Carrier®

50PG20-28
Single Package Rooftop Units
Electric Cooling with Electric Heat Option and Electromechanical Controls with PURON® (R-410A) Refrigerant

Installation, Start-Up and Service Instructions

CONTENTS

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform the basic maintenance functions of replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

⚠ CAUTION

Puron (R-410A) refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment. If service equipment is not rated for Puron refrigerant, equipment damage or personal injury may result.

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

IMPORTANT: Units have high ambient operating limits. If limits are exceeded, the units will automatically lock the compressor out of operation. Manual reset will be required to restart the compressor.

Book	1	4	PC 111	Catalog No. 535-00141	Printed in U.S.A.	Form 50PG-7SI	Pg 1	9-05	Replaces: New
Tab	1b	6b							

INSTALLATION

Step 1 — Provide Unit Support

ROOF CURB — Assemble or install accessory roof curb in accordance with instructions shipped with this accessory. See Fig. 1. Install insulation, cant strips, roofing, and counter flashing as shown. Ductwork can be installed to roof curb before unit is set in place. Ductwork must be attached to curb and not to unit. Curb must be level. This is necessary to permit unit drain to function properly. Unit leveling tolerance is ± $^{1}/_{16}$ in. per linear ft in any direction. Refer to Accessory Roof Curb Installation Instructions for additional information as required. When accessory roof curb is used, unit may be installed on class A, B, or C roof covering material. Carrier roof curb accessories are for flat roofs or slab mounting.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket with the roof curb as shown in Fig. 1. Improperly applied gasket can also result in air leaks and poor unit performance. Do not slide unit to position on roof curb.

ALTERNATE UNIT SUPPORT — When a curb cannot be used, install unit on a noncombustible surface. Support unit with sleepers, using unit curb support area. If sleepers cannot be used, support long sides of unit with a minimum of 3 equally spaced 4-in. x 4-in. pads on each side.

SLAB MOUNT (Horizontal Units Only) — Provide a level concrete slab that extends a minimum of 6 in. beyond unit cabinet. Install a gravel apron in front of condenser coil air inlet to prevent grass and foliage from obstructing airflow.

NOTE: Horizontal units may be installed on a roof curb if required.

Step 2 — Remove Shipping Rails — Remove shipping rails prior to lowering unit onto roof curb. See Fig. 2. The rails are attached to the unit at both the return end and condenser end. Remove the screws from both ends of each rail. Be careful not to drop the rails onto any surface that could be damaged. Discard the rails. It is important to replace the screws into the unit to avoid any air or water leakage.

⚠ CAUTION

Do not allow the shipping rail to drop on the roof surface. Damage to the roof surface may result.

Step 3 — Rig and Place Unit — Inspect unit for transportation damage. See Tables 1-3 for physical data. File any claim with transportation agency.

⚠ CAUTION

All panels must be in place when rigging. Unit is not designed for handling by fork truck. Damage to unit can result.

Do not drop unit; keep upright. Use spreader bars over unit to prevent sling or cable damage. Rollers may be used to move unit across a roof. Level by using unit frame as a reference; leveling tolerance is ± $^{1}/_{16}$ in. per linear ft in any direction. See Fig. 3 for additional information. Unit rigging weight is shown in Fig. 3.

Four lifting holes are provided in the unit base rails as shown in Fig. 3. Refer to rigging instructions on unit.

POSITIONING — Maintain clearance, per Fig. 4, around and above unit to provide minimum distance from combustible materials, proper airflow, and service access.

Do not install unit in an indoor location. Do not locate air inlets near exhaust vents or other sources of contaminated air.

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

ROOF MOUNT — Check building codes for weight distribution requirements. Unit operating weight is shown in Table 1.

INSTALLATION ONTO CURB — The 50PG units are designed to fit on the accessory full perimeter curb. Correct placement of the unit onto the curb is critical to operating performance. To aid in correct positioning, $^{3}/_{8}$-in. diameter locating holes have been added to the unit base rails. When placing the unit, these holes should line up with the roof curb edge as shown in Fig. 5 and 6, to assure proper duct opening alignment. For placement on the curb, use the alignment holes located approximately 2-in. from the end of the base rail on the return end of the unit. See labels on the side of the unit for more details.

⚠ CAUTION

Do not slide unit to position it when it is sitting on the curb. Curb gasketing material may be damaged and leaks may result.

ROOFCURB ACCESSORY	CURB HEIGHT	DESCRIPTION	C	D
CRRFCURB018C00	1′-2″ [356]	ROOF CURB 14″ HIGH	3′-1 15/16″ [963]	9′-6 7/16″ [2906]
CRRFCURB019C00	2′-0″ [610]	ROOF CURB 24″ HIGH	3′-1 15/16″ [963]	9′-6 7/16″ [2906]

NOTES:
1. ROOFCURB ACCESSORY IS SHIPPED DISASSEMBLED.
2. DIMENSIONS IN ( ) ARE IN MILLIMETERS.
3. (hatched arrow) DIRECTION OF AIRFLOW.
4. ROOF CURB: 16 GA. (VA03-56) STEEL.
5. TO PREVENT THE HAZARD OF STAGNANT WATER BUILD-UP IN THE UNIT DO NOT EXCEED CURB LEVELING TOLERANCES.
6. CLEARANCE BETWEEN UNIT BASE RAIL AND CURB FLANGE IS 1/4-IN. (6 MM) ON EACH SIDE.

MAX CURB LEVELING TOLERANCES:

ROOFCURB	A		B	
	DEG.	IN.	DEG.	IN.
CRRFCURB018C00 CRRFCURB019C00	.28	.57	.28	.42

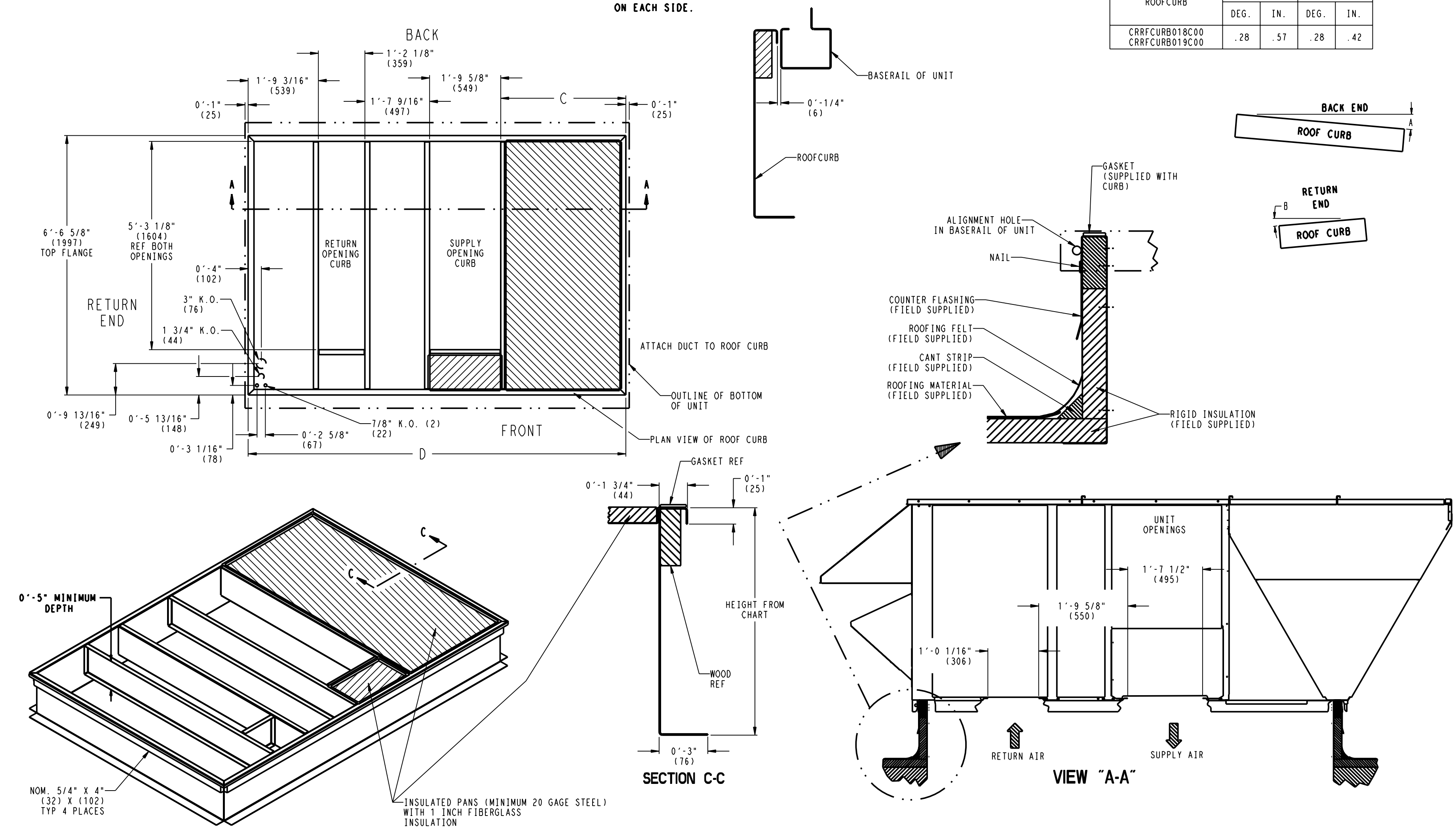


Fig. 1 — Roof Curb Details

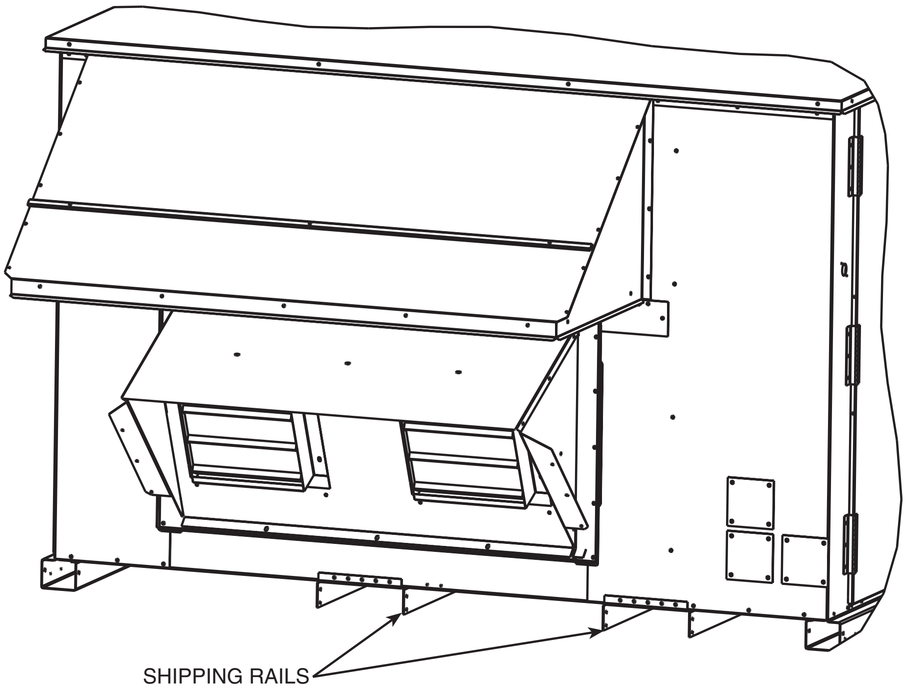
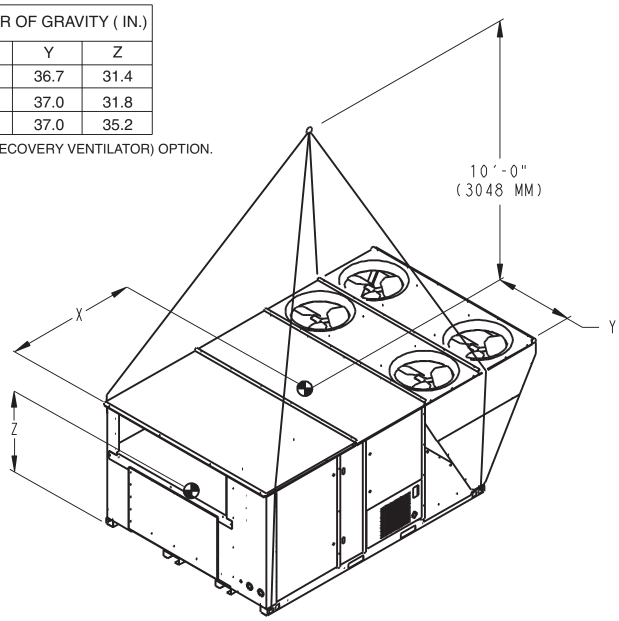


Fig. 2 — Shipping Rail Removal



CAUTION - NOTICE TO RIGGERS:

ALL PANELS MUST BE IN PLACE WHEN RIGGING.

NOTICE TO RIGGERS: Rig by inserting hooks into unit base rails as shown. Maintain a distance of 120 inches (3048 MM) from top of unit to eyehook. Leave coil cover attached to unit while rigging to protect coil of unit from damage.

UNIT SIZE	MAX WEIGHT (LB) *	CENTER OF GRAVITY (IN.)		
		X	Y	Z
PG20	3825	66.5	36.7	31.4
PG24	4075	66.5	37.0	31.8
PG28	4300	70.5	37.0	35.2

* DOES NOT INCLUDE ERV (ENERGY RECOVERY VENTILATOR) OPTION.

NOTES:
1. Add 150 lb (68 kg) for domestic crating.
2. See label for unit location on roof curb.

Fig. 3 — Rigging Details

NOTES:

1. FOR OUTDOOR USE ONLY.
2. WEIGHTS SHOWN ARE FOR 50PG COOLING ONLY UNIT WITH MANUAL 25% OUTDOOR AIR OPTION, ALUMINUM COILS, AND STANDARD DRIVE. FOR WEIGHTS OF OPTIONAL EQUIPMENT CONSULT PRODUCT DATA BOOK.
3. MIN. CLEARANCES TO BE :
   RIGHT SIDE : 6'-0" [1829] CONDENSER AIR
   LEFT SIDE : 10'-0" [3048] OUTSIDE AIR
   FRONT SIDE : 3'-0" [915] SERVICE
   : 6'-0" [1829] CONDENSER AIR
   : 8'-0" [2438] COIL REMOVAL
   REAR SIDE : 6'-0" [1829] CONDENSER AIR
   : 6'-6" [1981] ECONOMIZER REMOVAL
   TOP : 6'-0 [1829] CONDENSER FAN
   BOTTOM : 1'-2" [356] COMBUSTIBLE SURFACES (W/O CURB)
4. FOR SMALLER SERVICE AND OPERATIONAL CLEARANCES, CONTACT CARRIER APPLICATION ENGINEERING DEPARTMENT.
5. DOWN SHOT DUCTS DESIGNED TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. IF UNIT IS MOUNTED SIDE SUPPLY, IT IS RECOMMENDED THE DUCTS MUST BE SUPPORTED BY CROSS BRACES AS DONE ON ACCESSORY ROOF CURB.
6. DIMENSIONS IN [ ] ARE IN MILLIMETERS OR KILOGRAMS.
7. WITH THE EXCEPTION OF CLEARANCE FOR THE CONDENSER COIL AND THE DAMPER/POWER EXHAUST AS STATED IN NOTE #3, A REMOVABLE FENCE OR BARRICADE REQUIRES NO CLEARANCE.
8. DIMENSIONS ARE FROM OUTSIDE OF BASE RAIL. ALLOW 0- 5/16 [8] ON EACH SIDE FOR TOP COVER DRIP EDGE.
9. A FIELD SUPPLIED 90° ELBOW DUCT MUST BE INSTALLED IN THE SUPPLY DUCTWORK BELOW THE UNIT DISCHARGE CONNECTION.

UNIT SIZE	OPERATING WT. WITHOUT HEAT (50PG)	UNIT HEIGHT	UNIT LENGTH	UNIT LENGTH	UNIT LENGTH	CENTER OF GRAVITY LOCATION			CORNER WEIGHT LB [KG]			
		W	E	F	G	X	Y	Z				
	LB [KG]	IN. [MM]	IN. [MM]	IN. [MM]	IN. [MM]	IN. [MM]	IN. [MM]	IN. [MM]	A	B	C	D
PG20	2367 [1074]	57-3/4 [1467]	196-7/16 [4989]	172-15/16 [4392]	130-1/16 [3304]	69.7 [1770]	35.9 [912]	30.2 [767]	643.8 [292]	740.9 [336]	456.7 [207]	525.6 [238]
PG24	2483 [1126]	57-3/4 [1467]	196-7/16 [4989]	172-15/16 [4392]	130-1/16 [3304]	72.7 [1847]	36.3 [922]	30.2 [767]	636.9 [289]	804.4 [365]	460.3 [209]	581.4 [264]
PG28	2668 [1210]	69-3/4 [1771]	169-1/4 [4298]	145-3/4 [3701]	116-7/16 [2957]	67.1 [1704]	34.5 [876]	33.8 [859]	679.9 [308]	925.7 [420]	449.9 [204]	612.5 [278]

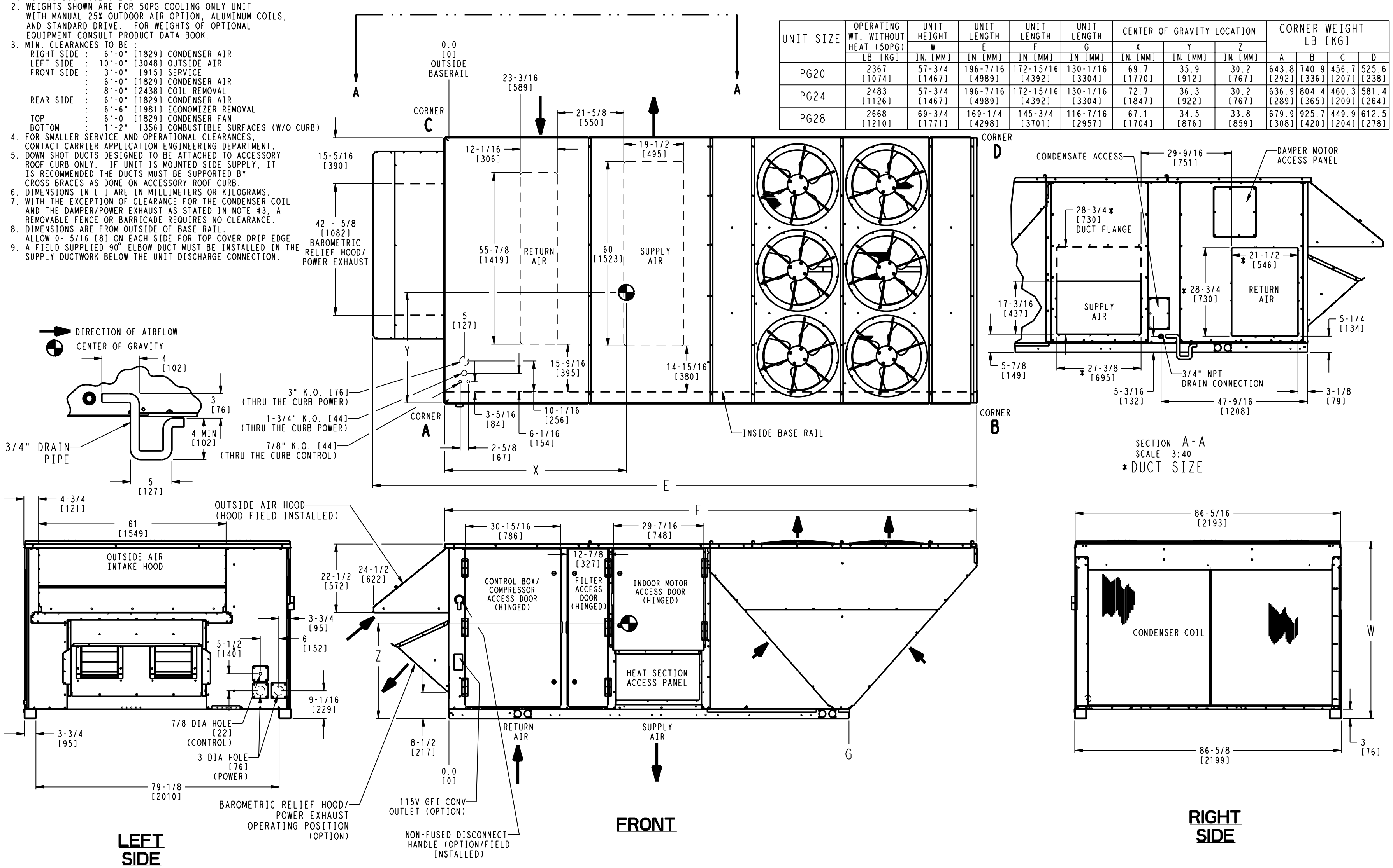


Fig. 4 — Base Unit Dimensions

Table 1 — Physical Data

UNIT 50PG	20		24		28	
VOLTAGE	208/230 and 460	575	208/230 and 460	575	208/230 and 460	575
NOMINAL CAPACITY (Tons)	18		20		25	
OPERATING WEIGHT (lb)						
Al/Al*	2367	2367	2483	2483	2668	2668
COMPRESSOR	Fully Hermetic Scroll					
Quantity	2	2	2	2	3	3
Number of Refrigerant Circuits	2	2	2	2	2	2
Oil (ounces) Comp A1, A2, B1	85, NA, 85	85, NA, 85	85, NA, 85	85, NA, 85	85, 85, 85	85, 85, 85
REFRIGERANT TYPE	Puron® Refrigerant (R-410A)					
Expansion Device	TXV	TXV	TXV	TXV	TXV	TXV
Operating Charge (lb)						
Circuit A	25.3	25.3	35.7	35.7	49.3	49.3
Circuit B	25.3	25.3	33.5	33.5	24.3	24.3
REFRIGERANT SUBCOOLER						
Heat Exchanger Size	B15H x 26 x 26	B15H x 26 x 26	B15H x 26 x 26	B15H x 26 x 26	B15H x 26 x 36	B15H x 26 x 36
Expansion Device	TXV	TXV	TXV	TXV	TXV	TXV
CONDENSER COIL	Enhanced Copper Tubes, Aluminum Lanced Fins					
Rows...Fins/inch	2...17	2...17	3...17	3...17	3...17	3...17
Quantity	2	2	3	3	3	3
Length of Coil (Between Tube Sheets) (in.)	80.3	80.3	80.3	80.3	80.3	80.3
Width (in.)	60	60	60	60	60	60
Total Face area (sq ft)	33.46	33.46	33.46	33.46	33.46	33.46
CONDENSER FAN	Propeller					
Nominal Cfm (Total, all fans)	14,000	14,000	21,000	21,000	21,000	21,000
Quantity...Diameter (in.)	4...22	4...22	6...22	6...22	6...22	6...22
Motor Hp...Rpm	1/4...1100	1/4...1100	1/4...1100	1/4...1100	1/4...1100	1/4...1100
Watts input (Total)	1400	1400	2100	2100	2100	2100
EVAPORATOR COIL	Enhanced Copper Tubes, Face Split, Aluminum Lanced Fins					
Rows...Fins/inch	4...15	4...15	4...15	4...15	4...15	4...15
Length of Coil (Between Tube Sheets) (in.)	69.4	69.4	69.4	69.4	69.4	69.4
Width (in.)	48	48	48	48	60	60
Total Face area (sq ft)	23.13	23.13	23.13	23.13	28.92	28.92
EVAPORATOR FAN	Centrifugal, Belt Type					
Quantity...Size (in.)	2...15 x 11	2...15 x 11	2...15 x 11	2...15 x 11	2...15 x 11	2...15 x 11
Type Drive	Belt	Belt	Belt	Belt	Belt	Belt
Nominal Cfm	7000	7000	8000	8000	10,000	10,000
Motor Bearing Type	Ball	Ball	Ball	Ball	Ball	Ball
Maximum Allowable Fan Rpm	1400	1400	1400	1400	1400	1400
HIGH PRESSURE SWITCHES (psig)						
Cutout	630 ± 10	630 ± 10	630 ± 10	630 ± 10	630 ± 10	630 ± 10
Reset (Auto)	505 ± 20	505 ± 20	505 ± 20	505 ± 20	505 ± 20	505 ± 20
OUTDOOR AIR INLET SCREENS						
Quantity...Size (in.)	3...20 x 25	3...20 x 25	3...20 x 25	3...20 x 25	3...20 x 25	3...20 x 25
RETURN AIR FILTERS						
Quantity...Size (in.)	9...16 x 25 x 2	9...16 x 25 x 2	9...16 x 25 x 2	9...16 x 25 x 2	9...20 x 25 x 2	9...20 x 25 x 2

LEGEND

TXV — Thermostatic Expansion Valve

*Aluminum evaporator coil/aluminum condenser coil.

Table 2 — Fan Motor and Drive Data — Vertical Supply/Return

50PG	20		24		28	
	208/230 and 460 v	575 v	208/230 and 460 v	575 v	208/230 and 460 v	575 v
LOW RANGE						
Motor Hp	3.7	5	3.7	5	5	5
Motor Nominal Rpm	1750	1750	1750	1750	1750	1750
Maximum Continuous Bhp	4.26	5.75	4.26	5.75	5.75	5.75
Maximum Continuous Watts	3174	4290	3174	4290	4290	4290
Motor Frame Size	56HZ	S184T	56HZ	S184T	S184T	S184T
Motor Shaft Diameter (in.)	7/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8
Fan Rpm Range	685-939	751-954	685-939	751-954	687-873	687-873
Motor Pulley Min. Pitch Diameter (in.)	2.7	3.7	2.7	3.7	3.7	3.7
Motor Pulley Max. Pitch Diameter (in.)	3.7	4.7	3.7	4.7	4.7	4.7
Blower Pulley Pitch Diameter (in.)	6.8	8.6	6.8	8.6	9.4	9.4
Blower Pulley Shaft Diameter (in.)	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16
Blower Pulley Type	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Pulley Center Line Distance (in.)	11.293-13.544	9.81-13.055	11.293-13.544	9.81-13.055	9.81-13.055	9.81-13.055
Belt, Quantity...Type...Length (in.)	1...BX38...39.8	1...BX40...41.8	1...BX38...39.8	1...BX40...41.8	1...BX41...42.8	1...BX41...42.8
Speed Change Per Turn — Moveable Pulley (Rpm)	42	34	42	34	31	31
Moveable Pulley Maximum Full Turns	6	6	6	6	6	6
Factory Speed Setting (Rpm)	812	853	812	853	780	780
MID-LOW RANGE						
Motor Hp	5	5	5	5	5	5
Motor Nominal Rpm	1750	1750	1750	1750	1750	1750
Maximum Continuous Bhp	5.75	5.75	5.75	5.75	5.75	5.75
Maximum Continuous Watts	4290	4290	4290	4290	4290	4290
Motor Frame Size	S184T	S184T	S184T	S184T	S184T	S184T
Motor Shaft Diameter (in.)	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
Fan Rpm Range	949-1206	949-1206	949-1206	949-1206	805-1007	805-1007
Motor Pulley Min. Pitch Diameter (in.)	3.7	3.7	3.7	3.7	4.8	4.8
Motor Pulley Max. Pitch Diameter (in.)	4.7	4.7	4.7	4.7	6.0	6.0
Blower Pulley Pitch Diameter (in.)	6.8	6.8	6.8	6.8	10.4	10.4
Blower Pulley Shaft Diameter (in.)	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16
Blower Pulley Type	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Pulley Center Line Distance (in.)	9.81-13.055	9.81-13.055	9.81-13.055	9.81-13.055	9.81-13.055	9.81-13.055
Belt, Quantity...Type...Length (in.)	1...BX38...39.8	1...BX38...39.8	1...BX38...39.8	1...BX38...39.8	1...BX45...46.8	1...BX45...46.8
Speed Change Per Turn — Moveable Pulley (Rpm)	43	43	43	43	34	34
Moveable Pulley Maximum Full Turns	6	6	6	6	6	6
Factory Speed Setting (Rpm)	1078	1078	1078	1078	906	906
MID-HIGH RANGE						
Motor Hp	7.5	7.5	7.5	7.5	7.5	7.5
Motor Nominal Rpm	1750	1750	1750	1750	1750	1750
Maximum Continuous Bhp	8.63	8.63	8.63	8.63	8.63	8.63
Maximum Continuous Watts	6434	6434	6434	6434	6434	6434
Motor Frame Size	S213T	S213T	S213T	S213T	S213T	S213T
Motor Shaft Diameter (in.)	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8
Fan Rpm Range	941-1176	941-1176	941-1176	941-1176	941-1176	941-1176
Motor Pulley Min. Pitch Diameter (in.)	4.8	4.8	4.8	4.8	4.8	4.8
Motor Pulley Max. Pitch Diameter (in.)	6.0	6.0	6.0	6.0	6.0	6.0
Blower Pulley Pitch Diameter (in.)	8.9	8.9	8.9	8.9	8.9	8.9
Blower Pulley Shaft Diameter (in.)	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16
Blower Pulley Type	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Pulley Center Line Distance (in.)	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179
Belt, Quantity...Type...Length (in.)	1...BX42...43.8	1...BX42...43.8	1...BX42...43.8	1...BX42...43.8	1...BX42...43.8	1...BX42...43.8
Speed Change Per Turn — Moveable Pulley (Rpm)	39	39	39	39	39	39
Moveable Pulley Maximum Full Turns	6	6	6	6	6	6
Factory Speed Setting (Rpm)	1059	1059	1059	1059	1059	1059
HIGH RANGE						
Motor Hp	10	10	10	10	10	10
Motor Nominal Rpm	1750	1750	1750	1750	1750	1750
Maximum Continuous Bhp	11.50	11.50	11.50	11.50	11.50	11.50
Maximum Continuous Watts	8579	8579	8579	8579	8579	8579
Motor Frame Size	S215T	S215T	S215T	S215T	S215T	S215T
Motor Shaft Diameter (in.)	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8
Fan Rpm Range	1014-1297	1014-1297	1014-1297	1014-1297	1014-1297	1014-1297
Motor Pulley Min. Pitch Diameter (in.)	4.3	4.3	4.3	4.3	4.3	4.3
Motor Pulley Max. Pitch Diameter (in.)	5.5	5.5	5.5	5.5	5.5	5.5
Blower Pulley Pitch Diameter (in.)	7.4	7.4	7.4	7.4	7.4	7.4
Blower Pulley Shaft Diameter (in.)	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16
Blower Pulley Type	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Pulley Center Line Distance (in.)	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179
Belt, Quantity...Type...Length (in.)	2...BX38...39.8	2...BX38...39.8	2...BX38...39.8	2...BX38...39.8	2...BX38...39.8	2...BX38...39.8
Speed Change Per Turn — Moveable Pulley (Rpm)	47	47	47	47	47	47
Moveable Pulley Maximum Full Turns	6	6	6	6	6	6
Factory Speed Setting (Rpm)	1156	1156	1156	1156	1156	1156

Table 3 — Fan Motor and Drive Data — Horizontal Supply/Return

50PG	20		24		28	
	208/230 and 460 v	575 v	208/230 and 460 v	575 v	208/230 and 460 v	575 v
LOW RANGE						
Motor Hp	3.7	5	3.7	5	5	5
Motor Nominal Rpm	1750	1750	1750	1750	1750	1750
Maximum Continuous Bhp	4.26	5.75	4.26	5.75	5.75	5.75
Maximum Continuous Watts	3174	4290	3174	4290	4290	4290
Motor Frame Size	56HZ	S184T	56HZ	S184T	S184T	S184T
Motor Shaft Diameter (in.)	$^{7}/_{8}$	$1^{1}/_{8}$	$^{7}/_{8}$	$1^{1}/_{8}$	$1^{1}/_{8}$	$1^{1}/_{8}$
Fan Rpm Range	685-939	751-954	685-939	751-954	687-873	687-873
Motor Pulley Min. Pitch Diameter (in.)	2.7	3.7	2.7	3.7	3.7	3.7
Motor Pulley Max. Pitch Diameter (in.)	3.7	4.7	3.7	4.7	4.7	4.7
Blower Pulley Pitch Diameter (in.)	6.8	8.6	6.8	8.6	9.4	9.4
Blower Pulley Shaft Diameter (in.)	1.1875	1.1875	1.1875	1.1875	$1^{3}/_{16}$	$1^{3}/_{16}$
Blower Pulley Type	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Pulley Center Line Distance (in.)	11.293-13.544	9.81-13.055	11.293-13.544	9.81-13.055	9.81-13.055	9.81-13.055
Belt, Quantity...Type...Length (in.)	1...BX38...39.8	1...BX40...41.8	1...BX38...39.8	1...BX40...41.8	1...BX41...42.8	1...BX41...42.8
Speed Change Per Turn — Moveable Pulley (Rpm)	42	34	42	34	31	31
Moveable Pulley Maximum Full Turns	6	6	6	6	6	6
Factory Speed Setting (Rpm)	812	853	812	853	780	780
MID-LOW RANGE						
Motor Hp	5	5	5	5	5	5
Motor Nominal Rpm	1750	1750	1750	1750	1750	1750
Maximum Continuous Bhp	5.75	5.75	5.75	5.75	5.75	5.75
Maximum Continuous Watts	4290	4290	4290	4290	4290	4290
Motor Frame Size	S184T	S184T	S184T	S184T	S184T	S184T
Motor Shaft Diameter (in.)	$1^{1}/_{8}$	$1^{1}/_{8}$	$1^{1}/_{8}$	$1^{1}/_{8}$	$1^{1}/_{8}$	$1^{1}/_{8}$
Fan Rpm Range	949-1206	949-1206	949-1206	949-1206	805-1007	805-1007
Motor Pulley Min. Pitch Diameter (in.)	3.7	3.7	3.7	3.7	4.8	4.8
Motor Pulley Max. Pitch Diameter (in.)	4.7	4.7	4.7	4.7	6.0	6.0
Blower Pulley Pitch Diameter (in.)	6.8	6.8	6.8	6.8	10.4	10.4
Blower Pulley Shaft Diameter (in.)	1.1875	1.1875	1.1875	1.1875	$1^{3}/_{16}$	$1^{3}/_{16}$
Blower Pulley Type	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Pulley Center Line Distance (in.)	9.81-13.055	9.81-13.055	9.81-13.055	9.81-13.055	9.81-13.055	9.81-13.055
Belt, Quantity...Type...Length (in.)	1...BX38...39.8	1...BX38...39.8	1...BX38...39.8	1...BX38...39.8	1...BX45...46.8	1...BX45...46.8
Speed Change Per Turn — Moveable Pulley (Rpm)	43	43	43	43	34	34
Moveable Pulley Maximum Full Turns	6	6	6	6	6	6
Factory Speed Setting (Rpm)	1078	1078	1078	1078	906	906
MID-HIGH RANGE						
Motor Hp	7.5	7.5	7.5	7.5	7.5	7.5
Motor Nominal Rpm	1750	1750	1750	1750	1750	1750
Maximum Continuous Bhp	8.63	8.63	8.63	8.63	8.63	8.63
Maximum Continuous Watts	6434	6434	6434	6434	6434	6434
Motor Frame Size	S213T	S213T	S213T	S213T	S213T	S213T
Motor Shaft Diameter (in.)	$1^{3}/_{8}$	$1^{3}/_{8}$	$1^{3}/_{8}$	$1^{3}/_{8}$	$1^{3}/_{8}$	$1^{3}/_{8}$
Fan Rpm Range	941-1176	941-1176	941-1176	941-1176	941-1176	941-1176
Motor Pulley Min. Pitch Diameter (in.)	4.8	4.8	4.8	4.8	4.8	4.8
Motor Pulley Max. Pitch Diameter (in.)	6.0	6.0	6.0	6.0	6.0	6.0
Blower Pulley Pitch Diameter (in.)	8.9	8.9	8.9	8.9	8.9	8.9
Blower Pulley Shaft Diameter (in.)	1.1875	1.1875	1.1875	1.1875	$1^{3}/_{16}$	$1^{3}/_{16}$
Blower Pulley Type	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Pulley Center Line Distance (in.)	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179
Belt, Quantity...Type...Length (in.)	1...BX42...43.8	1...BX42...43.8	1...BX42...43.8	1...BX42...43.8	1...BX42...43.8	1...BX42...43.8
Speed Change Per Turn — Moveable Pulley (Rpm)	39	39	39	39	39	39
Moveable Pulley Maximum Full Turns	6	6	6	6	6	6
Factory Speed Setting (Rpm)	1059	1059	1059	1059	1059	1059
HIGH RANGE						
Motor Hp	10	10	10	10	10	10
Motor Nominal Rpm	1750	1750	1750	1750	1750	1750
Maximum Continuous Bhp	11.50	11.50	11.50	11.50	11.50	11.50
Maximum Continuous Watts	8579	8579	8579	8579	8579	8579
Motor Frame Size	S215T	S215T	S215T	S215T	S215T	S215T
Motor Shaft Diameter (in.)	$1^{3}/_{8}$	$1^{3}/_{8}$	$1^{3}/_{8}$	$1^{3}/_{8}$	$1^{3}/_{8}$	$1^{3}/_{8}$
Fan Rpm Range	1014-1297	1014-1297	1014-1297	1014-1297	1014-1297	1014-1297
Motor Pulley Min. Pitch Diameter (in.)	4.3	4.3	4.3	4.3	4.3	4.3
Motor Pulley Max. Pitch Diameter (in.)	5.5	5.5	5.5	5.5	5.5	5.5
Blower Pulley Pitch Diameter (in.)	7.4	7.4	7.4	7.4	7.4	7.4
Blower Pulley Shaft Diameter (in.)	1.1875	1.1875	1.1875	1.1875	$1^{3}/_{16}$	$1^{3}/_{16}$
Blower Pulley Type	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Pulley Center Line Distance (in.)	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179	9.025-12.179
Belt, Quantity...Type...Length (in.)	2...BX38...39.8	2...BX38...39.8	2...BX38...39.8	2...BX38...39.8	1...BX38...39.8	1...BX38...39.8
Speed Change Per Turn — Moveable Pulley (Rpm)	47	47	47	47	47	47
Moveable Pulley Maximum Full Turns	6	6	6	6	6	6
Factory Speed Setting (Rpm)	1156	1156	1156	1156	1156	1156

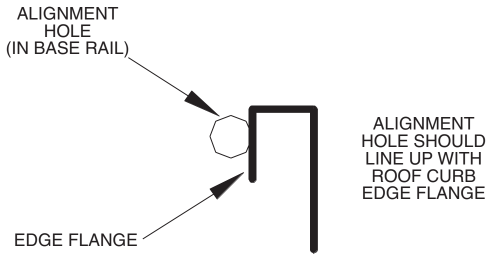


Fig. 5 — Alignment Hole Details

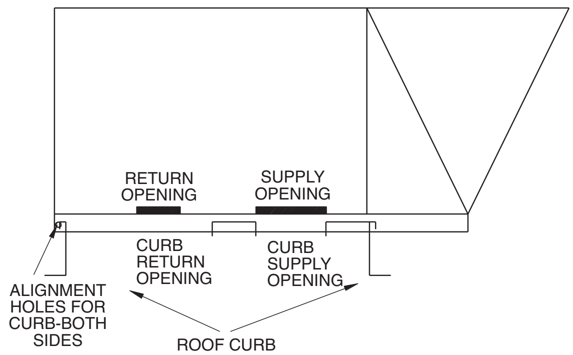


Fig. 6 — Alignment Hole Location

Step 4 — Field Fabricate Ductwork — On vertical units, secure all ducts to roof curb and building structure. *Do not connect ductwork to unit.* For horizontal applications, field-supplied flanges should be attached to horizontal discharge openings and all ductwork secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes.

A minimum clearance is not required around ductwork. Cabinet return-air static shall not exceed –.35 in. wg with economizer or .45 in. wg without economizer.

These units are designed for a minimum continuous return-air temperature in heating of 50 F (dry bulb), or an intermittent operation down to 45 F (dry bulb), such as when used with a night set-back thermostat.

To operate at lower return-air temperatures, a field-supplied outdoor-air temperature control must be used to initiate both stages of heat when the temperature is below 45 F. Indoor comfort may be compromised when these lower air temperatures are used with insufficient heating temperature rise.

Step 5 — Make Unit Duct Connections

VERTICAL CONFIGURATION — Unit is shipped for thru-the-bottom duct connections. Ductwork openings are shown in Fig. 1 and 4. Duct connections for vertical supply and return configuration are shown in Fig. 7. Field-fabricated concentric ductwork may be connected as shown in Fig. 8 and 9. The unit is designed to attach the ductwork to the roof curb. Do not attach duct directly to the unit.

⚠ WARNING

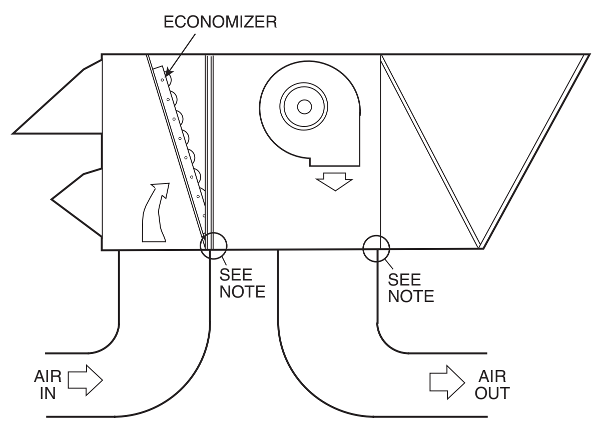
For vertical supply and return units, tools or parts could drop into ductwork and cause an injury. Install a 90-degree turn in the return ductwork between the unit and the conditioned space. If a 90-degree elbow cannot be installed, then a grille of sufficient strength and density should be installed to prevent objects from falling into the conditioned space.

Units with electric heat require a 1-in. clearance for the first 24 in. of ductwork. Outlet grilles must not lie directly below unit discharge.

NOTE: A 90-degree elbow must be provided in the supply ductwork to comply with UL (Underwriters' Laboratories) codes for use with electric heat.

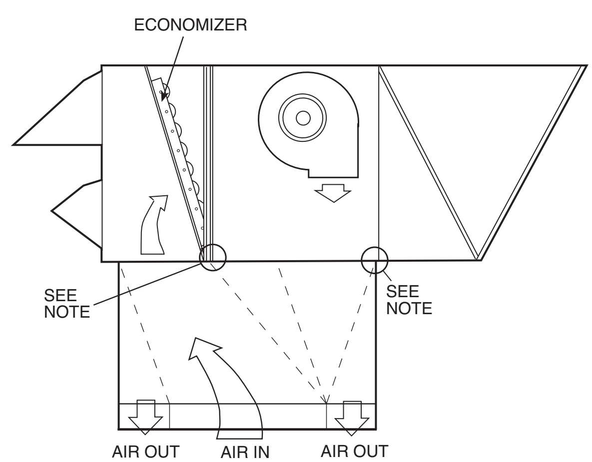
HORIZONTAL APPLICATIONS — Horizontal units are shipped with outer panels that allow for side by side horizontal duct connections. If specified during ordering, the unit will be shipped with the vertical duct openings blocked off from the factory, ready for side supply installation. If the horizontal option was not specified at time of ordering the unit, a field-installed accessory kit is required to convert the vertical unit into a horizontal supply configuration.

Installation of the duct block-off covers should be completed prior to placing the unit unless sufficient side clearance is available. A minimum of 66 in. is required between the unit and any obstruction to install the duct block-off covers. Side supply duct dimensions and locations are shown on Fig. 4. Connect ductwork to horizontal duct flange connections on side of unit.



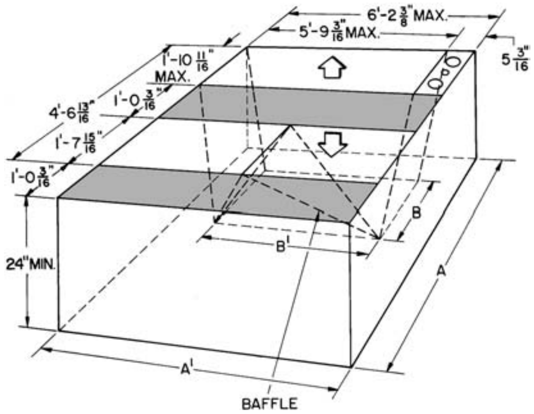
NOTE: Do not drill in this area; damage to basepan may result in water leak.

Fig. 7 — Air Distribution — Vertical Supply and Return



NOTE: Do not drill in this area; damage to basepan may result in water leak.

Fig. 8 — Air Distribution — Concentric Duct



NOTE: Dimensions A, A′, B, and B′ are obtained from field-supplied ceiling diffuser.

Shaded areas indicate block-off pans.

Fig. 9 — Concentric Duct Details

Step 6 — Trap Condensate Drain — See Fig. 10 for drain location. One 3/4-in. half coupling is provided outside unit evaporator section for condensate drain connection. A trap at least 4-in. deep must be used. See Fig. 11.

All units must have an external trap for condensate drainage. Install a trap at least 4 in. deep and protect against freeze-up. If drain line is installed downstream from the external trap, pitch the line away from the unit at 1 in. per 10 ft of run. Do not use a pipe size smaller than the unit connection.

Step 7 — Make Electrical Connections

FIELD POWER SUPPLY — Unit is factory wired for voltage shown on unit nameplate. Be sure to check for correct voltage.

When installing units, provide disconnect per NEC (National Electrical Code) of adequate size (MOCP [Maximum Overcurrent protection] of unit is on the informative plate). See Tables 4A and 4B. All field wiring must comply with NEC and local codes. Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 12 for power wiring connections to the unit power terminal block and equipment grounds.

Route power and ground lines through control box end panel or unit basepan (see Fig. 4) to connections as shown on unit wiring diagram and Fig. 12.

⚠ CAUTION

The correct power phasing is critical to the operation of the scroll compressors. An incorrect phasing will result in an alarm being generated and compressor operation lockout. Should this occur, power phase correction must be made to the incoming power.

⚠ WARNING

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC, ANSI/NFPA (American National Standards Institute/National Fire Protection Association), latest edition, and local electrical codes. Failure to follow this warning could result in the installer being liable for personal injury of others.

Field wiring must conform to temperature limitations for type "T" wire. All field wiring must comply with NEC and local requirements.

Operating voltage to compressor must be within voltage range indicated on unit nameplate. On 3-phase units, voltages between phases must be balanced within 2%.

Unit failure as a result of operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components.

FIELD CONTROL WIRING — Unit can be controlled with a Carrier-approved accessory thermostat. Install thermostat according to the installation instructions included with accessory. Locate thermostat assembly or space temperature sensor on a solid interior wall in the conditioned space to sense average temperature.

Route thermostat cable or equivalent single leads of colored wire from subbase terminals through conduit into unit to low-voltage connections as shown on unit label wiring diagram and in Fig. 13.

NOTE: For wire runs up to 50 ft, use no. 18 AWG (American Wire Gage) insulated wire (35 C minimum). For 50 to 75 ft, use no. 16 AWG insulated wire (35 C minimum). For over 75 ft, use no. 14 AWG insulated wire (35 C minimum). All wire larger than no. 18 AWG cannot be directly connected at the thermostat and will require a junction box and splice at the thermostat.

Text continued on page 23.

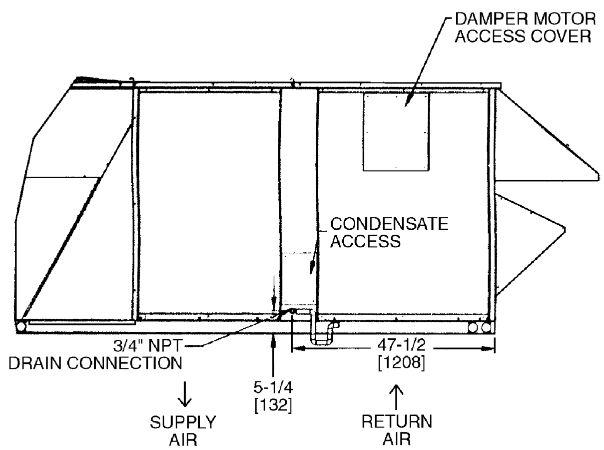
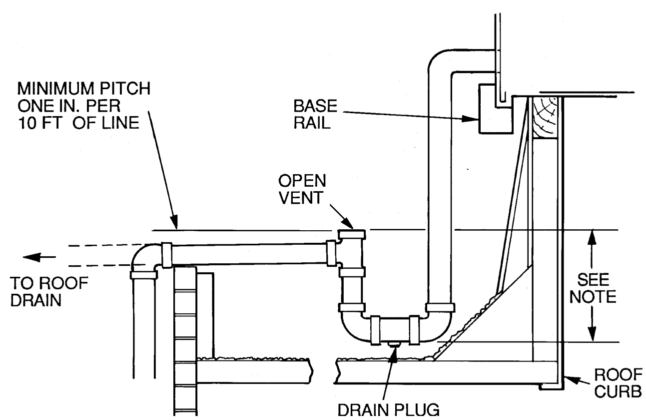


Fig. 10 — Condensate Drain Details



NOTE: Trap should be deep enough to offset maximum unit static difference. A 4-in. trap is recommended.

Fig. 11 — Condensate Drain Piping Details

Table 4A — Electrical Data (Units Without Optional Convenience Outlet)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
20	208/230	187	253	28.2	208	28.2	208	—	—	4	0.25	1.5	—	—	3.7	10.6/ 9.6	— 2	— 1	— 5.9	80/ 79 92/ 91	100/100 100/100	80/ 80 92/ 92	100/100 100/100	84/ 83 98/ 96
															5	16.7/15.2	— 2	— 1	— 5.9	86/ 85 98/ 96	100/100 100/100	86/ 86 98/ 98	100/100 100/100	91/ 89 105/103
															7.5	24.2/22	— 2	— 1	— 5.9	94/ 91 105/103	100/100 125/125	94/ 94 105/105	100/100 125/125	100/ 97 113/111
															10	30.8/28	— 2	— 1	— 5.9	101/ 97 113/109	125/100 125/125	101/101 113/113	125/125 125/125	107/104 121/118
													19/25	52/ 60	3.7	10.6/ 9.6	— 2	— 1	— 5.9	80/ 87 93/102	100/100 100/110	87/ 87 102/102	100/100 125/125	84/ 83 98/ 96
															5	16.7/15.2	— 2	— 1	— 5.9	86/ 94 101/109	100/100 125/110	94/ 94 109/109	100/100 125/125	91/ 89 105/103
															7.5	24.2/22	— 2	— 1	— 5.9	95/103 110/117	100/110 125/125	103/103 117/117	125/125 125/125	100/ 97 113/111
															10	30.8/28	— 2	— 1	— 5.9	104/110 118/125	125/125 125/125	110/110 125/125	125/125 125/125	107/104 121/118
													38/50	104/120	3.7	10.6/ 9.6	— 2	— 1	— 5.9	143/132 158/147	150/150 175/150	143/143 158/158	150/150 175/175	132/149 145/163
															5	16.7/15.2	— 2	— 1	— 5.9	151/139 166/154	175/150 175/175	151/151 166/166	175/175 175/175	139/155 152/169
															7.5	24.2/22	— 2	— 1	— 5.9	160/148 175/162	175/150 200/175	160/160 175/175	175/175 200/200	147/163 161/177
															10	30.8/28	— 2	— 1	— 5.9	169/155 183/170	175/175 200/175	169/169 183/183	175/175 200/200	155/170 169/184
													56/75†	156/180	3.7	10.6/ 9.6	— 2	— 1	— 5.9	80/ 79 92/ 91	100/100 100/100	80/ 80 92/ 92	100/100 100/100	84/ 83 98/ 96
															5	16.7/15.2	— 2	— 1	— 5.9	86/ 85 98/ 96	100/100 100/100	86/ 86 98/ 98	100/100 100/100	91/ 89 105/103
															7.5	24.2/22	— 2	— 1	— 5.9	94/ 91 105/103	100/100 125/125	94/ 94 105/105	100/100 125/125	100/ 97 113/111
															10	30.8/28	— 2	— 1	— 5.9	101/ 97 113/109	125/100 125/125	101/101 113/113	125/125 125/125	107/104 121/118
	460	414	506	15.4	104	15.4	104	—	—	4	0.25	0.7	—	—	3.7	4.8	— 2	— 1	— 3.1	42 48	50 60	42 48	50 60	44 51
															5	7.6	— 2	— 1	— 3.1	45 51	60 60	45 51	60 60	47 55
															7.5	11	— 2	— 1	— 3.1	48 55	60 60	48 55	60 60	51 58
															10	14	— 2	— 1	— 3.1	51 58	60 60	51 58	60 60	55 62
													25	30	3.7	4.8	— 2	— 1	— 3.1	44 51	50 60	44 51	50 60	44 51
															5	7.6	— 2	— 1	— 3.1	47 55	60 60	47 55	60 60	47 55
															7.5	11	— 2	— 1	— 3.1	51 59	60 60	51 59	60 60	51 58
															10	14	— 2	— 1	— 3.1	55 63	60 70	55 63	60 70	55 62
													50	60	3.7	4.8	— 2	— 1	— 3.1	66 74	80 80	66 74	80 80	75 82
															5	7.6	— 2	— 1	— 3.1	70 77	80 80	70 77	80 80	78 85
															7.5	11	— 2	— 1	— 3.1	74 82	80 90	74 82	80 90	82 89
															10	14	— 2	— 1	— 3.1	78 85	90 90	78 85	90 90	85 92
													75	90	3.7	4.8	— 2	— 1	— 3.1	96 104	100 110	96 104	100 125	109 116
															5	7.6	— 2	— 1	— 3.1	100 107	110 125	100 107	125 125	112 119
															7.5	11	— 2	— 1	— 3.1	104 112	125 125	104 112	125 125	116 123
															10	14	— 2	— 1	— 3.1	108 115	125 125	108 115	125 125	120 127

See Legend and Notes on page 12.

Table 4A — Electrical Data (Units Without Optional Convenience Outlet) (cont)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
20	575	518	633	12.8	83	12.8	83	—	—	4	0.25	0.7	—	—	5	6.1	— 2	— 1	— 2.4	38 43	50 50	38 43	50 50	40 45
															7.5	9	— 2	— 1	— 2.4	41 45	50 50	41 45	50 50	43 49
															10	11	— 2	— 1	— 2.4	43 47	50 60	43 47	50 60	45 51
													24.8	24	5	6.1	— 2	— 1	— 2.4	38 44	50 50	38 44	50 50	40 45
															7.5	9	— 2	— 1	— 2.4	41 47	50 50	41 47	50 50	43 49
															10	11	— 2	— 1	— 2.4	44 50	50 60	44 50	50 60	45 51
													48.3	46	5	6.1	— 2	— 1	— 2.4	65 71	70 80	65 71	70 80	60 65
															7.5	9	— 2	— 1	— 2.4	69 75	70 80	69 75	70 80	63 69
															10	11	— 2	— 1	— 2.4	71 77	80 80	71 77	80 80	66 71
													78	75	5	6.1	— 2	— 1	— 2.4	83 89	90 100	83 89	90 100	93 99
															7.5	9	— 2	— 1	— 2.4	86 92	100 100	86 92	100 100	97 102
															10	11	— 2	— 1	— 2.4	89 95	100 100	89 95	100 100	99 104

ELECTRIC HEAT BRANCH CIRCUIT FOR 208/240-V 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
20	208/240	187	253	NA	NA	NA	NA	NA	NA	NA	NA	NA	56/75	156/180	NA	NA	NA	NA	NA	156/180	175/200	180/180	200/200	179/207

FEEDER CIRCUIT FOR 208/230-V UNIT WITH 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
20	208/240	187	253	28.2	208	28.2	208	—	—	4	0.25	1.5	56/75	156/180	3.7	10.6/ 9.6	— 2	— 1	— 5.9	169/192 184/207	200/225 200/225	192/192 207/207	200/225 225/225	192/218 205/232
															5	16.7/15.2	— 2	— 1	— 5.9	177/199 192/214	200/225 200/225	199/199 214/214	200/225 225/225	199/224 212/238
															7.5	24.2/22	— 2	— 1	— 5.9	186/208 201/222	200/225 225/225	208/208 222/222	225/225 225/225	207/232 221/246
															10	30.8/28	— 2	— 1	— 5.9	195/215 209/230	225/225 225/250	215/215 230/230	225/225 250/250	215/239 228/253

LEGEND

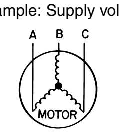
FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

*Fuse or HACR circuit breaker.
†208/230 v 75-kW Electric Heat units must use dual-point wiring. The main table lists the branch circuit values for the refrigeration part of the system. The following two tables list the branch circuit values for the electric heat and values for a feeder circuit for both branch circuits.

NOTES:
1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.
   % Voltage Imbalance

   $$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

   Example: Supply voltage is 460-3-60.



   AB = 452 v
   BC = 464 v
   AC = 455 v

   $$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

   $$= \frac{1371}{3}$$

   $$= 457$$

   Determine maximum deviation from average voltage.
   (AB) 457 – 452 = 5 v
   (BC) 464 – 457 = 7 v
   (AC) 457 – 455 = 2 v
   Maximum deviation is 7 v.
   Determine percent of voltage imbalance.

   $$\%\ \text{Voltage Imbalance} = 100 \times \frac{7}{457}$$

   $$= 1.53\%$$

   This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

   IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact the local electric utility company immediately.

3. The 75-kW 208/240-v electric heat can be factory installed but it must be wired separately in the field.
4. The convenience outlet full load amps (FLA) are 5, 3 and 3 for 208/230, 460, 575-v units, respectively.
5. The FLA load amps provided in the table for electric heaters are based on 208/240, 480 and 600 v.
6. MCA calculation for 50PG units with electric heaters over 50 kW is = 1.25 x (IFM + Power Exhaust + Convenience Outlet FLA amps) + 1.00 x (Electric Heater FLA).

Table 4A — Electrical Data (Units Without Optional Convenience Outlet) (cont)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		COMPRESSOR No. 3		OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
24	208/230	187	253	32.1	240	32.1	240	—	—	6	0.25	1.5	—	—	3.7	10.6/ 9.6	— 2	— 1	— 5.9	92/ 91 104/103	100/100 125/125	92/ 92 104/104	100/100 125/125	96/ 95 110/109
															5	16.7/15.2	— 2	— 1	— 5.9	98/ 96 110/108	100/100 125/125	98/ 98 110/110	100/100 125/125	103/102 117/115
															7.5	24.2/22	— 2	— 1	— 5.9	105/103 117/115	125/125 125/125	105/105 117/117	125/125 125/125	112/109 126/123
															10	30.8/28	— 2	— 1	— 5.9	112/109 124/121	125/125 150/150	112/112 124/124	125/125 150/150	120/116 133/130
													19/25	52/ 60	3.7	10.6/ 9.6	— 2	— 1	— 5.9	92/ 91 104/103	100/100 125/125	92/ 92 104/104	100/100 125/125	96/ 95 110/109
															5	16.7/15.2	— 2	— 1	— 5.9	98/ 96 110/109	100/100 125/125	98/ 98 110/110	100/100 125/125	103/102 117/115
															7.5	24.2/22	— 2	— 1	— 5.9	105/103 117/117	125/125 125/125	105/105 117/117	125/125 125/125	112/109 126/123
															10	30.8/28	— 2	— 1	— 5.9	112/110 124/125	125/125 150/150	112/112 125/125	125/125 150/150	120/116 133/130
													38/50	104/120	3.7	10.6/ 9.6	— 2	— 1	— 5.9	143/132 158/147	150/150 175/150	143/143 158/158	150/150 175/175	132/149 145/163
															5	16.7/15.2	— 2	— 1	— 5.9	151/139 166/154	175/150 175/175	151/151 166/166	175/175 175/175	139/155 152/169
															7.5	24.2/22	— 2	— 1	— 5.9	160/148 175/162	175/150 200/175	160/160 175/175	175/175 200/200	147/163 161/177
															10	30.8/28	— 2	— 1	— 5.9	169/155 183/170	175/175 200/175	169/169 183/183	175/175 200/200	155/170 169/184
													56/75†	156/180	3.7	10.6/ 9.6	— 2	— 1	— 5.9	92/ 91 104/103	100/100 125/125	92/ 92 104/104	100/100 125/125	96/ 95 110/109
															5	16.7/15.2	— 2	— 1	— 5.9	98/ 96 110/108	100/100 125/125	98/ 98 110/110	100/100 125/125	103/102 117/115
															7.5	24.2/22	— 2	— 1	— 5.9	105/103 117/115	125/125 125/125	105/105 117/117	125/125 125/125	112/109 126/123
															10	30.8/28	— 2	— 1	— 5.9	112/109 124/121	125/125 150/150	112/112 124/124	125/125 150/150	120/116 133/130
	460	414	506	15.4	110	15.4	110	—	—	6	0.25	0.7	—	—	3.7	4.8	— 2	— 1	— 3.1	44 50	50 60	44 50	50 60	46 53
															5	7.6	— 2	— 1	— 3.1	46 53	60 60	46 53	60 60	49 56
															7.5	11	— 2	— 1	— 3.1	50 56	60 60	50 56	60 60	53 60
															10	14	— 2	— 1	— 3.1	53 59	60 60	53 59	60 60	56 63
													25	30	3.7	4.8	— 2	— 1	— 3.1	44 51	50 60	44 51	50 60	46 53
															5	7.6	— 2	— 1	— 3.1	47 55	60 60	47 55	60 60	49 56
															7.5	11	— 2	— 1	— 3.1	51 59	60 60	51 59	60 60	53 60
															10	14	— 2	— 1	— 3.1	55 63	60 70	55 63	60 70	56 63
													50	60	3.7	4.8	— 2	— 1	— 3.1	66 74	80 80	66 74	80 80	75 82
															5	7.6	— 2	— 1	— 3.1	70 77	80 80	70 77	80 80	78 85
															7.5	11	— 2	— 1	— 3.1	74 82	80 90	74 82	80 90	82 89
															10	14	— 2	— 1	— 3.1	78 85	90 90	78 85	90 90	85 92
													75	90	3.7	4.8	— 2	— 1	— 3.1	96 104	100 110	96 104	100 125	109 116
															5	7.6	— 2	— 1	— 3.1	100 107	110 125	100 107	125 125	112 119
															7.5	11	— 2	— 1	— 3.1	104 112	125 125	104 112	125 125	116 123
															10	14	— 2	— 1	— 3.1	108 115	125 125	108 115	125 125	120 127

See Legend and Notes on page 14.

Table 4A — Electrical Data (Units Without Optional Convenience Outlet) (cont)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		COMPRESSOR No. 3		OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
24	575	518	633	12.8	88	12.8	88	—	—	6	0.25	0.7	—	—	5	6.1	— 2	— 1	— 2.4	39 44	50 50	39 44	50 50	41 47
															7.5	9	— 2	— 1	— 2.4	42 47	50 50	42 47	50 50	45 50
															10	11	— 2	— 1	— 2.4	44 49	50 60	44 49	50 60	47 52
													24.8	24	5	6.1	— 2	— 1	— 2.4	39 44	50 50	39 44	50 50	41 47
															7.5	9	— 2	— 1	— 2.4	42 47	50 50	42 47	50 50	45 50
															10	11	— 2	— 1	— 2.4	44 50	50 60	44 50	50 60	47 52
													48.3	46	5	6.1	— 2	— 1	— 2.4	65 71	70 80	65 71	70 80	60 65
															7.5	9	— 2	— 1	— 2.4	69 75	70 80	69 75	70 80	63 69
															10	11	— 2	— 1	— 2.4	71 77	80 80	71 77	80 80	66 71
													78	75	5	6.1	— 2	— 1	— 2.4	83 89	90 100	83 89	90 100	93 99
															7.5	9	— 2	— 1	— 2.4	86 92	100 100	86 92	100 100	97 102
															10	11	— 2	— 1	— 2.4	89 95	100 100	89 95	100 100	99 104

ELECTRIC HEAT BRANCH CIRCUIT FOR 208/240-V 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		COMPRESSOR No. 3		OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
24	208/240	187	253	NA	NA	NA	NA	NA	NA	NA	NA	NA	56/75	156/180	NA	NA	NA	NA	NA	156/180	175/200	180/180	200/200	179/207

FEEDER CIRCUIT FOR 208/230-V UNIT WITH 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		COMPRESSOR No. 3		OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
24	208/240	187	253	32.1	240	32.1	240	—	—	6	0.25	1.5	56/75	156/180	3.7	10.6/ 9.6	— 2	— 1	— 5.9	169/192 184/207	200/225 200/225	192/192 207/207	200/225 225/225	192/218 205/232
															5	16.7/15.2	— 2	— 1	— 5.9	177/199 192/214	200/225 200/225	199/199 214/214	200/225 225/225	199/224 212/238
															7.5	24.2/22	— 2	— 1	— 5.9	186/208 201/222	200/225 225/225	208/208 222/222	225/225 225/225	207/232 221/246
															10	30.8/28	— 2	— 1	— 5.9	195/215 209/230	225/225 225/250	215/215 230/230	225/225 250/250	215/239 228/253

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

*Fuse or HACR circuit breaker.
†208/230 v 75-kW Electric Heat units must use dual-point wiring. The main table lists the branch circuit values for the refrigeration part of the system. The following two tables list the branch circuit values for the electric heat and values for a feeder circuit for both branch circuits.

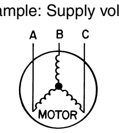
NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

   % Voltage Imbalance

   $$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

   Example: Supply voltage is 460-3-60.



   AB = 452 v
   BC = 464 v
   AC = 455 v

   $$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$
   $$= \frac{1371}{3}$$
   $$= 457$$

   Determine maximum deviation from average voltage.
   (AB) 457 – 452 = 5 v
   (BC) 464 – 457 = 7 v
   (AC) 457 – 455 = 2 v

   Maximum deviation is 7 v.

   Determine percent of voltage imbalance.

   $$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457}$$
   $$= 1.53\%$$

   This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

   IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact the local electric utility company immediately.

3. The 75-kW 208/240-v electric heat can be factory installed but it must be wired separately in the field.
4. The convenience outlet full load amps (FLA) are 5, 3 and 3 for 208/230, 460, 575-v units, respectively.
5. The FLA load amps provided in the table for electric heaters are based on 208/240, 480 and 600 v.
6. MCA calculation for 50PG units with electric heaters over 50 kW is = 1.25 x (IFM + Power Exhaust + Convenience Outlet FLA amps) + 1.00 x (Electric Heater FLA).

Table 4A — Electrical Data (Units Without Optional Convenience Outlet) (cont)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		COMPRESSOR No. 3		OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
28	208/230	187	253	28.2	208	28.2	208	28.2	208	6	0.25	1.5	—	—	5	16.7/15.2	— 2	— 1	— 5.9	117/116 129/128	125/125 150/150	117/117 129/129	125/125 150/150	127/125 140/139
															7.5	24.2/22	— 2	— 1	— 5.9	125/123 137/134	150/150 150/150	125/125 137/137	150/150 150/150	135/133 149/147
															10	30.8/28	— 2	— 1	— 5.9	132/129 144/140	150/150 150/150	132/132 144/144	150/150 150/150	143/140 157/153
													19/25	52/ 60	5	16.7/15.2	— 2	— 1	— 5.9	117/116 129/128	125/125 150/150	117/117 129/129	125/125 150/150	127/125 140/139
															7.5	24.2/22	— 2	— 1	— 5.9	125/123 137/134	150/150 150/150	125/125 137/137	150/150 150/150	135/133 149/147
															10	30.8/28	— 2	— 1	— 5.9	132/129 144/140	150/150 150/150	132/132 144/144	150/150 150/150	143/140 157/153
													38/50	104/120	5	16.7/15.2	— 2	— 1	— 5.9	151/139 166/154	175/150 175/175	151/151 166/166	175/175 175/175	139/155 152/169
															7.5	24.2/22	— 2	— 1	— 5.9	160/148 175/162	175/150 200/175	160/160 175/175	175/175 200/200	147/163 161/177
															10	30.8/28	— 2	— 1	— 5.9	169/155 183/170	175/175 200/175	169/169 183/183	175/175 200/200	155/170 169/184
													56/75†	156/180	5	16.7/15.2	— 2	— 1	— 5.9	117/116 129/128	125/125 150/150	117/117 129/129	125/125 150/150	127/125 140/139
															7.5	24.2/22	— 2	— 1	— 5.9	125/123 137/134	150/150 150/150	125/125 137/137	150/150 150/150	135/133 149/147
															10	30.8/28	— 2	— 1	— 5.9	132/129 144/140	150/150 150/150	132/132 144/144	150/150 150/150	143/140 157/153
	460	414	506	15.4	104	15.4	104	15.4	104	6	0.25	0.7	—	—	5	7.6	— 2	— 1	— 3.1	62 68	70 80	62 68	70 80	67 74
															7.5	11	— 2	— 1	— 3.1	65 71	80 80	65 71	80 80	71 78
															10	14	— 2	— 1	— 3.1	68 74	80 80	68 74	80 80	74 81
													25	30	5	7.6	— 2	— 1	— 3.1	62 68	70 80	62 68	70 80	67 74
															7.5	11	— 2	— 1	— 3.1	65 71	80 80	65 71	80 80	71 78
															10	14	— 2	— 1	— 3.1	68 74	80 80	68 74	80 80	74 81
													50	60	5	7.6	— 2	— 1	— 3.1	70 77	80 80	70 77	80 80	78 85
															7.5	11	— 2	— 1	— 3.1	74 82	80 90	74 82	80 90	82 89
															10	14	— 2	— 1	— 3.1	78 85	90 90	78 85	90 90	85 92
													75	90	5	7.6	— 2	— 1	— 3.1	100 107	110 125	100 107	125 125	112 119
															7.5	11	— 2	— 1	— 3.1	104 112	125 125	104 112	125 125	116 123
															10	14	— 2	— 1	— 3.1	108 115	125 125	108 115	125 125	120 127

See Legend and Notes on page 16.

Table 4A — Electrical Data (Units Without Optional Convenience Outlet) (cont)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
28	575	518	633	12.8	83	12.8	83	12.8	83	6	0.25	0.7	—	—	5	6.1	— 2	— 1	— 2.4	52 57	60 60	52 57	60 60	56 62
															7.5	9	— 2	— 1	— 2.4	55 60	60 60	55 60	60 60	59 65
															10	11	— 2	— 1	— 2.4	57 62	60 70	57 62	60 70	62 67
													24.8	24	5	6.1	— 2	— 1	— 2.4	52 57	60 60	52 57	60 60	56 62
															7.5	9	— 2	— 1	— 2.4	55 60	60 60	55 60	60 60	59 65
															10	11	— 2	— 1	— 2.4	57 62	60 70	57 62	60 70	62 67
													48.3	46	5	6.1	— 2	— 1	— 2.4	65 71	70 80	65 71	70 80	60 65
															7.5	9	— 2	— 1	— 2.4	69 75	70 80	69 75	70 80	63 69
															10	11	— 2	— 1	— 2.4	71 77	80 80	71 77	80 80	66 71
													78	75	5	6.1	— 2	— 1	— 2.4	83 89	90 100	83 89	90 100	93 99
															7.5	9	— 2	— 1	— 2.4	86 92	100 100	86 92	100 100	97 102
															10	11	— 2	— 1	— 2.4	89 95	100 100	89 95	100 100	99 104

ELECTRIC HEAT BRANCH CIRCUIT FOR 208/240-V 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
28	208/240	187	253	NA	NA	NA	NA	NA	NA	NA	NA	NA	56/75	156/180	NA	NA	NA	NA	NA	156/180	175/200	180/180	200/200	179/207

FEEDER CIRCUIT FOR 208/230-V UNIT WITH 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
28	208/240	187	253	28.2	208	28.2	208	28.2	208	6	0.25	1.5	56/75	156/180	5	16.7/15.2	— 2	— 1	— 5.9	177/199 192/214	200/225 200/225	199/199 214/214	200/225 225/225	199/224 212/238
															7.5	24.2/22	— 2	— 1	— 5.9	186/208 201/222	200/225 225/225	208/208 222/222	225/225 225/225	207/232 221/246
															10	30.8/28	— 2	— 1	— 5.9	195/215 209/230	225/225 225/250	215/215 230/230	225/225 250/250	215/239 228/253

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

*Fuse or HACR circuit breaker.
†208/230 v 75-kW Electric Heat units must use dual-point wiring. The main table lists the branch circuit values for the refrigeration part of the system. The following two tables list the branch circuit values for the electric heat and values for a feeder circuit for both branch circuits.

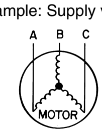
NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

   % Voltage Imbalance

   $$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

   Example: Supply voltage is 460-3-60.

   AB = 452 v
   BC = 464 v
   AC = 455 v

   $$\text{Average Voltage} = \frac{452 + 464 + 455}{3} = \frac{1371}{3} = 457$$

   Determine maximum deviation from average voltage.
   (AB) 457 – 452 = 5 v
   (BC) 464 – 457 = 7 v
   (AC) 457 – 455 = 2 v
   Maximum deviation is 7 v.
   Determine percent of voltage imbalance.

   $$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457} = 1.53\%$$

   This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

   > IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact the local electric utility company immediately.

3. The 75-kW 208/240-v electric heat can be factory installed but it must be wired separately in the field.
4. The convenience outlet full load amps (FLA) are 5, 3 and 3 for 208/230, 460, 575-v units, respectively.
5. The FLA load amps provided in the table for electric heaters are based on 208/240, 480 and 600 v.
6. MCA calculation for 50PG units with electric heaters over 50 kW is = 1.25 x (IFM + Power Exhaust + Convenience Outlet FLA amps) + 1.00 x (Electric Heater FLA).

Table 4B — Electrical Data (Units With Optional Convenience Outlet)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		COMPRESSOR No. 3		OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
20	208/230	187	253	28.2	208	28.2	208	—	—	4	0.25	1.5	—	—	3.7	10.6/ 9.6	— 2	— 1	— 5.9	85/ 84 97/ 96	100/100 100/100	85/ 85 97/ 97	100/100 100/100	90/ 89 103/102
															5	16.7/15.2	— 2	— 1	— 5.9	91/ 90 103/101	100/100 125/125	91/ 91 103/103	100/100 125/125	97/ 95 110/109
															7.5	24.2/22	— 2	— 1	— 5.9	99/ 96 110/108	100/100 125/125	99/ 99 110/110	100/100 125/125	105/103 119/116
															10	30.8/28	— 2	— 1	— 5.9	106/102 118/114	125/125 125/125	106/106 118/118	125/125 125/125	113/110 127/123
													19/25	52/ 60	3.7	10.6/9.6	— 2	— 1	— 5.9	85/ 93 99/108	100/100 100/110	93/ 93 108/108	100/100 125/125	90/ 89 103/102
															5	16.7/15.2	— 2	— 1	— 5.9	92/100 107/115	100/110 125/125	100/100 115/115	125/125 125/125	97/ 95 110/109
															7.5	24.2/22	— 2	— 1	— 5.9	102/109 116/124	125/110 125/125	109/109 124/124	125/125 125/125	105/103 119/116
															10	30.8/28	— 2	— 1	— 5.9	110/116 125/131	125/125 125/150	116/116 131/131	125/125 150/150	113/110 127/123
													38/50	104/120	3.7	10.6/ 9.6	— 2	— 1	— 5.9	150/138 164/153	150/150 175/175	150/150 164/164	150/150 175/175	138/155 151/168
															5	16.7/15.2	— 2	— 1	— 5.9	157/145 172/160	175/150 175/175	157/157 172/172	175/175 175/175	145/161 158/175
															7.5	24.2/22	— 2	— 1	— 5.9	167/154 181/169	175/175 200/175	167/167 181/181	175/175 200/200	153/169 167/183
															10	30.8/28	— 2	— 1	— 5.9	175/161 190/176	175/175 200/200	175/175 190/190	175/175 200/200	161/176 174/190
													56/75†	156/180	3.7	10.6/9.6	— 2	— 1	— 5.9	85/ 84 97/ 96	100/100 100/100	85/ 85 97/ 97	100/100 100/100	90/ 89 103/102
															5	16.7/15.2	— 2	— 1	— 5.9	91/ 90 103/101	100/100 125/125	91/ 91 103/103	100/100 125/125	97/ 95 110/109
															7.5	24.2/22	— 2	— 1	— 5.9	99/ 96 110/108	100/100 125/125	99/ 99 110/110	100/100 125/125	105/103 119/116
															10	30.8/28	— 2	— 1	— 5.9	106/102 118/114	125/125 125/125	106/106 118/118	125/125 125/125	113/110 127/123
	460	414	506	15.4	104	15.4	104	—	—	4	0.25	0.7	—	—	3.7	4.8	— 2	— 1	— 3.1	45 51	60 60	45 51	60 60	48 55
															5	7.6	— 2	— 1	— 3.1	48 54	60 60	48 54	60 60	51 58
															7.5	11	— 2	— 1	— 3.1	51 58	60 60	51 58	60 60	55 62
															10	14	— 2	— 1	— 3.1	54 61	60 70	54 61	60 70	58 65
													25	30	3.7	4.8	— 2	— 1	— 3.1	47 55	60 60	47 55	60 60	48 55
															5	7.6	— 2	— 1	— 3.1	51 59	60 60	51 59	60 60	51 58
															7.5	11	— 2	— 1	— 3.1	55 63	60 70	55 63	60 70	55 62
															10	14	— 2	— 1	— 3.1	59 67	60 70	59 67	60 70	58 65
													50	60	3.7	4.8	— 2	— 1	— 3.1	70 78	80 80	70 78	80 80	78 85
															5	7.6	— 2	— 1	— 3.1	73 81	80 90	73 81	80 90	81 88
															7.5	11	— 2	— 1	— 3.1	78 85	80 90	78 85	80 90	85 92
															10	14	— 2	— 1	— 3.1	81 89	90 100	81 89	90 100	89 96
													75	90	3.7	4.8	— 2	— 1	— 3.1	100 108	110 125	100 108	125 125	112 120
															5	7.6	— 2	— 1	— 3.1	103 111	125 125	103 111	125 125	116 123
															7.5	11	— 2	— 1	— 3.1	108 115	125 125	108 115	125 125	120 127
															10	14	— 2	— 1	— 3.1	111 119	125 125	111 119	125 125	123 130

See Legend and Notes on page 18.

Table 4B — Electrical Data (Units With Optional Convenience Outlet) (cont)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		COMPRESSOR No. 3		OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
20	575	518	633	12.8	83	12.8	83	—	—	4	0.25	0.7	—	—	5	6.1	— 2	— 1	— 2.4	41 46	50 50	41 46	50 50	43 49
															7.5	9	— 2	— 1	— 2.4	44 48	50 60	44 48	50 60	46 52
															10	11	— 2	— 1	— 2.4	46 50	50 60	46 50	50 60	49 54
													24.8	24	5	6.1	— 2	— 1	— 2.4	41 47	50 50	41 47	50 50	43 49
															7.5	9	— 2	— 1	— 2.4	45 51	50 60	45 51	50 60	46 52
															10	11	— 2	— 1	— 2.4	48 54	50 60	48 54	50 60	49 54
													48.3	46	5	6.1	— 2	— 1	— 2.4	69 75	70 80	69 75	70 80	63 69
															7.5	9	— 2	— 1	— 2.4	73 79	80 80	73 79	80 80	67 72
															10	11	— 2	— 1	— 2.4	75 81	80 90	75 81	80 90	69 75
													78	75	5	6.1	— 2	— 1	— 2.4	86 92	100 100	86 92	100 100	97 102
															7.5	9	— 2	— 1	— 2.4	90 96	100 100	90 96	100 100	100 106
															10	11	— 2	— 1	— 2.4	93 99	100 100	93 99	100 100	102 108

ELECTRIC HEAT BRANCH CIRCUIT FOR 208/240-V 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		COMPRESSOR No. 3		OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
20	208/240	187	253	NA	NA	NA	NA	NA	NA	NA	NA	NA	56/75	156/180	NA	NA	NA	NA	NA	156/180	175/200	180/180	200/200	179/207

FEEDER CIRCUIT FOR 208/230-V UNIT WITH 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		COMPRESSOR No. 3		OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
20	208/240	187	253	28.2	208	28.2	208	—	—	4	0.25	1.5	56/75	156/180	3.7	10.6/ 9.6	— 2	— 1	— 5.9	176/198 190/213	200/225 200/225	198/198 213/213	200/225 225/225	197/224 211/237
															5	16.7/15.2	— 2	— 1	— 5.9	183/205 198/220	200/225 200/225	205/205 220/220	225/225 225/225	204/230 218/244
															7.5	24.2/22	— 2	— 1	— 5.9	193/214 207/229	200/225 225/250	214/214 229/229	225/225 250/250	213/238 227/252
															10	30.8/28	— 2	— 1	— 5.9	201/221 216/236	225/225 225/250	221/221 236/236	225/225 250/250	221/245 234/259

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

*Fuse or HACR circuit breaker.
†208/230 v 75-kW Electric Heat units must use dual-point wiring. The main table lists the branch circuit values for the refrigeration part of the system. The following two tables list the branch circuit values for the electric heat and values for a feeder circuit for both branch circuits.

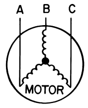
NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

   % Voltage Imbalance

   $$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

   Example: Supply voltage is 460-3-60.

   AB = 452 v
   BC = 464 v
   AC = 455 v

   $$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

   $$= \frac{1371}{3}$$

   $$= 457$$

   Determine maximum deviation from average voltage.

   (AB) 457 – 452 = 5 v
   (BC) 464 – 457 = 7 v
   (AC) 457 – 455 = 2 v

   Maximum deviation is 7 v.

   Determine percent of voltage imbalance.

   $$\text{\% Voltage Imbalance} = 100 \times \frac{7}{457}$$

   $$= 1.53\%$$

   This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

   IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact the local electric utility company immediately.

3. The 75-kW 208/240-v electric heat can be factory installed but it must be wired separately in the field.
4. The convenience outlet full load amps (FLA) are 5, 3 and 3 for 208/230, 460, 575-v units, respectively.
5. The FLA load amps provided in the table for electric heaters are based on 208/240, 480 and 600 v.
6. MCA calculation for 50PG units with electric heaters over 50 kW is = 1.25 x (IFM + Power Exhaust + Convenience Outlet FLA amps) + 1.00 x (Electric Heater FLA).

Table 4B — Electrical Data (Units With Optional Convenience Outlet) (cont)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		COMPRESSOR No. 3		OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
24	208/230	187	253	32.1	240	32.1	240	—	—	6	0.25	1.5	—	—	3.7	10.6/ 9.6	— 2	— 1	— 5.9	97/ 96 109/108	100/100 125/125	97/ 97 109/109	100/100 125/125	102/101 116/115
															5	16.7/15.2	— 2	— 1	— 5.9	103/101 115/113	125/125 125/125	103/103 115/115	125/125 125/125	109/107 123/121
															7.5	24.2/22	— 2	— 1	— 5.9	110/108 122/120	125/125 150/150	110/110 122/122	125/125 150/150	118/115 131/129
															10	30.8/28	— 2	— 1	— 5.9	117/114 129/126	125/125 150/150	117/117 129/129	125/125 150/150	125/122 139/136
													19/25	52/ 60	3.7	10.6/ 9.6	— 2	— 1	— 5.9	97/ 96 109/108	100/100 125/125	97/ 97 109/109	100/100 125/125	102/101 116/115
															5	16.7/15.2	— 2	— 1	— 5.9	103/101 115/115	125/125 125/125	103/103 115/115	125/125 125/125	109/107 123/121
															7.5	24.2/22	— 2	— 1	— 5.9	110/109 122/124	125/125 150/150	110/110 124/124	125/125 150/150	118/115 131/129
															10	30.8/28	— 2	— 1	— 5.9	117/116 129/131	125/125 150/150	117/117 131/131	125/125 150/150	125/122 139/136
													38/50	104/120	3.7	10.6/ 9.6	— 2	— 1	— 5.9	150/138 164/153	150/150 175/175	150/150 164/164	150/150 175/175	138/155 151/168
															5	16.7/15.2	— 2	— 1	— 5.9	157/145 172/160	175/150 175/175	157/157 172/172	175/175 175/175	145/161 158/175
															7.5	24.2/22	— 2	— 1	— 5.9	167/154 181/169	175/175 200/175	167/167 181/181	175/175 200/200	153/169 167/183
															10	30.8/28	— 2	— 1	— 5.9	175/161 190/176	175/175 200/200	175/175 190/190	175/175 200/200	161/176 174/190
													56/75†	156/180	3.7	10.6/ 9.6	— 2	— 1	— 5.9	97/ 96 109/108	100/100 125/125	97/ 97 109/109	100/100 125/125	102/101 116/115
															5	16.7/15.2	— 2	— 1	— 5.9	103/101 115/113	125/125 125/125	103/103 115/115	125/125 125/125	109/107 123/121
															7.5	24.2/22	— 2	— 1	— 5.9	110/108 122/120	125/125 150/150	110/110 122/122	125/125 150/150	118/115 131/129
															10	30.8/28	— 2	— 1	— 5.9	117/114 129/126	125/125 150/150	117/117 129/129	125/125 150/150	125/122 139/136
	460	414	506	15.4	110	15.4	110	—	—	6	0.25	0.7	—	—	3.7	4.8	— 2	— 1	— 3.1	47 53	60 60	47 53	60 60	49 56
															5	7.6	— 2	— 1	— 3.1	49 56	60 60	49 56	60 60	52 60
															7.5	11	— 2	— 1	— 3.1	53 59	60 60	53 59	60 60	56 63
															10	14	— 2	— 1	— 3.1	56 62	60 70	56 62	60 70	60 67
													25	30	3.7	4.8	— 2	— 1	— 3.1	47 55	60 60	47 55	60 60	49 56
															5	7.6	— 2	— 1	— 3.1	51 59	60 60	51 59	60 60	52 60
															7.5	11	— 2	— 1	— 3.1	55 63	60 70	55 63	60 70	56 63
															10	14	— 2	— 1	— 3.1	59 67	60 70	59 67	60 70	60 67
													50	60	3.7	4.8	— 2	— 1	— 3.1	70 78	80 80	70 78	80 80	78 85
															5	7.6	— 2	— 1	— 3.1	73 81	80 90	73 81	80 90	81 88
															7.5	11	— 2	— 1	— 3.1	78 85	80 90	78 85	80 90	85 92
															10	14	— 2	— 1	— 3.1	81 89	90 100	81 89	90 100	89 96
													75	90	3.7	4.8	— 2	— 1	— 3.1	100 108	110 125	100 108	125 125	112 120
															5	7.6	— 2	— 1	— 3.1	103 111	125 125	103 111	125 125	116 123
															7.5	11	— 2	— 1	— 3.1	108 115	125 125	108 115	125 125	120 127
															10	14	— 2	— 1	— 3.1	111 119	125 125	111 119	125 125	123 130

See Legend and Notes on page 20.

Table 4B — Electrical Data (Units With Optional Convenience Outlet) (cont)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
24	575	518	633	12.8	88	12.8	88	—	—	6	0.25	0.7	—	—	5	6.1	— 2	— 1	— 2.4	42 47	50 50	42 47	50 50	45 50
															7.5	9	— 2	— 1	— 2.4	45 50	50 60	45 50	50 60	48 54
															10	11	— 2	— 1	— 2.4	47 52	50 60	47 52	50 60	50 56
													24.8	24	5	6.1	— 2	— 1	— 2.4	42 47	50 50	42 47	50 50	45 50
															7.5	9	— 2	— 1	— 2.4	45 51	50 60	45 51	50 60	48 54
															10	11	— 2	— 1	— 2.4	48 54	50 60	48 54	50 60	50 56
													48.3	46	5	6.1	— 2	— 1	— 2.4	69 75	70 80	69 75	70 80	63 69
															7.5	9	— 2	— 1	— 2.4	73 79	80 80	73 79	80 80	67 72
															10	11	— 2	— 1	— 2.4	75 81	80 90	75 81	80 90	69 75
													78	75	5	6.1	— 2	— 1	— 2.4	86 92	100 100	86 92	100 100	97 102
															7.5	9	— 2	— 1	— 2.4	90 96	100 100	90 96	100 100	100 106
															10	11	— 2	— 1	— 2.4	93 99	100 100	93 99	100 100	102 108

ELECTRIC HEAT BRANCH CIRCUIT FOR 208/240-V 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
24	208/240	187	253	NA	NA	NA	NA	NA	NA	NA	NA	NA	56/75	156/180	NA	NA	NA	NA	NA	156/180	175/200	180/180	200/200	179/207

FEEDER CIRCUIT FOR 208/230-V UNIT WITH 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
24	208/240	187	253	32.1	240	32.1	240	—	—	6	0.25	1.5	56/75	156/180	3.7	10.6/ 9.6	— 2	— 1	— 5.9	176/198 190/213	200/225 200/225	198/198 213/213	200/225 225/225	197/224 211/237
															5	16.7/15.2	— 2	— 1	— 5.9	183/205 198/220	200/225 200/225	205/205 220/220	225/225 225/225	204/230 218/244
															7.5	24.2/22	— 2	— 1	— 5.9	193/214 207/229	200/225 225/250	214/214 229/229	225/225 250/250	213/238 227/252
															10	30.8/28	— 2	— 1	— 5.9	201/221 216/236	225/225 225/250	221/221 236/236	225/225 250/250	221/245 234/259

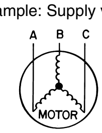
LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

*Fuse or HACR circuit breaker.
†208/230 v 75-kW Electric Heat units must use dual-point wiring. The main table lists the branch circuit values for the refrigeration part of the system. The following two tables list the branch circuit values for the electric heat and values for a feeder circuit for both branch circuits.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.
   % Voltage Imbalance
   $$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$
   Example: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$
$$= \frac{1371}{3}$$
$$= 457$$

Determine maximum deviation from average voltage.
(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v
Maximum deviation is 7 v.
Determine percent of voltage imbalance.

$$\text{\% Voltage Imbalance} = 100 \times \frac{7}{457}$$
$$= 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

> IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact the local electric utility company immediately.

3. The 75-kW 208/240-v electric heat can be factory installed but it must be wired separately in the field.
4. The convenience outlet full load amps (FLA) are 5, 3 and 3 for 208/230, 460, 575-v units, respectively.
5. The FLA load amps provided in the table for electric heaters are based on 208/240, 480 and 600 v.
6. MCA calculation for 50PG units with electric heaters over 50 kW is = 1.25 x (IFM + Power Exhaust + Convenience Outlet FLA amps) + 1.00 x (Electric Heater FLA).

Table 4B — Electrical Data (Units With Optional Convenience Outlet) (cont)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
28	208/230	187	253	28.2	208	28.2	208	28.2	208	6	0.25	1.5	—	—	5	16.7/15.2	— 2	— 1	— 5.9	122/121 134/133	150/125 150/150	122/122 134/134	150/150 150/150	133/131 146/144
															7.5	24.2/22	— 2	— 1	— 5.9	130/128 142/139	150/150 150/150	130/130 142/142	150/150 150/150	141/139 155/152
															10	30.8/28	— 2	— 1	— 5.9	137/134 149/145	150/150 175/150	137/137 149/149	150/150 175/175	149/146 162/159
													19/25	52/ 60	5	16.7/15.2	— 2	— 1	— 5.9	122/121 134/133	150/125 150/150	122/122 134/134	150/150 150/150	133/131 146/144
															7.5	24.2/22	— 2	— 1	— 5.9	130/128 142/139	150/150 150/150	130/130 142/142	150/150 150/150	141/139 155/152
															10	30.8/28	— 2	— 1	— 5.9	137/134 149/145	150/150 175/150	137/137 149/149	150/150 175/175	149/146 162/159
													38/50	104/120	5	16.7/15.2	— 2	— 1	— 5.9	157/145 172/160	175/150 175/175	157/157 172/172	175/175 175/175	145/161 158/175
															7.5	24.2/22	— 2	— 1	— 5.9	167/154 181/169	175/175 200/175	167/167 181/181	175/175 200/200	153/169 167/183
															10	30.8/28	— 2	— 1	— 5.9	175/161 190/176	175/175 200/200	175/175 190/190	175/175 200/200	161/176 174/190
													56/75†	156/180	5	16.7/15.2	— 2	— 1	— 5.9	122/121 134/133	150/125 150/150	122/122 134/134	150/150 150/150	133/131 146/144
															7.5	24.2/22	— 2	— 1	— 5.9	130/128 142/139	150/150 150/150	130/130 142/142	150/150 150/150	141/139 155/152
															10	30.8/28	— 2	— 1	— 5.9	137/134 149/145	150/150 175/150	137/137 149/149	150/150 175/175	149/146 162/159
	460	414	506	15.4	104	15.4	104	15.4	104	6	0.25	0.7	—	—	5	7.6	— 2	— 1	— 3.1	65 71	80 80	65 71	80 80	70 77
															7.5	11	— 2	— 1	— 3.1	68 74	80 80	68 74	80 80	74 81
															10	14	— 2	— 1	— 3.1	71 77	80 90	71 77	80 90	78 85
													25	30	5	7.6	— 2	— 1	— 3.1	65 71	80 80	65 71	80 80	70 77
															7.5	11	— 2	— 1	— 3.1	68 74	80 80	68 74	80 80	74 81
															10	14	— 2	— 1	— 3.1	71 77	80 90	71 77	80 90	78 85
													50	60	5	7.6	— 2	— 1	— 3.1	73 81	80 90	73 81	80 90	81 88
															7.5	11	— 2	— 1	— 3.1	78 85	80 90	78 85	80 90	85 92
															10	14	— 2	— 1	— 3.1	81 89	90 100	81 89	90 100	89 96
													75	90	5	7.6	— 2	— 1	— 3.1	103 111	125 125	103 111	125 125	116 123
															7.5	11	— 2	— 1	— 3.1	108 115	125 125	108 115	125 125	120 127
															10	14	— 2	— 1	— 3.1	111 119	125 125	111 119	125 125	123 130

See Legend and Notes on page 22.

Table 4B — Electrical Data (Units With Optional Convenience Outlet) (cont)

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
28	575	518	633	12.8	83	12.8	83	12.8	83	6	0.25	0.7	—	—	5	6.1	— 2	— 1	— 2.4	55 60	60 60	55 60	60 60	59 65
															7.5	9	— 2	— 1	— 2.4	58 63	60 70	58 63	60 70	63 68
															10	11	— 2	— 1	— 2.4	60 65	60 70	60 65	60 70	65 71
													24.8	24	5	6.1	— 2	— 1	— 2.4	55 60	60 60	55 60	60 60	59 65
															7.5	9	— 2	— 1	— 2.4	58 63	60 70	58 63	60 70	63 68
															10	11	— 2	— 1	— 2.4	60 65	60 70	60 65	60 70	65 71
													48.3	46	5	6.1	— 2	— 1	— 2.4	69 75	70 80	69 75	70 80	63 69
															7.5	9	— 2	— 1	— 2.4	73 79	80 80	73 79	80 80	67 72
															10	11	— 2	— 1	— 2.4	75 81	80 90	75 81	80 90	69 75
													78	75	5	6.1	— 2	— 1	— 2.4	86 92	100 100	86 92	100 100	97 102
															7.5	9	— 2	— 1	— 2.4	90 96	100 100	90 96	100 100	100 106
															10	11	— 2	— 1	— 2.4	93 99	100 100	93 99	100 100	102 108

ELECTRIC HEAT BRANCH CIRCUIT FOR 208/240-V 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
28	208/240	187	253	NA	NA	NA	NA	NA	NA	NA	NA	NA	56/75	156/180	NA	NA	NA	NA	NA	156/180	175/200	180/180	200/200	179/207

FEEDER CIRCUIT FOR 208/230-V UNIT WITH 75-kW ELECTRIC HEAT†

UNIT SIZE 50PG	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR						OFM			ELECTRIC HEAT		IFM		POWER EXHAUST			POWER SUPPLY		POWER SUPPLY WITH OPTIONAL HACR BREAKER		DISCONNECT SIZE
				No. 1		No. 2		No. 3																
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	kW	FLA	Hp	FLA	Qty	Hp	FLA (ea)	MCA	MOCP*	MCA	MOCP	FLA
28	208/240	187	253	28.2	208	28.2	208	28.2	208	6	0.25	1.5	56/75	156/180	5	16.7/15.2	— 2	— 1	— 5.9	183/205 198/220	200/225 200/225	205/205 220/220	225/225 225/225	204/230 218/244
															7.5	24.2/22	— 2	— 1	— 5.9	193/214 207/229	200/225 225/250	214/214 229/229	225/225 250/250	213/238 227/252
															10	30.8/28	— 2	— 1	— 5.9	201/221 216/236	225/225 225/250	221/221 236/236	225/225 250/250	221/245 234/259

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

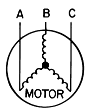
*Fuse or HACR circuit breaker.
†208/230 v 75-kW Electric Heat units must use dual-point wiring. The main table lists the branch circuit values for the refrigeration part of the system. The following two tables list the branch circuit values for the electric heat and values for a feeder circuit for both branch circuits.

NOTES:
1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

% Voltage Imbalance

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3} = \frac{1371}{3} = 457$$

Determine maximum deviation from average voltage.
(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

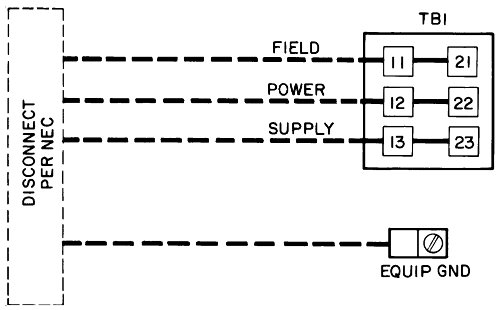
$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457} = 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

> IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact the local electric utility company immediately.

3. The 75-kW 208/240-v electric heat can be factory installed but it must be wired separately in the field.
4. The convenience outlet full load amps (FLA) are 5, 3 and 3 for 208/230, 460, 575-v units, respectively.
5. The FLA load amps provided in the table for electric heaters are based on 208/240, 480 and 600 v.
6. MCA calculation for 50PG units with electric heaters over 50 kW is = 1.25 x (IFM + Power Exhaust + Convenience Outlet FLA amps) + 1.00 x (Electric Heater FLA).

C UL US



LEGEND

EQUIP — Equipment
GND — Ground
NEC — National Electrical Code
TB — Terminal Board

NOTE: The maximum wire size for TB1 is 2/0.

Fig. 12 — Field Power Wiring Connections

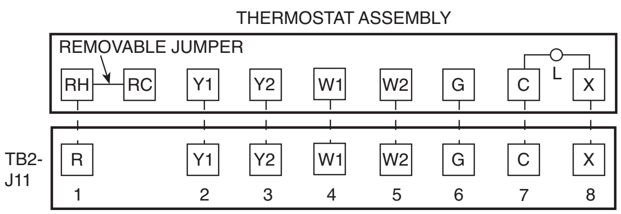


Fig. 13 — Field Control Thermostat Wiring

Set heat anticipator settings as shown in Table 5.

Table 5 — Heat Anticipator Settings

UNIT SIZE 50PG	ELECTRIC HEAT (kW)	STAGE 1 (W1) ON			STAGES 1 AND 2 (W1 and W2) ON		
		Voltage			Voltage		
		208/240	480	600	208/240	480	600
20-28	25	0.2	0.2	0.2	0.4	0.4	0.4
	50	0.4	0.2	0.2	0.8	0.4	0.4
	75	0.4	0.2	0.2	0.8	0.4	0.4

Settings may be changed slightly to provide a greater degree of comfort for a particular installation.

Step 8 — Install Outdoor Air Hood — Perform the following procedure to install the outdoor-air hood on units equipped with an economizer, two-position damper, or outdoor-air damper:

1. Remove blank panel from return end of unit (hood section). Save the screws. See Fig. 14 for shipping location of components.
2. Hood sides are fastened to sides of outdoor air opening. Remove the hood sides and save the screws (3 each side).
3. Remove the bracket holding the bottom half of the hood in the shipping position. Remove the hood bottom half and filters (or manual dampers on units so equipped) from outdoor section.

   NOTE: On units without economizers, the components are attached to the unit basepan. To access the components, remove the panel below the outdoor air intake section.
4. Remove inner filter track from shipping position in outdoor section. Position inner filter track so the track is facing outward from the unit. Install the filter track with 4 screws provided.
5. Apply seal strip (provided) to back flange of both hood sides where hood side connects to the unit back panel. See Fig. 15.
6. Apply seal strip (provided) to top flange of both hood sides where hood sides connect to the hood top panels. See Fig. 15.
7. Install hood sides to the back panels using the screws from Step 2. The sloped flanges point outward. The drip edges of the side panels should face outward as well. The filter guides should face inward to hold the filters in place. See Fig. 15.
8. Apply seal strip along the entire length of the bottom flange of the hood top. See Fig. 15.
9. Install the bottom part of the hood top using 4 screws provided. See Fig. 15.
10. Remove the packaging from filters (3) and install into the filter tracks. Slide the filters to the sides then place the last filter into the center of the filter track.

NOTE: For units with manual dampers, replace the end filters with the manual dampers. Install the filter in the center between the manual dampers.

11. Install the filter retainer track along the bottom edge of the outdoor air hood using 4 screws provided. See Fig. 15.
12. Install top section of the outdoor air hood using 9 screws provided. See Fig. 15. See Fig. 16 for a picture of the assembled outdoor air hood.

NOTE: For filter removal, remove the four screws holding the filter retainer. The filters can then be removed, cleaned, or replaced. Install the filters by reversing the procedure.

MANUAL DAMPER ASSEMBLY — For units equipped with manual dampers, the assembly process is similar to the outdoor air hood for units with economizers. There are two slide dampers shipped with the unit to allow for manual setting of the outside air volume. When assembling the hood, place one of the manual slide dampers in each of the end positions and the remaining filter in the center position. The manual dampers can then be moved to the appropriate position and then locked into place using the screws mounted in the adjustment slots. See Fig. 17.

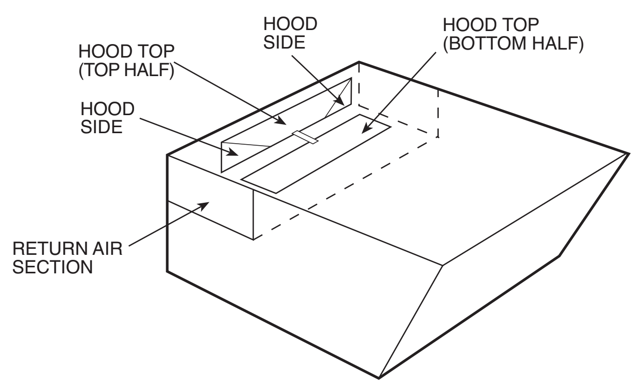
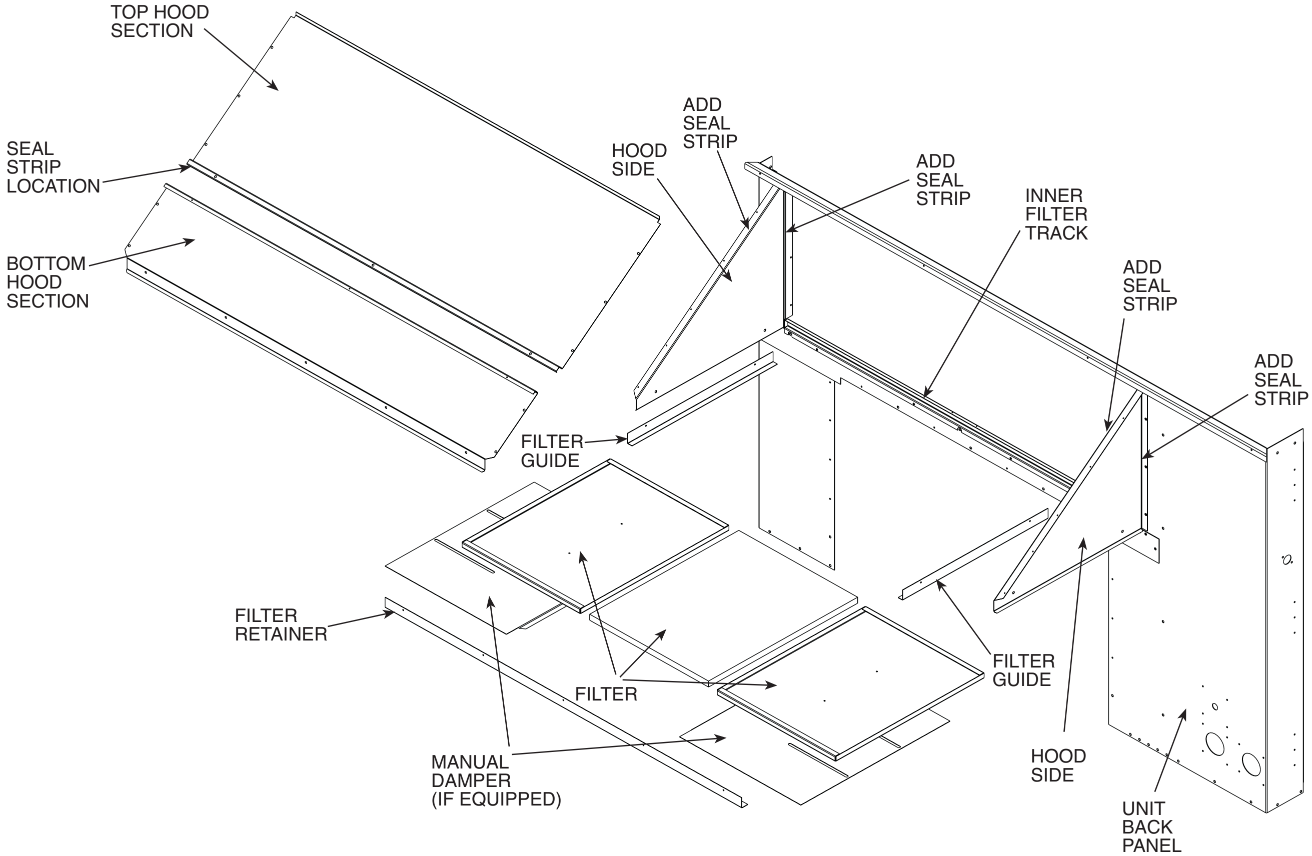


Fig. 14 — Outdoor-Air Hood Compartment Shipping Location



NOTE: Units with manual damper only use one filter.

Fig. 15 — Outdoor Air Hood Details

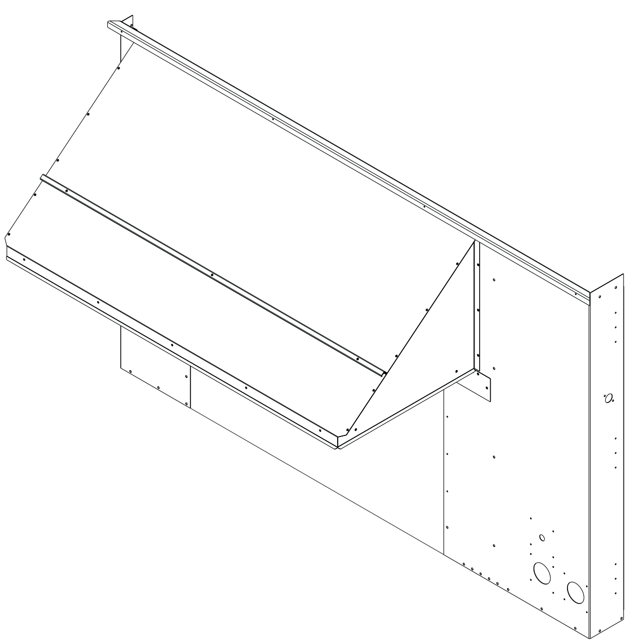


Fig. 16 — Outdoor Air Hood Assembled

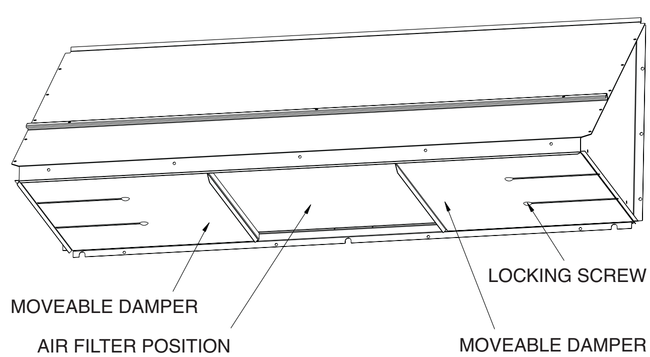


Fig. 17 — Manual Damper Details

Step 9 — Position Optional Power Exhaust or Barometric Relief Damper Hood — The optional power exhaust or barometric relief dampers are shipped assembled and tilted back into the unit for shipping. Brackets and extra screws are shipped in shrink wrap around the dampers.

1. Remove 9 screws holding each damper assembly in place. See Fig. 18. Each damper assembly is secured with 3 screws on each side and 3 screws along the bottom. Save screws.

⚠ CAUTION

Be careful when tilting blower assembly. Hoods and blowers are heavy and can cause injury if dropped.

2. Pivot the damper assembly outward until top edge of damper assembly rests against inside wall of unit.
3. Secure each damper assembly to unit with 6 screws across top (3 screws provided) and bottom (3 screws from Step 1) of damper.
4. With screws saved from Step 1, install brackets on each side of damper assembly. See Fig. 19.
5. Remove tape from damper blades.

Step 10 — Non-Fused Disconnect — The handle for the factory-installed non-fused disconnect is shipped inside the unit to prevent the handle from damage during shipping. Follow these steps to complete installation of the handle.

⚠ WARNING

BE SURE POWER IS SHUT OFF TO THE UNIT FROM THE BUILDING POWER SUPPLY. ELECTRICAL SHOCK COULD CAUSE PERSONAL INJURY.

1. Open the control box access door.
2. Remove the small cover plate located on the unit corner post near the control section.
3. Remove the inner control box cover. The handle and shaft are located in a plastic bag at the bottom of the control box.
4. Insert the square shaft into the disconnect with the pins vertical. On the 100 amp disconnect the shaft is keyed into the disconnect and can only be installed one way with the pins vertical.
5. Insert the handle through the corner post and onto the shaft with the handle positioned so that "OFF" is on top.
6. Rotate the handle to the "ON" position to lock the pins into the handle.
7. From the inside of the corner post, attach the handle mounting screws to the handle. Slide the shaft fully into the handle and tighten the set screws(s) on the disconnect to lock the shaft. Tighten the screws that attach the handle to the corner post.
8. Rotate the handle back to the "OFF" position.
9. Replace all panels and doors.
10. Restore power to unit.

Step 11 — Install All Accessories — After all of the factory-installed options have been adjusted, install all field-installed accessories. Refer to the accessory installation instructions included with each accessory. Consult the Carrier Price Pages for accessory package numbers for particular applications.

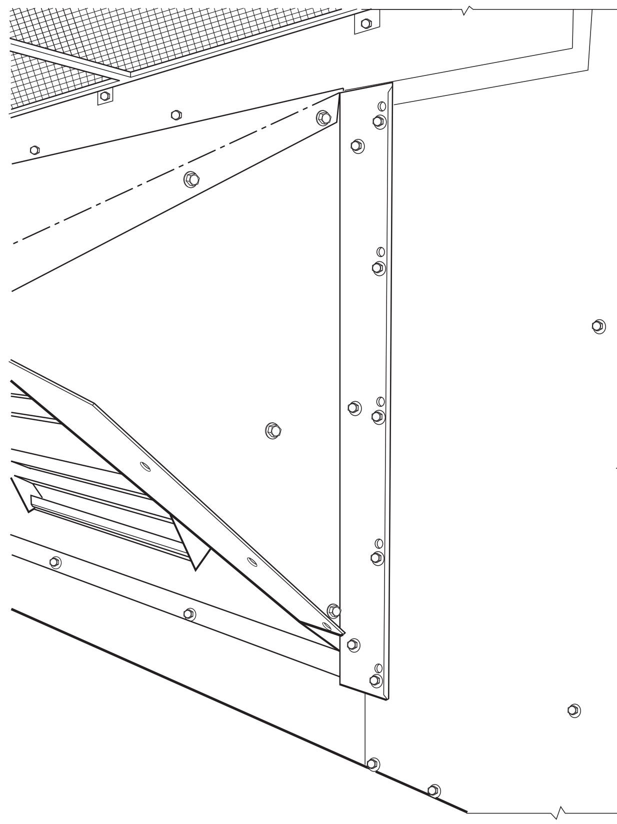


Fig. 19 — Bracket and Hood Positioning

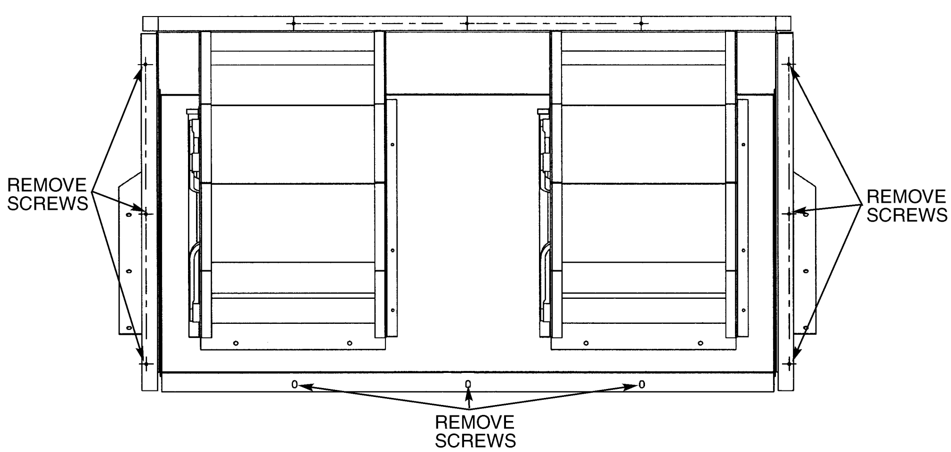


Fig. 18 — Power Exhaust or Barometric Relief Damper Mounting Details

PRE-START-UP

> **⚠ WARNING**
>
> Failure to observe the following warnings could result in serious personal injury:
>
> 1. Follow recognized safety practices and wear protective goggles when checking or servicing refrigerant system.
> 2. Do not operate compressor or provide any electric power to unit unless compressor terminal cover is in place and secured.
> 3. Do not remove compressor terminal cover until all electrical sources are disconnected and properly tagged.
> 4. Relieve all pressure from system before touching or disturbing anything inside terminal box if refrigerant leak is suspected around compressor terminals. Use accepted methods to recover refrigerant.
> 5. Never attempt to repair soldered connection while refrigerant system is under pressure.
> 6. Do not use torch to remove any component. System contains oil and refrigerant under pressure. To remove a component, wear protective goggles and proceed as follows:
>   a. Shut off electrical power to unit and install lockout tag.
>   b. Relieve all pressure from system using both high-and low-pressure ports. Use accepted methods to recover refrigerant.
>   c. Cut component connection tubing with tubing cutter and remove component from unit.
>   d. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Proceed as follows to inspect and prepare the unit for initial start-up:

1. Remove all access panels.
2. Read and follow instructions on all WARNING, CAUTION, and INFORMATION labels attached to or shipped with unit.
3. Make the following inspections:
   a. Inspect for shipping and handling damages such as broken lines, loose parts, or disconnected wires.
   b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak-test all refrigerant tubing connections using electronic leak detector, halide torch, or liquid-soap solution.
   c. Inspect all field-wiring and factory-wiring connections. Be sure that connections are completed and tight.
   d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following:
   a. Make sure that condenser-fan blades are correctly positioned in fan orifice. Refer to Condenser-Fan Adjustment section on page 45 for more details.
   b. Make sure that air filters are in place.
   c. Make sure that condensate drain trap is filled with water to ensure proper drainage.
   d. Make sure that all tools and miscellaneous loose parts have been removed.
   e. Make sure that the start-up checklist has been performed and filled out.

NOTE: Ensure wiring does not contact any refrigerant tubing.

START-UP

Use the following information and Start-Up Checklist on page CL-1 to check out unit PRIOR to start-up.

Unit Preparation — Check that unit has been installed in accordance with these installation instructions and all applicable codes.

Compressor Mounting — Compressors are internally spring mounted. Do not loosen or remove compressor hold-down bolts.

Refrigerant Service Ports — Each independent refrigerant system has a total of 3 Schrader-type service gage ports per circuit. One port is located on the suction line, one on the compressor discharge line, and one on the liquid line. Be sure that caps on the ports are tight.

Crankcase Heater(s) — Crankcase heaters are energized as long as there is power to the unit and the compressor is not operating.

> IMPORTANT: Unit power must be on for 24 hours prior to start-up. Otherwise, damage to compressor may result.

Compressor Rotation — On 3-phase units, it is important to be certain the scroll compressor is rotating in the proper direction. To determine whether or not compressor is rotating in the proper direction:

1. Connect service gages to suction and discharge pressure fittings.
2. Energize the compressor.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

1. Note that the evaporator fan is probably also rotating in the wrong direction.
2. Turn off power to the unit and install lockout tag.
3. Reverse any two of the unit power leads.
4. Turn on power to the unit.

The suction and discharge pressure levels should now move to their normal start-up levels.

NOTE: When the compressor is rotating in the wrong direction, the unit makes an elevated level of noise and does not provide heating or cooling.

> **⚠ CAUTION**
>
> Compressor damage will occur if rotation is not immediately corrected.

Internal Wiring — Check all electrical connections in unit control boxes; tighten as required.

Subcooler Heat Exchanger (SHX) — The subcooler heat exchanger adds approximately 10 to 15° F of subcooling to the system. Check all valves and TXV (thermostatic expansion valve).

Evaporator Fan — Fan belt and variable pulleys are factory-installed. See Tables 6-12 for Fan Performance Data. Be sure that fans rotate in the proper direction. See Table 13 for air quantity limits. See Table 14 for evaporator fan motor specifications. See Tables 15 and 16 for accessory FIOP static pressure. See Table 17 for fan rpm at various motor pulley settings. To alter fan performance, see Evaporator Fan Performance Adjustment section on page 45.

Condenser Fans and Motors — Condenser fans and motors are factory set. Refer to Condenser-Fan Adjustment section (page 45) as required.

Return-Air Filters — Check that correct filters are installed in filter tracks (see Table 1). Do not operate unit without return-air filters.

NOTE: For units with 4-in. filter option, units are shipped with standard 2-in. filters. To install 4-in. filters, the filter spacers must be removed.

Outdoor-Air Inlet Screens — Outdoor-air inlet screens must be in place before operating unit.

Table 6 — Fan Performance — 50PG20 Vertical Supply/Return Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	**533**	**1.27**	**611**	**1.54**	**682**	**1.82**	748	2.10	808	2.37
5500	**571**	**1.57**	**643**	**1.86**	711	2.15	773	2.44	832	2.73
6000	**610**	**1.92**	**676**	**2.21**	740	2.52	A 800	2.82	A 857	3.13
6500	**650**	**2.31**	712	2.61	A 772	2.93	829	3.25	883	3.58
7000	691	2.75	A 748	3.06	805	3.39	859	3.73	911	4.07
7500	A 732	3.24	786	3.57	839	3.91	891	4.25	**941**	**4.61**
8000	775	3.79	824	4.12	**874**	**4.47**	**924**	**4.83**	B 972	5.19
8500	**817**	**4.40**	**863**	**4.74**	**911**	**5.09**	B 958	5.46	C 1003	5.84
9000	**860**	**5.06**	**904**	**5.41**	C 948	5.77	C 993	6.15	1036	6.54

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	865	2.64	A 918	2.91	969	3.17	1018	3.44	1065	3.70
5500	886	3.02	938	3.31	988	3.59	1035	3.87	1081	4.16
6000	A 910	3.44	960	3.74	B 1008	4.05	B 1054	4.35	B 1099	4.65
6500	935	3.90	984	4.22	1030	4.54	1075	4.86	1118	5.18
7000	961	4.40	B 1008	4.74	1054	5.08	1098	5.41	1140	5.75
7500	B 989	4.96	1035	5.31	1079	5.66	1122	6.01	C 1163	6.36
8000	1018	5.56	1062	5.93	C 1105	6.29	C 1147	6.66	1187	7.02
8500	C 1048	6.22	C 1091	6.60	1133	6.98	1173	7.36	D 1212	7.73
9000	1079	6.93	1121	7.32	1161	7.71	D 1201	8.11	1239	8.50

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field-supplied drive required.

NOTES:
1. Motor drive ranges:
   - **(A)** Low Range: 685 to 939 rpm, 4.26 Bhp (208/230 and 460-v), 751 to 954 rpm, 5.75 Bhp 4 (575-v)
   - **(B)** Mid-Low Range: 949 to 1206 rpm, 5.75 Bhp
   - **(C)** Mid-High Range: 941 to 1176 rpm, 8.63 Bhp
   - **(D)** High Range: 1014 to 1297 rpm, 11.50 Bhp

   All other rpms require field-supplied drive.
2. See page 32 for general fan performance notes.

Table 7 — Fan Performance — 50PG24 Vertical Supply/Return Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	**571**	**1.57**	**643**	**1.86**	711	2.15	773	2.44	832	2.73
6,000	**610**	**1.92**	**676**	**2.21**	740	2.52	800	2.82	A 857	3.13
6,500	**650**	**2.31**	712	2.61	A 772	2.93	A 829	3.25	883	3.58
7,000	691	2.75	A 748	3.06	805	3.39	859	3.73	911	4.07
7,500	A 732	3.24	786	3.57	839	3.91	891	4.25	**941**	**4.61**
8,000	775	3.79	824	4.12	**874**	**4.47**	**924**	**4.83**	B 972	5.19
8,500	**817**	**4.40**	**863**	**4.74**	**911**	**5.09**	B 958	5.46	1003	5.84
9,000	**860**	**5.06**	**904**	**5.41**	948	5.77	993	6.15	C 1036	6.54
9,500	**903**	**5.79**	C 944	6.14	C 986	6.51	C 1028	6.90	1070	7.29
10,000	C 947	6.57	985	6.93	1025	7.32	1065	7.71	1105	8.11

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	886	3.02	A 938	3.31	988	3.59	1035	3.87	1081	4.16
6,000	A 910	3.44	960	3.74	B 1008	4.05	B 1054	4.35	B 1099	4.65
6,500	935	3.90	B 984	4.22	1030	4.54	1075	4.86	1118	5.18
7,000	961	4.40	1008	4.74	1054	5.08	1098	5.41	1140	5.75
7,500	B 989	4.96	1035	5.31	1079	5.66	1122	6.01	C 1163	6.36
8,000	1018	5.56	1062	5.93	C 1105	6.29	C 1147	6.66	1187	7.02
8,500	1048	6.22	C 1091	6.60	1133	6.98	1173	7.36	1212	7.73
9,000	C 1079	6.93	1121	7.32	1161	7.71	1201	8.11	D 1239	8.50
9,500	1112	7.70	1152	8.10	D 1191	8.51	D 1229	8.91	1266	9.32
10,000	1145	8.52	D 1184	8.94	1222	9.36	1259	9.78	1295	10.20

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field-supplied drive required.

NOTES:
1. Motor drive ranges:
   (A) Low Range: 685 to 939 rpm, 4.26 Bhp (208/230 and 460-v), 751 to 954 rpm, 5.75 Bhp (5.75-v)
   (B) Mid-Low Range: 949 to 1206 rpm, 5.75 Bhp
   (C) Mid-High Range: 941 to 1176 rpm, 8.63 Bhp
   (D) High Range: 1014 to 1297 rpm, 11.50 Bhp
   All other rpms require field-supplied drive.
2. See page 32 for general fan performance notes.

Table 8 — Fan Performance — 50PG28 Vertical Supply/Return Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6,500	674	1.83	752	2.30	A 803	2.61	A 848	2.89	891	3.19
7,000	709	2.15	A 792	2.74	844	3.10	887	3.42	B 928	3.73
7,500	A 746	2.53	831	3.23	884	3.66	B 927	4.01	966	4.34
8,000	786	2.96	869	3.76	B 925	4.27	968	4.66	1006	5.02
8,500	827	3.45	905	4.33	964	4.94	1008	5.38	1046	5.78
9,000	870	4.02	B 940	4.92	1003	5.66	C 1049	6.17	C 1086	6.61
9,500	B 913	4.65	975	5.55	1042	6.43	1089	7.03	1127	7.52
10,000	957	5.35	1010	6.23	C 1079	7.25	1128	7.95	1167	8.50
10,500	1002	6.13	C 1047	6.98	1115	8.11	1167	8.93	D 1207	9.56
11,000	C 1047	6.98	1086	7.80	1150	9.01	D 1205	9.97	1247	10.68
11,500	1092	7.91	1126	8.72	D 1185	9.94	1242	11.06	**1286**	**11.88**
12,000	D 1137	8.93	D 1168	9.72	1220	10.93	**1278**	**12.19**	**1325**	**13.15**
12,500	1182	10.04	1210	10.82	**1256**	**12.00**	**1314**	**13.38**	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6,500	934	3.51	B 978	3.88	1023	4.29	1071	4.75	1119	5.28
7,000	B 967	4.05	1007	4.40	1048	4.79	C 1090	5.23	C 1134	5.71
7,500	1003	4.67	1040	5.02	C 1078	5.40	1116	5.81	1155	6.27
8,000	1041	5.37	C 1076	5.73	1111	6.11	1146	6.51	1181	6.95
8,500	C 1081	6.15	1114	6.53	1147	6.92	1179	7.32	D 1212	7.74
9,000	1121	7.02	1153	7.41	1184	7.81	D 1215	8.22	1246	8.65
9,500	1161	7.96	1193	8.38	D 1223	8.80	1253	9.23	1282	9.66
10,000	1202	8.99	D 1233	9.44	1263	9.89	1291	10.33	**1319**	**10.77**
10,500	D 1242	10.10	1273	10.59	**1303**	**11.06**	**1331**	**11.53**	**1358**	**11.99**
11,000	1282	11.28	**1314**	**11.83**	**1343**	**12.34**	**1371**	**12.83**	**1397**	**13.31**
11,500	**1322**	**12.56**	**1354**	**13.15**	**1384**	**13.70**	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field-supplied motor and drive required.

NOTES:
1. Motor drive ranges:
   (A) Low Range: 687 to 873 rpm, 5.75 Bhp
   (B) Mid-Low Range: 805 to 1007 rpm, 5.75 Bhp
   (C) Mid-High Range: 941 to 1176 rpm, 8.63 Bhp
   (D) High Range: 1014 to 1297 rpm, 11.50 Bhp
   All other rpms require field-supplied motor/drive.
2. See page 32 for general fan performance notes.

Table 9 — Fan Performance — 50PG20 Horizontal Supply/Return Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	**575**	**1.37**	**642**	**1.61**	700	1.84	754	2.08	808	2.33
5500	**619**	**1.71**	**682**	**1.96**	737	2.21	788	2.45	E 837	2.71
6000	**663**	**2.09**	723	2.35	E 776	2.62	E 825	2.88	871	3.14
6500	708	2.53	E 765	2.80	816	3.08	863	3.35	906	3.63
7000	E 753	3.02	807	3.30	857	3.59	902	3.88	**944**	**4.17**
7500	800	3.58	850	3.86	898	4.16	**942**	**4.47**	F 982	4.77
8000	847	4.20	**894**	**4.48**	**940**	**4.80**	F 982	5.11	1022	5.43
8500	**894**	**4.88**	**939**	**5.17**	F 982	5.49	G 1024	5.82	G 1062	6.14
9000	G 941	5.63	G 983	5.92	G 1025	6.24	1065	6.58	1103	6.92

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5000	862	2.60	E 917	2.89	972	3.20	1028	3.53	1084	3.89
5500	E 886	2.97	935	3.25	985	3.55	1035	3.87	1086	4.21
6000	916	3.41	960	3.69	F 1005	3.98	F 1050	4.29	F 1096	4.61
6500	949	3.90	F 990	4.19	1032	4.48	1073	4.78	1114	5.10
7000	F 984	4.46	1023	4.75	1062	5.04	1100	5.34	1139	5.66
7500	1021	5.07	1059	5.37	1095	5.67	G 1131	5.98	G 1167	6.29
8000	1059	5.74	1095	6.05	G 1130	6.36	1165	6.67	1199	6.99
8500	G 1099	6.47	G 1133	6.79	1167	7.11	H 1200	7.43	H 1232	7.76
9000	1138	7.26	1172	7.59	H 1205	7.93	1237	8.26	1268	8.59

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field-supplied drive required.

NOTES:
1. Motor drive ranges:
   (E) Low Range: 685 to 939 rpm, 4.26 Bhp (208/230 and 460-v), 751 to 954 rpm, 5.75 Bhp (575-v)
   (F) Mid-Low Range: 949 to 1206 rpm, 5.75 Bhp
   (G) Mid-High Range: 941 to 1176 rpm 8.63 Bhp
   (H) High Range: 1014 to 1297 rpm, 11.50 Bhp
   All other rpms require field-supplied drive.
2. See page 32 for general fan performance notes.

Table 10 — Fan Performance — 50PG24 Horizontal Supply/Return Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	**619**	**1.71**	**682**	**1.96**	737	2.21	788	2.45	837	2.71
6,000	**663**	**2.09**	723	2.35	776	2.62	E 825	2.88	E 871	3.14
6,500	708	2.53	E 765	2.80	E 816	3.08	863	3.35	906	3.63
7,000	E 753	3.02	807	3.30	857	3.59	902	3.88	**944**	**4.17**
7,500	800	3.58	850	3.86	898	4.16	**942**	**4.47**	F 982	4.77
8,000	847	4.20	**894**	**4.48**	**940**	**4.80**	F 982	5.11	1022	5.43
8,500	**894**	**4.88**	**939**	**5.17**	F 982	5.49	1024	5.82	1062	6.14
9,000	941	5.63	983	5.92	1025	6.24	G 1065	6.58	G 1103	6.92
9,500	G 989	6.45	G 1029	6.74	G 1069	7.07	1108	7.41	1144	7.77
10,000	1037	7.34	1075	7.63	1113	7.96	1150	8.32	H 1186	8.68

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
5,500	E 886	2.97	E 935	3.25	985	3.55	1035	3.87	1086	4.21
6,000	916	3.41	960	3.69	1005	3.98	F 1050	4.29	F 1096	4.61
6,500	949	3.90	F 990	4.19	F 1032	4.48	1073	4.78	1114	5.10
7,000	F 984	4.46	1023	4.75	1062	5.04	1100	5.34	1139	5.66
7,500	1021	5.07	1059	5.37	1095	5.67	G 1131	5.98	G 1167	6.29
8,000	1059	5.74	1095	6.05	G 1130	6.36	1165	6.67	1199	6.99
8,500	G 1099	6.47	G 1133	6.79	1167	7.11	1200	7.43	H 1232	7.76
9,000	1138	7.26	1172	7.59	1205	7.93	H 1237	8.26	1268	8.59
9,500	H 1179	8.12	H 1212	8.46	H 1244	8.81	1275	9.15	**1305**	**9.50**
10,000	1220	9.04	1252	9.40	1283	9.76	**1313**	**10.11**	**1342**	**10.47**

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field-supplied drive required.

NOTES:
1. Motor drive ranges:
   (E) Low Range: 685 to 939 rpm, 4.26 Bhp (208/230 and 460-v), 751 to 954 rpm, 5.75 Bhp (575-v)
   (F) Mid-Low Range: 949 to 1206 rpm, 5.75 Bhp
   (G) Mid-High Range: 941 to 1176 rpm, 8.63 Bhp
   (H) High Range: 1014 to 1297 rpm, 11.50 Bhp
   All other rpms require field-supplied motor or drive.
2. See page 32 for general fan performance notes.

Table 11 — Fan Performance — 50PG28 Horizontal Supply/Return Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6,500	759	2.34	E 804	2.61	E 844	2.87	883	3.13	F 922	3.42
7,000	E 810	2.87	853	3.17	891	3.45	F 928	3.73	964	4.02
7,500	862	3.48	903	3.80	F 939	4.11	974	4.40	1008	4.71
8,000	F 913	4.17	F 953	4.52	988	4.85	1021	5.17	G 1053	5.49
8,500	965	4.94	1003	5.33	1037	5.69	G 1069	6.03	1100	6.36
9,000	1017	5.81	G 1054	6.23	G 1087	6.62	1118	6.98	1147	7.34
9,500	G 1069	6.78	1105	7.24	1137	7.65	1167	8.03	1195	8.41
10,000	1121	7.85	1156	8.34	H 1187	8.78	H 1216	9.20	H 1243	9.60
10,500	H 1173	9.03	H 1207	9.56	1238	10.03	1266	10.47	1292	10.90
11,000	1226	10.32	1259	10.89	**1288**	**11.39**	**1316**	**11.86**	**1342**	**12.31**
11,500	**1278**	**11.73**	**1310**	**12.33**	**1339**	**12.87**	**1366**	**13.37**	—	—
12,000	**1331**	**13.27**	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
6,500	F 962	3.74	F 1003	4.10	1045	4.50	1090	4.95	G 1135	5.45
7,000	1000	4.34	1037	4.69	G 1075	5.07	G 1115	5.49	1155	5.96
7,500	1041	5.03	G 1075	5.38	1110	5.75	1145	6.16	1182	6.60
8,000	G 1085	5.82	1116	6.17	1148	6.54	1180	6.94	H 1214	7.37
8,500	1129	6.71	1159	7.06	1189	7.44	H 1219	7.83	1249	8.25
9,000	1175	7.70	1204	8.07	H 1232	8.45	1260	8.84	1288	9.26
9,500	H 1222	8.79	H 1249	9.17	1276	9.56	**1302**	**9.97**	**1329**	**10.39**
10,000	1270	10.00	1296	10.39	**1321**	**10.80**	**1346**	**11.21**	**1371**	**11.64**
10,500	**1318**	**11.31**	**1343**	**11.37**	**1367**	**12.15**	**1391**	**12.58**	—	—
11,000	**1366**	**12.75**	**1390**	**13.19**	—	—	—	—	—	—
11,500	—	—	—	—	—	—	—	—	—	—
12,000	—	—	—	—	—	—	—	—	—	—
12,500	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

Boldface indicates field-supplied motor/drive required.

NOTES:
1. Motor drive ranges:
   (E) Low Range: 687 to 873 rpm, 5.75 Bhp
   (F) Mid-Low Range: 805 to 1007 rpm, 5,75 Bhp
   (G) Mid-High Range: 941 to 1176 rpm, 8.63 Bhp
   (H) High Range: 1014 to 1297 rpm, 11.50 Bhp
   All other rpms require field-supplied motor or drive.
2. See below for general fan performance notes.

GENERAL NOTES FOR FAN PERFORMANCE DATA TABLES

1. Static pressure losses (i.e., economizer, electric heat, etc.) must be added to external static pressure before entering Fan Performance table.
2. Interpolation is permissible. Do not extrapolate.
3. Fan performance is based on wet coils, clean filters, and casing losses. See Accessory/FIOP Static Pressure information on pages 35 and 36.
4. Extensive motor and drive testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using the fan motors up to the bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
5. Use of a field-supplied motor may affect wire size. Recalculate the unit power supply MCA and MOCP if required. Contact the local Carrier representative for details.
6. Use the following formula to calculate Input Watts:
   Input Watts = Bhp x (746/motor eff.)

Table 12 — Power Exhaust Fan Performance

AIRFLOW (Cfm)	LOW SPEED						MEDIUM SPEED						HIGH SPEED					
	208 V			230,460,575V			208 V			230,460,575V			208 V			230,460,575V		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
3250	0.32	1.41	1580	0.70	1.49	1670	—	—	—	—	—	—	—	—	—	—	—	—
3350	0.23	1.44	1610	0.63	1.52	1700	0.60	1.51	1690	0.82	1.62	1810	—	—	—	—	—	—
3450	0.17	1.46	1635	0.59	1.55	1730	0.55	1.54	1720	0.78	1.64	1840	—	—	—	—	—	—
3550	0.13	1.47	1645	0.56	1.56	1745	0.49	1.56	1750	0.73	1.67	1870	—	—	—	—	—	—
3650	0.09	1.49	1665	0.53	1.58	1765	0.43	1.59	1780	0.68	1.70	1900	—	—	—	—	—	—
3750	—	—	—	0.51	1.60	1790	0.39	1.62	1815	0.64	1.72	1930	—	—	—	—	—	—
3850	—	—	—	0.48	1.62	1810	0.33	1.64	1835	0.59	1.74	1950	0.60	1.85	2070	0.73	1.99	2230
3950	—	—	—	0.45	1.64	1835	0.27	1.66	1860	0.54	1.76	1975	0.56	1.87	2095	0.69	2.01	2255
4050	—	—	—	0.40	1.67	1865	0.22	1.68	1885	0.49	1.79	2000	0.51	1.89	2120	0.65	2.04	2280
4250	—	—	—	—	—	—	0.17	1.74	1945	0.40	1.84	2060	0.41	1.92	2145	0.56	2.06	2310
4450	—	—	—	—	—	—	0.00	1.79	2005	0.30	1.89	2115	0.31	1.97	2205	0.47	2.12	2370
4650	—	—	—	—	—	—	—	—	—	0.22	1.94	2170	0.20	2.04	2280	0.37	2.19	2450
4850	—	—	—	—	—	—	—	—	—	0.16	1.98	2215	0.11	2.09	2335	0.30	2.24	2505
5050	—	—	—	—	—	—	—	—	—	0.12	2.02	2260	0.04	2.13	2385	0.23	2.28	2555
5250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.17	2.33	2610
5450	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.12	2.38	2665
5650	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.07	2.40	2690
5850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.04	2.42	2710

LEGEND
ESP — External Static Pressure

Table 13 — Operation Air Quantity Limits

50PG	COOLING		ELECTRIC HEAT	ELECTRIC HEAT (Vertical)	ELECTRIC HEAT (Horizontal)
	Minimum Cfm	Maximum Cfm		Minimum Cfm	Minimum Cfm
20	5000	9,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750
24	5500	10,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750
28	6500	12,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750

Table 14 — Evaporator Fan Motor Specifications

UNIT 50PG	DRIVE	ORIENTATION	MOTOR PART NO.	NOMINAL HP	VOLTAGE	MAX WATTS	EFFICIENCY (%)	MAX BHP	MAX BkW	MAX AMPS
20	Low	Vertical	HD60FK651	3.7	208	3698	85.8	4.25	3.17	10.6
			HD60FK651	3.7	230	3698	85.8	4.25	3.17	9.6
			HD60FK651	3.7	460	3698	85.8	4.25	3.17	4.8
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-Low	Vertical	HD60FK653	5	208	4900	87.5	5.75	4.29	16.7
			HD60FK653	5	230	4900	87.5	5.75	4.29	15.2
			HD60FK653	5	460	4900	87.5	5.75	4.29	7.6
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-High	Vertical	HD62FK652	7.5	208	7267	88.5	8.63	6.43	24.2
			HD62FK652	7.5	230	7267	88.5	8.63	6.43	22
			HD62FK652	7.5	460	7267	88.5	8.63	6.43	11
			HD62FK576	7.5	575	7267	88.5	8.63	6.43	9
	High	Vertical	HD64FK651	10	208	9582	89.5	11.5	8.58	30.8
			HD64FK651	10	230	9582	89.5	11.5	8.58	28
			HD64FK651	10	460	9582	89.5	11.5	8.58	14
			HD64FK575	10	575	9582	89.5	11.5	8.58	11
	Low	Horizontal	HD60FK651	3.7	208	3698	85.8	4.25	3.17	10.6
			HD60FK651	3.7	230	3698	85.8	4.25	3.17	9.6
			HD60FK651	3.7	460	3698	85.8	4.25	3.17	4.8
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-Low	Horizontal	HD60FK653	5	208	4900	87.5	5.75	4.29	16.7
			HD60FK653	5	230	4900	87.5	5.75	4.29	15.2
			HD60FK653	5	460	4900	87.5	5.75	4.29	7.6
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-High	Horizontal	HD62FK652	7.5	208	7267	88.5	8.63	6.43	24.2
			HD62FK652	7.5	230	7267	88.5	8.63	6.43	22
			HD62FK652	7.5	460	7267	88.5	8.63	6.43	11
			HD62FK576	7.5	575	7267	88.5	8.63	6.43	9
	High	Horizontal	HD64FK651	10	208	9582	89.5	11.5	8.58	30.8
			HD64FK651	10	230	9582	89.5	11.5	8.58	28
			HD64FK651	10	460	9582	89.5	11.5	8.58	14
			HD64FK575	10	575	9582	89.5	11.5	8.58	11
24	Low	Vertical	HD60FK651	3.7	208	3698	85.8	4.25	3.17	10.6
			HD60FK651	3.7	230	3698	85.8	4.25	3.17	9.6
			HD60FK651	3.7	460	3698	85.8	4.25	3.17	4.8
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-Low	Vertical	HD60FK653	5	208	4900	87.5	5.75	4.29	16.7
			HD60FK653	5	230	4900	87.5	5.75	4.29	15.2
			HD60FK653	5	460	4900	87.5	5.75	4.29	7.6
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-High	Vertical	HD62FK652	7.5	208	7267	88.5	8.63	6.43	24.2
			HD62FK652	7.5	230	7267	88.5	8.63	6.43	22
			HD62FK652	7.5	460	7267	88.5	8.63	6.43	11
			HD62FK576	7.5	575	7267	88.5	8.63	6.43	9
	High	Vertical	HD64FK651	10	208	9582	89.5	11.5	8.58	30.8
			HD64FK651	10	230	9582	89.5	11.5	8.58	28
			HD64FK651	10	460	9582	89.5	11.5	8.58	14
			HD64FK575	10	575	9582	89.5	11.5	8.58	11
	Low	Horizontal	HD60FK651	3.7	208	3698	85.8	4.25	3.17	10.6
			HD60FK651	3.7	230	3698	85.8	4.25	3.17	9.6
			HD60FK651	3.7	460	3698	85.8	4.25	3.17	4.8
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-Low	Horizontal	HD60FK653	5	208	4900	87.5	5.75	4.29	16.7
			HD60FK653	5	230	4900	87.5	5.75	4.29	15.2
			HD60FK653	5	460	4900	87.5	5.75	4.29	7.6
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-High	Horizontal	HD62FK652	7.5	208	7267	88.5	8.63	6.43	24.2
			HD62FK652	7.5	230	7267	88.5	8.63	6.43	22
			HD62FK652	7.5	460	7267	88.5	8.63	6.43	11
			HD62FK576	7.5	575	7267	88.5	8.63	6.43	9
	High	Horizontal	HD64FK651	10	208	9582	89.5	11.5	8.58	30.8
			HD64FK651	10	230	9582	89.5	11.5	8.58	28
			HD64FK651	10	460	9582	89.5	11.5	8.58	14
			HD64FK575	10	575	9582	89.5	11.5	8.58	11

NOTES:
1. Extensive motor and electrical testing ensures that the motors can be utilized with confidence up to the maximum applied bhp, watts, and amps. Using the fan motor up to the maximum ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
2. Convert bhp to watts using the following formula:

$$\text{watts} = \frac{\text{bhp (746)}}{\text{motor efficiency}}$$

Table 14 — Evaporator Fan Motor Specifications (cont)

UNIT 50PG	DRIVE	ORIENTATION	MOTOR PART NO.	NOMINAL HP	VOLTAGE	MAX WATTS	EFFICIENCY (%)	MAX BHP	MAX BkW	MAX AMPS
28	Low	Vertical	HD60FK653	5	208	4900	87.5	5.75	4.29	16.7
			HD60FK653	5	230	4900	87.5	5.75	4.29	15.2
			HD60FK653	5	460	4900	87.5	5.75	4.29	7.6
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-Low	Vertical	HD60FK653	5	208	4900	87.5	5.75	4.29	16.7
			HD60FK653	5	230	4900	87.5	5.75	4.29	15.2
			HD60FK653	5	460	4900	87.5	5.75	4.29	7.6
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-High	Vertical	HD62FK652	7.5	208	7267	88.5	8.63	6.43	24.2
			HD62FK652	7.5	230	7267	88.5	8.63	6.43	22
			HD62FK652	7.5	460	7267	88.5	8.63	6.43	11
			HD62FK576	7.5	575	7267	88.5	8.63	6.43	9
	High	Vertical	HD64FK651	10	208	9582	89.5	11.5	8.58	30.8
			HD64FK651	10	230	9582	89.5	11.5	8.58	28
			HD64FK651	10	460	9582	89.5	11.5	8.58	14
			HD64FK575	10	575	9582	89.5	11.5	8.58	11
	Low	Horizontal	HD60FK653	5	208	4900	87.5	5.75	4.29	16.7
			HD60FK653	5	230	4900	87.5	5.75	4.29	15.2
			HD60FK653	5	460	4900	87.5	5.75	4.29	7.6
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-Low	Horizontal	HD60FK653	5	208	4900	87.5	5.75	4.29	16.7
			HD60FK653	5	230	4900	87.5	5.75	4.29	15.2
			HD60FK653	5	460	4900	87.5	5.75	4.29	7.6
			HD60FK575	5	575	4900	87.5	5.75	4.29	6.1
	Mid-High	Horizontal	HD62FK652	7.5	208	7267	88.5	8.63	6.43	24.2
			HD62FK652	7.5	230	7267	88.5	8.63	6.43	22
			HD62FK652	7.5	460	7267	88.5	8.63	6.43	11
			HD62FK576	7.5	575	7267	88.5	8.63	6.43	9
	High	Horizontal	HD64FK651	10	208	9582	89.5	11.5	8.58	30.8
			HD64FK651	10	230	9582	89.5	11.5	8.58	28
			HD64FK651	10	460	9582	89.5	11.5	8.58	14
			HD64FK575	10	575	9582	89.5	11.5	8.58	11

NOTES:

1. Extensive motor and electrical testing ensures that the motors can be utilized with confidence up to the maximum applied bhp, watts, and amps. Using the fan motor up to the maximum ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
2. Convert bhp to watts using the following formula:

$$\text{watts} = \frac{\text{bhp (746)}}{\text{motor efficiency}}$$

Table 15 — Accessory/FIOP Static Pressure (in. wg)*

COMPONENT	CFM								
	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000
Economizer	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10

COMPONENT	CFM							
	8,500	9,000	9,500	10,000	10,500	11,000	11,500	12,000
Economizer	0.11	0.12	0.13	0.15	0.16	0.17	0.19	0.20

LEGEND

FIOP — Factory-Installed Option

*The static pressure must be added to the external static pressure. The sum and the evaporator entering-air cfm should then be used in conjunction with the Fan Performance tables to determine blower rpm and watts.

Table 16 — Accessory/FIOP Electric Heat Static Pressure (in. wg)

UNIT 50PG	Unit Voltages 208/240	Cfm	ELECTRIC HEATERS Nominal Heater Size (kW)	Pressure Drop (in. wg)	Nominal Heater Size (kW)	Pressure Drop (in. wg)	Nominal Heater Size (kW)	Pressure Drop (in. wg)
20, 24, 28	208/240-3-60	4,800	25	0.01	50	0.02	75	0.03
		5,000		0.01		0.02		0.04
		6,000		0.02		0.04		0.06
		7,000		0.03		0.06		0.08
		8,000		0.04		0.08		0.12
		9,000		0.05		0.10		0.15
		10,000		0.06		0.13		0.20
		11,500		0.09		0.18		0.27
	480-3-60	4,800		0.01		0.02		0.03
		5,000		0.01		0.02		0.04
		6,000		0.02		0.04		0.06
		7,000		0.03		0.06		0.08
		8,000		0.04		0.08		0.12
		9,000		0.05		0.10		0.15
		10,000		0.06		0.13		0.20
		11,500		0.09		0.18		0.27
	575-3-60	4,800		0.01		0.02		0.03
		5,000		0.01		0.02		0.04
		6,000		0.02		0.04		0.06
		7,000		0.03		0.06		0.08
		8,000		0.04		0.08		0.12
		9,000		0.05		0.10		0.15
		10,000		0.06		0.13		0.20
		11,500		0.09		0.18		0.27

LEGEND

FIOP — Factory-Installed Option

NOTES:
1. Heaters are rated at 240 v, 480 v, and 600 v.
2. The static pressure must be added to external static pressure. The sum and the evaporator entering-air cfm should then be used in conjunction with the Fan Performance table to determine blower rpm, bhp, and watts.

Table 17 — Fan Rpm at Motor Pulley Settings*

50PG	DRIVE	MOTOR PULLEY TURNS OPEN 0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6
20 and 24 (230 and 460 volt)	Low Range Vertical	685	706	727	749	770	791	812	833	854	876	897	918	939
	Mid-Low Range Vertical	949	970	992	1013	1035	1056	1078	1099	1120	1142	1163	1185	1206
	Mid-High Range Vertical	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Vertical	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
	Low Range Horizontal	685	706	727	749	770	791	812	833	854	876	897	918	939
	Mid-Low Range Horizontal	949	970	992	1013	1035	1056	1078	1099	1120	1142	1163	1185	1206
	Mid-High Range Horizontal	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Horizontal	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
20 and 24 (575 Volt)	Low Range Vertical	751	768	785	802	819	836	853	869	886	903	920	937	954
	Mid-Low Range Vertical	949	970	992	1013	1035	1056	1078	1099	1120	1142	1163	1185	1206
	Mid-High Range Vertical	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Vertical	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
	Low Range Horizontal	751	768	785	802	819	836	853	869	886	903	920	937	954
	Mid-Low Range Horizontal	949	970	992	1013	1035	1056	1078	1099	1120	1142	1163	1185	1206
	Mid-High Range Horizontal	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Horizontal	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
28 (all voltages)	Low Range Vertical	687	703	718	734	749	765	780	796	811	827	842	858	873
	Mid-Low Range Vertical	805	822	839	856	872	889	906	923	940	957	973	990	1007
	Mid-High Range Vertical	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Vertical	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297
	Low Range Horizontal	687	703	718	734	749	765	780	796	811	827	842	858	873
	Mid-Low Range Horizontal	805	822	839	856	872	889	906	923	940	957	973	990	1007
	Mid-High Range Horizontal	941	961	980	1000	1019	1039	1059	1078	1098	1117	1137	1156	1176
	High Range Horizontal	1014	1038	1061	1085	1108	1132	1156	1179	1203	1226	1250	1273	1297

*Approximate fan rpm shown.
NOTE: Factory pulley speed setting is at 3 turns open.

**Optional EconoMi$er IV —** See Fig. 20 for EconoMi$er IV component locations. The optional EconoMi$er IV comes from the factory fully wired and assembled. No field wiring or assembly is required for standard outdoor dry bulb changeover operation. Field wiring of accessory sensors is required for different operational modes.

ECONOMI$ER IV STANDARD SENSORS

Outdoor Air Temperature (OAT) Sensor — The outdoor air temperature sensor is a 10 to 20 mA device used to measure the outdoor-air temperature. The outdoor-air temperature is used to determine when the EconoMi$er IV can be used for free cooling. The sensor is factory-installed on the EconoMi$er IV in the outdoor airstream. See Fig. 21. The operating range of temperature measurement is 40 to 100 F.

Mixed Air Temperature (MAT) Sensor — The mixed air temperature sensor is a 3 K thermistor located at the outlet of the indoor fan. See Fig. 21. This sensor is factory installed. The operating range of temperature measurement is 0° to 158 F.

The temperature sensor is a short probe with blue wires running to it.

Outdoor Air Lockout Sensor — The EconoMi$er IV is equipped with an ambient temperature lockout switch located in the outdoor airstream which is used to lock out the compressors below a 42 F ambient temperature.

ECONOMI$ER IV CONTROLLER WIRING AND OPERATIONAL MODES — Determine the EconoMi$er IV control mode before set up of the control. Some modes of operation may require different sensors. Refer to Table 18. The EconoMi$er IV is supplied from the factory with a mixed air temperature sensor and an outdoor air temperature sensor. This allows for operation of the EconoMi$er IV with outdoor air dry bulb changeover control. Additional accessories can be added to allow for different types of changeover control and operation of the EconoMi$er IV and unit.

Outdoor Dry Bulb Changeover — The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air and mixed air temperature sensors are included as standard. For this control mode, the outdoor temperature is compared to an adjustable set point selected on the control. If the outdoor-air temperature is above the set point, the EconoMi$er IV will adjust the outdoor-air dampers to minimum position. If the outdoor-air temperature is below the set point, the position of the outdoor-air dampers will be controlled to provided free cooling using outdoor air. When in this mode, the LED next to the free cooling set point potentiometer will be on. The changeover temperature set point is controlled by the free cooling set point potentiometer located on the control. The scale on the potentiometer is A, B, C, and D. See Fig. 22 for the corresponding temperature changeover values.

Differential Dry Bulb Control — For differential dry bulb control the standard outdoor dry bulb sensor is used in conjunction with an additional accessory dry bulb sensor (part number CRTEMPSN002A00). The accessory sensor must be mounted in the return airstream. Wiring is provided in the EconoMi$er IV wiring harness. See Fig. 23.

In this mode of operation, the outdoor-air temperature is compared to the return air temperature and the lower temperature airstream is used for cooling. When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting.

Outdoor Enthalpy Changeover — For enthalpy control, accessory enthalpy sensor (part number HH57AC078) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. When the outdoor air enthalpy rises above the outdoor enthalpy changeover set point, the outdoor-air damper moves to its minimum position. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi$er IV controller. The set points are A, B, C, and D. See Fig. 24. The factory-installed 620-ohm jumper must be in place across terminals S_R and + on the EconoMi$er IV controller. See Fig. 23.

Differential Enthalpy Control — For differential enthalpy control, the EconoMi$er IV controller uses two enthalpy sensors (HH57AC078 and CRENTDIF004A00), one in the outside air and one in the return air duct. The EconoMi$er IV controller compares the outdoor air enthalpy to the return air enthalpy to determine EconoMi$er IV use. The controller selects the lower enthalpy air (return or outdoor) for cooling. For example, when the outdoor air has a lower enthalpy than the return air, the EconoMi$er IV opens to bring in outdoor air for free cooling.

Replace the standard outside air dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. Mount the return air enthalpy sensor in the return air duct. Wiring is provided in the EconoMi$er IV wiring harness. See Fig. 23. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi$er IV controller. When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting. See Fig. 25.

Indoor Air Quality (IAQ) Sensor Input — The IAQ input can be used for demand control ventilation control based on the level of CO_2 measured in the space or return air duct.

Mount the optional IAQ sensor according to manufacturer specifications. The IAQ sensor should be wired to the AQ and AQ1 terminals of the controller. Adjust the DCV (demand controlled ventilation) potentiometers to correspond to the DCV voltage output of the indoor air quality sensor at the user-determined set point. See Fig. 26.

If a separate field-supplied transformer is used to power the IAQ sensor, the sensor must not be grounded or the EconoMi$er IV control board will be damaged.

Exhaust Set Point Adjustment — The exhaust set point will determine when the exhaust fan runs based on damper position (if accessory power exhaust is installed). The set point is modified with the Exhaust Fan Set Point (EXH SET) potentiometer. See Fig. 25. The set point represents the damper position above which the exhaust fans will be turned on. When there is a call for exhaust, the EconoMi$er IV controller provides a 45 ± 15 second delay before exhaust fan activation to allow the dampers to open. This delay allows the damper to reach the appropriate position to avoid unnecessary fan overload.

Minimum Position Control — There is a minimum damper position potentiometer on the EconoMi$er IV controller. See Fig. 25. The minimum damper position maintains the minimum airflow into the building during the occupied period.

When using demand ventilation, the minimum damper position represents the minimum ventilation position for VOC (volatile organic compounds) ventilation requirements. The maximum demand ventilation position is used for fully occupied ventilation.

When demand ventilation control is not being used, the minimum position potentiometer should be used to set the occupied ventilation position. The maximum demand ventilation position should be turned fully clockwise.

Adjust the minimum position potentiometer to allow the minimum amount of outdoor air, as required by local codes, to enter the building. Make minimum position adjustments with at least 10° F temperature difference between the outdoor and return-air temperatures.

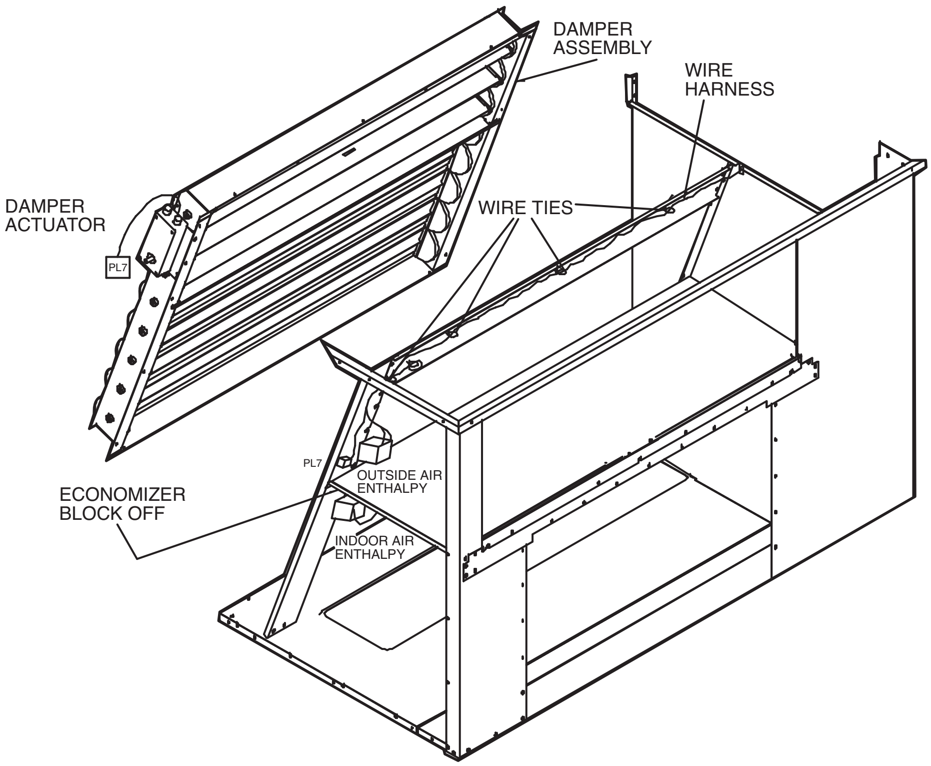


Fig. 20 — EconoMi$er IV Component Locations (Exploded View)

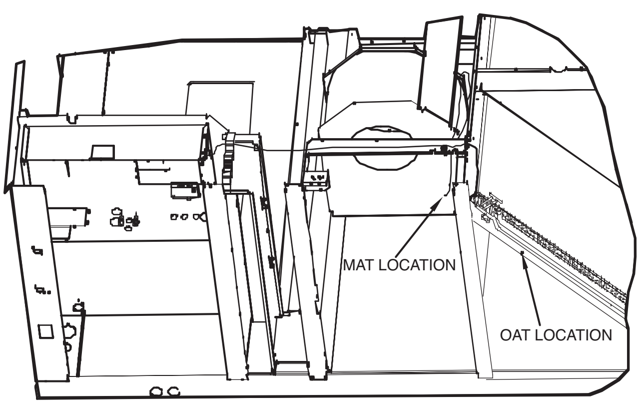


Fig. 21 — Sensor Locations (OAT and MAT)

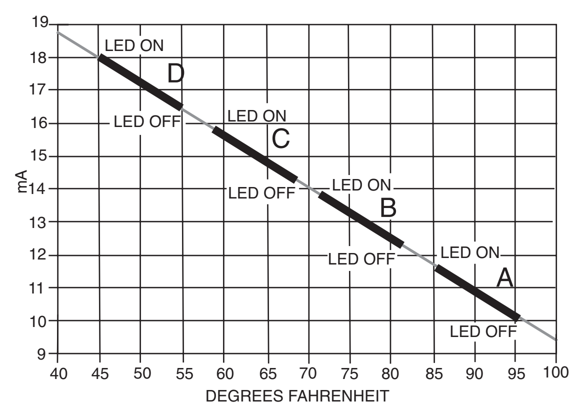


Fig. 22 — Temperature Changeover Set Points

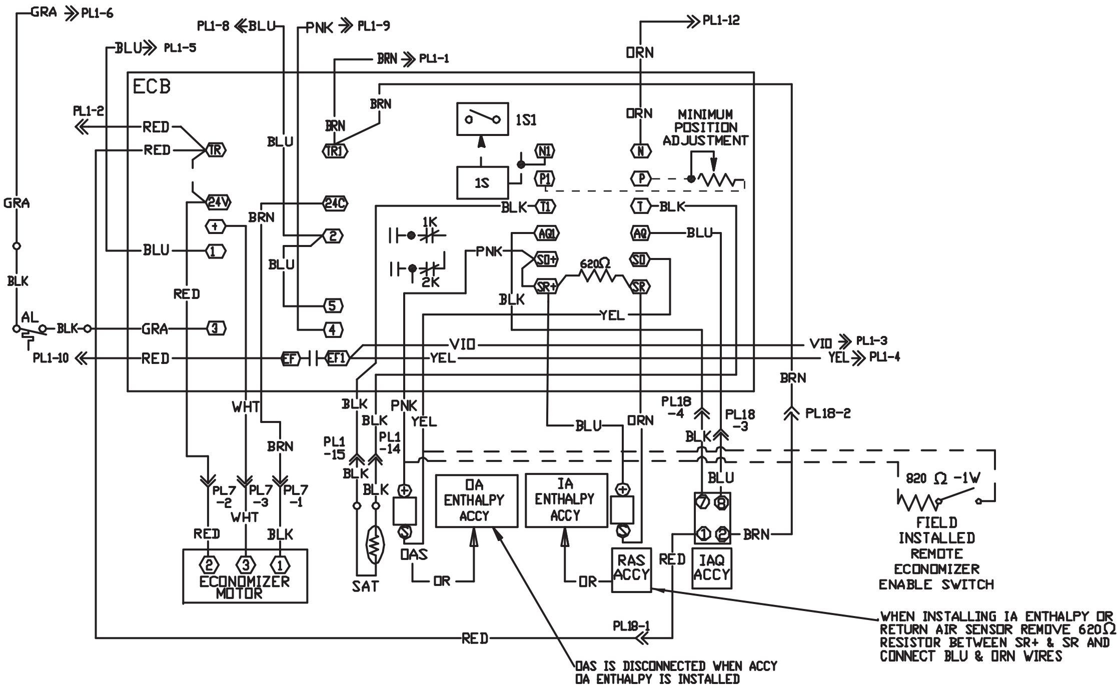


Fig. 23 — EconoMi$er IV Wiring

Table 18 — EconoMi$er IV Sensor Usage

APPLICATION	ECONOMI$ER IV WITH OUTDOOR AIR DRY BULB SENSOR	ECONOMI$ER IV WITH SINGLE ENTHALPY SENSOR
	Accessories Required	Accessories Required
Outdoor Air Dry Bulb	None. The outdoor air dry bulb sensor is factory installed.	CRTEMPSN002A00*
Differential Dry Bulb	CRTEMPSN002A00*	(2) CRTEMPSN002A00*
Single Enthalpy	HH57AC078	None. The single enthalpy sensor is factory installed.
Differential Enthalpy	HH57AC078 and CRENTDIF004A00*	CRENTDIF004A00*
CO_2 for DCV Control using a Wall-Mounted CO_2 Sensor	33ZCSENCO2	33ZCSENCO2
CO_2 for DCV Control using a Duct-Mounted CO_2 Sensor	33ZCSENCO2† and 33ZCASPCO2** OR CRCBDIOX005A00††	33ZCSENCO2† and 33ZCASPCO2** OR CRCBDIOX005A00††

*CRENTDIF004A00 and CRTEMPSN002A00 accessories are used on many different base units. As such, these kits may contain parts that will not be needed for installation.
†33ZCSENCO2 is an accessory CO_2 sensor.
**33ZCASPCO2 is an accessory aspirator box required for duct-mounted applications.
††CRCBDIOX005A00 is an accessory that contains both 33ZCSENCO2 and 33ZCASPCO2 accessories.

CONTROL CURVE	CONTROL POINT APPROX. °F (°C) AT 50% RH
A	73 (23)
B	70 (21)
C	67 (19)
D	63 (17)

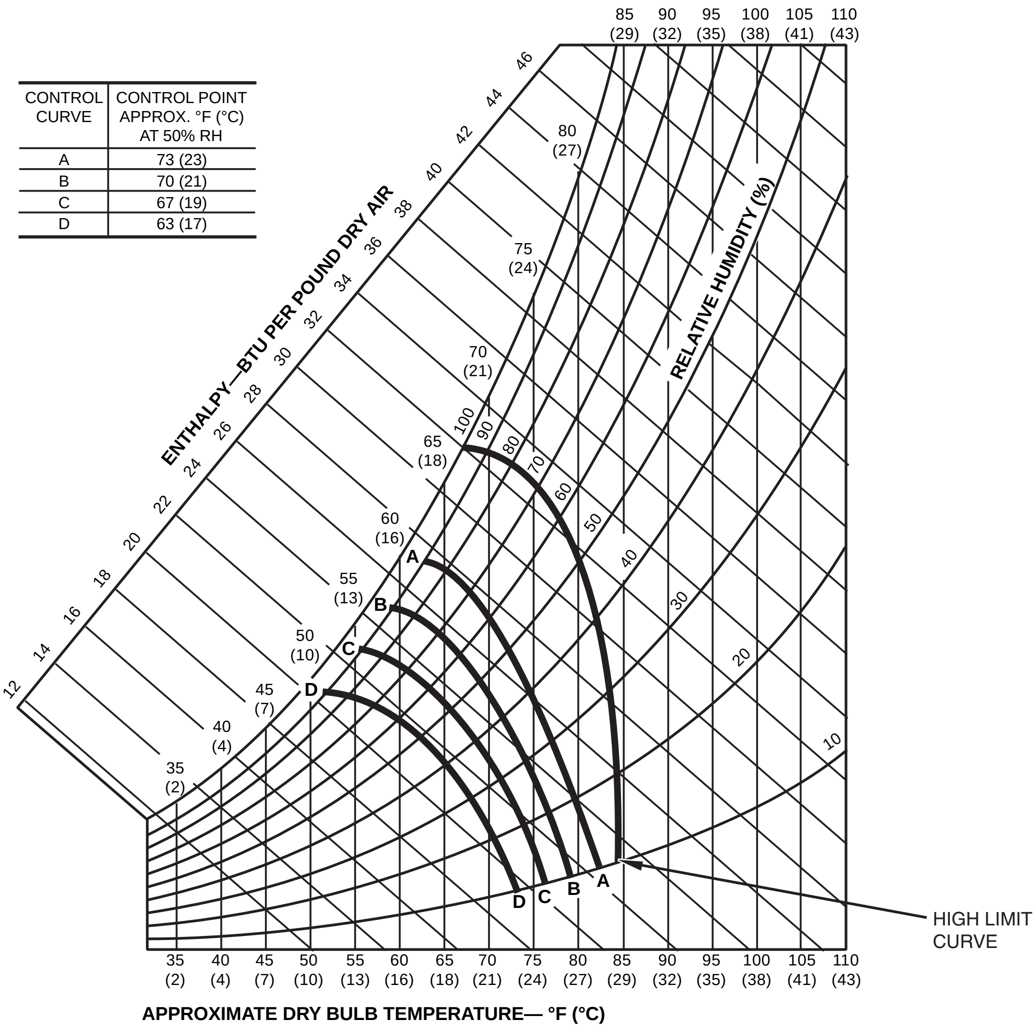


Fig. 24 — Enthalpy Changeover Set Points

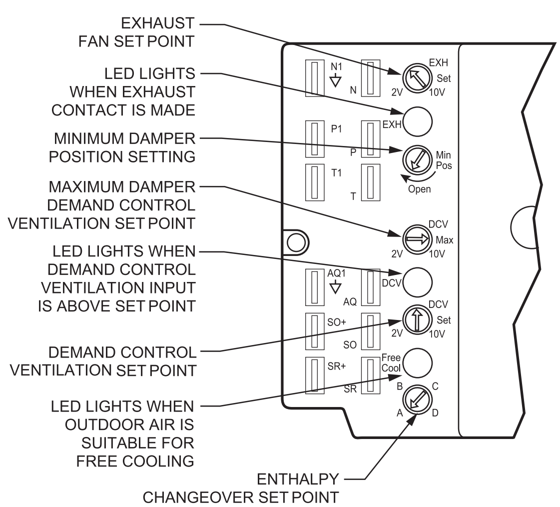


Fig. 25 — EconoMi$er IV Controller Potentiometer and LED Locations

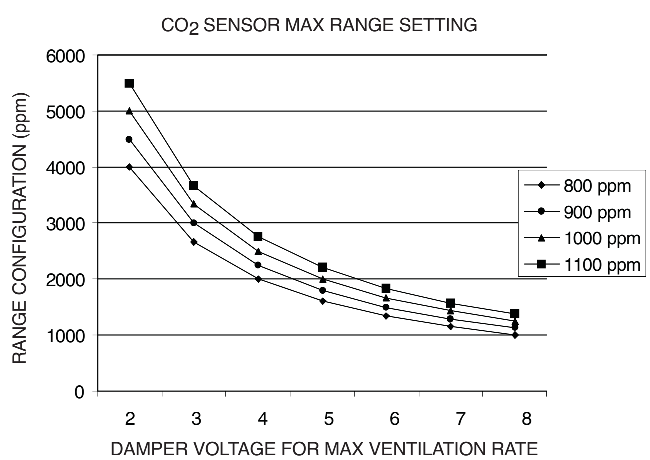


Fig. 26 — CO_2 Sensor Maximum Range Setting

To determine the minimum position setting, perform the following procedure:

1. Calculate the appropriate mixed air temperature using the following formula:

   $(T_O \times OA) + (T_R \times RA) = T_M$

   T_O = Outdoor-Air Temperature

   OA = Percent of Outdoor Air

   T_R = Return-Air Temperature

   RA = Percent of Return Air

   T_M = Mixed-Air Temperature

   As an example, if local codes require 10% outdoor air during occupied conditions, outdoor-air temperature is 60 F, and return-air temperature is 75 F.

   $(60 \times .10) + (75 \times .90) = 73.5$ F
2. Disconnect the mixed air sensor from terminals T and T1.
3. Ensure that the factory-installed jumper is in place across terminals P and P1. If remote damper positioning is being used, make sure that the terminals are wired according to Fig. 23 and that the minimum position potentiometer is turned fully clockwise.
4. Connect 24 vac across terminals TR and TR1.
5. Carefully adjust the minimum position potentiometer until the measured mixed air temperature matches the calculated value.
6. Reconnect the mixed air sensor to terminals T and T1.

Remote control of the EconoMi$er IV damper is desirable when requiring additional temporary ventilation. If a field-supplied remote potentiometer (Honeywell part number S963B1128) is wired to the EconoMi$er IV controller, the minimum position of the damper can be controlled from a remote location.

To control the minimum damper position remotely, remove the factory-installed jumper on the P and P1 terminals on the EconoMi$er IV controller. Wire the field-supplied potentiometer to the P and P1 terminals on the EconoMi$er IV controller. See Fig. 23.

<u>Damper Movement</u> — When the EconoMi$er IV board receives initial power, it can take the damper up to 2 1/2 minutes before it begins to position itself. After the initial positioning, subsequent changes to damper position will take up to 30 seconds to initiate. Damper movement from full open to full closed (or vice versa) takes 2 1/2 minutes.

<u>Thermostats</u> — The EconoMi$er IV control works with conventional thermostats that have a Y1 (cool stage 1), Y2 (cool stage 2), W1 (heat stage 1), W2 (heat stage 2), and G (fan). The EconoMi$er IV control does not support space temperature sensors like the T55 or T56. Connections are made at the thermostat terminal connection board located in the main control box.

<u>Demand Control Ventilation</u> — When using the EconoMi$er IV for demand control ventilation, there are some equipment selection criteria which should be considered. When selecting the heat capacity and cool capacity of the equipment, the maximum ventilation rate must be evaluated for design conditions. The maximum damper position must be calculated to provide the desired fresh air.

Typically the maximum ventilation rate will be about 5 to 10% more than the typical cfm required per person, using normal outside air design criteria.

A proportional anticipatory strategy should be taken with the following conditions: a zone with a large area, varied occupancy, and equipment that cannot exceed the required ventilation rate at design conditions. Exceeding the required ventilation rate means the equipment can condition air at a maximum ventilation rate that is greater than the required ventilation rate for maximum occupancy. A proportional-anticipatory strategy will cause the fresh air supplied to increase as the room CO_2 level increases even though the CO_2 set point has not been reached. By the time the CO_2 level reaches the set point, the damper will be at maximum ventilation and should maintain the set point.

In order to have the CO_2 sensor control the economizer damper in this manner, first determine the damper voltage output for minimum or base ventilation. Base ventilation is the ventilation required to remove contaminants during unoccupied periods. The following equation may be used to determine the percent of outside-air entering the building for a given damper position. For best results there should be at least a 10 degree difference in outside and return-air temperatures.

$(T_O \times OA) + (T_R \times RA) = T_M$

T_O = Outdoor-Air Temperature

OA = Percent of Outdoor Air

T_R = Return-Air Temperature

RA = Percent of Return Air

T_M = Mixed-Air Temperature

Once base ventilation has been determined, set the minimum damper position potentiometer to the correct position.

The same equation can be used to determine the occupied or maximum ventilation rate to the building. For example, an output of 3.6 volts to the actuator provides a base ventilation rate of 5% and an output of 6.7 volts provides the maximum ventilation rate of 20% (or base plus 15 cfm per person). Use Fig. 26 to determine the maximum setting of the CO_2 sensor. For example, a 1100 ppm set point relates to a 15 cfm per person design. Use the 1100 ppm curve on Fig. 26 to find the point when the CO_2 sensor output will be 6.7 volts. Line up the point on the graph with the left side of the chart to determine that the range configuration for the CO_2 sensor should be 1800 ppm. The EconoMi$er IV controller will output the 6.7 volts from the CO_2 sensor to the actuator when the CO_2 concentration in the space is at 1100 ppm. The DCV set point may be left at 2 volts since the CO_2 sensor voltage will be ignored by the EconoMi$er IV controller until it rises above the 3.6 volt setting of the minimum position potentiometer.

Once the fully occupied damper position has been determined, set the maximum damper demand control ventilation potentiometer to this position. Do not set to the maximum position as this can result in over-ventilation to the space and potential high-humidity levels.

<u>CO_2 Sensor Configuration</u> — The CO_2 sensor has preset standard voltage settings that can be selected anytime after the sensor is powered up. See Table 19.

Use setting 1 or 2 for Carrier equipment. See Table 19.

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.
3. Use the Up/Down button to select the preset number. See Table 19.
4. Press Enter to lock in the selection.
5. Press Mode to exit and resume normal operation.

The custom settings of the CO_2 sensor can be changed anytime after the sensor is energized. Follow the steps below to change the non-standard settings:

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.
3. Use the Up/Down button to toggle to the NONSTD menu and press Enter.

4. Use the Up/Down button to toggle through each of the nine variables, starting with Altitude, until the desired setting is reached.
5. Press Mode to move through the variables.
6. Press Enter to lock in the selection, then press Mode to continue to the next variable.

Dehumidification of Fresh Air with DCV Control — Information from ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) indicates that the largest humidity load on any zone is the fresh air introduced. For some applications, a device such as a 62AQ energy recovery unit is added to reduce the moisture content of the fresh air being brought into the building when the enthalpy is high. In most cases, the normal heating and cooling processes are more than adequate to remove the humidity loads for most commercial applications.

This makes the control of the of the dehumidification device simple when using the enthalpy or differential enthalpy sensor. The enthalpy sensor or differential enthalpy sensor is installed on the equipment to determine economizer operation. The high enthalpy signal from the enthalpy sensor or differential enthalpy sensor can be used to turn on the outdoor air moisture removal device any time fresh air is required for the space.

The energy recovery device should be sized for maximum latent and sensible conditioning at maximum ventilation on a design day. A calculation for leaving-air temperature on a low ambient, low ventilation day should also be done to determine the mixed-air temperature of the return and pre-conditioned outside air. The design should produce an air temperature somewhat near room conditions to prevent reheat of the air mixture. The energy recovery device should be interlocked with the heat to turn off the device when in the heat mode.

Operating Sequence

COOLING, UNITS WITHOUT ECONOMIZER — When the thermostat calls for one stage of cooling, Y1 and G are energized. The indoor-fan contactor (IFC) and compressor contactor(s) (C.A1 and C.B1 on three-compressor units or C.A1 only on two-compressor units), and outdoor-fan contactors (OFC1 and OFC2 when outdoor temperature is above LTS setting) are energized and the indoor fan motor, compressor(s) (A1 and B1 on three-compressor units or A1 only on two-compressor units), and outdoor fans controlled by OFC1 are started. If the outdoor temperature is above the setting of the low temperature switch, the outdoor fans controlled by OFC2 are also started.

If more cooling is required, the thermostat will call for a second stage of cooling, energizing Y2. This will allow relay CR1 to energize, which in turn energizes the compressor contactor (C.C1 on three-compressor units or C.B1 on two-compressor units). The second stage compressor (C1 on three-compressor units or B1 on two-compressor units) is then started.

HEATING, UNITS WITHOUT ECONOMIZER

NOTE: The 50HJ020-028 units have 2 stages of electric heat.

When the thermostat calls for one stage of heating, W1 is energized. The thermostat must be configured such that the blower output (G) is energized when there is a W1 call for heating. The indoor-fan contactor (IFC) and first stage electric heat contactor(s) are energized and the indoor-fan motor, and first stage electric heater are started.

If additional heating is required, the thermostat will call for a second stage of heating, energizing W2. This will energize the second stage of electric heat.

COOLING, UNITS WITH ECONOMI$ER IV — When free cooling is not available, the compressors will be controlled by the zone thermostat. When free cooling is available, the outdoor-air damper is modulated by the EconoMi$er IV control to provide a 50 to 55 F mixed-air temperature into the zone. As the mixed-air temperature fluctuates above 55 or below 50 F, the dampers will be modulated (open or close) to bring the mixed-air temperature back within control.

If mechanical cooling is utilized with free cooling, the outdoor-air damper will maintain its current position at the time the compressor is started. If the increase in cooling capacity causes the mixed air temperature to drop below 45 F, then the outdoor-air damper position will be decreased to the minimum position. If the mixed-air temperature continues to fall, the outdoor-air damper will close. Control returns to normal once the mixed-air temperature rises above 48 F.

If optional power exhaust is installed, as the outdoor-air damper opens and closes, the power exhaust fans will be energized and deenergized.

If field-installed accessory CO_2 sensors are connected to the EconoMi$er IV control, a demand controlled ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 set point, the minimum position of the damper will be increased proportionally. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed.

Table 19 — CO_2 Sensor Standard Settings

SETTING	EQUIPMENT	OUTPUT	VENTILATION RATE (cfm/Person)	ANALOG OUTPUT	CO_2 CONTROL RANGE (ppm)	OPTIONAL RELAY SETPOINT (ppm)	RELAY HYSTERESIS (ppm)
1	Interface w/Standard Building Control System	Proportional	Any	0-10V 4-20 mA	0-2000	1000	50
2		Proportional	Any	2-10V 7-20 mA	0-2000	1000	50
3		Exponential	Any	0-10V 4-20 mA	0-2000	1100	50
4	Economizer	Proportional	15	0-10V 4-20 mA	0-1100	1100	50
5		Proportional	20	0-10V 4-20 mA	0- 900	900	50
6		Exponential	15	0-10V 4-20 mA	0-1100	1100	50
7		Exponential	20	0-10V 4-20 mA	0- 900	900	50
8	Health & Safety	Proportional	—	0-10V 4-20 mA	0-9999	5000	500
9	Parking/Air Intakes/ Loading Docks	Proportional	—	0-10V 4-20 mA	0-2000	700	50

LEGEND

PPM — Parts Per Million

For EconoMi$er IV operation, there must be a thermostat call for the fan (G). This will move the damper to its minimum position.

When the EconoMi$er IV control is in the occupied mode and a call for cooling exists (Y1 on the thermostat), the control will first check for indoor fan operation. If the fan is not on, then cooling will not be activated. If the fan is on, then the control will open the EconoMi$er IV damper to the minimum position.

On the initial power to the EconoMi$er IV control, it will take the damper up to 2$^1/_2$ minutes before it begins to position itself. Any change in damper position will take up to 30 seconds to initiate. Damper movement from full closed to full open (or vice versa) will take between 1$^1/_2$ to 2$^1/_2$ minutes.

If free cooling can be used as determined from the appropriate changeover command (switch, dry bulb, enthalpy curve, differential dry bulb, or differential enthalpy), then the control will modulate the dampers open to maintain the mixed air temperature set point at 50 to 55 F.

If there is a further demand for cooling (cooling second stage — Y2 is energized), then the control will bring on compressor stage 1 to maintain the mixed air temperature set point. The EconoMi$er IV damper will be open at maximum position. EconoMi$er IV operation is limited to a single compressor.

HEATING, UNITS WITH ECONOMI$ER IV — When the room temperature calls for heat, the heating controls are energized as described in the Heating, Units Without Economizer section. The IFM is energized and the EconoMi$er IV damper modulates to the minimum position. When the thermostat is satisfied, the damper modulates closed.

SUBCOOLER HEAT EXCHANGER (SHX) OPERATION — The purpose of the subcooler heat exchanger (SHX) and the subcooler TXV is to increase the capacity of the evaporator by sending subcooled liquid refrigerant into the evaporator. Normally, the condenser subcools the liquid refrigerant by approximately 10 F. The SHX adds another 10 F to 15 F degrees of subcooling before the refrigerant reaches the evaporator. This allows the refrigerant to absorb more heat from the mixed air, thereby providing more cooling capacity.

The subcooler functions by taking a small percentage of the high pressure, low temperature liquid refrigerant which exits the condenser and converting it into a low pressure, low temperature gas. This is accomplished by using the subcooler TXV. The gas is then routed through a reverse-flow heat exchanger (SHX), which transfers heat from the remaining liquid refrigerant in the liquid line to the reverse flow gas refrigerant. The moderate temperature gas is then sent to the compressor to complete the loop and the cooler liquid refrigerant continues its normal path to the main TXV and the evaporator. See Fig. 27.

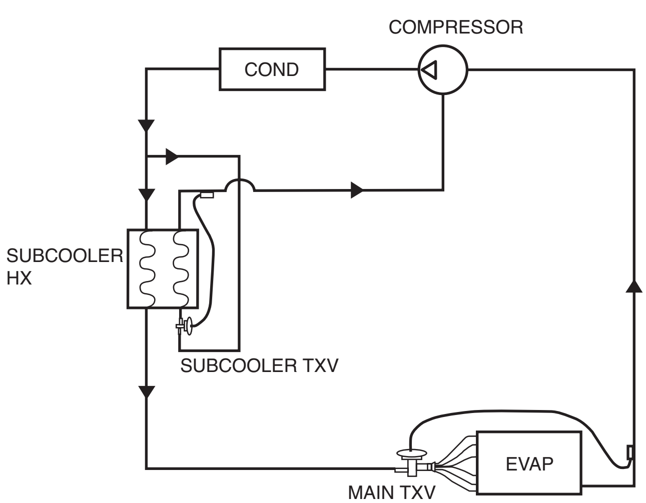


Fig. 27 — Subcooler Operation

SERVICE

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

⚠ CAUTION

Puron® (R-410A) refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment. If service equipment is not rated for Puron refrigerant, equipment damage or personal injury may result.

Cleaning — Inspect unit interior at beginning of each heating and cooling season and as operating conditions require. Remove unit top panel and/or side panels for access to unit interior.

COIL MAINTENANCE AND CLEANING RECOMMENDATION — Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit. The following maintenance and cleaning procedures are recommended as part of the routine maintenance activities to extend the life of the coil.

Remove Surface Loaded Fibers — Surface loaded fibers or dirt should be removed with a vacuum cleaner. If a vacuum cleaner is not available, a soft non-metallic bristle brush may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges can be easily bent over and damage to the coating of a protected coil) if the tool is applied across the fins.

NOTE: Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers must be completely removed prior to using low velocity clean water rinse.

Periodic Clean Water Rinse — A periodic clean water rinse is very beneficial for coils that are applied in coastal or industrial environments. However, it is very important that the water rinse is made with very low velocity water stream to avoid damaging the fin edges. Monthly cleaning as described below is recommended.

Routine Cleaning of Coil Surfaces — Monthly cleaning with Totaline® environmentally sound coil cleaner is essential to extend the life of coils. This cleaner is available from Carrier Replacement parts division as part number P902-0301 for a one gallon container, and part number P902-0305 for a 5 gallon container. It is recommended that all coils, including standard aluminum, pre-coated, copper/copper or E-coated coils be cleaned with the Totaline environmentally sound coil cleaner as described below. Coil cleaning should be part of the unit's regularly scheduled maintenance procedures to ensure long life of the coil. Failure to clean the coils may result in reduced durability in the environment.

Avoid the use of:

- coil brighteners
- acid cleaning prior to painting
- high pressure washers
- poor quality water for cleaning

Totaline environmentally sound coil cleaner is nonflammable, hypoallergenic, nonbacterial, and a USDA accepted biodegradable agent that will not harm the coil or surrounding components such as electrical wiring, painted metal surfaces, or insulation. Use of non-recommended coil cleaners is strongly discouraged since coil and unit durability could be affected.

Totaline® Environmentally Sound Coil Cleaner Application Equipment

- $2^1/_2$ gallon garden sprayer
- water rinse with low velocity spray nozzle

⚠ CAUTION

Harsh chemicals, household bleach or acid or basic cleaners should not be used to clean outdoor or indoor coils of any kind. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion at the fin/tube interface where dissimilar materials are in contact. If there is dirt below the surface of the coil, use the Totaline® environmentally sound coil cleaner as described above.

⚠ CAUTION

High velocity water from a pressure washer, garden hose, or compressed air should never be used to clean a coil. The force of the water or air jet will bend the fin edges and increase airside pressure drop. Reduced unit performance or nuisance unit shutdown may occur.

Totaline Environmentally Sound Coil Cleaner Application Instructions

1. Proper eye protection such as safety glasses is recommended during mixing and application.
2. Remove all surface loaded fibers and dirt with a vacuum cleaner as described above.
3. Thoroughly wet finned surfaces with clean water and a low velocity garden hose, being careful not to bend fins.
4. Mix Totaline environmentally sound coil cleaner in a $2^1/_2$ gallon garden sprayer according to the instructions included with the cleaner. The optimum solution temperature is 100 F.

NOTE: Do NOT USE water in excess of 130 F, as the enzymatic activity will be destroyed.

5. Thoroughly apply Totaline environmentally sound coil cleaner solution to all coil surfaces including finned area, tube sheets and coil headers.
6. Hold garden sprayer nozzle close to finned areas and apply cleaner with a vertical, up-and-down motion. Avoid spraying in horizontal pattern to minimize potential for fin damage.
7. Ensure cleaner thoroughly penetrates deep into finned areas.
8. Interior and exterior finned areas must be thoroughly cleaned.
9. Finned surfaces should remain wet with cleaning solution for 10 minutes.
10. Ensure surfaces are not allowed to dry before rinsing. Reapplying cleaner as needed to ensure 10-minute saturation is achieved.
11. Thoroughly rinse all surfaces with low velocity clean water using downward rinsing motion of water spray nozzle. Protect fins from damage from the spray nozzle.

CONDENSATE DRAIN — Check and clean each year at the start of the cooling season. In winter, keep drains and traps dry. An access panel is located above the condensate connection to allow easy clean out of the condensate pan. The first time the panel is removed, the insulation behind the access panel will need to be cut away. Carefully cut the insulation with a knife or blade on three sides so the insulation can be folded out of the way during cleaning. Be careful not to damage components behind the insulation while cutting. Once cleaning is completed, fold the insulation back into place and secure the access panel in the original position.

FILTERS — Clean or replace at start of each heating and cooling season, or more often if operating conditions require. Refer to Table 1 for type and size.

OUTDOOR-AIR INLET SCREENS — Clean screens with steam or hot water and a mild detergent. Do not use throwaway filters in place of screens. See Table 1 for quantity and size.

Lubrication

COMPRESSORS — Each compressor is charged with the correct amount of oil at the factory.

⚠ CAUTION

The compressor is in a Puron® refrigerant system and uses a polyolester (POE) oil. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oils can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Avoid exposure of the oil to the atmosphere. Damage to components could result.

Polyolester (POE) compressor lubricants are known to cause long term damage to some synthetic roofing materials. Exposure, even if immediately cleaned up, may cause roofing materials to become brittle (leading to cracking) within a year. When performing any service which may risk exposure of compressor oil to the roof, take appropriate precautions to protect roofing. Procedures which risk oil leakage include compressor replacement, repairing refrigerant leaks, and replacing refrigerant components. To prepare rooftop:

1. Cover extended roof work area with an impermeable plastic dropcloth or tarp. Make sure a 10 x 10 area around the work area is covered.
2. Cover area in front of the unit service panel with a terry cloth shop towel to absorb lubricant spills and prevent run-offs. Towel will also protect dropcloth from tears caused by tools or components.
3. Place terrycloth shop towel inside the unit directly under components to be serviced to prevent spills through the bottom of the unit.
4. Perform the required service.
5. Remove and dispose of any oil contaminated material per local codes.

FAN SHAFT BEARINGS — Lubricate bearings at least every 6 months with suitable bearing grease. Typical lubricants are given below:

MANUFACTURER	LUBRICANT
Texaco	Regal AFB-2*
Mobil	Mobilplex EP No. 1
Sunoco	Prestige 42
Texaco	Multifak 2

*Preferred lubricant because it contains rust and oxidation inhibitors.

FAN MOTOR BEARINGS — Fan motor bearings are of the permanently lubricated type. No field lubrication is required. No lubrication of the condenser or evaporator motors are required.

Manual Outdoor Air Damper — If manual outdoor air damper blade adjustment is required, refer to Step 8 — Install Outdoor Air Hood section on page 23.

Economizer Adjustment — If economizer adjustment is required, refer to Optional EconoMi$er IV section on page 37.

Evaporator Fan Service and Replacement — The 50PG units feature a slide-out fan deck for easy servicing of the indoor-fan motor, pulleys, belt, and bearings. To service components in this section, perform the following procedure:

1. Turn off unit power.

2. Open the fan section access panel.
3. Remove three no. 10 screws at front of slide-out fan deck. Save screws. See Fig. 28.
4. Fan deck can now be slid out to access serviceable components.

⚠ CAUTION

DO NOT SLIDE FAN DECK OUT PAST THE STOP BRACKET. If further access is required, the fan deck must be supported. Make sure plugs and wiring are not pinched between fan housing and unit center post. Damage to unit may result.

5. To replace fan deck to operating position, slide fan deck back into the unit. Secure with the three no. 10 screws removed in Step 3.
6. Close fan section access door.
7. Restore power to unit.

Evaporator Fan Performance Adjustment (Fig. 28 and 29) — Fan motor pulleys are factory set for speed shown in Table 17.

To change fan speeds:

1. Shut off unit power supply.
2. Loosen nuts on the 4 carriage bolts in the mounting base. Using adjusting bolts and plate, slide motor and remove belt.
3. Loosen movable-pulley flange setscrew (see Fig. 29).
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Table 17.

   See Table 13 for air quantity limits.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 17 for speed change for each full turn of pulley flange.)
6. Replace and tighten belts (see Evaporator Fan Belt Tension Adjustment section below).
7. Restore power to unit.

To align fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft.
3. Make angular alignment by loosening motor from mounting plate.

Evaporator Fan Belt Tension Adjustment — To adjust belt tension:

1. Turn off unit power.
2. Slide out fan deck to service position as shown in Evaporator Fan Service and Replacement section above.
3. Loosen fan motor bolts.
4. Move motor mounting plate to adjust to proper belt tension. See Table 20. Motor adjuster bolts may be used to tighten belts. See Fig. 28.
5. Check for proper belt alignment. Adjust if necessary.
6. Tighten motor mounting plate bolts to lock motor in proper position.
7. Return fan deck back into operating position.
8. Restore power to unit.

Condenser-Fan Adjustment (Fig. 30)

1. Shut off unit power supply.
2. Remove condenser-fan assembly (grille, motor, motor cover, and fan) and loosen fan hub setscrews.
3. Adjust fan height as shown in Fig. 30.
4. Tighten setscrews and replace condenser-fan assembly.
5. Turn on power to unit.

Verify Sensor Performance — Using an ohmmeter and a thermometer, compare measured temperature to the resistance shown in Table 21.

Economizer Operation During Power Failure — Dampers have a spring return. In event of power failure, dampers will return to fully closed position until power is restored. *Do not manually operate damper motor.*

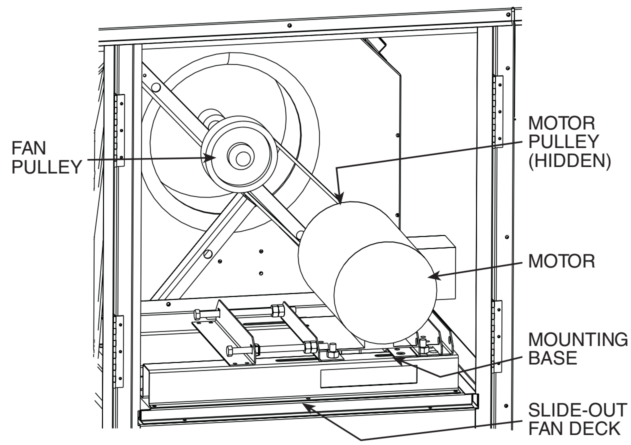


Fig. 28 — Evaporator-Fan Motor Adjustment

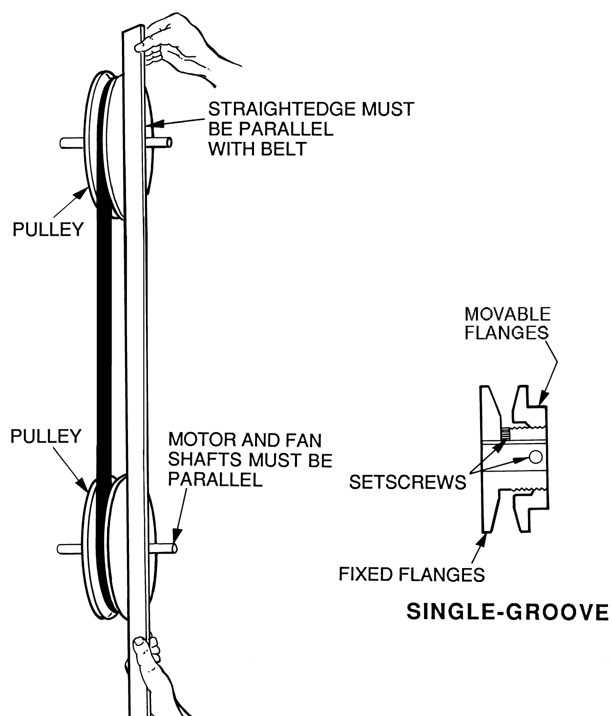


Fig. 29 — Evaporator-Fan Alignment and Adjustment

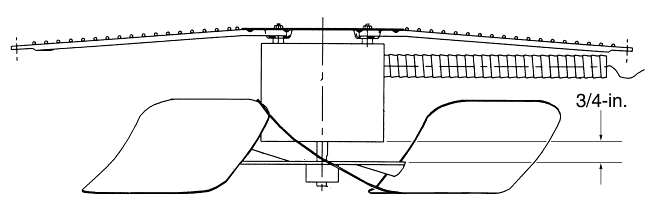


Fig. 30 — Condenser-Fan Adjustment

Table 20 — Belt Tension Adjustment

50PG	VOLTAGE	BELT TENSION (lb) Unit Model Number Position 10							
		A,J	B,K	C,L	D,M	E,N	F,P	G,Q	H,R
20	230	4.8	5.1	5.6	4.5	4.8	5.1	5.6	4.5
	460	4.8	5.1	5.6	4.5	4.8	5.1	5.6	4.5
	575	5.3	5.1	5.6	4.5	5.3	5.1	5.6	4.5
24	230	4.8	5.1	5.6	4.5	4.8	5.1	5.6	4.5
	460	4.8	5.1	5.6	4.5	4.8	5.1	5.6	4.5
	575	5.3	5.1	5.6	4.5	5.3	5.1	5.6	4.5
28	230	4.5	5.4	5.9	4.5	4.5	5.4	5.9	4.5
	460	4.5	5.4	5.9	4.5	4.5	5.4	5.9	4.5
	575	4.5	5.4	5.9	4.5	4.5	5.4	5.9	4.5

Table 21 — Sensor Temperature/Resistance Values

TEMPERATURE (F)	RESISTANCE (ohms)
–58	200,250
–40	100,680
–22	53,010
–4	29,091
14	16,590
32	9,795
50	5,970
68	3,747
77	3,000
86	2,416
104	1,597
122	1,080
140	746
158	525
176	376
185	321
194	274
212	203
230	153
248	116
257	102
266	89
284	70
302	55

Evacuation — Proper evacuation of the system will remove noncondensables and ensure a tight, dry system before charging. Evacuate from both high and low side ports. Never use the system compressor as a vacuum pump. Refrigerant tubes and indoor coil should be evacuated to 500 microns. Always break a vacuum with dry nitrogen. The two possible methods are the deep vacuum method and the triple evacuation method.

DEEP VACUUM METHOD — The deep vacuum method requires a vacuum pump capable of pulling a minimum vacuum of 500 microns and a vacuum gage capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water. (See Fig. 31.)

TRIPLE EVACUATION METHOD — The triple evacuation method should only be used when vacuum pump is capable of pumping down to 28 in. of mercury and system does not contain any liquid water. Proceed as follows:

1. Pump system down to 28 in. of mercury and allow pump to continue operating for an additional 15 minutes.
2. Close service valves and shut off vacuum pump.
3. Connect a nitrogen cylinder and regulator to system and open until system pressure is 2 psig.
4. Close service valve and allow system to stand for 1 hr. During this time, dry nitrogen will be able to diffuse throughout the system, absorbing moisture.
5. Repeat this procedure. System will then contain minimal amounts of contaminants and water vapor.

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate. Refer to Carrier GTAC II; Module 5; Charging, Recovery, Recycling, and Reclamation section for charging methods and procedures. Unit panels must be in place when unit is operating during charging procedure.

Puron® (R-410A) refrigerant cylinders contain a dip tube which allows liquid refrigerant to flow from the cylinder in an upright position. Charge units with cylinder in the upright position and a commercial type metering device in the manifold hose.

⚠ CAUTION

This system uses Puron refrigerant which has higher pressures than R-22 and other refrigerants. No other refrigerant may be used in this system. Gage set, hoses, and recovery system must be designed to handle Puron refrigerant. If unsure about equipment, consult the equipment manufacturer.

NOTE: Do not use recycled refrigerant as it may contain contaminants.

NO CHARGE — Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant (refer to unit nameplate).

LOW CHARGE COOLING — Using cooling charging chart (see Fig. 32-34), add or remove refrigerant until conditions of the chart are met. An accurate pressure gage and temperature-sensing device are required. Charging is accomplished by ensuring the proper amount of liquid subcooling. Measure liquid line pressure at the liquid line service valve using pressure gage. Connect temperature sensing device to the liquid line near the liquid line service valve and insulate it so that outdoor ambient temperature does not affect reading.

TO USE THE COOLING CHARGING CHART — Use the above temperature and pressure readings, and find the intersection point on the cooling charging chart. If intersection point on chart is above line, add refrigerant. If intersection point on chart is below line, carefully recover some of the charge. Recheck suction pressure as charge is adjusted.

NOTE: Indoor-air cfm must be within normal operating range of unit. All outdoor fans must be operating.

The TXV (thermostatic expansion valve) is set to maintain between 10 and 15 degrees of superheat at the compressors. The valves are factory set and cannot be adjusted. Do not use a TXV designed for use with R-22 refrigerant.

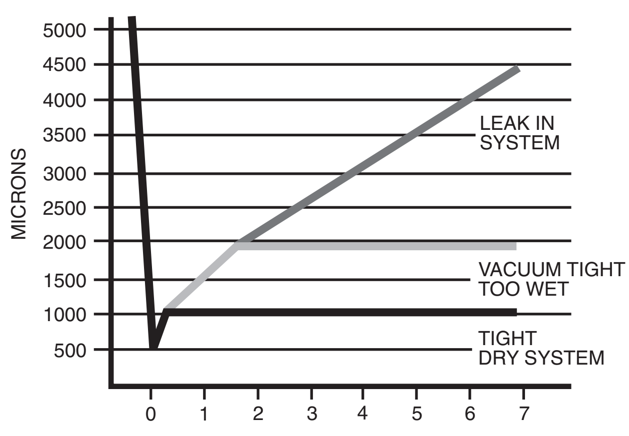


Fig. 31 — Deep Vacuum Graph

PURON® REFRIGERANT — Puron refrigerant operates at 50 to 70 percent higher pressures than R-22. Be sure that servicing equipment and replacement components are designed to operate with Puron refrigerant. Do not mix with components that have been used with other refrigerants. Puron refrigerant, as with other HFCs, is only compatible with POE oils.

Recovery cylinder service pressure rating must be 400 psig. Puron systems should be charged with liquid refrigerant. Use a commercial-type metering device in the manifold hose. Manifold sets should be 750 psig high-side and 200 psig low-side with 520 psig low-side retard. Use hoses with 750 psig service pressure rating. Leak detectors should be designed to detect HFC refrigerant.

Filter Drier — Replace whenever refrigerant system is exposed to atmosphere. Only use factory specified liquid-line filter driers with working pressures no less than 650 psig. Do not install a suction-line filter drier in liquid line. A liquid-line filter drier designed for use with Puron® refrigerant is required for each circuit.

Protective Devices

COMPRESSOR PROTECTION

Overcurrent — Each compressor has internal line break motor protection.

Overtemperature — Each compressor has an internal protector to protect it against excessively high discharge gas temperatures.

High-Pressure Switch — If the high-pressure switch opens, the compressor will shut down and the compressor lockout (CLO) device will energize to block further compressor operation. The high-pressure switch will reset automatically as the refrigerant pressure drops below its reset level. The CLO will remain energized until manually reset.

Low-Pressure Switch — If the low-pressure switch opens, the compressor will shut down and the compressor lockout (CLO) device will energize to block further compressor operation. The low-pressure switch will reset automatically as the refrigerant pressure rises above its reset level. The CLO will remain energized until manually reset.

Freeze Protection Switch — This switch is installed on each evaporator coil section to provide protection against continued unit operation with a frosted evaporator surface. If the freeze protection switch opens, the compressor on this circuit will shut down and the compressor lockout (CLO) device will energize to block further compressor operation. The freeze protection switch will reset as the evaporator tube temperature rises above its reset level. The CLO will remain energized until manually reset.

Compressor Lockout (CLO) Device — The CLO prevents automatic recycling of the compressor as safety controls reset. If the high-pressure switch, low-pressure switch or freeze protection switch opens, the CLO device will energize to block further compressor operation. To reset the CLO (after all safety switches have reset), either open the thermostat to remove the cooling demand signal (and then re-close) or cycle the control power in the unit.

EVAPORATOR FAN MOTOR PROTECTION — A manual reset, calibrated trip, magnetic circuit breaker protects against overcurrent. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

CONDENSER-FAN MOTOR PROTECTION — Each condenser-fan motor is internally protected against overtemperature.

Fuses are also located in the control box and feed power to the condenser fan motors. Always replace blown fuses with the correct size fuse as indicated on the unit fuse label.

Relief Devices — All units have relief devices to protect against damage from excessive pressures (i.e., fire). These devices protect the high and low side and are located at the suction line service port. Protect joint during brazing operations near joint.

Control Circuit, 24-V — Each control circuit is protected against overcurrent by a 3.2 amp circuit breaker. Breaker can be reset. If it trips, determine cause of trouble before resetting. See Fig. 35-38 for wiring diagrams.

Replacement Parts — A complete list of replacement parts may be obtained from any Carrier distributor upon request.

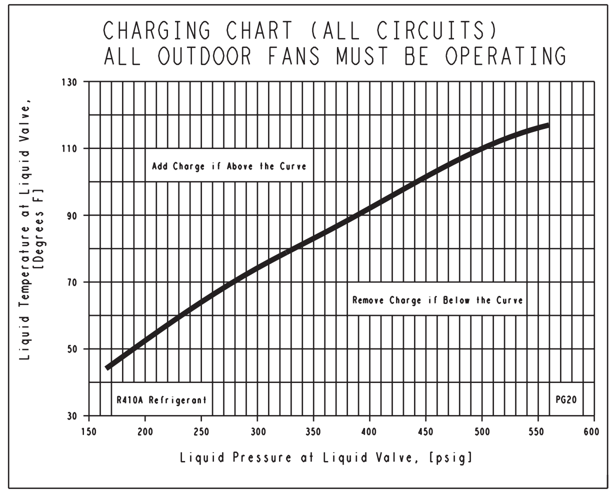


Fig. 32 — Charging Chart — 50PG20

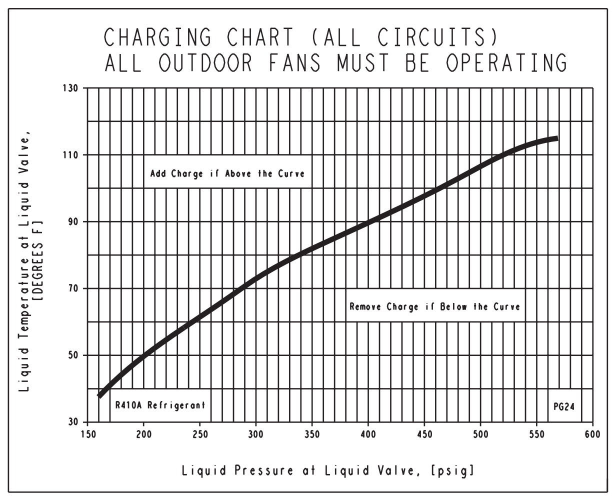


Fig. 33 — Charging Chart — 50PG24

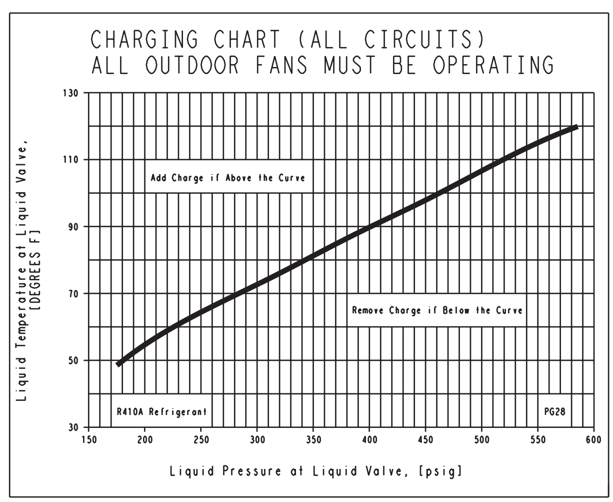


Fig. 34 — Charging Chart — 50PG28

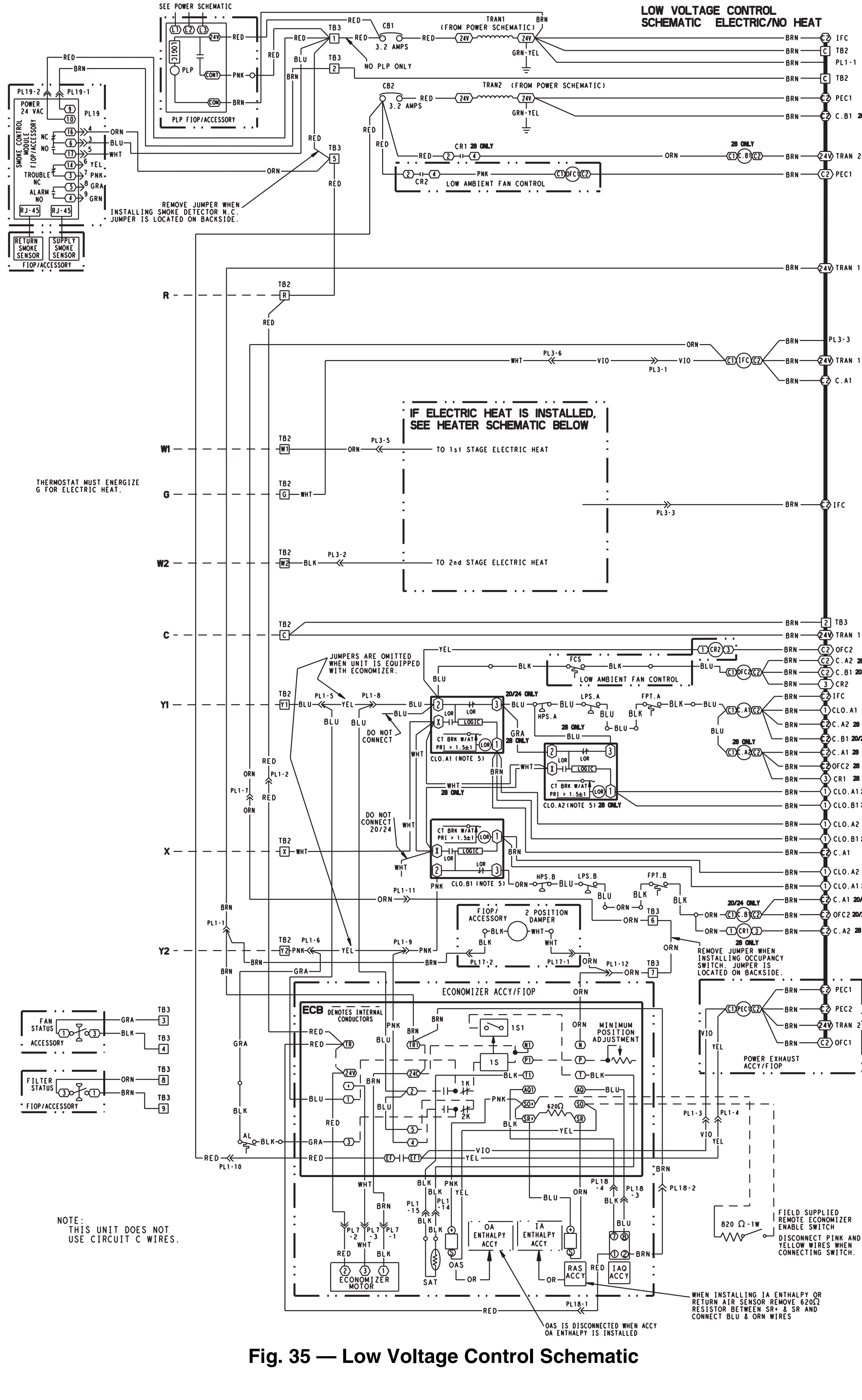


Fig. 35 — Low Voltage Control Schematic

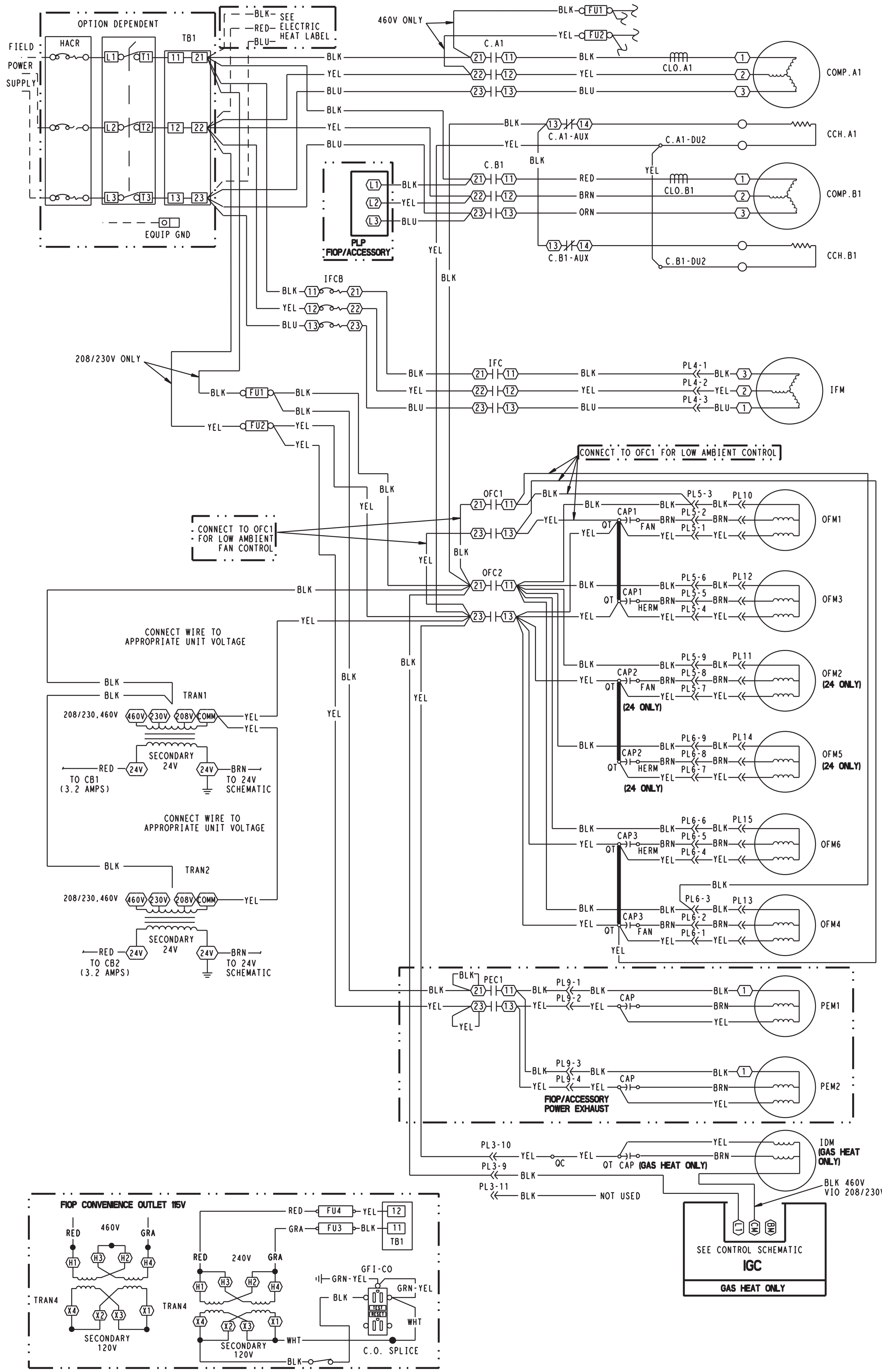
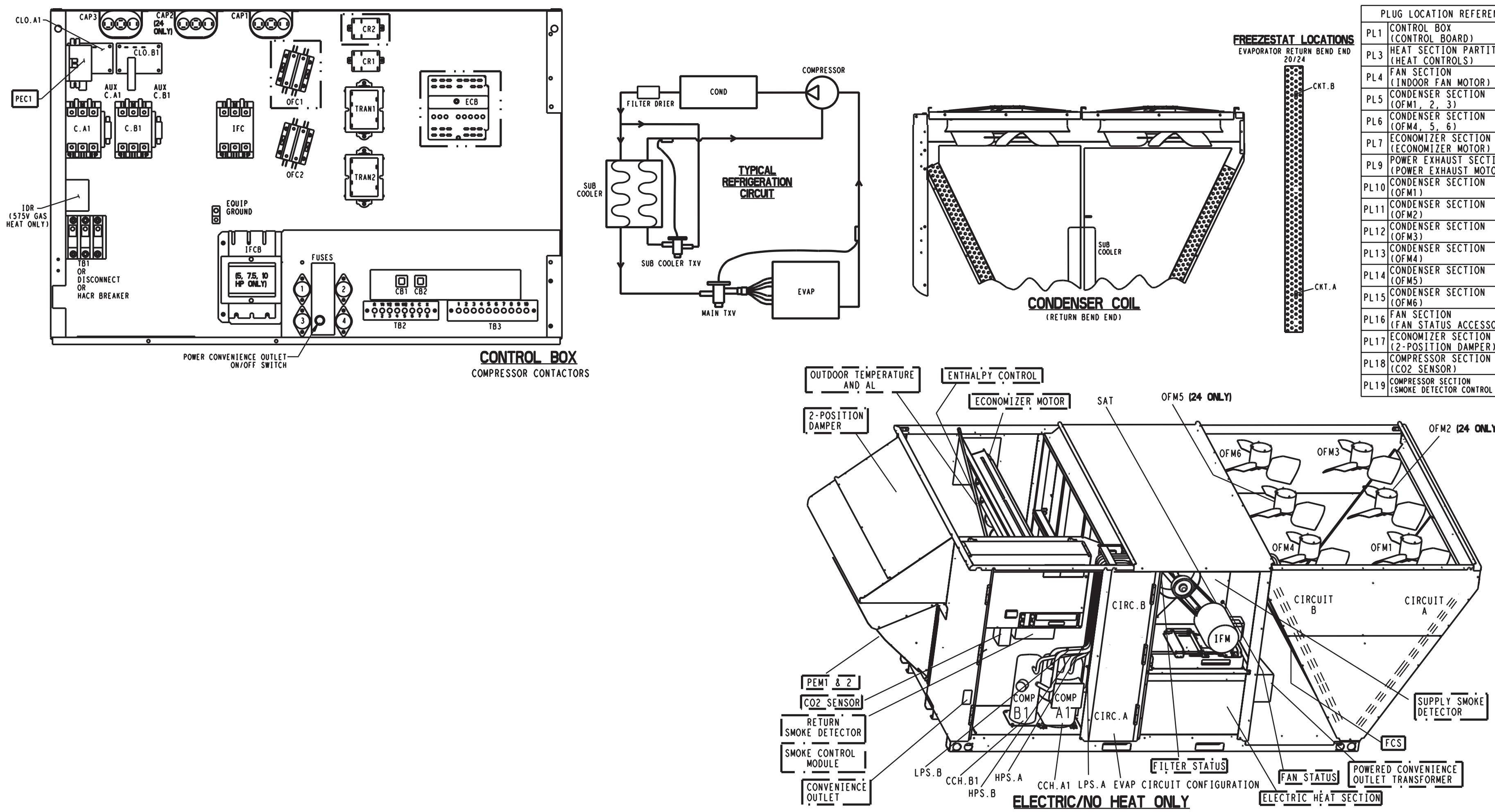


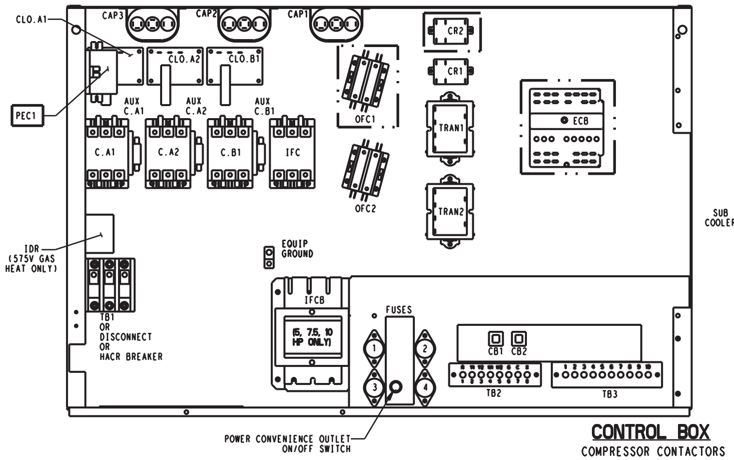
Fig. 36 — Power Schematic (50PG20 and 24, 208/230V and 460V Shown)

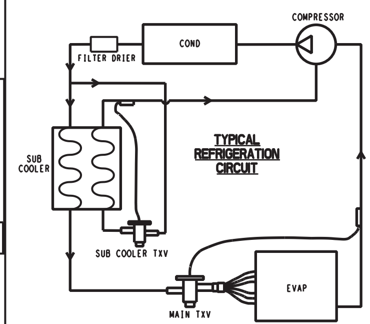


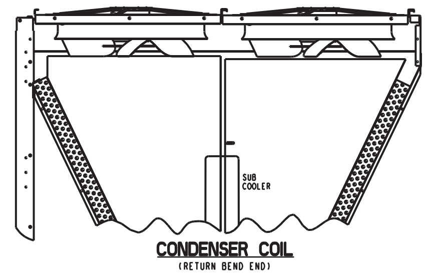
PLUG LOCATION REFERENCE	
PL1	CONTROL BOX (CONTROL BOARD)
PL3	HEAT SECTION PARTITION (HEAT CONTROLS)
PL4	FAN SECTION (INDOOR FAN MOTOR)
PL5	CONDENSER SECTION (OFM1, 2, 3)
PL6	CONDENSER SECTION (OFM4, 5, 6)
PL7	ECONOMIZER SECTION (ECONOMIZER MOTOR)
PL9	POWER EXHAUST SECTION (POWER EXHAUST MOTORS)
PL10	CONDENSER SECTION (OFM1)
PL11	CONDENSER SECTION (OFM2)
PL12	CONDENSER SECTION (OFM3)
PL13	CONDENSER SECTION (OFM4)
PL14	CONDENSER SECTION (OFM5)
PL15	CONDENSER SECTION (OFM6)
PL16	FAN SECTION (FAN STATUS ACCESSORY)
PL17	ECONOMIZER SECTION (2-POSITION DAMPER)
PL18	COMPRESSOR SECTION (CO2 SENSOR)
PL19	COMPRESSOR SECTION (SMOKE DETECTOR CONTROL MODULE)

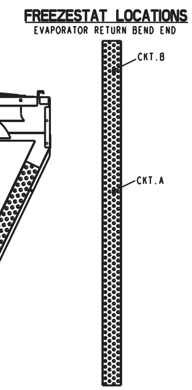
Fig. 37 — Component Arrangement — 50PG20,24

COMPONENT ARRANGEMENT

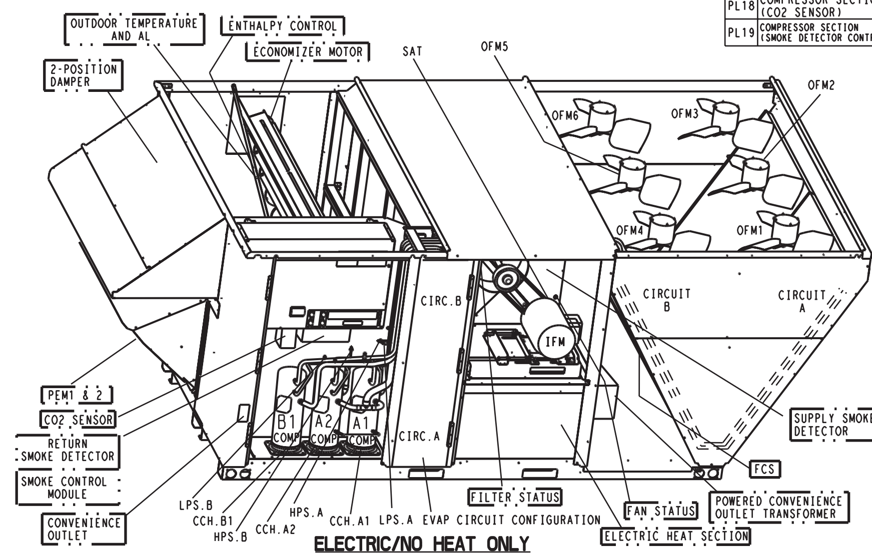








PLUG LOCATION REFERENCE	
PL1	CONTROL BOX (CONTROL BOARD)
PL3	HEAT SECTION PARTITION (HEAT CONTROLS)
PL4	FAN SECTION (INDOOR FAN MOTOR)
PL5	CONDENSER SECTION (OFM1, 2, 3)
PL6	CONDENSER SECTION (OFM4, 5, 6)
PL7	ECONOMIZER SECTION (ECONOMIZER MOTOR)
PL9	POWER EXHAUST SECTION (POWER EXHAUST MOTORS)
PL10	CONDENSER SECTION (OFM1)
PL11	CONDENSER SECTION (OFM2)
PL12	CONDENSER SECTION (OFM3)
PL13	CONDENSER SECTION (OFM4)
PL14	CONDENSER SECTION (OFM5)
PL15	CONDENSER SECTION (OFM6)
PL16	FAN SECTION (FAN STATUS ACCESSORY)
PL17	ECONOMIZER SECTION (2-POSITION DAMPER)
PL18	COMPRESSOR SECTION (CO2 SENSOR)
PL19	COMPRESSOR SECTION (SMOKE DETECTOR CONTROL MODULE)



LEGEND

---A	— Circuit A	OAS	— Outdoor Air Sensor
AL	— Ambient Limit	OFC	— Outdoor-Fan Contactor
AUX	— Auxiliary Contact	OFM	— Outdoor-Fan Motor
---B	— Circuit B	PEC	— Power Exhaust Contactor
C	— Compressor, Contactor	PEM	— Power Exhaust Motor
CAP	— Capacitor	PL	— Plug
CB	— Circuit Breaker	PLP	— Phase Loss Protection
CCH	— Crankcase Heater	QC	— Quick Connect
CLO	— Compressor Lockout	QT	— Quadruple Terminal
COMP	— Compressor	RAS	— Return Air Sensor
CT BRK	— Circuit Breaker	SAT	— Supply-Air Temperature
CR	— Control Relay	SS	— Speed Sensor
DU	— Dummy Terminal	TB	— Terminal Block
ECB	— Economizer Control Board	TRAN	— Transformer
FCS	— Fan Cycling Switch	TXV	— Thermostatic Expansion Valve
FIOP	— Factory-Installed Option	W/AT	— With Auxiliary Trip
FPT	— Freeze Protect Thermostat	[X]	Terminal Block
FU	— Fuse	○	Terminal (Unmarked)
GND	— Ground	⟨X⟩	Terminal (Marked)
HACR	— Heating, Air Conditioning, and Refrigeration	●	Splice
HERM	— Hermetic	———	Factory Wiring
HPS	— High-Pressure Switch	– – –	Field Wiring
IAQ	— Indoor Air Quality	━━━	To Indicate Common Potential Only. Not to Represent Wiring.
IDR	— Induced-Draft Relay	—·· —	To Indicate FIOP or Accessory
IFC	— Indoor-Fan Contactor		
IFCB	— Indoor Fan Circuit Breaker		
IFM	— Indoor-Fan Motor		
IGC	— Integrated Gas Controller		
LOR	— Lockout Relay		
LPS	— Low-Pressure Switch		

THERMOSTAT/IGC MARKINGS

BM	— Blower Motor	RT	— Power Supply
C	— Common	SS	— Speed Sensor
CM	— Combustion Motor	W	— Thermostat Heat
CS	— Centrifugal Switch	W1	— 1st Stage of Heating
G	— Fan	W2	— 2nd Stage of Heating
IFO	— Indoor Fan On	X	— Alarm Output
L1	— Line 1	Y1	— 1st Stage of Cooling
R	— Thermostat Power	Y2	— 2nd Stage of Cooling

NOTES:
1. Factory wiring is in accordance with the National Electrical Codes. Any field modifications or additions must be in compliance with all applicable codes.
2. Use 75° C min wire for field power supply. Use copper wires for all units.
3. All circuit breakers “Must Trip Amps” are equal to or less than 156% RLA.
4. Compressor and fan motors are thermally protected — three phase motors protected against primary single phase conditions.
5. The CLO locks out the compressor to prevent short cycling on compressor overload and safety devices. Before replacing CLO, check these devices.

Fig. 38 — Component Arrangement — 50PG28

TROUBLESHOOTING

Unit Troubleshooting — Refer to Tables 22 and 23 for troubleshooting details.

Table 22 — Cooling Service Analysis

PROBLEM	CAUSE	REMEDY
Compressor and Condenser Fan Will Not Start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay.	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
	Thermostat setting too high.	Lower thermostat setting below room temperature.
Compressor Will Not Start but Condenser Fan Runs.	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor.
	Defective overload.	Determine cause and replace.
	Compressor locked out	Determine cause for safety trip and reset lockout.
	One leg of 3-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor Cycles (other than normally satisfying thermostat).	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor.	Replace and determine cause.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective overload.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor.	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
Compressor Operates Continuously.	Dirty air filter.	Replace filter.
	Unit undersized for load.	Decrease load or increase unit size.
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge.	Locate leak, repair, and recharge.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive Head Pressure.	Dirty air filter.	Replace filter.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharged.	Recover excess refrigerant.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling.	Determine cause and correct.
Head Pressure Too Low.	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Restriction in liquid tube.	Remove restriction.
Excessive Suction Pressure.	High heat load.	Check for source and eliminate.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction Pressure Too Low.	Dirty air filter.	Replace filter.
	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Field-installed filter drier restricted.	Replace.

LEGEND

TXV — Thermostatic Expansion Valve

Table 23 — Heating Service Analysis

PROBLEM	CAUSE	REMEDY
No Heat.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped. CB1, CB2, CB3.	Replace fuse or reset circuit breaker.
	Thermostat not calling for heating.	Check thermostat.
	No 24 vac at primary contactor.	Check transformer and circuit breaker.
	No power (high voltage) to L2 of primary contactor.	Check safety switches, one shot backup, and auto limit.
	Bad electrical elements.	With power off, remove high voltage wires and check resistance of heater. Replace if open.

EconoMi$er IV Troubleshooting

ECONOMI$ER IV PREPARATION — This procedure is used to prepare the EconoMi$er IV for troubleshooting. No troubleshooting or testing is done by performing the following procedure.

NOTE: This procedure requires a 9-v battery, 1.2 kilo-ohm resistor, and a 5.6 kilo-ohm resistor which are not supplied with the EconoMi$er IV.

> IMPORTANT: Be sure to record the positions of all potentiometers before starting troubleshooting.

1. Disconnect power at TR and TR1. All LEDs should be off. Exhaust fan contacts should be open.
2. Disconnect device at P and P1.
3. Jumper P to P1.
4. Disconnect wires at T and T1. Place 5.6 kilo-ohm resistor across T and T1.
5. Jumper TR to 1.
6. Jumper TR to N.
7. If connected, remove sensor from terminals S_O and +. Connect 1.2 kilo-ohm 4074EJM checkout resistor across terminals S_O and +.
8. Put 620-ohm resistor across terminals S_R and +.
9. Set minimum position, DCV set point, and exhaust potentiometers fully CCW (counterclockwise).
10. Set DCV maximum position potentiometer fully CW (clockwise).
11. Set enthalpy potentiometer to D.
12. Apply power (24 vac) to terminals TR and TR1.

DIFFERENTIAL ENTHALPY — To check differential enthalpy:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Place 620-ohm resistor across S_O and +.
3. Place 1.2 kilo-ohm resistor across S_R and +. The Free Cool LED should be lit.
4. Remove 620-ohm resistor across S_O and +. The Free Cool LED should turn off.
5. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

SINGLE ENTHALPY — To check single enthalpy:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Set the enthalpy potentiometer to A (fully CCW). The Free Cool LED should be lit.
3. Set the enthalpy potentiometer to D (fully CW). The Free Cool LED should turn off.
4. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

DCV (Demand Controlled Ventilation) AND POWER EXHAUST — To check DCV and power exhaust:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Ensure terminals AQ and AQ1 are open. The LED for both DCV and Exhaust should be off. The actuator should be fully closed.
3. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The LED for both DCV and Exhaust should turn on. The actuator should drive to between 90 and 95% open.
4. Turn the Exhaust potentiometer CW until the Exhaust LED turns off. The LED should turn off when the potentiometer is approximately 90%. The actuator should remain in position.
5. Turn the DCV set point potentiometer CW until the DCV LED turns off. The DCV LED should turn off when the potentiometer is approximately 9 v. The actuator should drive fully closed.
6. Turn the DCV and Exhaust potentiometers CCW until the Exhaust LED turns on. The exhaust contacts will close 30 to 120 seconds after the Exhaust LED turns on.
7. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

DCV MINIMUM AND MAXIMUM POSITION — To check the DCV minimum and maximum position:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The DCV LED should turn on. The actuator should drive to between 90 and 95% open.
3. Turn the DCV Maximum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
4. Turn the DCV Maximum Position potentiometer to fully CCW. The actuator should drive fully closed.
5. Turn the Minimum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
6. Turn the Minimum Position Potentiometer fully CW. The actuator should drive fully open.
7. Remove the jumper from TR and N. The actuator should drive fully closed.
8. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

MIXED AIR INPUT — To check mixed air input:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Set the Enthalpy potentiometer to A. The Free Cool LED turns on. The actuator should drive to between 20 and 80% open.
3. Remove the 5.6 kilo-ohm resistor and jumper T to T1. The actuator should drive fully open.

4. Remove the jumper across T and T1. The actuator should drive fully closed.
5. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

ECONOMI$ER IV TROUBLESHOOTING COMPLETION — This procedure is used to return the EconoMi$er IV to operation. No troubleshooting or testing is done by performing the following procedure.

1. Disconnect power at TR and TR1.
2. Set enthalpy potentiometer to previous setting.
3. Set DCV maximum position potentiometer to previous setting.
4. Set minimum position, DCV set point, and exhaust potentiometers to previous settings.
5. Remove 620-ohm resistor from terminals S_R and +.
6. Remove 1.2 kilo-ohm checkout resistor from terminals S_O and +. If used, reconnect sensor from terminals S_O and +.
7. Remove jumper from TR to N.
8. Remove jumper from TR to 1.
9. Remove 5.6 kilo-ohm resistor from T and T1. Reconnect wires at T and T1.
10. Remove jumper from P to P1. Reconnect device at P and P1.
11. Apply power (24 vac) to terminals TR and TR1.

Phase Loss Protection — The phase loss protection option will monitor the three-phase electrical system to provide phase reversal and phase loss protection.

PHASE REVERSAL PROTECTION — If the control senses an incorrect phase relationship, the relay (K1) will be deenergized (opening its contact). If the phase relationship is correct, the relay will be energized. The control has a self-bypass function after a pre-set time. If the control determines that the three phases stay in a correct relationship for 10 consecutive minutes, the relay will stay energized regardless of the phase sequence of three inputs as long as 24-vac control voltage is applied. This self-bypass function will be reset if all three phases are restored in a phase loss event.

PHASE LOSS PROTECTION — If the reverse rotation board senses any one of the three phase inputs has no AC voltage, the relay will be deenergized (opening its contact). This protection is always active as long as 24-vac control voltage is applied, and is not affected by the self-bypass function of the phase sequence monitoring function. However, in the event of phase loss, the relay will be re-energized only if all three phases are restored and the three phases are in the correct sequence.

A red LED is provided to indicate the function of the board. See the table below.

LED STATUS	FUNCTION
On Continuously	Relay contact closed (normal operation).
Blinking	Relay contact open (phase loss or phase reversal has occurred) — No power will be supplied to the control system.
Off	24 vac control power not present (off).

UNIT START-UP CHECKLIST

MODEL NO.:______________________________ SERIAL NO.:______________________________

DATE:______________________________ TECHNICIAN: ______________________________

I. PRE-START-UP:

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ VERIFY INSTALLATION OF OUTDOOR AIR HOOD
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS
- ☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
- ☐ CHECK THAT INDOOR-AIR FILTERS ARE CLEAN AND IN PLACE
- ☐ CHECK THAT OUTDOOR AIR INLET SCREENS ARE IN PLACE
- ☐ VERIFY THAT UNIT IS LEVEL
- ☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE, AND VERIFY SETSCREW IS TIGHT
- ☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED
- ☐ VERIFY THAT SCROLL COMPRESSORS ARE ROTATING IN THE CORRECT DIRECTION
- ☐ VERIFY INSTALLATION OF THERMOSTAT
- ☐ VERIFY THAT CRANKCASE HEATERS HAVE BEEN ENERGIZED FOR AT LEAST 24 HOURS

II. START-UP

ELECTRICAL

SUPPLY VOLTAGE L1-L2 ________ L2-L3 ________ L3-L1 ________

COMPRESSOR AMPS — COMPRESSOR A1		L1 ________	L2 ________	L3 ________
— COMPRESSOR A2		L1 ________	L2 ________	L3 ________
— COMPRESSOR B1		L1 ________	L2 ________	L3 ________
ELECTRIC HEAT AMPS (IF EQUIPPED)		L1 ________	L2 ________	L3 ________
SUPPLY FAN AMPS	________	L1 ________	L2 ________	L3 ________

TEMPERATURES

OUTDOOR-AIR TEMPERATURE ________ F DB (Dry Bulb)

RETURN-AIR TEMPERATURE ________ F DB ________ F WB (Wet Bulb)

COOLING SUPPLY AIR ________ F

ELECTRIC HEAT SUPPLY AIR ________ F

PRESSURES

REFRIGERANT SUCTION CIRCUIT A ________ PSIG

CIRCUIT B ________ PSIG

REFRIGERANT DISCHARGE CIRCUIT A ________ PSIG

CIRCUIT B ________ PSIG

☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS ON PAGE 47

GENERAL

☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS

CUT ALONG DOTTED LINE

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Book 1 4 PC 111 Catalog No. 535-00141 Printed in U.S.A. Form 50PG-7SI Pg CL-1 9-05 Replaces: New
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