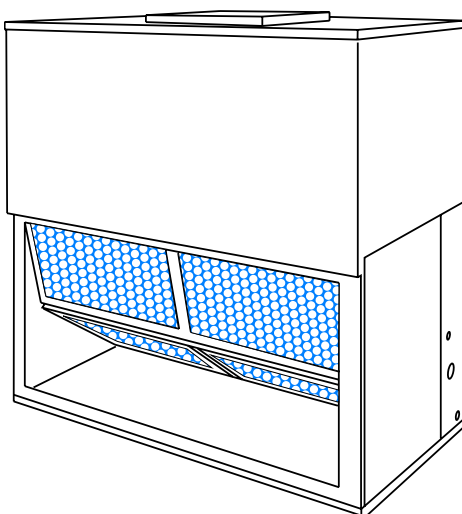




## Heating and Air Conditioning Technical Guide



### SPLIT-SYSTEM

### EVAPORATOR BLOWERS

### 7-1/2 NOMINAL TON

### LA-090



208/230/460  
VOLT ONLY



208/230/575  
VOLT ONLY



## DESCRIPTION

These completely assembled units include a well-insulated cabinet, a DX cooling coil with copper tubes and aluminum fins, expansion valve(s), distributor(s), throwaway filters, a centrifugal blower, a blower motor, an adjustable belt drive, a blower motor contactor and a small holding charge of refrigerant-22.

The units are shipped in the vertical position ready for field installation. They can be installed for horizontal operation by reversing the position of the solid bottom panel with the return air duct flange on the front of the unit.

## ACCESSORIES—FIELD INSTALLED

### SUPPLY AIR PLENUMS

These fully insulated plenums are available for free standing units located within the conditioned space, are shipped knocked-down for easy field assembly, are finished to match the exterior of the basic unit, and have double deflection grilles that can be adjusted to vary the throw, spread and drop of the supply air.

### RETURN AIR GRILLES

These expanded metal grilles are available for free standing units located within the conditioned space, are finished to match the exterior of the basic unit and are shipped in one piece for easy installation.

### BASES

Bases are available to raise vertical units above the floor. Outdoor air may be introduced through these bases by cutting an access opening to accommodate the outdoor air duct connection. These bases are finished to match the exterior of the basic unit. They may have to be insulated in the field for certain applications.

### THREE-PHASE ELECTRIC HEATERS

Electric heaters are available in several capacities to provide maximum flexibility. Both the air conditioning unit and the heater can be selected to precisely match the cooling and heating requirements of the conditioned space. These heaters are designed for easy field installation over the supply air opening of the unit. They have been tested by Underwriters' Laboratories and will be shipped with a UL label. Every heater will be fully protected against excessive current and temperature by fuses and two high limit thermostats.

Units with electric heat will require only one power supply for both the heating elements and the supply air blower motor, and the power wiring can be protected by either dual element/time delay fuses or an inverse time circuit breaker.

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**▲ WARNING**

*IMPROPER INSTALLATION MAY CREATE A CONDITION WHERE THE OPERATION OF THE PRODUCT COULD CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.*

*IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE INJURY OR PROPERTY DAMAGE. REFER TO THIS MANUAL FOR ASSISTANCE OR ADDITIONAL INFORMATION, CONSULT A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.*

**▲ CAUTION**

*THIS PRODUCT MUST BE INSTALLED IN STRICT COMPLIANCE WITH THE ENCLOSED INSTALLATION INSTRUCTIONS AND ANY APPLICABLE LOCAL, STATE, AND NATIONAL CODES INCLUDING BUT NOT LIMITED TO, BUILDING, ELECTRICAL AND MECHANICAL CODES.*

**▲ WARNING**

*The furnace area must not be used as a broom closet or for any other storage purposes, as a fire hazard may be created. Never store items such as the following on, near or in contact with the furnace.*

1. *Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners or other cleaning tools.*
2. *Soap powders, bleaches, waxes or other cleaning compounds; plastic items or containers; gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids or other volatile fluid.*
3. *Paint thinners and other painting compounds.*
4. *Paper bags, boxes or other paper products.*
5. *Never operate the furnace with the blower door removed. To do so could result in serious personal injury and/or equipment damage.*

## HOT WATER COILS

These drainable coils have 2 rows of 1/2" copper tubes, 12 aluminum fins per inch, a casing that is finished to match the exterior of the basic unit, but no water control valve. The coils slide out of their casings for easy field installation. They should be mounted over the return air opening.

## STEAM COILS

These non-freeze coils have 1 row of 1" copper tubes, a 5/8" copper tube inside each 1" tube to distribute the steam evenly across the entire length of the coil, 8 aluminum fins per inch, a casing that is finished to match the exterior of the basic unit, but no steam control valve. The coils slide out of their casings for easy field installation and are pitched in their casings to facilitate condensate drainage. They should be mounted over the return air opening.

## APPLICATION FLEXIBILITY

### MODELS 090

These units are built in a single cabinet with two condensate drain pans. This allows the units to be installed in either the vertical or horizontal position for maximum flexibility.

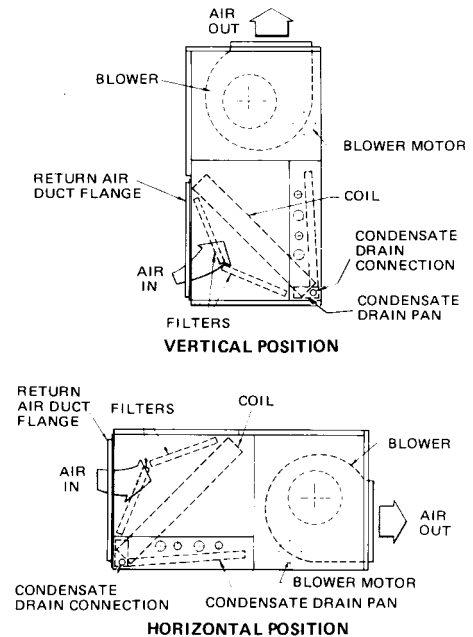
On vertical applications, the air velocity across the cooling coil keeps the condensate from dripping off the finned surface onto the filters.

On horizontal applications, the unit must be installed with the condensate drain pan under the entire cooling coil.

- The Supply Air Plenum and the Return Air Grille accessories can be used on either arrangement.

- The Base accessory can only be used on the vertical arrangement.

Units installed horizontally are designed for ceiling suspension. Four 3/8"-16 weld nuts are provided in the angle supports on the front of the unit (the side with the logo). Knockouts are provided in the exterior panels for access to these weld nuts. The hanger rods must be supplied in the field.



**FIGURE 1 - MODEL 090 - VERTICAL & HORIZONTAL POSITION**

**TABLE 1: HEATING CAPACITY - ELECTRIC HEAT ACCESSORY**

Unit Model	Heater Model		UL Voltage Test	Nominal Ratings*		Capacity*			
						Per Stage*		Per Stage†	
				KW	MBH	KW	MBH	KW	MBH
090	2HS045010	25	240†	10	34.2	10	34.2	-	-
		46	480‡						
	2HS045016	25	240†	16	54.7	10	34.2	6	20.5
		46	480‡						
	2HS045026	25	240†	26	88.9	16	54.7	10	34.2
		46	480‡						
	2HS045036	25	240†	36	123.0	16	54.7	20	68.3
		46	480‡						

\*. Capacity Ratings do not include the heat generated by the air blower motor.

†. For 208 volts, multiply the MBH and KW values by  $(208/240)^2$  or 0.751. For 230 volts, multiply the MBH and KW values by  $(230/240)^2$  or 0.918.

‡. For 460 volts, multiply the MBH and KW values by  $(460/480)^2$  or 0.918.

**TABLE 2: SOUND POWER RATINGS**

Unit Model	CFM	ESP	BLOWER		SOUND POWER (dB 10 <sup>-12</sup> WATTS)											
					Octave Band Centerline Frequency (Hz)										SWL Db(a)	dB(A) @ 10 FT.*
					IWG	RPM	BHP	63	125	250	500	1,000	2,000	4,000		
090	3,000	0.60	750	1.05	88	88	78	73	71	66	61	56	77	45		

\*. At a distance of 10 feet from the blower.

NOTE: These values have been accessed using a model of sound propagation from a point source into the hemispheric free field. The dBA values provided are for reference only. Calculation of dBA values cover matters of system design and the fan manufacturer has no way of knowing the details of each system. This constitutes an exception to any specification or guarantee requiring a dBA value or sound data in any other form than sound power level ratings.

**TABLE 3: STEAM COIL CAPACITY\*, MBH@2 PSIG†**

STEAM COIL MODEL	UNIT MODEL	CFM	DRY BULB TEMPERATURE OF AIR ENTERING COIL, °F			
			10	30	50	70
1NF0451	090	2400	172.2	155.5	139.1	122.4
		3000	191.2	172.6	154.3	136.0
		3600	207.5	187.1	167.4	147.4

\*. These capacities do not include any blower motor heat.

†. Multiply these capacities by the following factors to correct for higher steam pressures.

Steam Pressure, psig	5	10	15	20	25
Capacity correction factor	1.05	1.12	1.19	1.25	1.30

NOTE: Steam rate (lb./hr.) = 1.025 x MBH

CAUTION: Do NOT operate a motor above its nominal HP rating when a unit is equipped with a steam coil accessory.

**TABLE 4: HOT WATER CAPACITY\*, MBH**

WATER COIL MODEL	UNIT MODEL	GPM	CFM	ENTERING WATER TEMP. MINUS ENTERING AIR TEMP., °F				
				70	90	110	130	150
1HW0451	090	15	2400	78.0	101.3	124.7	148.5	169.7
			3000	87.7	113.3	139.6	166.6	190.4
			3600	95.5	124.0	153.0	182.1	208.1

\*. These capacities do no include any blower motor heat.

NOTE: Water Temperature Drop, °F = 2 x MBH

CAUTION: Do NOT operate a motor above its nominal HP rating when a unit is equipped with a hot water coil accessory.

**TABLE 5: PRESSURE DROP VS. GPM**

1HW0450	GPM	10	20	30
	Pressure Drop, PSI	.10	.32	.67
1HW0451	GPM	15	30	45
	Pressure Drop, PSI	.17	.58	1.22
1HW0452	GPM	20	40	60
	Pressure Drop, PSI	.20	.67	1.41

**TABLE 6: CAPACITY CORRECTION VS. GPM**

1HW0450	GPM	20	30
	Capacity Correction	1.12	1.16
1HW0451	GPM	30	45
	Capacity Correction	1.11	1.15
1HW0452	GPM	40	60
	Capacity Correction	1.12	1.17

**TABLE 7: SUPPLY AIR BLOWER PERFORMANCE\***

RPM	CFM														
	SP†	BHP‡	KW	SP†	BHP‡	KW	SP†	BHP‡	KW	SP†	BHP‡	KW	SP†	BHP‡	KW
090															
	2400			2700			3000			3300			3600		
600	0.35	0.62	0.59	0.26	0.70	0.66	0.13	0.78	0.73	-	-	-	-	-	-
655	0.49	0.70	0.66	0.41	0.78	0.72	0.30	0.87	0.82	0.07	0.96	0.90	-	-	-
700	0.60	0.77	0.73	0.53	0.85	0.80	0.43	0.95	0.89	0.29	1.06	0.99	0.12	1.17	1.09
800	0.92	0.97	0.90	0.85	1.06	0.99	0.77	1.18	1.10	0.65	1.30	1.21	0.49	1.42	1.32
880	1.18	1.11	1.04	1.11	1.24	1.16	1.03	1.37	1.28	0.91	1.50	1.38	0.77	1.64	1.53
900	1.24	1.15	1.07	1.18	1.28	1.19	1.10	1.42	1.32	0.98	1.55	1.43	0.84	1.70	1.57
1000	1.58	1.35	1.26	1.53	1.48	1.38	1.46	1.63	1.48	1.37	1.81	1.65	1.24	2.02	1.85

NOTE: Refer to Form 550.13-AD1 for blower performance curves.

RPM range for the standard, factory-mounted drive components.  
Exceeds the BHP limitation of the standard factory mounted blower motor.

- \*. Unit resistance is based on a wet evaporator coil and clean filters.
- †. Available static pressure IWG to overcome the resistance of the duct system and any accessories added to the unit. Refer to the respective tables for the resistance of these accessories and for additional motor and drive data.
- ‡. Motors can be selected to operate into their service factor because they are located in the moving air stream, upstream of any heating device. Units with steam or hot water coils are the only exception. On these units, the BHP must not exceed the nominal HP rating of the motor.

**TABLE 8: STATIC RESISTANCES FOR UNIT ACCESSORIES (IWG)**

Unit Model	Accessory	CFM					
		2400	2700	3000	3300	3600	
090	Electric Heaters	10 K	0.01	0.01	0.01	0.02	0.02
		16 K	0.01	0.02	0.02	0.03	0.04
		26 K	0.03	0.04	0.05	0.06	0.07
		36 K	0.05	0.07	0.08	0.10	0.11
	Supply Air Plenum		0.03	0.03	0.04	0.05	0.06
	Return Air Grille		0.02	0.03	0.04	0.05	0.06
	Hot Water Coil		0.11	0.14	0.17	0.20	0.23
Steam Coil		0.10	0.12	0.14	0.16	0.19	

Model	CFM	Face Velocity (FM)	Angle of Deflection																	
			Vertical Louvers <sup>1</sup> (Plan View) 0° SPREAD				Horizontal Louvers (Elevation View)		Vertical Louvers <sup>1</sup> (Plan View) 0° SPREAD				Horizontal Louvers (Elevation View)		Vertical Louvers <sup>1</sup> (Plan View) 45° SPREAD				Horizontal Louvers (Elevation View)	
			Throw (feet)		Spread (Feet)		Drop (Feet)		Throw (Feet)		Spread Feet		Drop (Feet)		Throw Feet		Spread Feet		Drop (Feet)	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
090	2400	615	47	74	20	29	19	9	34	53	23	33	17	8	26	39	45	65	9	5
	2700	690	53	83	22	32	20	10	39	59	25	36	18	9	29	45	48	71	10	5
	3000	770	59	92	24	35	21	10	42	66	27	40	19	9	32	50	52	78	10	5
	3300	845	65	101	26	38	21	10	46	73	29	44	19	9	35	55	56	85	10	5
	3600	920	71	110	28	41	22	11	50	79	32	47	20	10	38	60	60	91	11	6

MODEL	MOTOR HP	BLOWER (RPM)	Adjustable Motor Pulley		Fixed Blower Pulley		Belts	
			Pitch Dia. (In.)	Bore (In.)	Pitch Dia. (In.)	Bore (In.)	Designation	Pitch Length (In.)
090	1-1/2	655 - 880	2.8 - 3.8	7/8	7.5	1	A36	37.3

Motor Specifications - 090	
<ul style="list-style-type: none"> <li>• 1750 RPM</li> <li>• 208/230/460-3-60</li> <li>• Solid Base</li> <li>• 56 Frame</li> </ul>	<ul style="list-style-type: none"> <li>• Inherent Protection</li> <li>• 1.15 service factor</li> <li>• permanently lubricated ball bearings</li> </ul>

**TABLE 9: PHYSICAL DATA - UNITS AND ACCESSORIES**

Description		Unit Model 090	
EVAPORATOR COIL	Rows Deep x Rows Wide	3 x 28	
	Finned Length - inches	46	
	Face Area - square feet	8.94	
	Tube OD - inches	3/8	
	Fins per inch	13	
CENTRIFUGAL BLOWER (Forward Curve)	Diameter x Width - inches	15 x 15	
MOTORS*	Nominal HP Rating	1-1/2	
FILTERS (Throwaway)	Quantity Per Unit	16" x 25" x 1"	4
		20" x 20" x 1"	-
	Face Area - square feet	11.1	
DISTRIBUTOR	One Per Unit	5-3-14-1†	
OPERATING Weight, Lbs.‡	Basic Unit	320	
	Accessories		
	Supply Air Plenum	102	
	Return Air Grille	15	
	Hot Water Coil	82	
	Steam Coil	85	
	Base	60	
	Electric Heat:		
	10 KW	63	
	16 KW	66	
26 KW	71		
36 KW	74		
72 KW	-		
HOT WATER COIL	Tubes OD, inches	1/2 (Copper)	
	Rows Deep	2	
	Fins Per Inch	12 (Aluminum)	
	Face Area, square feet	6.8	
	Connections (Supply & Return)	1" NPTE	
STEAM COIL	Outer Tube OD, inches	1 (Brass)	
	Rows Deep	1	
	Fins Per Inch	8 (Aluminum)	
	Face Area - square feet	6.6	
	Connection		
	Inlet	1-1/2" NPTE	
	Outlet	1-1/2" NPTE	
ELECTRIC HEAT	Heater Elements	% Nickel	59.2
		% Chromium	16.0
		Watt Density, watts/sq. in.	59.0
	Face Area, square feet	3.0	
SHIPPING VOLUME - Cubic Feet (Basic Unit)		53	

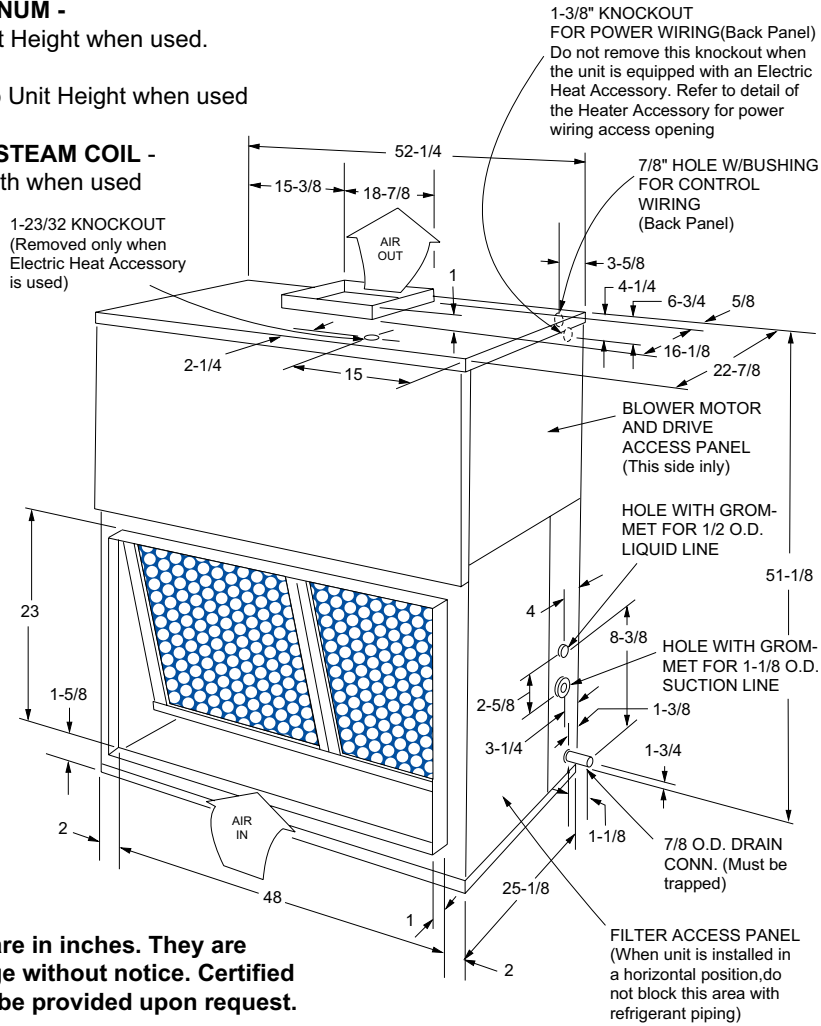
\*. Refer to Blower Motor and Drive Data for additional blower motor and drive information.

†. The first digit refers to inlet diameter (1/8"), second digit refers to tube diameter (1/16") and the third digit refers to number of tubes and the fourth digit refers to number of distributors.

‡. Refer to the unit installation instruction for the distributed weight of the evaporator blower unit:  
 - Form 550.23-N2Y (060, 090 and 120)  
 - Form 550.13-N7Y (180)

**ACCESSORIES**

- **ELECTRIC HEATERS -**  
Add 14-1/4" to Unit Height when used
- **SUPPLY AIR PLENUM -**  
Add 27-1/2" to Unit Height when used.
- **BASE -** Add 20" to Unit Height when used
- **HOT WATER OR STEAM COIL -**  
Add 5" to Unit Depth when used



**All dimensions are in inches. They are subject to change without notice. Certified dimensions will be provided upon request.**

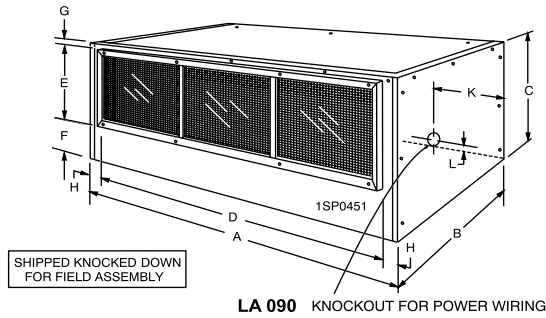
**FIGURE 2 - UNIT DIMENSIONS - 090**

**TABLE 10: UNIT DIMENSIONS - 090**

MINIMUM CLEARANCES	
Side with RETURN AIR opening	24"
Side with SUPPLY AIR opening	24"
Side with PIPING CONNECTIONS	52" <sup>†</sup>
Side opposite PIPING CONNECTIONS	12"
Side with access for both POWER & CONTROL WIRING	‡
Bottom	**

- \*. Overall dimension of the unit will vary if an electric heater, a supply air plenum or base is used.
- †. This dimension is required for removal of the coil. Only 26" is required for normal servicing.
- ‡. Although no clearance is required for service and operation, some clearance may be required for routing the power and control wiring.
- \*\*.

Allow enough clearance to trap the condensate drain line.



**FIGURE 3 - SUPPLY AIR PLENUM**

WITH ELECTRIC HEAT - Remove this 2-1/2" knockout from the rear panel of the plenum. Route the power wiring conduit through this opening and connect it to the field-supplied fitting on the electric heat accessory. Connect the power wiring to the fuse block in the heater control box.

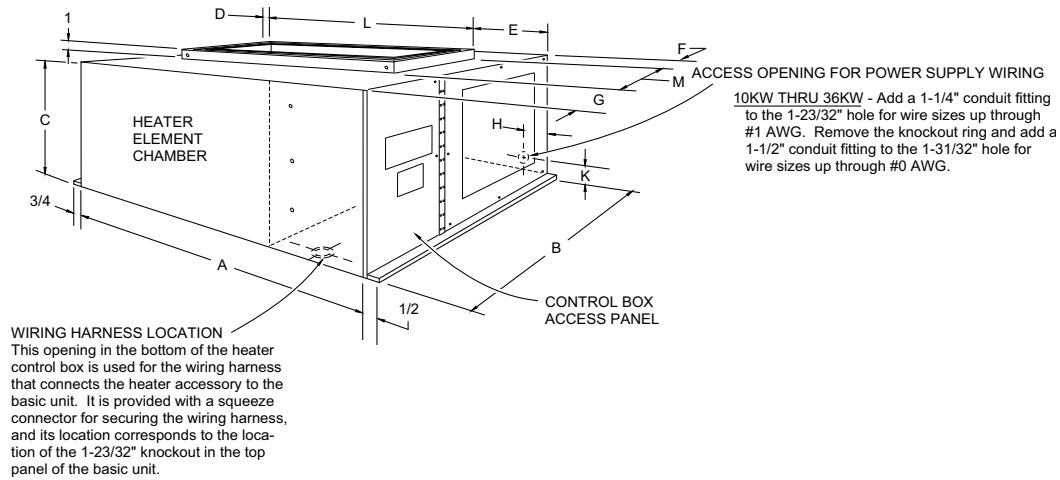
Install the control wiring per basic unit instruction Form 550.23-N2Y.

DO NOT route any field control wiring through the plenum.

WITHOUT ELECTRIC HEAT - Install the power and the control wiring basic unit instruction Form 550.23-N2Y. DO NOT route any wiring through the plenum and DO NOT remove this knockout.

NOTE: Electric Heaters are NOT UL approved for installation within a supply air plenum.

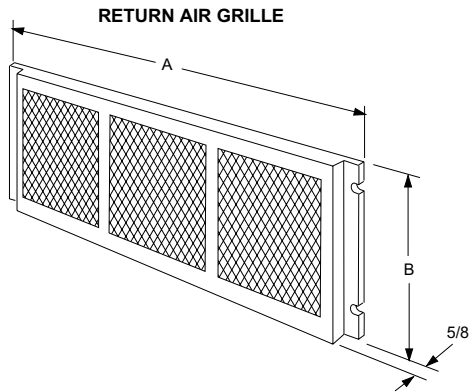
Plenum Model	Unit Model	Plenum Dimensions (inches)									
		A	B	C	D	E	F	G	H	K	L
1SP0451	090	52-1/8	28-1/4	27-1/2	49-3/8	17-7/8	8-3/4	7/8	1-1/8	15-1/4	1-3/4



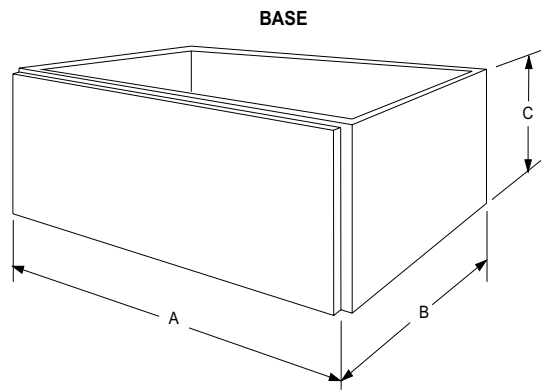
**FIGURE 4 - ELECTRIC HEATER**

Heater Model	Nom. KW	Unit Model	Heater Dimensions											
			A	B	C	D	E	F	G	H	I	K	L	M
2HS04501025,46 2HS04501625,46 2HS04502625,46	10 16 26 36	090	27-1/4	25-1/4	14-1/4	1	4	1/2	5-1/2	1-1/2	1-1/2	1-1/2	22-1/4	19-1/14

**ACCESSORY DIMENSIONS**



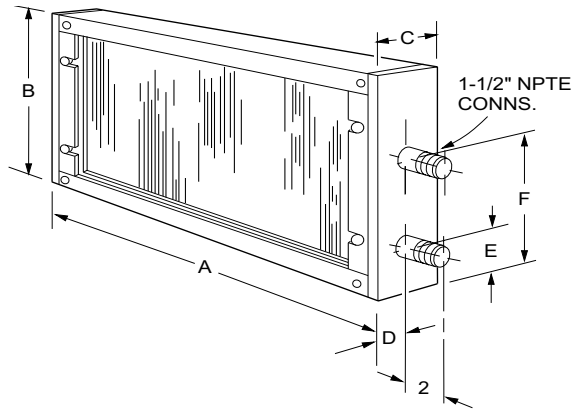
**FIGURE 5 - RETURN AIR GRILLE**



**FIGURE 6 - BASE ACCESSORY**

GRILL MODEL	UNIT MODEL	GRILLE DIMENSIONS (INCHES)	
		A	B
IRG0451	090	52	25

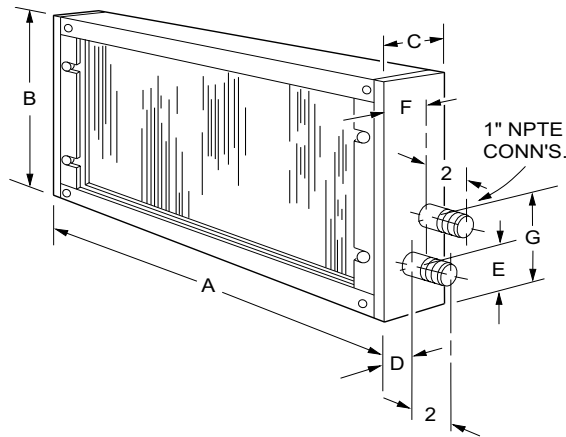
GRILL MODEL	UNIT MODEL	GRILLE DIMENSIONS (INCHES)		
		A	B	C
IBS0451	090	52	25-1/8	20



**FIGURE 7 - STEAM COIL**

GRILL MODEL	UNIT MODEL	GRILLE DIMENSIONS (INCHES)		
		A	B	C
1NF0451*	090	52	25	20

\*. Installs over the return air opening of the unit - before the filters.



**FIGURE 8 - HOT WATER COIL**

GRILL MODEL	UNIT MODEL	GRILLE DIMENSIONS (INCHES)							
		A	B	C	D	E	F	G	H
1HW0451*	090	52	25	5	1-11/16	2-3/8	3-3/8	5-7/8	1 NPTE

\*. Installs over the return air opening of the unit - before the filters

**TABLE 11: ELECTRICAL DATA - COOLING ONLY UNIT**

Model	Motor Blower HP	Power Supply	Full Load Amps	Maximum Fuse Size*, Amps
090	1-1/2	208-3-60	5.2	15
		230-3-60	5.0	15
		460-3-60	2.6	15

\*. Dual element, time delay fuses.

**TABLE 12: ELECTRICAL DATA - UNITS WITH ELECTRIC HEAT**

Model Basic Unit*	Nominal Heater KW†	Power Supply Voltage‡	Full Load Amps		Total Ampacity Amps	Max. Fuse Size**, Amps	Min. Wire Size††, AWG
			Heater	Blower Motor			
090	10	208	20.8	5.2	32.6	35	10
		230	23.1	5.0	35.1	40	8
		460	11.5	2.6	17.7	20	12
	16	208	33.4	5.2	48.2	50	8
		230	36.9	5.0	52.4	60	6
		460	18.4	2.6	26.3	30	10
	26	208	54.2	5.2	74.3	80	4
		230	59.9	5.0	81.2	90	4
		460	30.0	2.6	40.7	45	8
	36	208	75.1	5.2	100.3	110	2
		230	83.0	5.0	110.0	125	2
		460	41.5	2.6	55.1	60	6

\*. Units with an electric heat accessory will always be wired for a single power supply.

†. Refer to the HEATING CAPACITY table for the actual KW and MBH ratings of each heater at the different voltages.

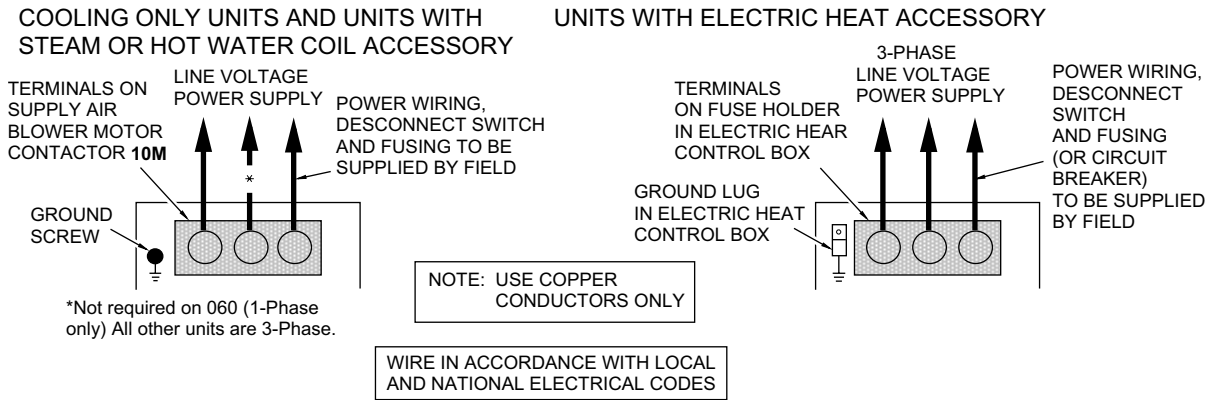
‡. All voltages are for 3-phase, 60 hertz operation.

\*\* Inverse time circuit breakers may be used in lieu of dual element, time delay fuses.

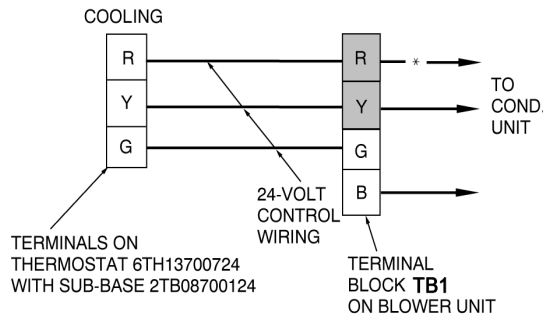
††. Based on three, insulated copper conductors in steel conduit

- 60°C wires when the total unit ampacity is below 100 amps.

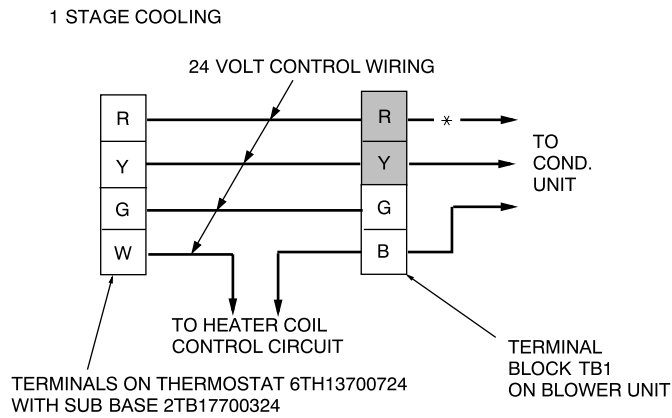
- 75°C wires when the total unit ampacity is above 100 amps.



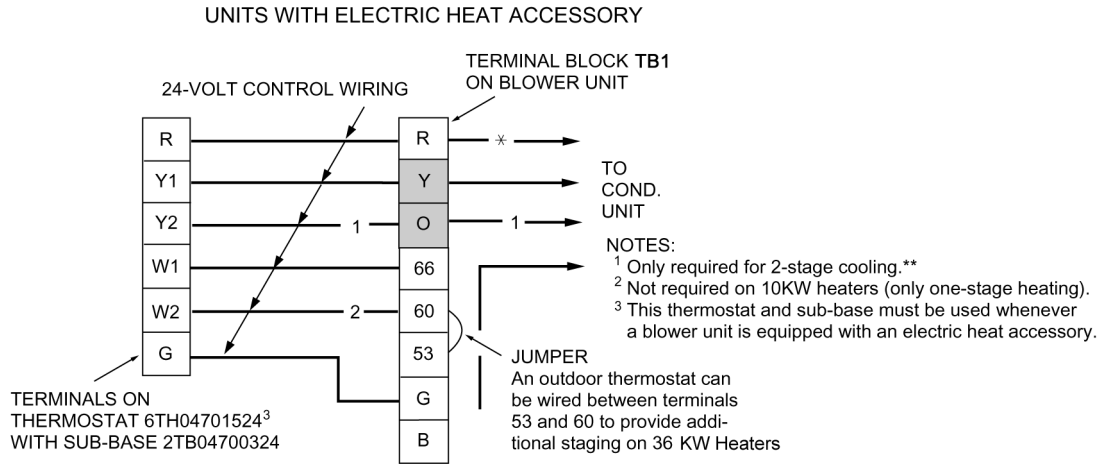
**FIGURE 9 - FIELD WIRING FOR POWER SUPPLY**



**FIGURE 10 - COOLING ONLY UNIT**



**FIGURE 11 - UNIT WITH STEAM OR HOT WATER COIL ACCESSORY**



The field wiring connected to these dummy terminals on TB1 can be routed directly from the condensing unit to the thermostat, if desired.

**FIGURE 12 - FIELD WIRING FOR UNITS WITH ELECTRIC HEAT**



