 (63.0)	1200 (47.2)	300 (11.8)	2	NSYSM1612302D	—	—	NSYMP1612	—	NSYSPF12100	NSYSPS3100
1600 (63.0)	1200 (47.2)	400 (15.7)	2	NSYSM1612402D	—	—	NSYMP1612	—	NSYSPF12100	NSYSPS4100
1800 (70.9)	400 (15.7)	400 (15.7)	1	—	NSYSF18440	NSY2SP184	—	NSYEC441	NSYSPF4100	NSYSPS4100
1800 (70.9)	400 (15.7)	500 (19.7)	1	—	NSYSF18450	NSY2SP185	—	NSYEC451	NSYSPF4100	NSYSPS5100
1800 (70.9)	400 (15.7)	600 (23.6)	1	—	NSYSF18460	NSY2SP186	—	NSYEC461	NSYSPF4100	NSYSPS6100
1800 (70.9)	600 (23.6)	300 (11.8)	1	NSYSM18630	—	—	NSYMP186	—	NSYSPF6100	NSYSPS3100
1800 (70.9)	600 (23.6)	400 (15.7)	1	NSYSM18640	NSYSF18640	NSY2SP184	NSYMP186	NSYEC641	NSYSPF6100	NSYSPS4100
1800 (70.9)	600 (23.6)	500 (19.7)	1	NSYSM18650	NSYSF18650	NSY2SP185	NSYMP186	NSYEC651	NSYSPF6100	NSYSPS5100
1800 (70.9)	600 (23.6)	600 (23.6)	1	—	NSYSF18660	NSY2SP186	NSYMP186	NSYEC661	NSYSPF6100	NSYSPS6100
1800 (70.9)	600 (23.6)	800 (31.5)	1	—	—	NSY2SP188	NSYMP186	NSYEC681	NSYSPF6100	NSYSPS8100
1800 (70.9)	800 (31.5)	300 (11.8)	1	NSYSM18830	—	—	NSYMP188	—	NSYSPF8100	NSYSPS3100
1800 (70.9)	800 (31.5)	400 (15.7)	1	NSYSM18840	NSYSF18840	NSY2SP184	NSYMP188	NSYEC841	NSYSPF8100	NSYSPS4100
1800 (70.9)	800 (31.5)	500 (19.7)	1	NSYSM18850	NSYSF18850	NSY2SP185	NSYMP188	NSYEC851	NSYSPF8100	NSYSPS5100
1800 (70.9)	800 (31.5)	600 (23.6)	1	NSYSM18860	NSYSF18860	NSY2SP186	NSYMP188	NSYEC861	NSYSPF8100	NSYSPS6100
1800 (70.9)	800 (31.5)	600 (23.6)	2	—	NSYSF188602D	NSY2SP186	NSYMP188	NSYEC861	NSYSPF8100	NSYSPS6100
1800 (70.9)	1000 (39.4)	400 (15.7)	1	NSYSM181040	NSYSF181040	NSY2SP184	NSYMP1810	NSYEC1041	NSYSPF10100	NSYSPS4100
1800 (70.9)	1000 (39.4)	400 (15.7)	2	NSYSM1810402D	NSYSF1810402D	NSY2SP184	NSYMP1810	NSYEC1041	NSYSPF10100	NSYSPS4100
1800 (70.9)	1000 (39.4)	500 (19.7)	1	—	NSYSF181050	NSY2SP185	NSYMP1810	NSYEC1051	NSYSPF10100	NSYSPS5100
1800 (70.9)	1000 (39.4)	500 (19.7)	2	NSYSM1810502D	—	—	NSYMP1810	—	NSYSPF10100	NSYSPS5100
1800 (70.9)	1000 (39.4)	600 (23.6)	1	—	NSYSF181060	NSY2SP186	NSYMP1810	NSYEC1061	NSYSPF10100	NSYSPS6100
1800 (70.9)	1000 (39.4)	600 (23.6)	2	—	NSYSF1810602D	NSY2SP186	NSYMP1810	NSYEC1061	NSYSPF10100	NSYSPS6100
1800 (70.9)	1200 (47.2)	400 (15.7)	2	NSYSM1812402D	NSYSF1812402D	NSY2SP184	NSYMP1812	NSYEC1241	NSYSPF12100	NSYSPS4100
1800 (70.9)	1200 (47.2)	500 (19.7)	2	NSYSM1812502D	NSYSF1812502D	NSY2SP185	NSYMP1812	NSYEC1251	NSYSPF12100	NSYSPS5100
1800 (70.9)	1200 (47.2)	600 (23.6)	2	—	NSYSF1812602D	NSY2SP186	NSYMP1812	NSYEC1261	NSYSPF12100	NSYSPS6100
1800 (70.9)	1600 (63.0)	400 (15.7)	2	NSYSM1816402D	—	—	NSYMP1816	—	NSYSPF16100	NSYSPS4100
1800 (70.9)	1600 (63.0)	500 (19.7)	2	NSYSM1816502D	—	—	NSYMP1816	—	NSYSPF16100	NSYSPS5100
2000 (78.7)	300 (11.8)	500 (19.7)	1	—	NSYSF20350	NSY2SP205	—	NSYEC351	NSYSPF3100	NSYSPS5100
2000 (78.7)	300 (11.8)	600 (23.6)	1	—	NSYSF20360	NSY2SP206	—	NSYEC361	NSYSPF3100	NSYSPS6100
2000 (78.7)	400 (15.7)	400 (15.7)	1	—	NSYSF20440	NSY2SP204	—	NSYEC441	NSYSPF4100	NSYSPS4100
2000 (78.7)	400 (15.7)	500 (19.7)	1	—	NSYSF20450	NSY2SP205	—	NSYEC451	NSYSPF4100	NSYSPS5100
2000 (78.7)	400 (15.7)	600 (23.6)	1	—	NSYSF20460	NSY2SP206	—	NSYEC461	NSYSPF4100	NSYSPS6100
2000 (78.7)	400 (15.7)	800 (31.5)	1	—	NSYSF20480	NSY2SP208	—	NSYEC481	NSYSPF4100	NSYSPS8100
2000 (78.7)	600 (23.6)	300 (11.8)	1	NSYSM20630	—	—	NSYMP206	—	NSYSPF6100	NSYSPS3100
2000 (78.7)	600 (23.6)	400 (15.7)	1	NSYSM20640	NSYSF20640	NSY2SP204	NSYMP206	NSYEC641	NSYSPF6100	NSYSPS4100
2000 (78.7)	600 (23.6)	500 (19.7)	1	NSYSM20650	NSYSF20650	NSY2SP205	NSYMP206	NSYEC651	NSYSPF6100	NSYSPS5100
2000 (78.7)	600 (23.6)	600 (23.6)	1	—	NSYSF20660	NSY2SP206	NSYMP206	NSYEC661	NSYSPF6100	NSYSPS6100
2000 (78.7)	600 (23.6)	800 (31.5)	1	—	NSYSF20680	NSY2SP208	NSYMP206	NSYEC681	NSYSPF6100	NSYSPS8100
2000 (78.7)	800 (31.5)	300 (11.8)	1	NSYSM20830	—	—	NSYMP208	—	NSYSPF8100	NSYSPS3100
2000 (78.7)	800 (31.5)	400 (15.7)	1	NSYSM20840	NSYSF20840	NSY2SP204	NSYMP208	NSYEC841	NSYSPF8100	NSYSPS4100
2000 (78.7)	800 (31.5)	500 (19.7)	1	NSYSM20850	NSYSF20850	NSY2SP205	NSYMP208	NSYEC851	NSYSPF8100	NSYSPS5100
2000 (78.7)	800 (31.5)	600 (23.6)	1	NSYSM20860	NSYSF20860	NSY2SP206	NSYMP208	NSYEC861	NSYSPF8100	NSYSPS6100

[1] See Table 28.2 UL File Numbers for Enclosures, page 28-3.

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Table 28.3 Spacial Steel Floor-Standing Enclosures (cont'd.)

Height: mm (in)	Width: mm (in)	Depth: mm (in)	# Doors	NSYSM Welded [1]	NSYSF Modular [1]		Accessories, Floor-Standing Enclosures			
				Without mounting plate	Without mounting plate	2 Side panels	Mounting plate	Cable-gland plate, 1 entry	Plinth height 100 mm (3.9 in)	
									Front/back	Sides
2000 (78.7)	800 (31.5)	600 (23.6)	2	—	NSYSF208602D	NSY2SP206	NSYMP208	NSYEC861	NSYSPF8100	NSYSPS6100
2000 (78.7)	800 (31.5)	800 (31.5)	1	—	NSYSF20880	NSY2SP208	NSYMP208	NSYEC881	NSYSPF8100	NSYSPS8100
2000 (78.7)	1000 (39.4)	400 (15.7)	1	—	NSYSF201040	NSY2SP204	NSYMP2010	NSYEC1041	NSYSPF10100	NSYSPS4100
2000 (78.7)	1000 (39.4)	400 (15.7)	2	NSYSM2010402D	NSYSF2010402D	NSY2SP204	NSYMP2010	NSYEC1041	NSYSPF10100	NSYSPS4100
2000 (78.7)	1000 (39.4)	500 (19.7)	1	—	NSYSF201050	NSY2SP205	NSYMP2010	NSYEC1051	NSYSPF10100	NSYSPS5100
2000 (78.7)	1000 (39.4)	500 (19.7)	2	NSYSM2010502D	NSYSF2010502D	NSY2SP205	NSYMP2010	NSYEC1051	NSYSPF10100	NSYSPS5100
2000 (78.7)	1000 (39.4)	600 (23.6)	1	—	NSYSF201060	NSY2SP206	NSYMP2010	NSYEC1061	NSYSPF10100	NSYSPS6100
2000 (78.7)	1000 (39.4)	600 (23.6)	2	—	NSYSF2010602D	NSY2SP206	NSYMP2010	NSYEC1061	NSYSPF10100	NSYSPS6100
2000 (78.7)	1000 (39.4)	800 (31.5)	1	—	NSYSF201080	NSY2SP208	NSYMP2010	NSYEC1081	NSYSPF10100	NSYSPS8100
2000 (78.7)	1200 (47.2)	400 (15.7)	2	NSYSM2012402D	NSYSF2012402D	NSY2SP204	NSYMP2012	NSYEC1241	NSYSPF12100	NSYSPS4100
2000 (78.7)	1200 (47.2)	500 (19.7)	2	NSYSM2012502D	NSYSF2012502D	NSY2SP205	NSYMP2012	NSYEC1251	NSYSPF12100	NSYSPS5100
2000 (78.7)	1200 (47.2)	600 (23.6)	2	NSYSM2012602D	NSYSF2012602D	NSY2SP206	NSYMP2012	NSYEC1261	NSYSPF12100	NSYSPS6100
2000 (78.7)	1200 (47.2)	800 (31.5)	2	—	NSYSF2012802D	NSY2SP208	NSYMP2012	NSYEC1281	NSYSPF12100	NSYSPS8100
2000 (78.7)	1600 (63.0)	400 (15.7)	2	NSYSM2016402D	NSYSF206402D	NSY2SP204	NSYMP2016	NSYEC1641	NSYSPF16100	NSYSPS4100
2000 (78.7)	1600 (63.0)	500 (19.7)	2	NSYSM2016502D	NSYSF2016502D	NSY2SP205	NSYMP2016	NSYEC1651	NSYSPF16100	NSYSPS5100
2000 (78.7)	1600 (63.0)	600 (23.6)	2	NSYSM2016602D	NSYSF2016602D	NSY2SP206	NSYMP2016	NSYEC1661	NSYSPF16100	NSYSPS6100
2200 (86.6)	400 (15.7)	600 (23.6)	1	—	NSYSF22460	NSY2SP226	—	NSYEC461	NSYSPF4100	NSYSPS6100
2200 (86.6)	600 (23.6)	600 (23.6)	1	—	NSYSF22660	NSY2SP226	NSYMP226	NSYEC661	NSYSPF6100	NSYSPS6100
2200 (86.6)	600 (23.6)	800 (31.5)	1	—	NSYSF22680	NSY2SP228	NSYMP226	NSYEC681	NSYSPF6100	NSYSPS8100
2200 (86.6)	800 (31.5)	600 (23.6)	1	—	NSYSF22860	NSY2SP226	NSYMP228	NSYEC861	NSYSPF8100	NSYSPS6100
2200 (86.6)	800 (31.5)	800 (31.5)	1	—	NSYSF22880	NSY2SP228	NSYMP228	NSYEC881	NSYSPF8100	NSYSPS8100
2200 (86.6)	1000 (39.4)	600 (23.6)	1	—	NSYSF221060	NSY2SP226	NSYMP2210	NSYEC1061	NSYSPF10100	NSYSPS6100
2200 (86.6)	1200 (47.2)	600 (23.6)	2	—	NSYSF2212602D	NSY2SP226	NSYMP2212	NSYEC1261	NSYSPF12100	NSYSPS6100
2200 (86.6)	1200 (47.2)	800 (31.5)	2	—	NSYSF2212802D	NSY2SP228	NSYMP2212	NSYEC1281	NSYSPF12100	NSYSPS8100

Stainless Steel Floor-Standing Enclosures

Table 28.4: Spacial Stainless Steel Floor-Standing Enclosures

Height: mm (in)	Width: mm (in)	Depth: mm (in)	# Doors	NSYSMX [2]	NSYSFX Modular [2]		Accessories, Stainless Steel		
				Without mounting plate	Without mounting plate	2 Side panels	Mounting plate	Plinth height 100 mm (3.9 in)	
								Front/back	Sides
1400 (55.1)	1000 (39.4)	300 (11.8)	2	NSYSMX141030	—	—	NSYMP1410	NSYSPXF10100H	NSYSPXS3100H
1600 (63.0)	800 (31.5)	400 (15.7)	1	NSYSMX16840	—	—	NSYMP168	NSYSPXF8100H	NSYSPXS4100H
1800 (70.9)	600 (23.6)	400 (15.7)	1	NSYSMX18640	NSYSFX18640	NSY2SPX184	NSYMP186	NSYSPXF6100H	NSYSPXS4100H
1800 (70.9)	800 (31.5)	400 (15.7)	1	NSYSMX18840	NSYSFX18840	NSY2SPX184	NSYMP188	NSYSPXF8100H	NSYSPXS4100H
1800 (70.9)	1200 (47.2)	400 (15.7)	2	NSYSMX181240	NSYSFX181240	NSY2SPX184	NSYMP1812	NSYSPXF12100H	NSYSPXS4100H
1800 (70.9)	1600 (63.0)	400 (15.7)	2	NSYSMX181640	—	—	NSYMP1813	NSYSPXF16100H	NSYSPXS4100H
2000 (78.7)	600 (23.6)	500 (19.7)	1	—	NSYSFX20650	NSY2SPX205	NSYMP206	—	—
2000 (78.7)	800 (31.5)	400 (15.7)	1	—	NSYSFX20840	NSY2SPX204	NSYMP208	—	—
2000 (78.7)	800 (31.5)	500 (19.7)	1	NSYSMX20850	—	—	NSYMP208	NSYSPXF8100H	NSYSPXS5100H
2000 (78.7)	800 (31.5)	600 (23.6)	1	—	NSYSFX20860	NSY2SPX206	NSYMP208	—	—
2000 (78.7)	1000 (39.4)	400 (15.7)	2	NSYSMX201040	—	—	NSYMP2010	NSYSPXF10100H	NSYSPXS4100H
2000 (78.7)	1000 (39.4)	600 (23.6)	2	—	NSYSFX201060	NSY2SPX206	NSYMP2010	—	
2000 (78.7)	1200 (47.2)	500 (19.7)	2	NSYSMX201250	—	—	NSYMP2012	NSYSPXF12100H	NSYSPXS5100H
2000 (78.7)	1200 (47.2)	600 (23.6)	2	—	NSYSFX201260	NSY2SPX206	NSYMP2012	—	—
2000 (78.7)	1600 (63.0)	600 (23.6)	2	NSYSMX201660	—	—	NSYMP2016	NSYSPXF16100H	NSYSPXS6100H

[1] See Table 28.2 UL File Numbers for Enclosures, page 28-3.
[2] See Table 28.2 UL File Numbers for Enclosures, page 28-3.

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Steel Wall-Mounting Enclosures

Table 28.5: Spacial Steel Wall-Mounting Enclosures

CRN/CRNG

S3DC

S3X Stainless Steel

Mounting Plate

Height: mm (in)	Width: mm (in)	Depth: mm (in)	# Doors [3]	Spacial Steel Wall-Mounting Enclosures [4]			Mounting Plate
				CRN/CRNG	S3DC	S3X Stainless steel	
200 (7.9)	200 (7.9)	150 (5.9)	1	NSYCRN22150 [5]	—	—	NSYMM22
200 (7.9)	300 (11.8)	150 (5.9)	1	NSYCRN23150 [5]	—	—	NSYMM32
250 (9.8)	200 (7.9)	150 (5.9)	1	NSYCRN252150	—	—	NSYMM2520
300 (11.8)	200 (7.9)	150 (5.9)	1	—	NSYS3DC3215	NSYS3X3215	NSYMM32
300 (11.8)	250 (9.8)	150 (5.9)	1	NSYCRN325150	—	NSYS3X302515	NSYMM3025
300 (11.8)	250 (9.8)	200 (7.9)	1	NSYCRN325200	—	—	NSYMM3025
300 (11.8)	300 (11.8)	150 (5.9)	1	NSYCRN33150	NSYS3DC3315	NSYS3X3315	NSYMM33
300 (11.8)	300 (11.8)	200 (7.9)	1	NSYCRN33200	NSYS3DC3320	—	NSYMM33
300 (11.8)	400 (15.7)	200 (7.9)	1	NSYCRN34200	—	—	NSYMM43
300 (11.8)	450 (17.7)	150 (5.9)	1	NSYCRN345150 [5]	—	—	NSYMM3045
400 (15.7)	300 (11.8)	150 (5.9)	1	NSYCRN43150	NSYS3DC4315	NSYS3X4315	NSYMM43
400 (15.7)	300 (11.8)	200 (7.9)	1	NSYCRN43200	NSYS3DC4320	NSYS3X4320	NSYMM43
400 (15.7)	400 (15.7)	200 (7.9)	1	NSYCRN44200	NSYS3DC4420	NSYS3X4420	NSYMM44
400 (15.7)	600 (23.6)	200 (7.9)		—	—	NSYS3X4620	NSYMM46
400 (15.7)	600 (23.6)	250 (9.8)	1	NSYCRN46250	—	—	NSYMM64
400 (15.7)	600 (23.6)	300 (11.8)	1	NSYCRN46300	—	—	NSYMM64
500 (19.7)	400 (15.7)	150 (5.9)	1	NSYCRN54150	—	—	NSYMM54
500 (19.7)	400 (15.7)	200 (7.9)	1	NSYCRN54200	NSYS3DC5420	NSYS3X5420	NSYMM54
500 (19.7)	400 (15.7)	250 (9.8)	1	NSYCRN54250	NSYS3DC5425	—	NSYMM54
500 (19.7)	500 (19.7)	200 (7.9)	1	—	NSYS3DC5520	—	NSYMM55
500 (19.7)	500 (19.7)	250 (9.8)	1	NSYCRN55250	NSYS3DC5525	—	NSYMM55
600 (23.6)	400 (15.7)	150 (5.9)	1	NSYCRN64150	—	—	NSYMM64
600 (23.6)	400 (15.7)	200 (7.9)	1	NSYCRN64200	NSYS3DC6420	NSYS3X6420	NSYMM64
600 (23.6)	400 (15.7)	250 (9.8)	1	NSYCRN64250	NSYS3DC6425	—	NSYMM64
600 (23.6)	500 (19.7)	150 (5.9)	1	NSYCRN65150	—	—	NSYMM65
600 (23.6)	500 (19.7)	200 (7.9)	1	NSYCRN65200	—	—	NSYMM65
600 (23.6)	500 (19.7)	250 (9.8)	1	NSYCRN65250	—	—	NSYMM65
600 (23.6)	600 (23.6)	200 (7.9)	1	NSYCRN66200	NSYS3DC6620	—	NSYMM66
600 (23.6)	600 (23.6)	250 (9.8)	1	NSYCRN66250	NSYS3DC6625	NSYS3X6625	NSYMM66
600 (23.6)	600 (23.6)	300 (11.8)	1	NSYCRN66300	NSYS3DC6630	—	NSYMM66
600 (23.6)	800 (31.5)	300 (11.8)	1	NSYCRN68300	—	—	NSYMM86
700 (27.6)	500 (19.7)	200 (7.9)	1	NSYCRN75200	—	—	NSYMM75
700 (27.6)	500 (19.7)	250 (9.8)	1	NSYCRN75250	NSYS3DC7525	NSYS3X7525	NSYMM75
800 (31.5)	600 (23.6)	200 (7.9)	1	NSYCRN86200	NSYS3DC8620	—	NSYMM86
800 (31.5)	600 (23.6)	250 (9.8)	1	NSYCRN86250	NSYS3DC8625	NSYS3X8625	NSYMM86
800 (31.5)	600 (23.6)	300 (11.8)	1	NSYCRN86300	NSYS3DC8630	—	NSYMM86
800 (31.5)	600 (23.6)	400 (15.7)	1	NSYCRNG86400	NSYS3DC8640	—	NSYMM86
800 (31.5)	800 (31.5)	200 (7.9)	1	NSYCRN88200	—	—	NSYMM88
800 (31.5)	800 (31.5)	250 (9.8)	1	—	NSYS3DC8825	—	NSYMM88
800 (31.5)	800 (31.5)	300 (11.8)	1	NSYCRN88300	NSYS3DC8830	NSYS3X8830	NSYMM86
800 (31.5)	1000 (39.4)	300 (11.8)	2	NSYCRNG810300D	—	—	NSYMM108
800 (31.5)	1200 (47.2)	300 (11.8)	2	NSYCRNG812300D	—	—	NSYMM128
1000 (39.4)	600 (23.6)	250 (9.8)	1	NSYCRN106250	NSYS3DC10625	—	NSYMM106
1000 (39.4)	600 (23.6)	300 (11.8)	1	NSYCRN106300	—	—	NSYMM106
1000 (39.4)	600 (23.6)	400 (15.7)	1	NSYCRNG106400	—	—	NSYMM106
1000 (39.4)	800 (31.5)	250 (9.8)	1	NSYCRN108250	NSYS3DC10825	—	NSYMM108
1000 (39.4)	800 (31.5)	300 (11.8)	1	NSYCRN108300	NSYS3DC10830	NSYS3X10830	NSYMM108
1000 (39.4)	800 (31.5)	400 (15.7)	1	NSYCRNG108400	NSYS3DC10840	—	NSYMM108
1000 (39.4)	1000 (39.4)	300 (11.8)	2	NSYCRNG1010300D	NSYS3DC101030	NSYS3X101030	NSYMM1010
1000 (39.4)	1200 (47.2)	300 (11.8)	2	NSYCRNG1012300D	—	—	NSYMM1210
1000 (39.4)	1200 (47.2)	400 (15.7)	2	NSYCRNG1012400D	—	—	NSYMM1210
1200 (47.2)	600 (23.6)	300 (11.8)	1	NSYCRNG126300	—	—	NSYMM126
1200 (47.2)	600 (23.6)	400 (15.7)	1	NSYCRNG126400	—	—	NSYMM126
1200 (47.2)	800 (31.5)	300 (11.8)	1	NSYCRNG128300	NSYS3DC12830	NSYS3X12830	NSYMM128
1200 (47.2)	800 (31.5)	400 (15.7)	1	NSYCRNG128400	NSYS3DC12840	—	NSYMM128
1200 (47.2)	1000 (39.4)	300 (11.8)	2	NSYCRNG1210300D	NSYS3DC121030	NSYS3X121030	NSYMM1210
1200 (47.2)	1000 (39.4)	400 (15.7)	2	NSYCRNG1210400D	—	—	NSYMM1210
1200 (47.2)	1200 (47.2)	300 (11.8)	2	NSYCRNG1212300D	—	—	NSYMM1212
1200 (47.2)	1200 (47.2)	400 (15.7)	2	NSYCRNG1212400D	—	—	NSYMM1212
1400 (55.1)	1000 (39.4)	300 (11.8)	2	NSYCRNG1410300D	—	—	NSYMM1410

[3] IP66 with one door, IP55 with two doors
[4] See Table 28.2 UL File Numbers for Enclosures, page 28-3.
[5] Two cable gland plates, one on top and one on bottom.

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Polyester Floor-Standing Enclosures

Table 28.6: Thalassa Polyester Floor-Standing Enclosures

	Height: mm (in)	Width: mm (in)	Depth: mm (in)	# Doors	Sealed Enclosure, IP65 [6]		Enclosures with Open Bottom, IP54 [6]
					Plain door	Transparent door	Plain door
Sealed Enclosure IP65—Plain Door	500 (19.7)	500 (19.7)	320 (12.6)	1	NSYPLA553	NSYPLA553T	NSYPLAZ553
	500 (19.7)	500 (19.7)	420 (16.5)	1	NSYPLA554	NSYPLA554T	NSYPLAZ554
	500 (19.7)	750 (29.5)	320 (12.6)	1	NSYPLA573	NSYPLA573T	NSYPLAZ573
	500 (19.7)	750 (29.5)	420 (16.5)	1	NSYPLA574	NSYPLA574T	NSYPLAZ574
	500 (19.7)	1000 (39.4)	320 (12.6)	2	NSYPLA5103	NSYPLA5103T	NSYPLAZ5103
	500 (19.7)	1000 (39.4)	420 (16.5)	2	NSYPLA5104	NSYPLA5104T	NSYPLAZ5104
	500 (19.7)	1250 (49.2)	320 (12.6)	2	NSYPLA5123	NSYPLA5123T	NSYPLAZ5123
	500 (19.7)	1250 (49.2)	420 (16.5)	2	NSYPLA5124	NSYPLA5124T	NSYPLAZ5124
	750 (29.5)	500 (19.7)	320 (12.6)	1	NSYPLA753	NSYPLA753T	NSYPLAZ753
	750 (29.5)	500 (19.7)	420 (16.5)	1	NSYPLA754	NSYPLA754T	NSYPLAZ754
	750 (29.5)	750 (29.5)	320 (12.6)	1	NSYPLA773	NSYPLA773T	NSYPLAZ773
	750 (29.5)	750 (29.5)	420 (16.5)	1	NSYPLA774	NSYPLA774T	NSYPLAZ774
	750 (29.5)	1000 (39.4)	320 (12.6)	2	NSYPLA7103	NSYPLA7103T	NSYPLAZ7103
	750 (29.5)	1000 (39.4)	420 (16.5)	2	NSYPLA7104	NSYPLA7104T	NSYPLAZ7104
	750 (29.5)	1250 (49.2)	320 (12.6)	2	NSYPLA7123	NSYPLA7123T	NSYPLAZ7123
	750 (29.5)	1250 (49.2)	420 (16.5)	2	NSYPLA7124	NSYPLA7124T	NSYPLAZ7124
Sealed Enclosure IP65—Transparent Door	1000 (39.4)	500 (19.7)	320 (12.6)	1	NSYPLA1053	NSYPLA1053T	NSYPLAZ1053
	1000 (39.4)	500 (19.7)	420 (16.5)	1	NSYPLA1054	NSYPLA1054T	NSYPLAZ1054
	1000 (39.4)	750 (29.5)	320 (12.6)	1	NSYPLA1073	NSYPLA1073T	NSYPLAZ1073
	1000 (39.4)	750 (29.5)	420 (16.5)	1	NSYPLA1074	NSYPLA1074T	NSYPLAZ1074
	1000 (39.4)	1000 (39.4)	320 (12.6)	2	NSYPLA10103	NSYPLA10103T	NSYPLAZ10103
	1000 (39.4)	1000 (39.4)	420 (16.5)	2	NSYPLA10104	NSYPLA10104T	NSYPLAZ10104
	1000 (39.4)	1250 (49.2)	320 (12.6)	2	NSYPLA10123	NSYPLA10123T	NSYPLAZ10123
	1000 (39.4)	1250 (49.2)	420 (16.5)	2	NSYPLA10124	NSYPLA10124T	NSYPLAZ10124
Enclosure with Open Bottom IP54—Plain Door	1250 (49.2)	500 (19.7)	320 (12.6)	1	NSYPLA1253	NSYPLA1253T	NSYPLAZ1253
	1250 (49.2)	500 (19.7)	420 (16.5)	1	NSYPLA1254	NSYPLA1254T	NSYPLAZ1254
	1250 (49.2)	750 (29.5)	320 (12.6)	1	NSYPLA1273	NSYPLA1273T	NSYPLAZ1273
	1250 (49.2)	750 (29.5)	420 (16.5)	1	NSYPLA1274	NSYPLA1274T	NSYPLAZ1274
	1250 (49.2)	1000 (39.4)	320 (12.6)	2	NSYPLA12103	NSYPLA12103T	NSYPLAZ12103
	1250 (49.2)	1000 (39.4)	420 (16.5)	2	NSYPLA12104	NSYPLA12104T	NSYPLAZ12104
	1250 (49.2)	1250 (49.2)	320 (12.6)	2	NSYPLA12123	NSYPLA12123T	NSYPLAZ12123
	1250 (49.2)	1250 (49.2)	420 (16.5)	2	NSYPLA12124	NSYPLA12124T	NSYPLAZ12124
	1500 (59.1)	500 (19.7)	320 (12.6)	1	NSYPLA1553	NSYPLA1553T	NSYPLAZ1553
	1500 (59.1)	500 (19.7)	420 (16.5)	1	NSYPLA1554	NSYPLA1554T	NSYPLAZ1554
	1500 (59.1)	750 (29.5)	320 (12.6)	1	NSYPLA1573	NSYPLA1573T	NSYPLAZ1573
	1500 (59.1)	750 (29.5)	420 (16.5)	1	NSYPLA1574	NSYPLA1574T	NSYPLAZ1574
	1500 (59.1)	1000 (39.4)	320 (12.6)	2	NSYPLA15103	NSYPLA15103T	NSYPLAZ15103
	1500 (59.1)	1000 (39.4)	420 (16.5)	2	NSYPLA15104	NSYPLA15104T	NSYPLAZ15104
	1500 (59.1)	1250 (49.2)	320 (12.6)	2	NSYPLA15123	NSYPLA15123T	NSYPLAZ15123
	1500 (59.1)	1250 (49.2)	420 (16.5)	2	NSYPLA15124	NSYPLA15124T	NSYPLAZ15124

Polyester Wall-Mounting Enclosures

Table 28.7: Thalassa Polyester Wall-Mounting Enclosures

	Height: mm (in)	Width: mm (in)	Depth: mm (in)	ABS/PC Wall-Mounting Enclosures IP66 [7]		Polyester Wall-Mounting Enclosures IP66 [7]				Polyester Wall-Mounting ATEX Enclosures [7]	Mounting Plate
				Plain door	Transparent door	Plain door	Transparent door	Plain door 3-point closure	Transparent door 3-point closure		
ABS/PC Wall-Mounting Enclosure IP66—Plain Door	310 (12.2)	215 (8.5)	160 (6.3)	NSYPLM32	NSYPLM32T	—	—	—	—	—	NSYMM32
	308 (12.1)	255 (10 0)	160 (6.3)	—	—	NSYPLM3025	NSYPLM3025T	—	—	NSYPLMEX3025	NSYMM3025
	430 (16.9)	330 (13.0)	200 (7.9)	—	—	NSYPLM43	NSYPLM43T	NSYPLM43V	NSYPLM43TV	NSYPLMEX43	NSYMM43
	530 (20 9)	430 (16.9)	200 (7.9)	—	—	NSYPLM54	NSYPLM54T	NSYPLM54V	NSYPLM54TV	NSYPLMEX54	NSYMM54
	647 (25.5)	436 (17.2)	250 (9.8)	—	—	NSYPLM64	NSYPLM64T	NSYPLM64V	NSYPLM64TV	NSYPLMEX64	NSYMM64
	747 (29.4)	536 (21.1)	300 (11.8)	—	—	NSYPLM75	NSYPLM75T	NSYPLM75V	NSYPLM75TV	NSYPLMEX75	NSYMM75
	847 (33.3)	636 (25.0)	300 (11.8)	—	—	NSYPLM86	NSYPLM86T	NSYPLM86V	NSYPLM86TV	NSYPLMEX86	NSYMM86
	1056 (41.6)	852 (33.5)	350 (13.8)	—	—	NSYPLM108	NSYPLM108T	—	—	NSYPLMEX108	NSYMM108

[6] See Table 28.2 UL File Numbers for Enclosures, page 28-3.
[7] See Table 28.2 UL File Numbers for Enclosures, page 28-3.

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Ventilation Systems with Filters

Specially recommended for installations in which the ambient temperature is lower than the desired temperature inside the enclosure, a high protection rating is required: IP54 or IP55, and the surrounding environment is relatively clean, allowing air to enter the enclosure.

- 38 to 850 m^3/h.
- Five input voltages: AC: 400/440 V, 230 V, 115 V (50/60 Hz), DC: 48 V and 24 V.
- Broad range of accessories (filters, IP55 and EMC covers, anti-vandalism kit).
- **UL Listing:** E80264

Table 28.8: Ventilation Systems with Filters

Fan flow rate (50 Hz)			Voltage	Catalog Number					
Free with filter	With 1 outlet grill	With 2 outlet grills		Fan with filter RAL 7035	Outlet grill	Color kit RAL 7032	IP55	IP55 stainless steel	EMC
38	25	33	230 V	NSYCVF38M230PF	NSYCAG92LPF	NSYCAG92LPC	—	—	—
38	27	35	115 V	NSYCVF38M115PF					
58	39	47	24 Vdc	NSYCVF38M24DPF					
44	34	41	48 Vdc	NSYCVF38M48DPF					
85	63	71	230 V	NSYCVF85M230PF	NSYCAG125LPF	NSYCAG125LPC	NSYCAP125LZF	NSYCAG125LXF	NSYCAG125SLE
79	65	73	115 V	NSYCVF85M115PF					
80	57	77	24 Vdc	NSYCVF85M24DPF					
79	59	68	48 Vdc	NSYCVF85M48DPF					
165	153	161	230 V	NSYCVF165M230PF	NSYCAG223LPF	NSYCAG223LPC	NSYCAP223LZF	NSYCAP223LXF	NSYCAP223LE
164	153	161	115 V	NSYCVF165M115PF					
188	171	179	24 Vdc	NSYCVF165M24DPF					
193	171	179	48 Vdc	NSYCVF165M48DPF					
302	260	268	230 V	NSYCVF300M230PF					
302	263	271	115 V	NSYCVF300M115PF					
262	221	229	24 Vdc	NSYCVF300M24DPF					
247	210	218	48 Vdc	NSYCVF300M48DPF					
562	473	481	230 V	NSYCVF560M230PF	NSYCAG291LPF	NSYCAG291LPC	NSYCAP291LZF	NSYCAP291LXF	NSYCAP291LE
582	485	494	115 V	NSYCVF560M115PF					
838	718	728	230 V	NSYCVF850M230PF					
983	843	854	115 V	NSYCVF850M115PF					
931	798	809	400/440 V	NSYCVF850M400PF					

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Thermal Control

Thermostats control the temperature inside the enclosure and send a signal when maximum or minimum temperature values have been reached.

- Temperature control: adjustable thermostats; single or double.
- Relative humidity control: adjustable humidistat.
- Temperature and relative humidity control: adjustable hygrotherm.

Table 28.9: Control temperature

N.C. thermostat

Control a resistance heater or an alarm	
Setting range	Catalog Number
0 to +60 °C	NSYCCOTHC
+32 to +140 °F	NSYCCOTHCF

N.O. thermostat

Control a fan or an alarm	
Setting range	Catalog Number
0 to +60 °C	NSYCCOTHO
+32 to +140 °F	NSYCCOTHOF

Double thermostat

Control a resistance heater and a fan	
Setting range	Catalog Number
0 to +60 °C	NSYCCOTHD
+32 to +140 °F	NSYCCOTHDF

Thermostat with inverse contact

Control a resistance heater or a fan	
Setting range	Catalog Number
0 to +60 °C	NSYCCOTHI
+32 to +140 °F	NSYCCOTHIF

Electronic thermostat

Control a resistance heater or a fan		
Setting range	Display	Catalog Number
+5 °C to +50 °C	°C or °F	NSYCCOTH30VID
		NSYCCOTH120VID
		NSYCCOTH230VID

7 different operating modes.
Option of installing one or two external sensors.

Electronic hygrotherm

Control temperature and relative humidity		
Setting range	Display	Catalog Number
+5 °C to +50 °C	°C or °F	NSYCCOHYT30VID
		NSYCCOHYT120VID
		NSYCCOHYT230VID

3 different operating modes.
Option of installing an external sensor.

Electronic hygrostat

Control relative humidity		
Setting range	Display	Catalog Number
20% to 80%	% RH	NSYCCOHY230VID

2 different operating modes.

Temperature sensor

PTC external temperature sensor (double insulation)
Catalog Number
NSYCCAST

Table 28.10: Insulated resistance heaters

Insulated resistance heater with fan		
Power (W)	Voltage (V)	Catalog Number
100	120–240 AC	NSYCR100WU2C
10	120–240 AC	NSYCR10WU2C
147	120–240 AC	NSYCR150WU2C
20	120–240 AC	NSYCR20WU2C
55	120–240 AC	NSYCR50WU2C
177	230 AC	NSYCR170W230VVC

Table 28.11: Ultra-thin resistance heaters

Ultra-thin heaters		
Power (W)	Voltage (V)	Catalog Number
10	120	NSYCRS10W120V
10	240	NSYCRS10W240V
25	120	NSYCRS25W120V
25	240	NSYCRS25W240V
50	120	NSYCRS50W120V
50	240	NSYCRS50W240V
100	120	NSYCRS100W120V
100	240	NSYCRS100W240V
200	120	NSYCRS200W120V
200	240	NSYCRS200W240V

Table 28.12: Thermofans

Thermofans		
Power (W)	Voltage (V)	Catalog Number
400/550	230 AC	NSYCRP1W230VTVC
400/550	120 AC	NSYCRP1W120VTVC

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Section 29

Uninterruptible Power Supplies

DIN Rail-Control Panel UPS, 500 VA / 325 W 29-2

SUA500PDR Series 29-2
- Applications 29-2
- Segments 29-2
- Description 29-3
- Benefits 29-3
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- Ordering Information 29-5
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Applications

- Manufacturing Equipment
  - Machine controllers
  - Process control
  - Sensitive equipment
  - Safety Infrastructure

- Material and Packaging Handling
  - Fillers
  - Packaging robots
  - Panel feeders/stackers

- Automation Control
  - PLCs
  - I/O controllers
  - Industrial PCs
  - SCADA systems
  - OITs and RTUs

- IP-based Devices
  - Industrial Ethernet
  - Imaging
  - Material analysis
  - Motion sensors

Segments

- Water and Wastewater
- Mining, Metals, and Minerals
- Biotech and Pharmaceutical
- Transportation
- Chemical
- Food and Beverage
- Semiconductor
- Automotive
- Oil and Gas

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Description

SUA500PDR

While everyone expects continuous power from their electric utility company, the power quality may be less than desirable—especially during times of peak demand. Issues that may arise include:

- Sag (undervoltage)
- Swell or surge (overvoltage)
- Transients

Power transmission can also be interrupted by:

- Weather conditions, such as spikes caused by lightning strikes or outages caused by downed power lines
- Accidents
- Construction

All of these conditions can cause issues with industrial processes and manufacturing, as well as with any solid state or microprocessor-controlled equipment.

An uninterruptible power supply (UPS) can provide relief from many of these conditions. UPS devices generally provide:

- Voltage regulation
- Noise filtering
- Battery backup—up to 30 minutes, depending on power draw

The **SUA500PDR** series of DIN rail mount devices provides a reliable, flexible, and cost effective UPS for control panels. Some of the features which make these UPS devices desirable for control panels include:

- All user controls are located on the front of the device for easy access
- Device size and design are ideal for DIN rail or direct mount in panels
- Management cards are available for remote UPS management
- Multiple communications options are available
- Battery can be mounted remotely from the UPS, even externally from the enclosure
- Network communication cards are available
- Suitable for either DIN rail or panel mounting

Benefits

SUA500PDRH shown

Flexible Installation

1. Control panel or DIN rail mountable
2. Hard-wired AC input / output (120 or 230 Vac)
3. Internal or external battery installation
   - Chassis knockout—right side or bottom
   - External battery mounting complies with NEC 480.9(A)

Manageable

4. Integrated dry contact relay I/O
5. DB-9 serial port communications, RS232 protocol
6. APC Smart Slot—optional network management, Modbus, or relay I/O contacts card
7. LED status indicators—external status LEDs indicate the UPS state: On-Line or On-Battery; Battery Disconnected or Needs to be Replaced
- Audible alarms—notify the user of the following conditions: On-Battery; Low Battery; Replace Battery

Easy to Maintain

8. Simple battery replacement—trained service personnel can replace the battery even while the UPS is operating on utility power.
- Simple testing—easily scheduled “Automatic Self Test”

High Availability and Reliability

- Temperature-compensated battery charging—prolongs battery life by regulating the charge voltage according to battery temperature.
- Automatic self-test—periodic battery self-test provides early detection of a battery in need of replacement.

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Technical Specifications

Table 29.1: UPS

Description		Unit of Measure-ment	SUA500PDRS (standard battery)	SUA500PDRH (high temp. battery)	SUA500PDRIS (standard battery)	SUA500PDRIH (high temp. battery)
Conformity to Standards	Certifications		cUL Recognized; UL 1778; CE; VDE			
Input	Nominal Input Voltage	**V**	120		240	
	Input Voltage Range	**Vac**	82–144		160–280	
	Input Frequency	**Hz**	45–65; auto-selecting			
	Input Connections		Hard-wired input (3-wire: H-N-G)			
Output	Nominal Output Capacity		500 VA / 325 W			
	Topology		Line interactive			
	Waveform		Sine wave			
	Input Voltage Range	**V**	120		230 (default) 220/230/240 (user configurable)	
	Output Frequency	**Hz**	50/60 +/- 3; sync to mains			
	Efficiency (Full-Load)		>94%			
	Output Voltage Distortion (Full Load)		<2% (100% linear load); <8% (100% non-linear load)			
	Output Connections		Hard-wired output (3-wire: H-N-G)			
Protection	Surge Energy Rating	**Joules**	540		340	
	Filtering		Full-time, multi-pole, noise filtering; 0.3% IEEE surge let-through; zero clamping response time; meets UL 1449			
	Thermal Protection		Yes			
Communications and Controls	Serial Port		DB9; UPS status; control of user configurable parameters			
	Smart Slot Accessories		AP9630 and AP9631 network cards; AP9613 relay I/O card; AP9622 Modbus card			
	Emergency Power Off (EPO)		Terminal block			
	Front Display Panel Buttons		On/Off; Self-Test; Alarm Silence; Cold-Start			
Visual and Audible Status Indicators	LEDs		On-Line; On-Battery; Overload; Replace Battery; Load and Battery Bar-Graphs			
	Audible Alarm		On-Line; On-Battery; Overload			
Environment	Operating Temperature / Humidity	**°F (°C)**	+32 to 104 (0 to 40) / 0–95% (non-condensing) (with standard battery) (-S SKUs) +32 to 122 (0 to 50) / 0–95% (non-condensing) (with high-temp battery) (-H SKUs)			
	Storage Temperature / Humidity	**°F (°C)**	+23 to 140 (-5 to +60) / 0–95% (non-condensing)			
	Mounting		Panel or DIN rail			

Table 29.2: Battery Cartridge

Description		Unit of Measure-ment	APCRBC135	APCRBC136
Battery	Battery Type		Maintenance-free, sealed lead acid battery	
	Nominal Battery Voltage	**Vdc**	24	
	Runtime (Full Load)		8.5 minutes	
	Recharge Time (To 90%)		<3 hours	
	Expected Battery Life		3–5 years at 68 °F (20 °C)	up to 8 years at 68–77 °F (20–25 °C)
Physical	Dimensions (H x W x D)	**in. (mm)**	4.22 x 4.20 x 5.65 (107 x 107 x 144)	
	Net Weight	**lb (kg)**	10.3 (4.68)	7.26 (3.3)
Environment	Operating Temperature / Humidity	**°F (°C)**	+32 to 104 (0 to 40) / 0–95% (non-condensing)	+32 to 122 (0 to 50) / 0–95% (non-condensing)
	Storage Temperature / Humidity	**°F (°C)**	+5 to 113 (-15 to +45) / 0–95% (non-condensing)	

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Ordering Information

SUA500PDRS

Table 29.3: UPS

Input Voltage	Battery Type	Catalog Number	Weight lbs (kg)	
			UPS Only	UPS + Battery
120	Standard	SUA500PDRS	18 (8.18)	28.3 (12.86)
	High temperature	SUA500PDRH		25.26 (11.48)
230	Standard	SUA500PDRIS		28.3 (12.86)
	High temperature	SUA500PDRIH		25.26 (11.48)

NOTE: Each SUA500PDR device includes a battery, which is shipped separately.

APCRBC135

Table 29.4: Replacement Batteries

Battery Type	Catalog Number	Weight lbs (kg)
Standard	APCRBC135	10.30 (4.68)
High temperature	APCRBC136	7.26 (3.30)

NOTE: These batteries are for replacement only. Each SUA500PDR device includes a battery, which is shipped separately.

AP9630

Table 29.5: Smart Slot Accessories

Card Type	Description	Catalog Number	Weight lbs (kg)
Dry Contact I/O Smart Slot Card	Interface expanders and other options for increased UPS monitoring and control functionality. Includes USB cable.	AP9613	0.88 (0.40)
Modbus™/Jbus Interface Card	Interface expanders and other options for increased UPS monitoring and control functionality.	AP9622	0.99 (0.45)
UPS Network Management Card	For remote monitoring and control of an individual UPS by connecting it directly to the network via Ethernet. Includes software.	AP9630	0.75 (0.34)
UPS Network Management Card with Environmental Monitoring	For remote monitoring and control of an individual UPS by connecting it directly to the network via Ethernet. Includes software and temperature sensor.	AP9631	0.75 (0.34)

NOTE: These Smart Slot accessories will function in all SUA500PDR UPS devices. Only one card may be used per UPS.

AP9335T

Table 29.6: Sensors for Use with AP9631 Network Management Card

Sensor Type	Catalog Number	Weight lbs (kg)
Temperature	AP9335T	0.31 (0.14)
Temperature and Humidity	AP9335TH	0.40 (0.18)

NOTE: An AP9335T temperature sensor is included with the AP9631 network management card.

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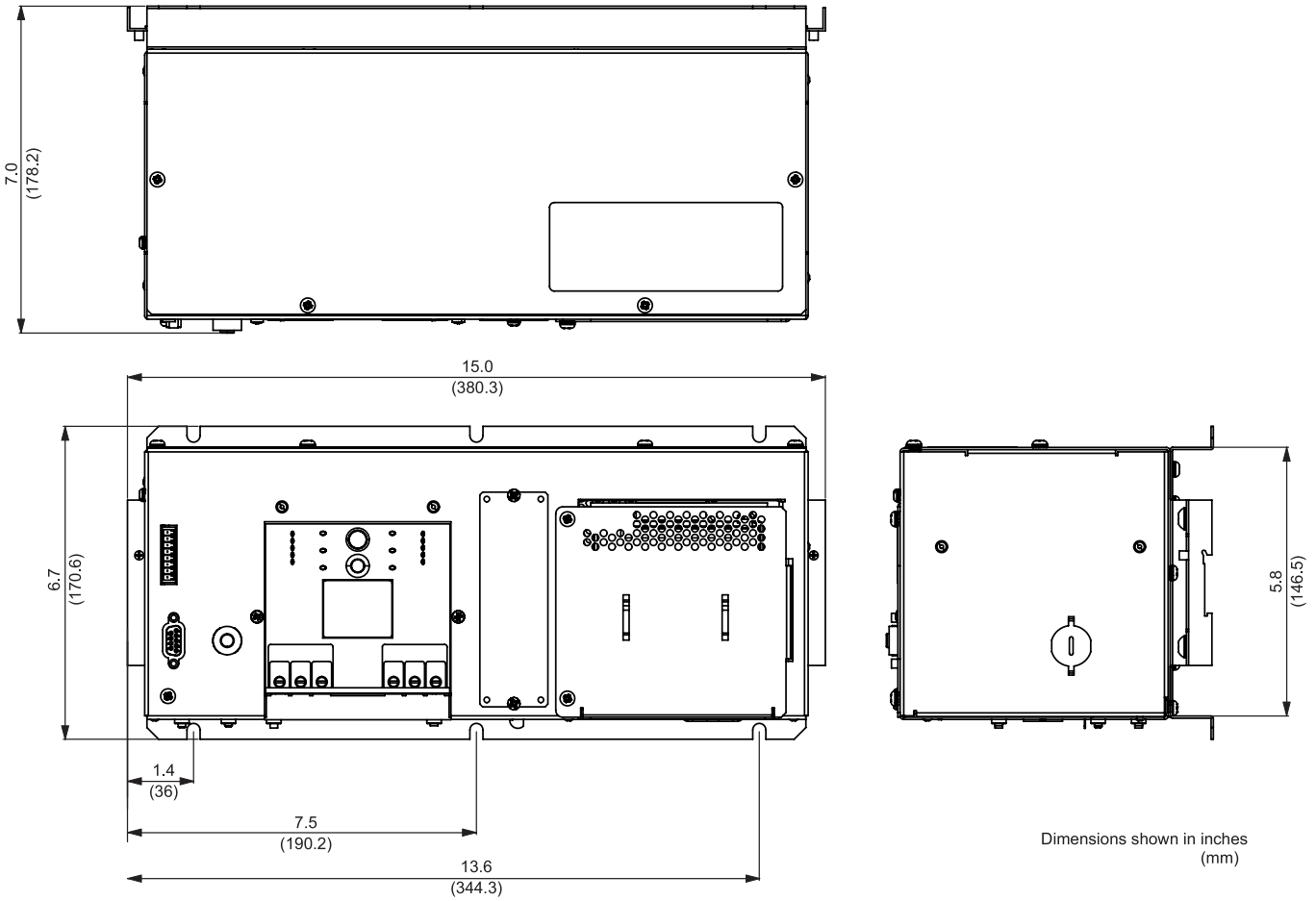
Dimensions

SUA500PDR



Dimensions shown in inches
(mm)

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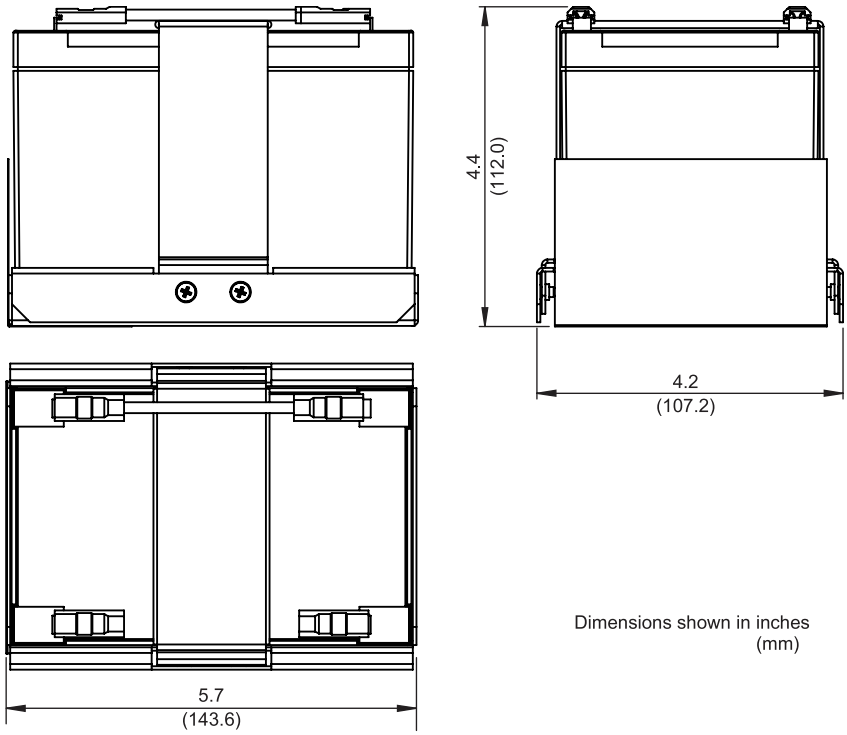
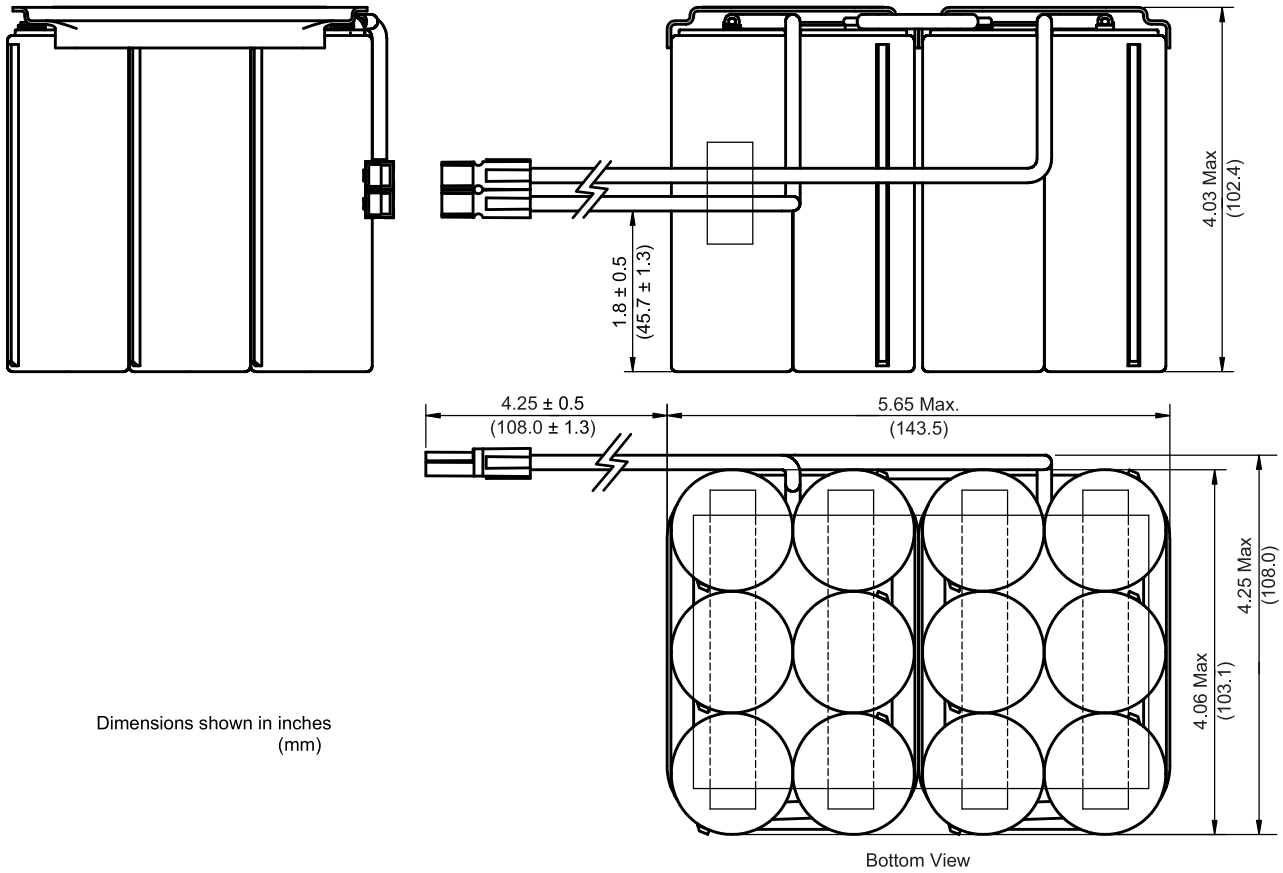
APCRBC135



Dimensions shown in inches
(mm)

APCRBC136



Dimensions shown in inches
(mm)

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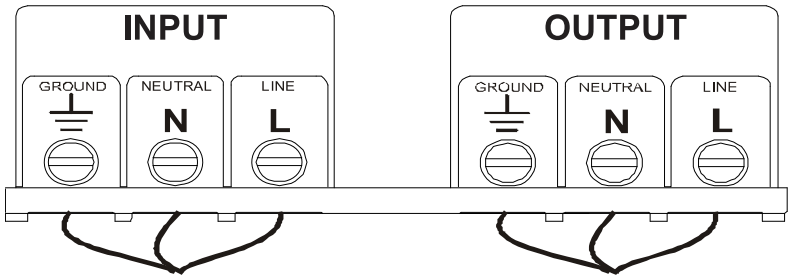
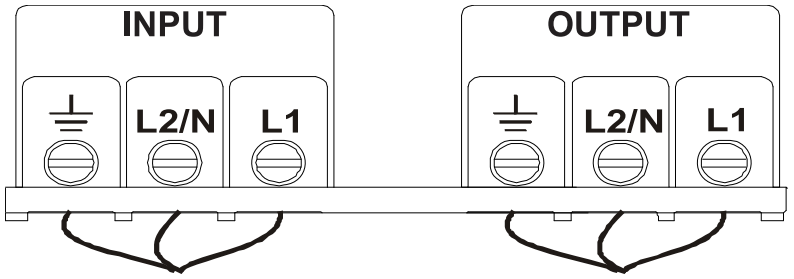
Wiring Diagrams

120 V Models



208/230 V Models



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ALPHABETICAL LISTING

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Conductor Ampacity Based on the 2014 National Electrical Code®

Ampacity based on NEC® Table 310.15(B)(16) [Formerly Table 310.16] – Allowable Ampacities of Insulated Conductors Rated Up to and Including 2000 Volts, 60° Through 90°C (140° Through 194°F), Not More Than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)*

For conduit fill see 2014 NEC Annex C.

For Information on Temperature Ratings of Terminations to Equipment See NEC 110.14(C).

Size	Temperature Rating of Conductor. [See Table 310.104(A).]						Size
	60°C (140°F)	75°C (167°F)	90°C (194°F)	60°C (140°F)	75°C (167°F)	90°C (194°F)	
AWG or kcmil	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, USE, ZW	Types TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, USE	Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	AWG or kcmil
	Copper			Aluminum or Copper-Clad Aluminum			
18**	—	—	14	—	—	—	—
16**	—	—	18	—	—	—	—
14**	15	20	25	—	—	—	—
12**	20	25	30	15	20	25	12**
10**	30	35	40	25	30	35	10**
8	40	50	55	35	40	45	8
6	55	65	75	40	50	55	6
4	70	85	95	55	65	75	4
3	85	100	115	65	75	85	3
2	95	115	130	75	90	100	2
1	110	130	145	85	100	115	1
1/0	125	150	170	100	120	135	1/0
2/0	145	175	195	115	135	150	2/0
3/0	165	200	225	130	155	175	3/0
4/0	195	230	260	150	180	205	4/0
250	215	255	290	170	205	230	250
300	240	285	320	195	230	260	300
350	260	310	350	210	250	280	350
400	280	335	380	225	270	305	400
500	320	380	430	260	310	350	500
600	350	420	475	285	340	385	600
700	385	460	520	315	375	425	700
750	400	475	535	320	385	435	750
800	410	490	555	330	395	445	800
900	435	520	585	355	425	480	900
1000	455	545	615	375	445	500	1000
1250	495	590	665	405	485	545	1250
1500	525	625	705	435	520	585	1500
1750	545	650	735	455	545	615	1750
2000	555	655	750	470	560	630	2000

* Refer to Section 310.15(B)(2)(a) for the ampacity correction factors where the ambient temperature is other than 30°C (86°F).
** See Section 240.4(D) for conductor overcurrent protection limitations.

120/240 Volt Single Phase Dwelling Services and Feeders [Section 310.15(B)(7)]

For one family dwellings and the individual dwelling units of two family and multifamily dwellings, service and feeder conductors supplied by a single phase, 120/240 volt system shall be permitted to be sized as follows:

1. For a service rated 100 through 400 A, the service conductors supplying the entire load associated with a one family dwelling, or the service conductors supplying the entire load associated with an individual dwelling unit in a two family or multifamily dwelling, shall be permitted to have an ampacity not less than 83 percent of the service rating.
2. For a feeder rated 100 through 400 A, the feeder conductors supplying the entire load associated with a one family dwelling, or the feeder conductors supplying the entire load associated with an individual dwelling unit in a two-family or multifamily dwelling, shall be permitted to have an ampacity not less than 83 percent of the feeder rating.
3. In no case shall a feeder for an individual dwelling unit be required to have an ampacity greater than that specified in (1) or (2).
4. Grounded conductors shall be permitted to be sized smaller than the ungrounded conductors, provided that the requirements of Sections 220.61 and 230.42 for service conductors or the requirements of Sections 215.2 and 220.61 for feeder conductors are met.

The conductor ampacity may require other correction or adjustment factors applicable to the conductor installation.

NEC 210.19 Conductors—Min. Ampacity and Size

For branch circuits not more than 600 volts, conductors shall have an ampacity not less than the maximum load to be served. Conductors shall be sized to carry not less than the larger of (a) or (b).

a. Where a branch circuit supplies continuous loads or any combination of continuous and noncontinuous loads, the minimum branch-circuit conductor size shall have an allowable ampacity not less than the noncontinuous load plus 125 percent of the continuous load.
b. The minimum branch-circuit conductor size shall have an allowable ampacity not less than the maximum load to be served after the application of any adjustment or correction factors.

Exception: If the assembly, including the overcurrent devices protecting the branch circuit(s), is listed for operation at 100 percent of its rating, the allowable ampacity of the branch-circuit conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load.

Correction Factors

Based on NEC Table 310.15(B)(2)(a)[Formerly Table 310(16)] Ambient Temperature Correction Factors Based on 30°C (86°F)

Ambient Temperature (°C)	Temperature Rating of Conductor			Ambient Temperature (°F)
	60°C	75°C	90°C	
10 or less	1.29	1.20	1.15	50 or less
11–15	1.22	1.15	1.12	51–59
16–20	1.15	1.11	1.08	60–68
21–25	1.08	1.05	1.04	69–77
26–30	1.00	1.00	1.00	78–86
31–35	0.91	0.94	0.96	87–95
36–40	0.82	0.88	0.91	96–104
41–45	0.71	0.82	0.87	105–113
46–50	0.58	0.75	0.82	114–122
51–55	0.41	0.67	0.76	123–131
56–60	—	0.58	0.71	132–140
61–65	—	0.47	0.65	141–149
66–70	—	0.33	0.58	150–158
71–75	—	—	0.50	159–167
76–80	—	—	0.41	168–176
81–85	—	—	0.29	177–185

Adjustment Factors – See NEC Table 310.15 (B)(3)(a)

Where the number of current-carrying conductors in a raceway or cable exceeds three, the allowable ampacities shall be reduced as shown in the following table:

Number of Conductors***	Percent of Values in Table 310.15(B)(16) through Table 310.15(B)(19) as Adjusted for Ambient Temperature if Necessary
4 through 6	80
7 through 9	70
10 through 20	50
21 through 30	45
31 through 40	40
41 and Above	35

*** Number of conductors is the total number of conductors in the raceway or cable, including spare conductors. The count shall be adjusted in accordance with Section 310.15(B)(5) and (6). The count shall not include conductors that are connected to electrical components but that cannot be simultaneously energized.

NEC 210.20(A) Continuous and Noncontinuous Loads

Where a branch-circuit supplies continuous loads or any combination of continuous and noncontinuous loads, the rating of the overcurrent device shall not be less than the noncontinuous load plus 125 percent of the continuous load.

NEC 240.4 Protection of Conductors

Conductors, other than flexible cords, flexible cables, and fixture wires, shall be protected against overcurrent in accordance with their ampacities specified in 310.15, unless otherwise permitted or required in 240.4(A) through (G).

NEC 240.4 (D) Small Conductors

Unless specifically permitted in 240.4(E) or (G), the overcurrent protection shall not exceed that required by (D)(1) through (D)(7) after any correction factors for ambient temperature and number of conductors have been applied.

NEC 430.22(A) Direct-Current Motor-Rectifier Supplied

For dc motors operating from a rectified power supply, the conductor ampacity on the input of the rectifier shall not be less than 125 percent of the rated input current to the rectifier. For dc motors operating from a rectified single-phase power supply, the conductors between the field wiring output terminals of the rectifier and the motor shall have an ampacity of not less than the following percentages of the motor full-load current rating:

(1) Where a rectifier bridge of the single-phase, half-wave type is used, 190 percent.

(2) Where a rectifier bridge of the single-phase, full-wave type is used, 150 percent.

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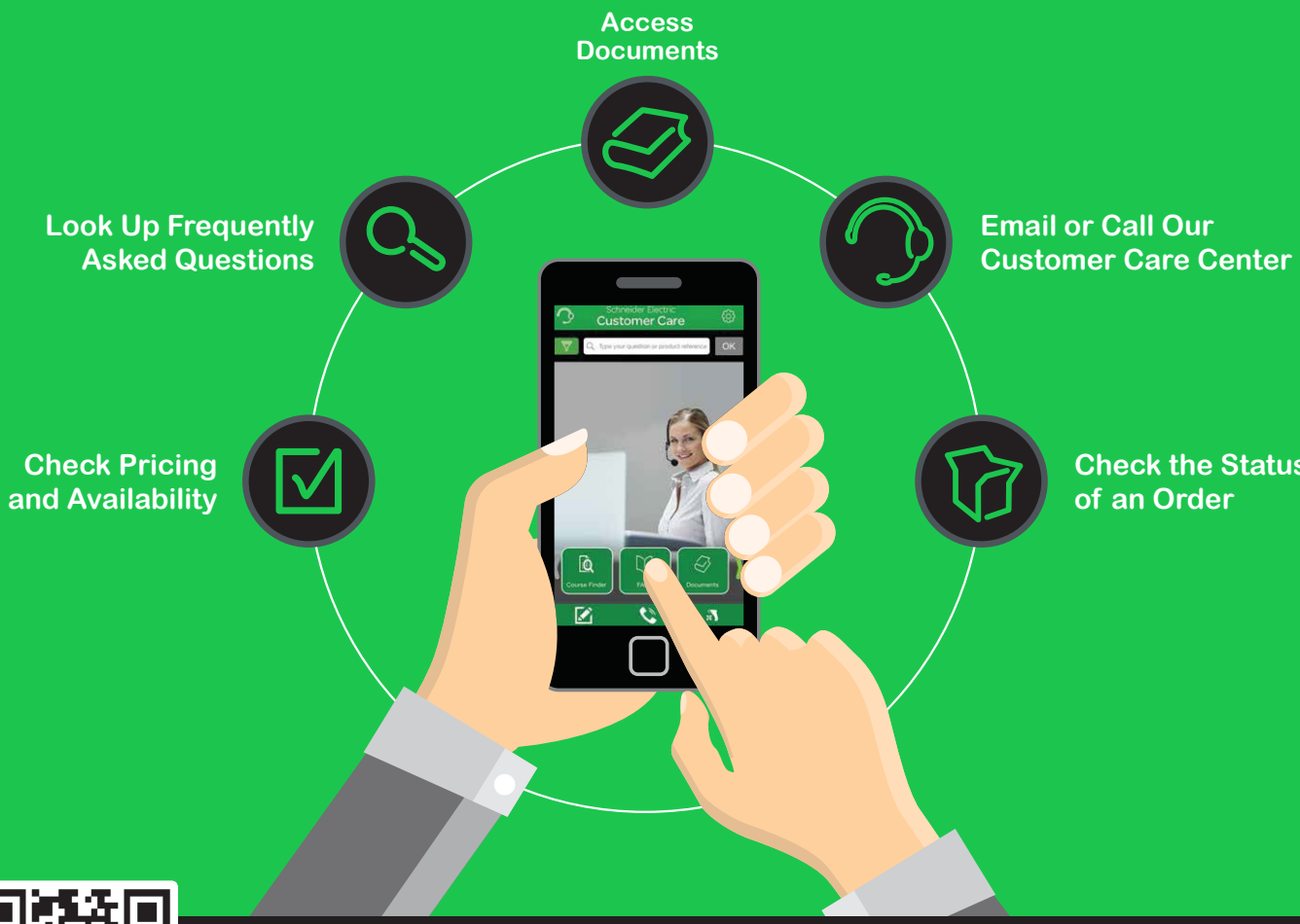

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