

# INSTALLATION MANUAL

## SINGLE PACKAGE HEAT PUMP/ELECTRIC

MODELS: PHE4 Series  
(2-5 Ton)



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## SECTION I: GENERAL INFORMATION

PHE units are factory assembled heat pumps designed for outdoor installation on a roof top or a slab. Field-installed optional electric heater accessories are available to provide supplemental electric heat combined with electric cooling and heating.

The units are completely assembled on rigid, removable base rails. All piping, refrigerant charge, and electrical wiring is factory installed and tested. The units require only electric power condensate drain and duct connections at the point of installation.

## SECTION II: SAFETY



This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention to the signal words **DANGER**, **WARNING**, or **CAUTION**.

**DANGER** indicates an **imminently** hazardous situation, which, if not avoided, **will result in death or serious injury**.

**WARNING** indicates a **potentially** hazardous situation, which, if not avoided, **could result in death or serious injury**.

**CAUTION** indicates a potentially hazardous situation, which, if not avoided **may result in minor or moderate injury**. It is also used to alert against unsafe practices and hazards involving only property damage.

### ▲ 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. **Failure to carefully read and follow all instructions in this manual can result in furnace malfunction, death, personal injury and/or property damage.** Only a qualified contractor, installer or service agency should install this product.*

### ▲ CAUTION

*This product must be installed in strict compliance with the installation instructions and any applicable local, state, and national codes including, but not limited to building, electrical, and mechanical codes.*

**⚠ WARNING**

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury. 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 system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system. Gage sets, hoses, refrigerant containers and recovery systems must be designed to handle R-410A. If you are unsure, consult the equipment manufacturer. Failure to use R-410A compatible servicing equipment may result in property damage or injury.

Due to system pressure, moving parts, and electrical components, installation and servicing of air conditioning equipment can be hazardous. Only qualified, licensed service personnel should install, repair, or service this equipment. Unlicensed personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters.

Observe all precautions in the literature, labels, and tags accompanying the equipment whenever working on air conditioning equipment. Be sure to follow all other applicable safety precautions and codes including.

Wear safety glasses and work gloves. Use quenching cloth and have a fire extinguisher available during brazing operations.

**INSPECTION**

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing.

**REPLACEMENT PARTS**

Contact your local Unitary Products parts distribution center for authorized replacement parts.

**SECTION III: MODEL NUMBER NOMENCLATURE**

PHE	4	A	24	2	1	A
1	2	3	4	6	8	9
<b>1. Model Family</b> PHE - packaged heat pump with electric heat, PCG - packaged A/C with gas heat, PHG - packaged heat pump with gas heat, PCE - packaged A/C with electric heat <b>2. Nominal Cooling Efficiency</b> 4 = 14 SEER, 6 = 16 SEER, etc. <b>3. Cabinet Size</b> A = small 35 x 51, B = large 45 x 51 <b>4. Nominal Air Conditioning Cooling Capacity BTUx1000</b> 24 = 24,000 BTU, etc. <b>Examples:</b> PHE4B4221A is a packaged heat pump, 14 SEER, 3-1/2 ton, large cabinet, 230 volt, single phase model, (first generation, first release).	<b>5. Gas Heating Input BTU/Hr x 1000</b> 050 = 50,000 BTU/Hr. input, blank = electric heat <b>6. Voltage-Phase-Frequency</b> 2 = 208/230-1-60, 3=208/230-3-60, 4 = 460-3-60 <b>7. NOx Approval</b> X = low-NOx, blank = not low-NOx <b>8. Generation Level</b> 1 = first generation <b>9. Revision Level</b> A = original release, B = second release					

**SECTION IV: INSTALLATION****LIMITATIONS**

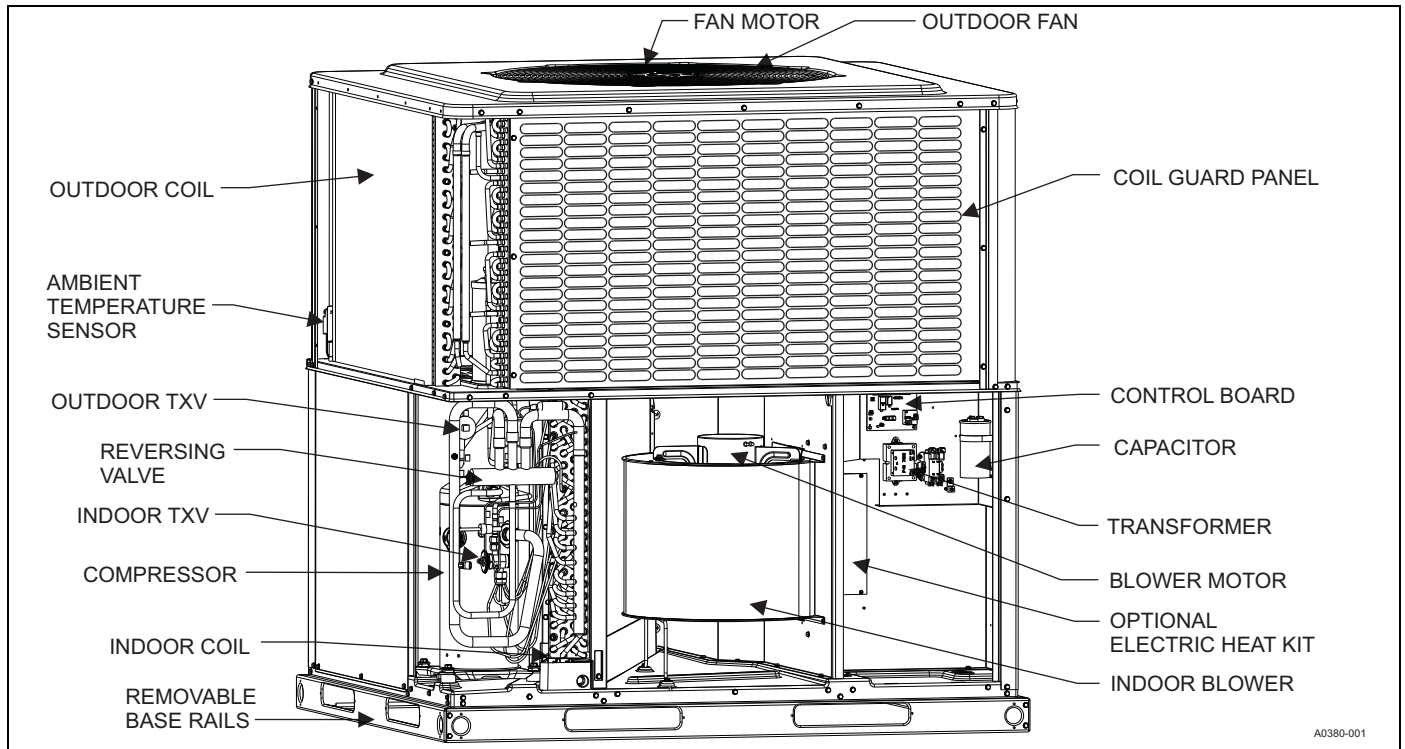
These units must be installed in accordance with the following national and local safety codes.

- National Electrical Code ANSI/NFPA No. 70 or Canadian Electrical Code Part 1, C22.1 (latest editions).
- Local plumbing and waste water codes and other applicable local codes.

Refer to Tables 2-3 for unit physical data and to Table 5 for electrical data.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer's and/or the customer's expense.

Size of unit for proposed installation should be based on heat loss/heat gain calculations made in accordance with industry recognized procedures such as the Air Conditioning Contractors of America (manual J).



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**FIGURE 1:** Component Location

**Table 1:** Unit Limitations

Model	Unit Voltage	Unit Limitations		
		Applied Voltage		Outdoor DB Temp
		Min	Max	Max (°F)
24	208/230-1-60	187	252	125
30	208/230-1-60	187	252	125
36	208/230-1-60	187	252	125
42	208/230-1-60	187	252	125
48	208/230-1-60	187	252	125
60	208/230-1-60	187	252	125

**LOCATION**

Use the following guidelines to select a suitable location for these units:

1. Unit is designed for **outdoor installation** only.
2. Outdoor coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either north or east side of building.
3. Suitable for mounting on roof curb.
4. For ground level installation, a level pad or slab should be used. The thickness and size of the pad or slab used should meet local codes and unit weight. Do not tie the slab to the building foundation.
5. Roof structures must be able to support the weight of the unit and its options/accessories. Unit must be installed on a solid, level roof curb or appropriate angle iron frame.
6. Maintain level tolerance to 1/8" across the entire width and length of unit.

**⚠ WARNING**

*Do not permit overhanging structures or shrubs to obstruct outdoor air discharge outlet.*

**CLEARANCES**

All units require certain clearances for proper operation and service. Refer to Table 4 for the clearances required for construction, servicing and proper unit operation.

**RIGGING AND HANDLING**

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreader bars, whose length exceeds the largest dimension across the unit, **MUST** be used across the top of the unit.

**⚠ CAUTION**

*Before lifting, make sure the unit weight is distributed equally on the rigging cables so it will lift evenly.*

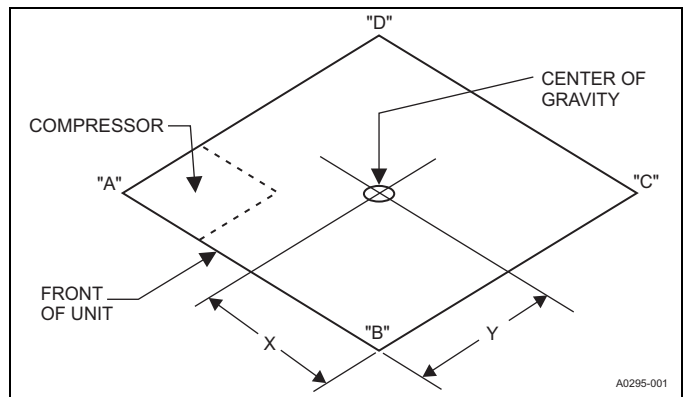
Units may be moved or lifted with a forklift. Slotted openings in the base rails are provided for this purpose.

**⚠ CAUTION**

*If a unit is to be installed on a roof curb other than a Unitary Products roof curb, gasket or sealant must be applied to all surfaces that come in contact with the unit underside.*

**⚠ CAUTION**

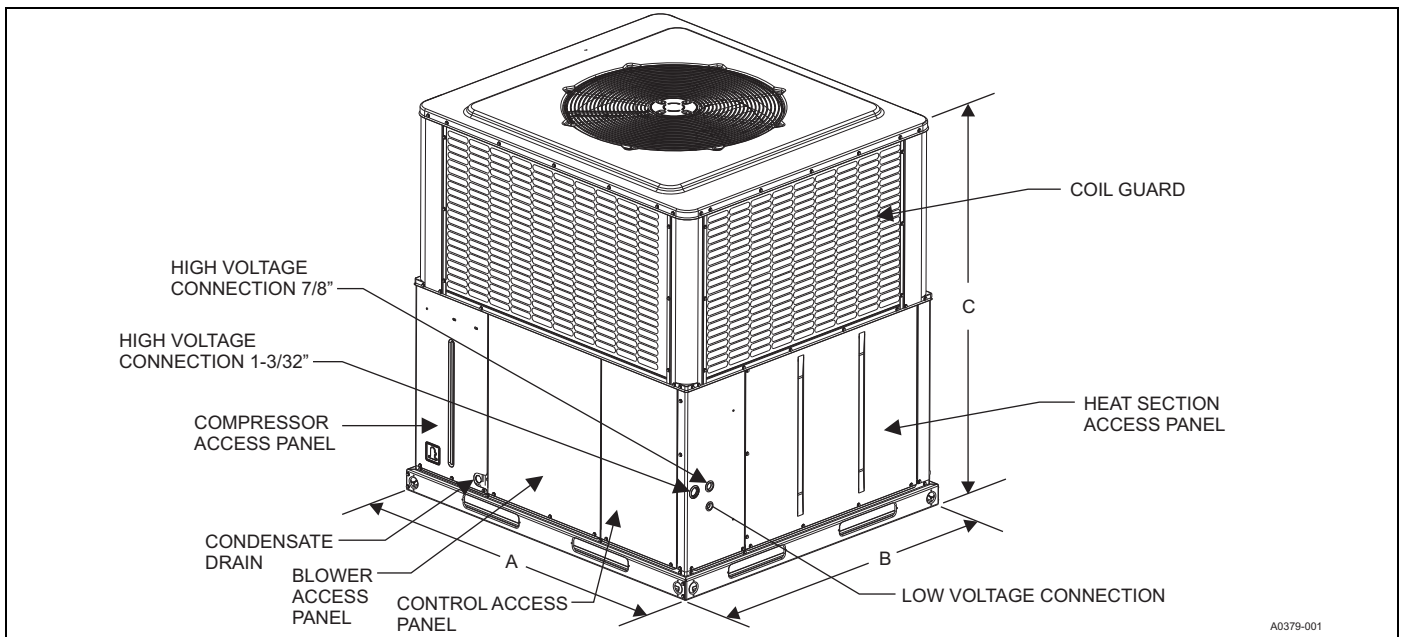
*All panels must be secured in place when the unit is lifted. The outdoor coils should be protected from rigging cable damage with plywood or other suitable material.*



**FIGURE 2:** Unit 4 Point Load Weight

**Table 2:** Weights and Dimensions

Model	Weight (lbs.)		Center of Gravity		4 Point Load Location (lbs.)			
	Shipping	Operating	X	Y	A	B	C	D
24	382	377	29	15	133	88	86	75
30	397	392	29	15	127	101	99	70
36	453	448	29	15	158	108	101	86
42	476	471	30	15	164	119	111	82
48	501	496	29	15	168	130	119	84
60	528	523	30	15	177	136	128	87



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FIGURE 3: Unit Dimensions

Table 3: Unit Dimensions

Model	Dimensions		
	A	B	C
24	51-1/4	35-3/4	47
30	51-1/4	35-3/4	49
36	51-1/4	45-3/4	49
42	51-1/4	45-3/4	49
48	51-1/4	45-3/4	53
60	51-1/4	45-3/4	55

Table 4: Unit Clearances

Direction	Distance (in.)	Direction	Distance (in.)
Top <sup>1</sup>	36	Right Side	36
Side Opposite Ducts	36	Left Side	24
Duct Panel	0	Bottom <sup>2 3</sup>	1

1. Minimum Clearance of 1inch all sides of supply air duct for the first 3 foot of duct for 20 & 25 kW., zero inches there after. For all other heaters, zero inch clearance all sides for entire length of duct.

2. Units must be installed outdoors. Over hanging structure or shrubs should not obscure outdoor air discharge outlet.

3. Units may be installed on combustible floors made from wood or class A, B or C roof covering materials.

**Note:** For units applied with a roof curb, the minimum clearance may be reduced from 1 inch to 1/2 inch? between combustible roof curb material and this supply air duct.

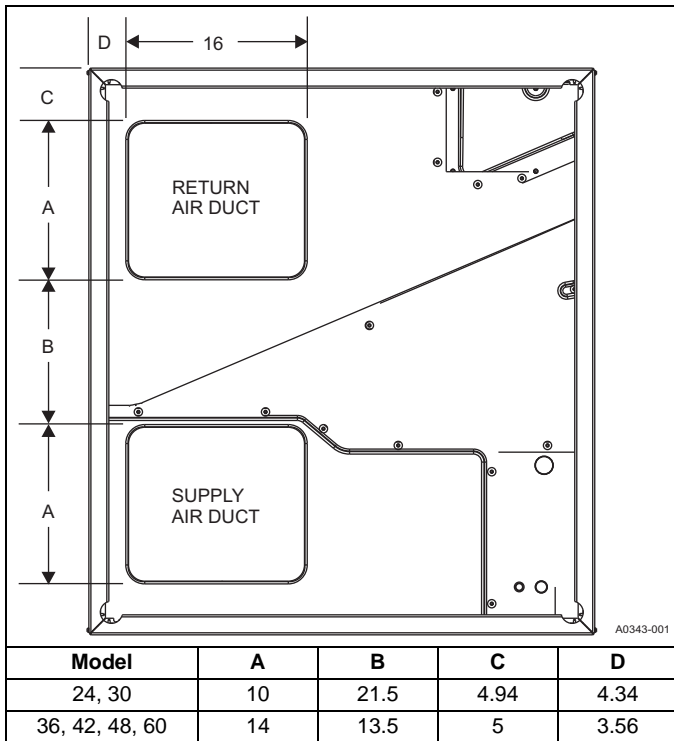


FIGURE 4: Bottom Duct Dimensions (inches)

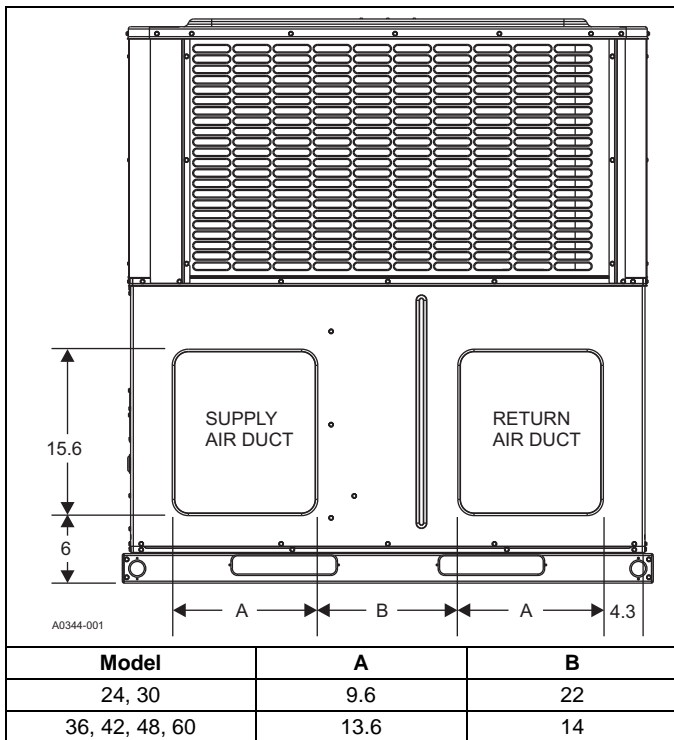


FIGURE 5: Rear Duct Dimensions (inches)

**DUCTWORK**

These units are adaptable to downflow use as well as rear supply and return air duct openings. To convert to downflow, use the following steps:

1. Remove the duct covers found in the bottom return and supply air duct openings. There are four (4) screws securing each duct cover (save these screws to use in Step 2).

2. Install the duct covers (removed in step one) to the rear supply and return air duct openings. Secure with the four (4) screws used in step one.
3. Seal duct covers with silicone caulk.

Duct work should be designed and sized according to the methods of the Air Conditioning Contractors of America (ACCA), as set forth in their Manual D.

A closed return duct system shall be used. This shall not preclude use of economizers or ventilation air intake. Flexible duct connectors are recommended in the supply and return duct work to minimize the transmission of vibration and noise.

**⚠ CAUTION**

*When fastening duct work to the side duct flanges on the unit, insert the screws through the duct flanges only. DO NOT insert the screws through the casing. Outdoor duct work must be insulated and water-proofed.*

**NOTICE**

*Be sure to note supply and return openings.*

Refer to Figures 4 and 5 for information concerning rear and bottom supply and return air duct openings.

**FILTERS**

Proper filter size is very important. Filter size, type and pressure drop should always be considered during duct system design.

Single phase units are shipped without a filter or filter racks. It is the responsibility of the installer to secure a filter in the return air ductwork or install a Filter/Frame Kit.

A filter rack and high velocity filters are standard on three phase units.

Filters must always be used and must be kept clean. When filters become dirt laden, insufficient air will be delivered by the blower, decreasing your units efficiency and increasing operating costs and wear-and-tear on the unit and controls.

Filters should be checked monthly; this is especially important since this unit is used for both heating and cooling.

**CONDENSATE DRAIN**

A condensate trap must be installed in the condensate drain. The plumbing must conform to local codes.

DO NOT use Teflon tape or Pipe thread compound.

**⚠ CAUTION**

*Hand tighten only.*

**SERVICE ACCESS**

Access to all serviceable components is provided at the following locations:

- Coil guards
- Unit top panel
- Corner posts
- Blower access panel
- Control access panel
- Indoor coil access panel
- Compressor access panel
- Heat section access panel

Refer to Figure 3 for location of these access locations and minimum clearances in Table 4.

## CAUTION

This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system. Gauge sets, hoses, refrigerant containers and recovery systems must be designed to handle R-410A. If you are unsure, consult the equipment manufacturer. Failure to use R-410A compatible servicing equipment may result in property damage or injury.

## WARNING

Wear safety glasses and gloves when handling refrigerants. Failure to follow this warning can cause serious personal injury.

Refer to Figure 12 for the R-410A Quick Reference Guide.

### THERMOSTAT

The room thermostat should be located on an inside wall approximately 60" above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. Sealant should be used behind thermostat to prevent air infiltration. Follow manufacturer's instructions enclosed with the thermostat for general installation procedure. Color coded insulated wires (minimum #18 AWG) should be used to connect thermostat to unit. See Figure 6. Do not use power stealing thermostats.

### POWER AND CONTROL WIRING

Field wiring to the unit must conform to provisions of the current N.E.C. ANSI/NFPA No. 70 or C.E.C. and/or local ordinances. The unit must be electrically grounded in accordance with local codes or, in their absence, with the N.E.C./C.E.C. Voltage tolerances which must be maintained at the compressor terminals during starting and running conditions are indicated on the unit Rating Plate and Table 1.

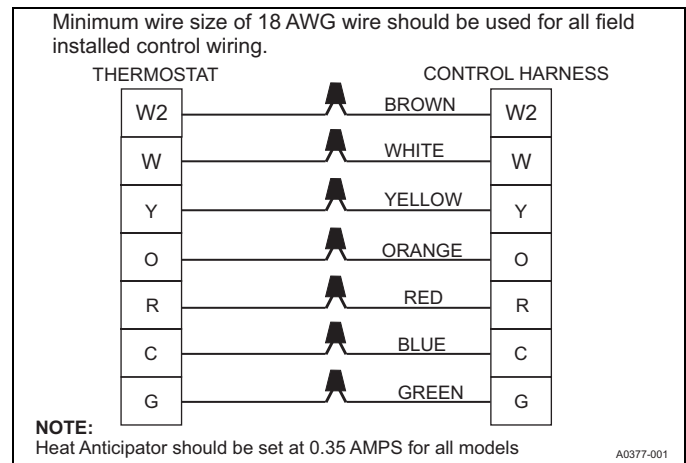
**The wiring entering the cabinet must be provided with mechanical strain relief.**

A fused disconnect switch should be field provided for the unit. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram.

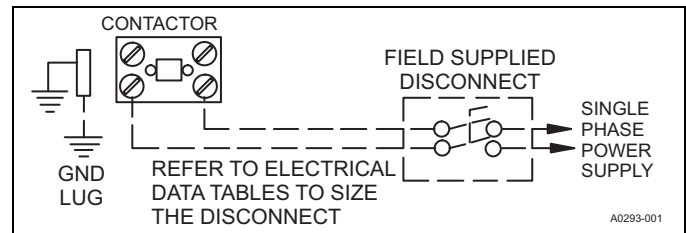
Electrical service must be sized properly to carry the load. Each unit must be wired with a separate branch circuit fed directly from the main distribution panel and properly fused.

Refer to Figures 6 and 7 for typical field wiring and to the appropriate unit wiring diagram for control circuit and power wiring information.

Unit comes wired for 230 volt power. If supply power is 208 volt, wires connected to the control transformer 230V tap must be moved to the 208V tap.



**FIGURE 6:** Typical Field Control Wiring Diagram For Heat Pump Models



**FIGURE 7:** Typical Field Power Wiring Diagram

## NOTICE

In some horizontal applications, the service disconnects on the electric heat kits must be rotated 180° so the up position of the disconnect is the ON position. This service disconnect orientation change is required by UL 1995, Article 26.19 (in reference to all circuit breakers).







**Table 6:** Electrical Data for 208-1-60 Multi Source Power

Model	Compressor			OD Fan Motor	Blower Motor	Electric Heat Option			Multi Source																	
	RLA	LRA	MCC	FLA	FLA	Heater Kit	Heater kW	Stages	Heater Amps	208	208	208	208	208	208	208	208									
							208		208																	
Multi Source: Compressor Circuit and Heat Circuits						Multi Source:	Circuit #1 Compressor Circuit								MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>				
							Circuit #2 Heat																Circuit #1	Circuit #2	Circuit #3	Circuit #4
							Circuit #2 Heat																			
							Circuit #3 Heat																			
A24	10	45	14	0.7	3.8	none	--	--	--	17.4	25	--	--	--	--	--	--									
						6HK(0,1)6500206	1.8	1	8.7	17.4	25	10.8	15	--	--	--	--									
						6HK(0,1)6500506	3.6	1	17.3	17.4	25	21.6	25	--	--	--	--									
						6HK(0,1)6500806	5.8	1	27.9	17.4	25	34.9	40	--	--	--	--									
						6HK(0,1)6501006	7.2	1	34.6	17.4	25	43.3	45	--	--	--	--									
						6HK16501306	9.4	2	45.2	17.4	25	37.7	40	18.8	20	--	--									
						6HK26501306	9.4	1	45.2	17.4	25	56.5	60	--	--	--	--									
A30	14	57	15	0.6	3.8	none	--	--	--	22.0	35	--	--	--	--	--	--									
						6HK(0,1)6500206	1.8	1	8.7	22.0	35	10.8	15	--	--	--	--									
						6HK(0,1)6500506	3.6	1	17.3	22.0	35	21.6	25	--	--	--	--									
						6HK(0,1)6500806	5.8	1	27.9	22.0	35	34.9	40	--	--	--	--									
						6HK(0,1)6501006	7.2	1	34.6	22.0	35	43.3	45	--	--	--	--									
						6HK16501306	9.4	2	45.2	22.0	35	37.7	40	18.8	20	--	--									
						6HK16501506	10.8	2	51.9	22.0	35	43.3	50	21.6	25	--	--									
6HK26501306	9.4	1	45.2	22.0	35	56.5	60	--	--	--	--															
6HK26501506	10.8	1	51.9	22.0	35	64.9	70	--	--	--	--															
B36	17	78	23	1.7	3.8	none	--	--	--	26.4	40	--	--	--	--	--	--									
						6HK(0,1)6500206	1.8	1	8.7	26.4	40	10.8	15	--	--	--	--									
						6HK(0,1)6500506	3.6	1	17.3	26.4	40	21.6	25	--	--	--	--									
						6HK(0,1)6500806	5.8	1	27.9	26.4	40	34.9	40	--	--	--	--									
						6HK(0,1)6501006	7.2	1	34.6	26.4	40	43.3	45	--	--	--	--									
						6HK16501306	9.4	2	45.2	26.4	40	37.7	40	18.8	20	--	--									
						6HK16501506	10.8	2	51.9	26.4	40	43.3	50	21.6	25	--	--									
6HK26501306	9.4	1	45.2	26.4	40	56.5	60	--	--	--	--															
6HK26501506	10.8	2	51.9	26.4	40	64.9	70	--	--	--	--															
B42	18	112	28	1.7	5.4	none	--	1	--	29.5	45	--	--	--	--	--	--									
						6HK(0,1)6500506	3.6	1	17.3	29.5	45	21.6	25	--	--	--	--									
						6HK(0,1)6500806	5.8	1	27.9	29.5	45	34.9	40	--	--	--	--									
						6HK(0,1)6501006	7.2	1	34.6	29.5	45	43.3	45	--	--	--	--									
						6HK16501306	9.4	2	45.2	29.5	45	56.5	40	21.6	20	--	--									
						6HK16501506	10.8	2	51.9	29.5	45	43.3	50	21.6	25	--	--									
						6HK16501806	13.0	2	62.5	29.5	45	52.1	40	26.0	40	--	--									
						6HK16502006	14.4	2	69.2	29.5	45	43.3	45	43.3	45	--	--									
						6HK26501306	9.4	1	45.2	29.5	45	56.5	60	--	--	--	--									
						6HK26501506	10.8	1	51.9	29.5	45	64.9	70	--	--	--	--									
6HK26501806	13.0	1	62.5	29.5	45	78.1	80	--	--	--	--															
6HK26502006	14.4	1	69.2	29.5	45	86.5	90	--	--	--	--															
B48	22	117	34	1.7	5.4	none	--	--	--	34.4	50	--	--	--	--	--	--									
						6HK(0,1)6500506	3.6	1	17.3	34.4	50	21.6	25	--	--	--	--									
						6HK(0,1)6500806	5.8	1	27.9	34.4	50	34.9	40	--	--	--	--									
						6HK(0,1)6501006	7.2	1	34.6	34.4	50	43.3	45	--	--	--	--									
						6HK16501306	9.4	2	45.2	34.4	50	56.5	40	21.6	20	--	--									
						6HK16501506	10.8	2	51.9	34.4	50	43.3	50	21.6	25	--	--									
						6HK16501806	13.0	2	62.5	34.4	50	52.1	40	26.0	40	--	--									
						6HK16502006	14.4	2	69.2	34.4	50	43.3	45	43.3	45	--	--									
						6HK26501306	9.4	1	45.2	34.4	50	56.5	60	--	--	--	--									
						6HK26501506	10.8	1	51.9	34.4	50	64.9	70	--	--	--	--									
6HK26501806	13.0	1	62.5	34.4	50	78.1	80	--	--	--	--															
6HK26502006	14.4	2	69.2	34.4	50	86.5	90	--	--	--	--															

For notes, see Page 17.

**Table 6:** Electrical Data for 208-1-60 Multi Source Power (Continued)

Model	Compressor			OD Fan Motor	Blower Motor	Electric Heat Option			Multi Source								
	RLA	LRA	MCC	FLA	FLA	Heater Kit	Heater kW	Stages	Heater Amps	208	208	208	208	208	208	208	
							208		208								
Multi Source: Compressor Circuit and Heat Circuits						Multi Source:	Circuit #1 Compressor Circuit			MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>
							Circuit #2 Heat										
							Circuit #2 Heat										
							Circuit #3 Heat										
B60	24	144	38	1.7	7.0	none	--	--	--	39.2	60	--	--	--	--	--	
						6HK(0,1)6500506	3.6	1	17.3	39.2	60	21.6	25	--	--	--	--
						6HK(0,1)6500806	5.8	1	27.9	39.2	60	34.9	40	--	--	--	--
						6HK(0,1)6501006	7.2	1	34.6	39.2	60	43.3	45	--	--	--	--
						6HK16501306	9.4	2	45.2	39.2	60	56.5	40	21.6	20	--	--
						6HK16501506	10.8	2	51.9	39.2	60	43.3	50	21.6	25	--	--
						6HK16501806	13.0	2	62.5	39.2	60	52.1	40	26.0	40	--	--
						6HK16502006	14.4	2	69.2	39.2	60	43.3	45	43.3	45	--	--
						6HK26501306	9.4	1	45.2	39.2	60	56.5	60	--	--	--	--
						6HK26501506	10.8	1	51.9	39.2	60	64.9	70	--	--	--	--
						6HK26501806	13.0	1	62.5	39.2	60	78.1	80	--	--	--	--
						6HK26502006	14.4	1	69.2	39.2	60	86.5	90	--	--	--	--
						6HK16502506	18.0	3	86.5	39.2	60	43.3	45	43.3	45	21.6	25
6HK26502506	18.0	1	86.5	39.2	60	108.2	110	--	--	--	--						

1. MCA = Minimum Circuit Ampacity.
2. MOP = Maximum Over Current Protection device; must be HACR type circuit breaker or time delay fuse.

**Table 7:** Electrical Data for 230-1-60 Multi Source Power

Model	Compressor			OD Fan Motor	Blower Motor	Electric Heat Option			Multi Source								
	RLA	LRA	MCC	FLA	FLA	Heater Kit	Heater kW	Stages	Heater Amps	230	230	230	230	230	230	230	
							230		230								
Multi Source: Compressor Circuit and Heat Circuits						Multi Source:	Circuit #1 Compressor Circuit			MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>
							Circuit #2 Heat										
							Circuit #2 Heat										
							Circuit #3 Heat										
A24	10	45	14	0.7	3.8	none	--	--	--	17.4	25	--	--	--	--	--	
						6HK(0,1)6500206	2.2	1	9.6	17.4	25	12.0	15	--	--	--	--
						6HK(0,1)6500506	4.4	1	19.1	17.4	25	23.9	25	--	--	--	--
						6HK(0,1)6500806	7.1	1	30.9	17.4	25	38.6	40	--	--	--	--
						6HK(0,1)6501006	8.8	1	38.3	17.4	25	47.8	50	--	--	--	--
						6HK16501306	11.5	2	50.0	17.4	25	41.7	45	20.8	25	--	--
						6HK26501306	11.5	1	50.0	17.4	25	62.5	70	--	--	--	--
A30	14	57	15	0.6	3.8	none	--	--	--	22.0	35	--	--	--	--	--	
						6HK(0,1)6500206	2.2	1	9.6	22.0	35	12.0	15	--	--	--	--
						6HK(0,1)6500506	4.4	1	19.1	22.0	35	23.9	25	--	--	--	--
						6HK(0,1)6500806	7.1	1	30.9	22.0	35	38.6	40	--	--	--	--
						6HK(0,1)6501006	8.8	1	38.3	22.0	35	47.8	50	--	--	--	--
						6HK16501306	11.5	2	50.0	22.0	35	41.7	45	20.8	25	--	--
						6HK16501506	13.2	2	57.4	22.0	35	47.8	50	23.9	25	--	--
						6HK26501306	11.5	1	50.0	22.0	35	62.5	70	--	--	--	--
6HK26501506	13.2	1	57.4	22.0	35	71.7	80	--	--	--	--						
B36	17	78	23	1.7	3.8	none	--	--	--	26.4	40	--	--	--	--	--	
						6HK(0,1)6500206	2.2	1	9.6	26.4	40	12.0	15	--	--	--	--
						6HK(0,1)6500506	4.4	1	19.1	26.4	40	23.9	25	--	--	--	--
						6HK(0,1)6500806	7.1	1	30.9	26.4	40	38.6	40	--	--	--	--
						6HK(0,1)6501006	8.8	1	38.3	26.4	40	47.8	50	--	--	--	--
						6HK16501306	11.5	2	50.0	26.4	40	41.7	45	20.8	25	--	--
						6HK16501506	13.2	2	57.4	26.4	40	47.8	50	23.9	25	--	--
						6HK26501306	11.5	1	50.0	26.4	40	62.5	70	--	--	--	--
6HK26501506	13.2	2	57.4	26.4	40	71.7	80	--	--	--	--						

For notes, see Page 18.

**Table 7:** Electrical Data for 230-1-60 Multi Source Power

Model	Compressor			OD Fan Motor	Blower Motor	Electric Heat Option				Multi Source								
	RLA	LRA	MCC	FLA	FLA	Heater Kit	Heater kW	Stages	Heater Amps	230	230	230	230	230	230	230	230	
							230		230									
Multi Source: Compressor Circuit and Heat Circuits						Multi Source:	Circuit #1 Compressor Circuit				MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>	MCA <sup>1</sup> Amps	MOP <sup>2</sup>
							Circuit #2 Heat											
							Circuit #2 Heat											
							Circuit #3 Heat											
										Circuit #1		Circuit #2		Circuit #3		Circuit #4		
B42	18	112	28	1.7	5.4	none	--	1	--	29.5	45	--	--	--	--	--	--	
						6HK(0,1)6500506	4.4	1	19.1	29.5	45	23.9	25	--	--	--	--	
						6HK(0,1)6500806	7.1	1	30.9	29.5	45	38.6	40	--	--	--	--	
						6HK(0,1)6501006	8.8	1	38.3	29.5	45	47.8	50	--	--	--	--	
						6HK16501306	11.5	2	50.0	29.5	45	62.5	45	23.9	25	--	--	
						6HK16501506	13.2	2	57.4	29.5	45	47.8	50	23.9	25	--	--	
						6HK16501806	15.9	2	69.1	29.5	45	57.6	45	28.8	45	--	--	
						6HK16502006	17.6	2	76.5	29.5	45	47.8	50	47.8	50	--	--	
						6HK26501306	11.5	1	50.0	29.5	45	62.5	70	--	--	--	--	
						6HK26501506	13.2	1	57.4	29.5	45	71.7	80	--	--	--	--	
						6HK26501806	15.9	1	69.1	29.5	45	86.4	90	--	--	--	--	
6HK26502006	17.6	1	76.5	29.5	45	95.7	100	--	--	--	--							
B48	22	117	34	1.7	5.4	none	--	--	--	34.4	50	--	--	--	--	--	--	
						6HK(0,1)6500506	4.4	1	19.1	34.4	50	23.9	25	--	--	--	--	
						6HK(0,1)6500806	7.1	1	30.9	34.4	50	38.6	40	--	--	--	--	
						6HK(0,1)6501006	8.8	1	38.3	34.4	50	47.8	50	--	--	--	--	
						6HK16501306	11.5	2	50.0	34.4	50	62.5	45	23.9	25	--	--	
						6HK16501506	13.2	2	57.4	34.4	50	47.8	50	23.9	25	--	--	
						6HK16501806	15.9	2	69.1	34.4	50	57.6	45	28.8	45	--	--	
						6HK16502006	17.6	2	76.5	34.4	50	47.8	50	47.8	50	--	--	
						6HK26501306	11.5	1	50.0	34.4	50	62.5	70	--	--	--	--	
						6HK26501506	13.2	1	57.4	34.4	50	71.7	80	--	--	--	--	
						6HK26501806	15.9	1	69.1	34.4	50	86.4	90	--	--	--	--	
6HK26502006	17.6	2	76.5	34.4	50	95.7	100	--	--	--	--							
B60	24	144	38	1.7	7.0	none	--	--	--	39.2	60	--	--	--	--	--	--	
						6HK(0,1)6500506	4.4	1	19.1	39.2	60	23.9	25	--	--	--	--	
						6HK(0,1)6500806	7.1	1	30.9	39.2	60	38.6	40	--	--	--	--	
						6HK(0,1)6501006	8.8	1	38.3	39.2	60	47.8	50	--	--	--	--	
						6HK16501306	11.5	2	50.0	39.2	60	62.5	45	23.9	25	--	--	
						6HK16501506	13.2	2	57.4	39.2	60	47.8	50	23.9	25	--	--	
						6HK16501806	15.9	2	69.1	39.2	60	57.6	45	28.8	45	--	--	
						6HK16502006	17.6	2	76.5	39.2	60	47.8	50	47.8	50	--	--	
						6HK26501306	11.5	1	50.0	39.2	60	62.5	70	--	--	--	--	
						6HK26501506	13.2	1	57.4	39.2	60	71.7	80	--	--	--	--	
						6HK26501806	15.9	1	69.1	39.2	60	86.4	90	--	--	--	--	
6HK26502006	17.6	1	76.5	39.2	60	95.7	100	--	--	--	--							
6HK16502506	22.0	3	95.7	39.2	60	47.8	50	47.8	50	23.9	25							
6HK26502506	22.0	1	95.7	39.2	60	119.6	125	--	--	--	--							

1. MCA = Minimum Circuit Ampacity.
2. MOP = Maximum Over Current Protection device; must be HACR type circuit breaker or time delay fuse.

Table 8: Physical Data

NOMINAL TONNAGE	MODELS					
	A24	A30	B36	B42	B48	B60
	2.0	2.5	3.0	3.5	4.0	5.0
<b>AHRI Cooling Performance</b>						
Gross Capacity @ AHRI A point (MBH)	23.5	29.4	36.0	41.1	47.0	58.1
AHRI net capacity (MBH)	23.1	29.0	35.5	40.7	45.5	57.5
EER	11.0	11.0	11.0	11.0	11.0	11.0
SEER	14.0	14.0	14.0	14.0	14.0	14.0
Nominal CFM	800	1000	1200	1400	1600	2000
System power (KW)	1.8	2.1	2.8	3.2	3.6	4.7
Refrigerant type	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant charge (lb-oz)	8-8	9-8	11-13	13-0	12-13	16-10
<b>AHRI Heating Performance</b>						
47 °F Capacity Rating (MBH)	21.9	27.0	33.5	38.1	44.1	55.9
System Power (kW/COP)	1.8	2.1	2.6	2.9	3.5	4.3
17 °F Capacity Rating (MBH)	11.3	14.5	19.0	22.0	25.4	31.7
HSPF (BTU/Watts-hr.)	8.0	8.0	8.0	8.0	8.0	8.0
<b>Dimensions (inches)</b>						
Length	51-1/4	51-1/4	51-1/4	51-1/4	51-1/4	51-1/4
Width	35-3/4	35-3/4	45-3/4	45-3/4	45-3/4	45-3/4
Height	47	49	49	49	53	55
<b>Operating WT. (lbs.)</b>	377	392	448	471	496	523
<b>Compressors</b>						
Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
<b>Outdoor Coil Data</b>						
Face area (Sq. Ft.)	15.3	17.2	19.8	19.8	24.1	26.3
Rows	2	2	2	2	2	2
Fins per inch	22	22	22	22	22	22
Tube diameter	3/8	3/8	3/8	3/8	3/8	3/8
Circuitry Type	Interlaced	Interlaced	Interlaced	Interlaced	Interlaced	Interlaced
Refrigerant control	TXV	TXV	TXV	TXV	TXV	TXV
<b>Indoor Coil Data</b>						
Face area (Sq. Ft.)	3.4	3.4	4.4	4.4	4.4	4.4
Rows	3	3	3	3	3	4
Fins per inch	16	16	16	16	16	16
Tube diameter	3/8	3/8	3/8	3/8	3/8	3/8
Circuitry Type	Interlaced	Interlaced	Interlaced	Interlaced	Interlaced	Interlaced
Refrigerant control	TXV	TXV	TXV	TXV	TXV	TXV
<b>Outdoor Fan Data</b>						
Fan diameter (Inch)	24	24	26	26	26	26
Type	Prop	Prop	Prop	Prop	Prop	Prop
Drive type	Direct	Direct	Direct	Direct	Direct	Direct
No. speeds	1	1	1	1	1	1
Motor HP each	1/10	1/8	1/3	1/3	1/3	1/3
RPM	850	850	850	850	850	850
Nominal total CFM	2400	2400	3200	3200	3200	3200
<b>Direct Drive Indoor Blower Data</b>						
Fan Size (Inch)	11 x 8	11 x 8	11 x 10	11 x 10	11 x 10	11 x 10
Type	Centrifugal	Centrifugal	Centrifugal	Centrifugal	Centrifugal	Centrifugal
Motor HP each	1/2	1/2	1/2	3/4	3/4	1
RPM	1200 Max	1200 Max	1200 Max	1200 Max	1200 Max	1200 Max
Frame size	48	48	48	48	48	48
<b>Filters</b>						
Filter size	A	A	B	B	B	B
Quantity size	Field-supplied external filters must be sized so as not to exceed 300 fpm air velocity through disposable filters. For internal filter use, a filter rack kit is available. Consult the instructions supplied with that kit for replacement filter sizes. Filter sizes: A=20x20, B=20x30.					

## COMPRESSORS

The compressor used in this product is specifically designed to operate with R-410A Refrigerant and cannot be interchanged.

### ▲ CAUTION

*This system uses R-410A Refrigerant which operates at higher pressures than R-22. No other refrigerant may be used in this system.*

The compressor uses polyolester (POE oil), Mobile 3MA POE. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oil can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. If refrigerant circuit is opened, take all necessary precautions to avoid exposure of the oil to the atmosphere.

### ▲ CAUTION

*Do not leave the system open to the atmosphere. Unit damage could occur due to moisture being absorbed by the **POE oil** in the system. This type of oil is highly susceptible to moisture absorption*

POE (polyolester) compressor lubricants are known to cause long term damage to some synthetic roofing materials.

### ▲ CAUTION

*Exposure, even if immediately cleaned up, may cause embrittlement (leading to cracking) to occur in one year or more. When performing any service that may risk exposure of compressor oil to the roof, take precautions to protect roofing.*

Procedures which risk oil leakage include, but are not limited to, compressor replacement, repairing refrigerant leaks, replacing refrigerant components such as filter drier, pressure switch, metering device or coil.

Units are shipped with compressor mountings which are factory-adjusted and ready for operation.

### ▲ CAUTION

*Do not loosen compressor mounting bolts.*

## SECTION V: AIRFLOW PERFORMANCE

**Table 9:** Airflow - Side Duct Application

Model	Motor Speed	External Static Pressure (Inches WC)							
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
		SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
24	Low (1)	791	739	727	668	614	564	518	439
	Low/Medium (2)	849	801	789	733	683	635	590	512
	Medium (3)	927	882	871	819	772	727	683	607
	Medium/High (4)	999	958	948	899	855	812	769	696
	High (5)	1176	1143	1133	1092	1052	1014	976	908
30	Low (1)	768	715	702	642	586	536	490	409
	Low/Medium (2)	941	898	887	836	789	744	701	625
	Medium (3)	1026	987	977	930	886	844	802	729
	Medium/High (4)	1112	1076	1067	1023	982	942	902	832
	High (5)	1176	1143	1133	1092	1052	1014	976	908
36	Low (1)	1108	1050	984	921	857	791	726	660
	Low/Medium (2)	1283	1225	1168	1115	1054	993	924	860
	Medium (3)	1362	1308	1252	1199	1142	1079	1015	979
	Medium/High (4)	1403	1347	1290	1235	1177	1118	1058	995
	High (5)	1623	1569	1519	1470	1418	1362	1306	1246
42	Low (1)	1436	1382	1342	1304	1262	1220	1179	1131
	Low/Medium (2)	1544	1492	1455	1416	1376	1336	1294	1248
	Medium (3)	1573	1523	1484	1445	1408	1367	1327	1279
	Medium/High (4)	1681	1640	1599	1557	1517	1478	1436	1393
	High (5)	1935	1887	1834	1788	1743	1701	1651	1591
48	Low (1)	1620	1564	1517	1466	1418	1360	1308	1206
	Low/Medium (2)	1694	1630	1580	1530	1482	1430	1380	1292
	Medium (3)	1798	1722	1669	1620	1572	1527	1480	1413
	Medium/High (4)	1835	1758	1703	1653	1604	1558	1511	1442
	High (5)	2146	2085	2025	1960	1872	1862	1798	1735
60	Low (1)	1730	1682	1628	1592	1552	1517	1479	1439
	Low/Medium (2)	1858	1807	1749	1710	1667	1629	1589	1546
	Medium (3)	2054	1998	1934	1890	1843	1801	1757	1710
	Medium/High (4)	2195	2144	2098	2049	2003	1955	1883	1868
	High (5)	2445	2388	2306	2293	2235	2178	2129	2077

1. Airflow tested with dry coil conditions, without air filters, at 230 volts.
2. Applications above 0.8" w.c. external static pressure are not recommended.
3. Brushless DC high efficiency standard ECM blower motor used for all indoor blower assemblies.
4. Minimal variations in airflow performance data results from operating at 208 volts. Data above may be used in those cases.
5. Heating applications tested at 0.50" w.c. esp, and cooling applications tested at 0.30" w.c. esp per standards.

**Table 10:** Airflow - Bottom Duct Application

Model	Motor Speed	External Static Pressure (Inches WC)							
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
		SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
24	Low (1)	791	755	745	686	632	585	537	455
	Low/Medium (2)	851	813	801	743	692	648	603	524
	Medium (3)	938	905	890	836	788	745	702	623
	Medium/High (4)	1069	978	969	921	872	830	787	713
	High (5)	1207	1182	1185	1122	1106	1066	1023	952
30	Low (1)	768	730	720	659	604	555	508	424
	Low/Medium (2)	943	911	900	847	800	759	716	641
	Medium (3)	1039	1013	998	949	905	865	825	748
	Medium/High (4)	1190	1099	1090	1048	1002	963	923	853
	High (5)	1207	1182	1185	1122	1106	1066	1023	952
36	Low (1)	1127	1082	1021	952	889	825	759	689
	Low/Medium (2)	1306	1265	1205	1154	1094	1029	963	892
	Medium (3)	1354	1315	1259	1212	1153	1093	1024	990
	Medium/High (4)	1397	1348	1297	1256	1195	1135	1077	1014
	High (5)	1634	1591	1548	1497	1446	1382	1309	1250
42	Low (1)	1455	1414	1379	1335	1294	1254	1212	1160
	Low/Medium (2)	1566	1532	1492	1455	1416	1372	1333	1280
	Medium (3)	1565	1530	1491	1458	1419	1381	1336	1290
	Medium/High (4)	1675	1641	1606	1578	1535	1495	1455	1412
	High (5)	1946	1909	1863	1815	1771	1721	1654	1595
48	Low (1)	1598	1548	1502	1454	1410	1362	1307	1251
	Low/Medium (2)	1663	1612	1568	1522	1476	1422	1370	1297
	Medium (3)	1789	1733	1670	1650	1596	1578	1535	1483
	Medium/High (4)	1931	1814	1808	1736	1673	1650	1597	1519
	High (5)	2131	2058	1998	1949	1892	1840	1788	1728
60	Low (1)	1655	1612	1596	1531	1461	1462	1429	1391
	Low/Medium (2)	1766	1720	1667	1629	1632	1539	1537	1498
	Medium (3)	1987	1933	1861	1817	1820	1715	1725	1651
	Medium/High (4)	2114	2050	2047	1974	1899	1889	1920	1866
	High (5)	2369	2308	2249	2183	2126	2088	2034	1990

1. Airflow tested with dry coil conditions, without air filters, at 230 volts
2. Applications above 0.8" w.c. external static pressure are not recommended.
3. Brushless DC high efficiency standard ECM blower motor used for all indoor blower assemblies.
4. Minimal variations in airflow performance data results from operating at 208 volts. Data above may be used in those cases.
5. Heating applications tested at 0.50" w.c. esp, and cooling applications tested at 0.30" w.c. esp per standards.

**Table 11:** Electric Heat Minimum Supply Air

Model	Voltage	Minimum Blower Speed for Electric Heat								
		Heater kW								
		2	5	8	10	13	15	18	20	25
A24	208/230-1-60	Low #1	Low #1	Med. Low #2	Med. #3	Med. Hi #4	--	--	--	--
A30	208/230-1-60	Low #1	Low #1	Low #1	Med. Low #2	Med #3	High #5	--	--	--
B36	208/230-1-60	Low #1	Low #1	Low #1	Low #1	Med. Low #2	High #5	--	--	--
B42	208/230-1-60	--	Low #1	Low #1	Low #1	Low #1	Med. Low #2	Med. Hi #4	High #5	--
B48	208/230-1-60	--	Low #1	Low #1	Low #1	Low #1	Low #1	Med. Low #2	Med. High #4	--
B60	208/230-1-60	--	Low #1	Low #1	Low #1	Low #1	Low #1	Low #1	Med. Low #2	Med. High #4

**Table 12:** Electric Heat Multipliers

Voltage		kW Capacity Multipliers <sup>1</sup>
Nominal	Applied	
240	208	0.75
	230	0.92

1. Electric heaters are rated at nominal voltage. Use this table to determine the electric heat capacity for heaters applied at lower voltages.

**Table 13:** Additional Static Resistance

Size (Tons)	CFM	Wet Indoor Coil	Economizer <sup>1</sup>	Filter/Frame Kit
24 (2.0)	500	0.01	0.00	0.01
	600	0.01	0.00	0.02
	700	0.01	0.00	0.04
	800	0.02	0.01	0.06
	900	0.03	0.01	0.08
	1000	0.04	0.01	0.10
	1100	0.05	0.01	0.13
	1200	0.06	0.02	0.16
30 (2.5)	700	0.01	0.00	0.04
	800	0.02	0.01	0.06
	900	0.03	0.01	0.08
	1000	0.04	0.01	0.10
	1100	0.05	0.01	0.13
	1200	0.06	0.02	0.16
	1300	0.07	0.03	0.17
36 (3.0)	700	0.01	0.00	0.04
	800	0.02	0.01	0.06
	900	0.03	0.01	0.08
	1000	0.04	0.01	0.10
	1100	0.05	0.01	0.13
	1200	0.06	0.02	0.16
	1300	0.07	0.03	0.17
	1400	0.08	0.04	0.18
42 (3.5)	1100	0.02	0.02	0.04
	1200	0.03	0.02	0.04
	1300	0.04	0.02	0.05
	1400	0.05	0.03	0.05
	1500	0.06	0.04	0.06
	1600	0.07	0.04	0.07
	1700	0.07	0.04	0.08
	1800	0.08	0.04	0.09
	1900	0.09	0.05	0.10
	2000	0.09	0.05	0.11
48 (4.0)	1100	0.02	0.02	0.04
	1200	0.03	0.02	0.04
	1300	0.04	0.02	0.05
	1400	0.05	0.03	0.05
	1500	0.06	0.04	0.06
	1600	0.07	0.04	0.07
	1700	0.07	0.04	0.08
	1800	0.08	0.04	0.09
	1900	0.09	0.05	0.10
	2000	0.09	0.05	0.11
60 (5.0)	1100	0.02	0.02	0.04
	1200	0.03	0.02	0.04
	1300	0.04	0.02	0.05
	1400	0.05	0.03	0.05
	1500	0.06	0.04	0.06
	1600	0.07	0.04	0.07
	1700	0.07	0.04	0.08
	1800	0.08	0.04	0.09
	1900	0.09	0.05	0.10
	2000	0.09	0.05	0.11

1. The pressure drop through the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

Filter pressure drop based on standard filter media tested at velocities not to exceed 300 ft/min.

## SECTION VI: OPERATION

The following sequences of operation are based on using a single-stage heat pump thermostat.

### COOLING SEQUENCE OF OPERATION

- When the fan switch on the thermostat is in the "ON" position, the 24 volts at "G" will bring on the indoor blower motor at the selected airflow. When the fan switch on the thermostat is in the "AUTO" position, the blower operates only when there is a call for cooling or heating by the thermostat.
- On a call for cooling, the thermostat sends 24 volts to "Y" and "O" to the defrost control board. The reversing valve solenoid is energized, and after the antishort cycle period is complete contactor coil M is energized. Power is supplied to the compressor and outdoor fan motor, and the reversing valve switched to the cooling position. When the fan switch on the thermostat is in the "AUTO" position the indoor blower motor is energized at the YSPD airflow.
- When the demand for cooling has been satisfied, the 24 volt "Y" signal is removed, and the M contactor is de-energized. When the fan switch on the thermostat is in the "ON" position, the indoor blower motor continues to run at GSPD. If the fan switch is in the "AUTO" position, the indoor motor ramps down after a 60 second delay.

### HEATING SEQUENCE OF OPERATION

- When the fan switch on the thermostat is in the "ON" position, the 24 volts at "G" brings on the indoor blower motor at the GSPD. When the fan switch on the thermostat is in the "AUTO" position, the blower operates when there is a call for heating by the thermostat.
- On a call for heating, the thermostat sends 24 volts to "Y" on the defrost control board. After the anti-short cycle period is complete, the 24 volt signal energizes contactor coil M and power is supplied to the compressor and outdoor fan motor. The reversing valve remains in the heating position. When the fan switch on the thermostat is in the "AUTO" position, the indoor blower is energized at the YSPD.
- For units equipped with supplementary electric heat, when the heat pump cannot meet the demand, the thermostat "W" sends 24 volts. This signal is sent through the defrost control terminals "W" to "Wout" an energizes the WSPD. The 24 volt signal energizes 1st stage of electric heat.
- When the heating demand is satisfied, the electric heat is de-energized when the 24 volt "W" signal is removed, and the M contactor is de-energized when the 24 volt "Y" signal is removed. When the fan switch on the thermostat is in the "ON" position, the indoor blower continues to run. When the fan switch is in the "AUTO" position, the indoor blower motor ramps down after a 60-second delay.

Please refer to Table 13 for more information.

### DEFROST OPERATION

The demand defrost control implements a temperature differential ("delta-T") demand defrost algorithm. The heat pump is allowed to operate in the heating mode until the combination of outdoor ambient and outdoor coil temperatures indicate that defrosting is necessary. When coil temperature is below the initiate point for the ambient temperature continuously for 4-1/2 minutes, the heat pump is put into a defrost cycle. This 4-1/2 minute timer eliminates unnecessary defrost cycles caused by refrigeration surges such as those that occur at the start of a heating cycle.

A timed inhibit feature prevents the system from responding to a call for defrost less than 40 minutes after the initiation of the previous defrost. After the 40 minute inhibit time has expired, temperature conditions must call for defrost continuously for 4-1/2 minutes before a defrost cycle is initiated. A temperature inhibit feature prohibits defrost if the coil temperature is above 40°F.

A forced-defrost feature puts the system into a defrost period every 6 hours and 4 minutes of accumulated compressor run-time to recirculate lubricants, unless the coil temperature is above 40°F and the ambient temperature is above 50°F. All defrost timing occurs only while the compressor is on.

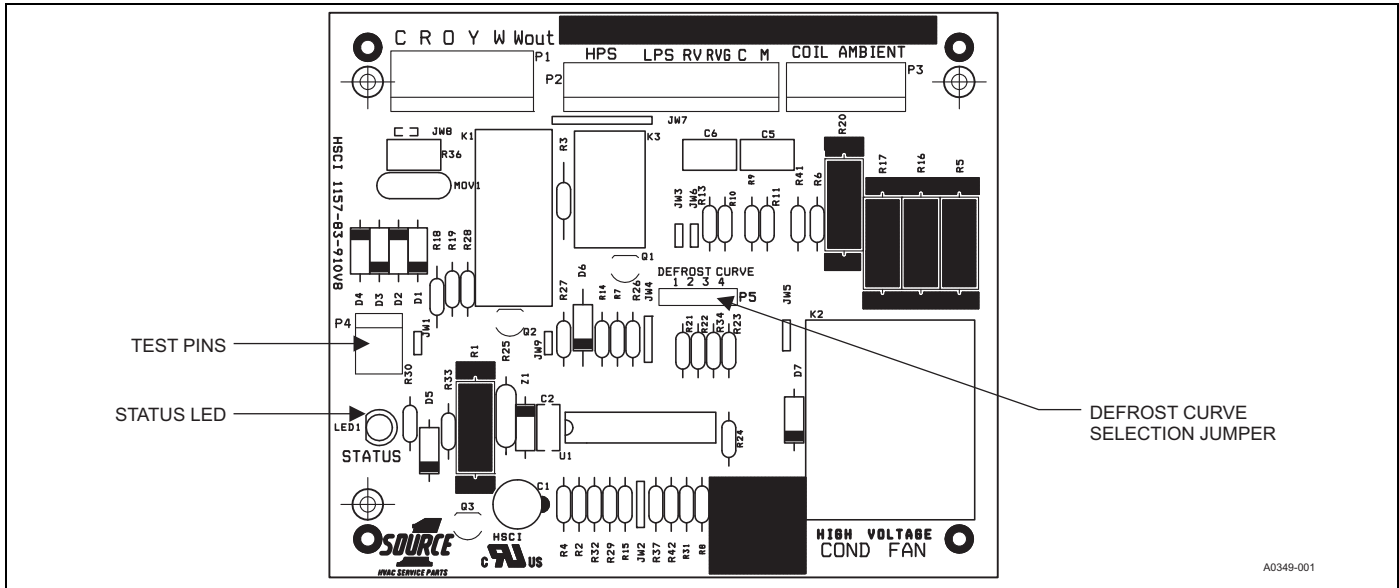


During the defrost mode, the reversing valve is energized, the outdoor fan is de-energized, the compressor is energized, and the defrost control will provide a 24 volt signal from terminal “Wout” to energize electric heat stage 1, if the unit is so equipped.

For trouble shooting purposes, the defrost cycle can be manually initiated by shorting the “TEST” pins together for 5 seconds while “Y” is energized. After removing the short, defrost will terminate normally during the “TEST” mode.

**Table 14: Demand Defrost Selection**

Unit	Pin Position
036, 048, 060	1
024, 030	2
042	3
024 Thru 060	2
024 Thru 060	2



**FIGURE 8: Demand Defrost Control**

**Heat Pump Safety Switch Operation**

The unit is equipped with a safety package. The refrigeration system will be protected against high refrigerant pressure and a loss of charge switch. If either of these safety switches open, the unit will be shut off for the 5 minute anti-short cycle time. Once this has expired, a six hour elapsed run timer begins. If a second opening of a safety switch occurs during this six hour period, the compressor will be locked out.

Resetting the lockout function is accomplished by:

1. Removing power from the control's thermostat 1st stage (Y) input for longer than 2 seconds.
2. Removing power from “R” for more than 2 seconds.
3. Shorting the “TEST” pins together for more than 2 seconds while “Y” is energized.
4. Shorting the “TEST” pins together for more than 5 seconds while “Y” is de-energized.

**Table 15: Test Pins**

Test Pin Shorted	Y	no Y
> 2 sec	Bypass ASCD	Show error coder
> 5 sec	Forced defrost	Clear error codes

**Table 16: Fault Codes**

Description	STATUS LED
High -pressure switch fault (not in lockout yet)	2 Flashes
System in high-pressure switch lockout (last mode of operation was normal compressor)	3 Flashes
System in high-pressure switch lockout (last mode of operation was defrost)	4 Flashes
System in loss of charge switch lockout (last mode of operation was normal compressor)	5 Flashes
Low Voltage (<19.2VAC) preventing further relay outputs for > 2 seconds	6 Flashes
Low Voltage (<16VAC) stopped current relay outputs for > 2 seconds	7 Flashes
Liquid Line sensor failure (Open or Shorted)	8 Flashes
Outdoor ambient sensor failure (Open or Shorted)	9 Flashes
Control Failure	10 Flashes

## Electric Heat Limit Switch Operation

6HK single phase heat kits utilize a normally closed line voltage limit switch and a normally closed fusible link. If the fusible link opens, it must be replaced with the appropriate OEM part and the cause must be investigated and corrected.

**Table 17:** Thermostat Signals

Signal	State	Board Function
G	ON	Indoor blower instant on
	OFF	Indoor blower off after 60-second delay
W	ON	Indoor blower instant on
		Electric heat stages on (if so equipped)
	OFF	Indoor blower off after 60-second delay
G & W	ON	Indoor blower instant on in heating speed
		Electric heat stages on (if so equipped)
	W OFF	Indoor blower switches to continuous fan speed
G & Y	ON	Outdoor fan instant on
		Indoor blower instant on in cooling speed
		Compressor on (after any anti-short cycle delay)
		System operates in heat pump heating mode
	Y OFF	Compressor instant off
		Outdoor fan instant off
G & Y & O	ON	Outdoor fan instant on
		Indoor blower instant on in cooling speed
		Compressor on (after any anti-short cycle delay)
		Reversing valve energized
		System operates in cooling mode
	Y & O OFF	Compressor instant off
		Outdoor fan instant off
		Indoor blower switches to continuous fan speed

\* Motor program has 60 second blower off delay on all 5 speed taps.

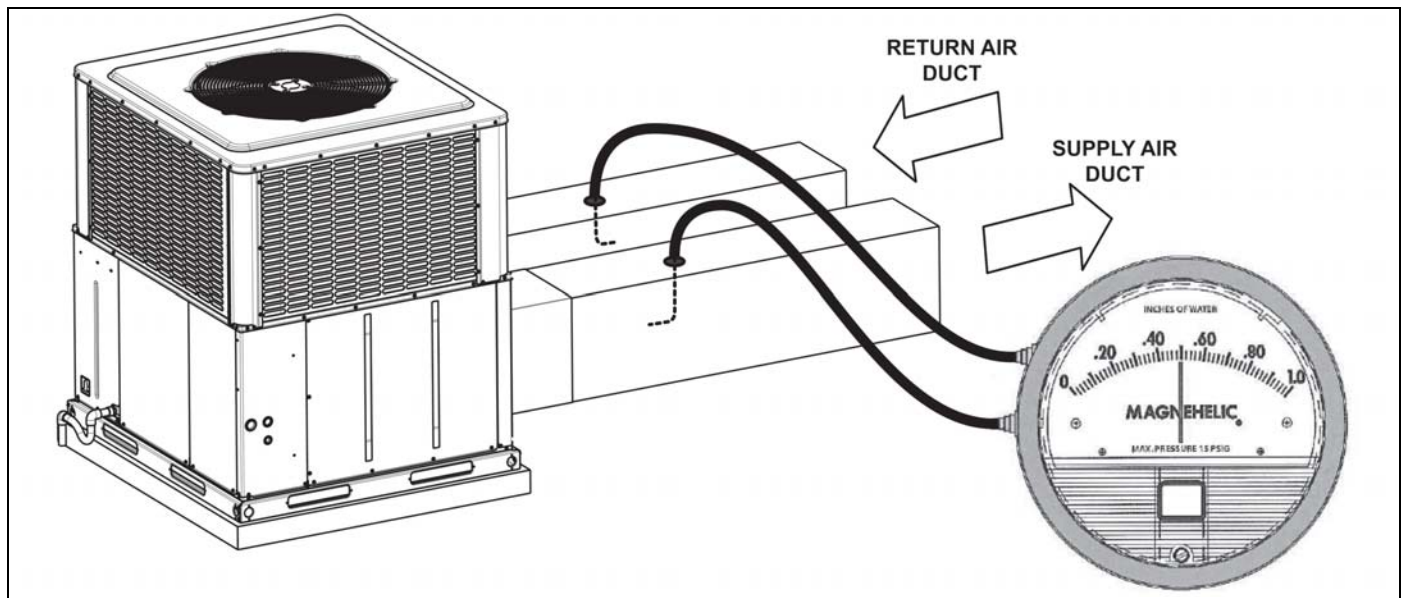
## STARTUP

1. Check the electrical supply voltage being supplied. Be sure that it is within the specified range on the unit data plate.
2. Make sure all electrical connections are tight.
3. If unit is connected to 208 volt supply power, the control transformer must be wired accordingly.
4. Turn unit electrical power on.
5. Set the room thermostat to COOL mode and lower the desired temperature setting lower than the room temperature to create a call for cooling.
6. Measure the total system duct static and set the blower motor cooling speed appropriately per airflow performance tables.
7. If an optional electric heat kit was installed make sure the minimum blower speed required per Table 10 is set.
8. Make sure all units panels are in place and secured, and that an air filter is installed.

## EXTERNAL STATIC PRESSURE SETUP

To measure external static pressure:

- Measure the supply air static pressure
- Record this positive number
- Measure the return air static pressure
- Record this negative number
- Treat the negative number as a positive and add the two numbers together
- This is total system static



**FIGURE 9:** Measuring External Static Pressure

## SECTION VII: MAINTENANCE

### NORMAL MAINTENANCE

#### ⚠ WARNING

*Prior to any of the following maintenance procedures, shut off all power to the unit, to avoid personal injury.*

Periodic maintenance consists of changing or cleaning filters and general cleaning of the outdoor coil.

**FILTERS** - Inspect once a month. Replace Disposable or clean Permanent Type as necessary. DO NOT replace Permanent Type with Disposable.

**MOTORS** - Indoor and outdoor fan motors are permanently lubricated and require no maintenance.

**OUTDOOR COIL** - Dirt should not be allowed to accumulate on the outdoor coil surface or other parts in the air circuit. Cleaning should be as often as necessary to keep the coil clean. If water is used to clean the coil, be sure that the power to the unit is shut off prior to cleaning.

#### NOTICE

*DO NOT use a pressure washer as coil fin damage will occur.*

#### ⚠ CAUTION

*Exercise care when cleaning the coil so that the coil fins are not damaged.*

*Do not permit the hot outdoor air discharge to be obstructed by overhanging structures or shrubs.*

### TROUBLESHOOTING

#### ⚠ WARNING

*Troubleshooting of components necessarily requires opening the electrical control box with the power connected to the unit. Use extreme care when working with live circuit! Check the unit nameplate for the correct range before making any connections with line terminals.*

#### ⚠ CAUTION

*The wire number or color and terminal designations referred to may vary. Check the wiring label inside the control box access panel for the correct wiring.*

SECTION VIII: TYPICAL WIRING DIAGRAMS

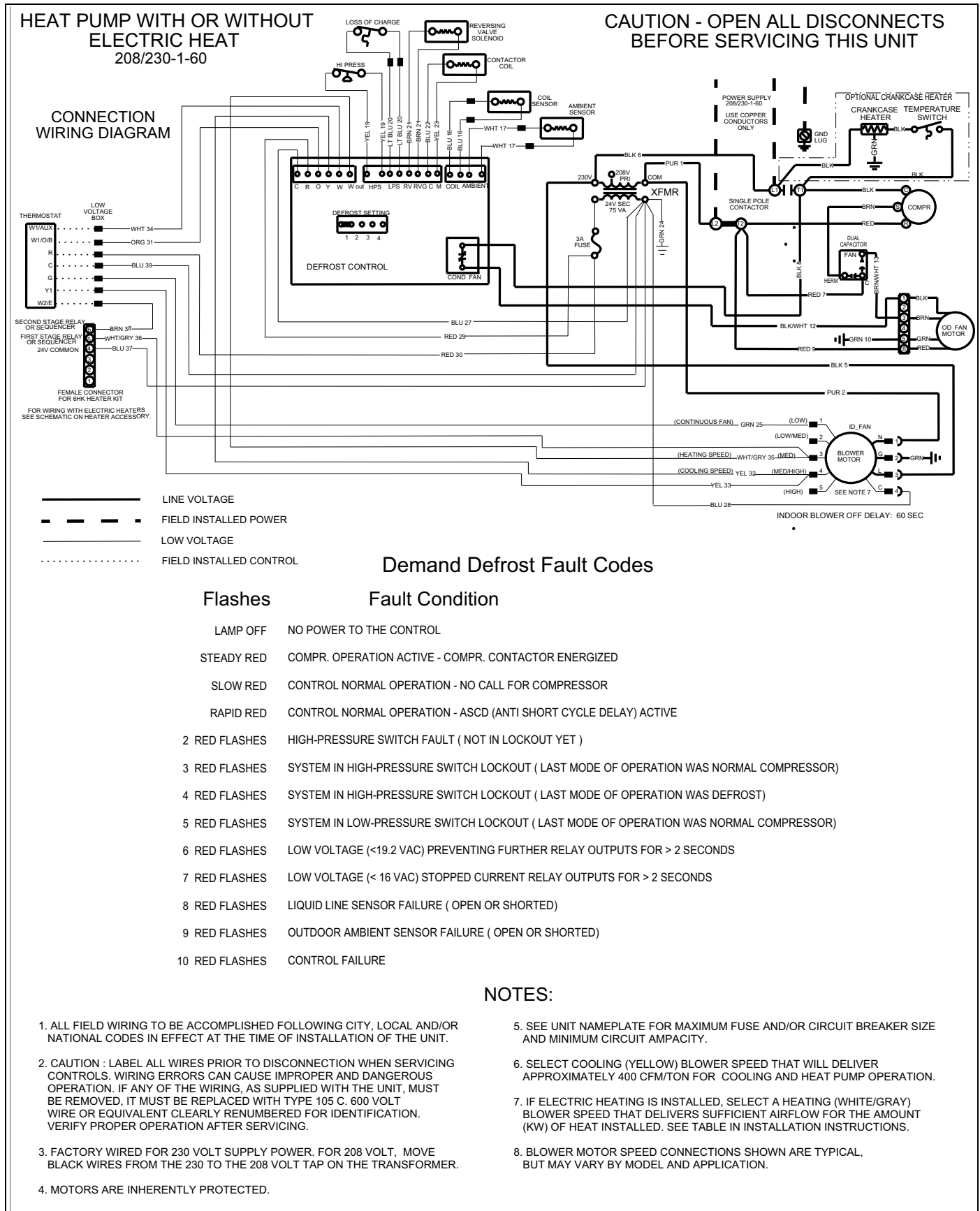


FIGURE 10: Connection Wiring Diagram

# HEAT PUMP WITH OR WITHOUT ELECTRIC HEAT

208/230-1-60

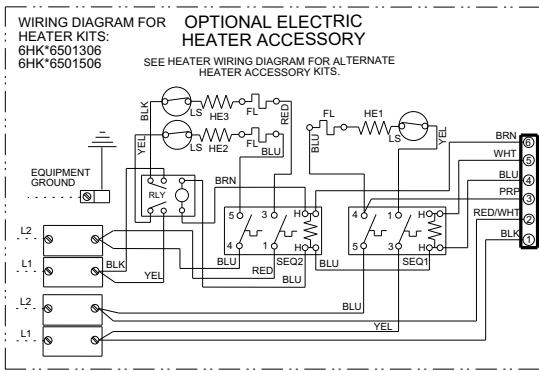
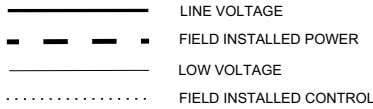
**CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT**

## Demand Defrost Fault Codes

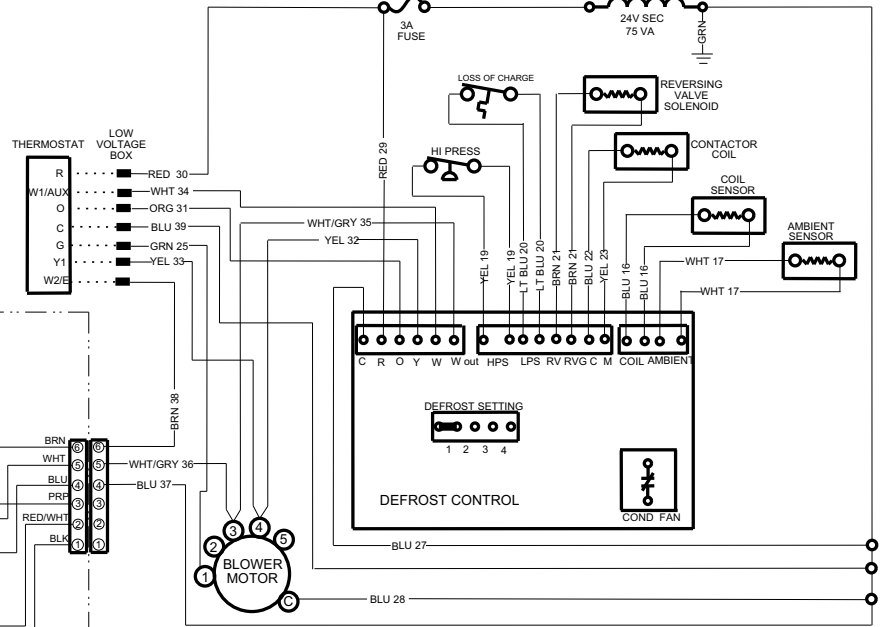
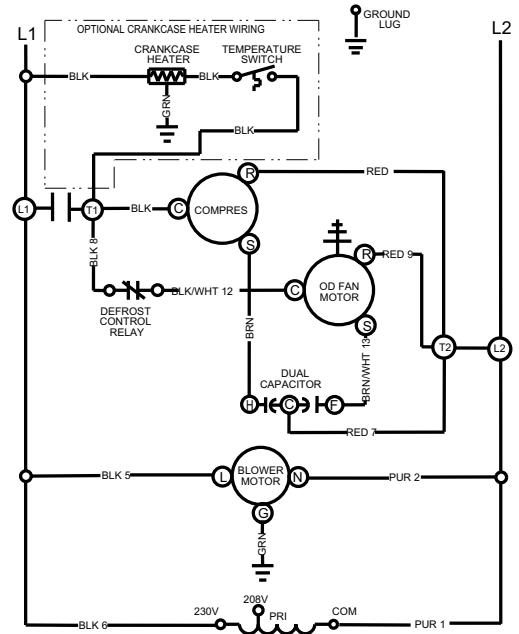
### Flashes

### Fault Condition

LAMP OFF	NO POWER TO THE CONTROL
STEADY RED	COMPR. OPERATION ACTIVE - COMPR. CONTACTOR ENERGIZED
SLOW RED	CONTROL NORMAL OPERATION - NO CALL FOR COMPRESSOR
RAPID RED	CONTROL NORMAL OPERATION - ASCD (ANTI SHORT CYCLE DELAY) ACTIVE
2 RED FLASHES	HIGH-PRESSURE SWITCH FAULT ( NOT IN LOCKOUT YET )
3 RED FLASHES	SYSTEM IN HIGH-PRESSURE SWITCH LOCKOUT ( LAST MODE OF OPERATION WAS NORMAL COMPRESSOR)
4 RED FLASHES	SYSTEM IN HIGH-PRESSURE SWITCH LOCKOUT ( LAST MODE OF OPERATION WAS DEFROST)
5 RED FLASHES	SYSTEM IN LOW-PRESSURE SWITCH LOCKOUT ( LAST MODE OF OPERATION WAS NORMAL COMPRESSOR)
6 RED FLASHES	LOW VOLTAGE (<19.2 VAC) PREVENTING FURTHER RELAY OUTPUTS FOR > 2 SECONDS
7 RED FLASHES	LOW VOLTAGE (< 16 VAC) STOPPED CURRENT RELAY OUTPUTS FOR > 2 SECONDS
8 RED FLASHES	LIQUID LINE SENSOR FAILURE ( OPEN OR SHORTED)
9 RED FLASHES	OUTDOOR AMBIENT SENSOR FAILURE ( OPEN OR SHORTED)
10 RED FLASHES	CONTROL FAILURE



# LADDER WIRING DIAGRAM



### NOTES:

- ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THE UNIT.
- CAUTION : LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION. IF ANY OF THE WIRING, AS SUPPLIED WITH THE UNIT, MUST BE REMOVED, IT MUST BE REPLACED WITH TYPE 105 C. 600 VOLT WIRE OR EQUIVALENT CLEARLY RENUMBERED FOR IDENTIFICATION. VERIFY PROPER OPERATION AFTER SERVICING.
- FACTORY WIRED FOR 230 VOLT SUPPLY POWER. FOR 208 VOLT, MOVE BLACK WIRES FROM THE 230 TO THE 208 VOLT TAP ON THE TRANSFORMER.
- MOTORS ARE INHERENTLY PROTECTED.
- SEE UNIT NAMEPLATE FOR MAXIMUM FUSE AND/OR CIRCUIT BREAKER SIZE AND MINIMUM CIRCUIT AMPACITY.
- SELECT COOLING (YELLOW) BLOWER SPEED THAT WILL DELIVER APPROXIMATELY 400 CFM/TON FOR COOLING AND HEAT PUMP OPERATION.
- IF ELECTRIC HEATING IS INSTALLED, SELECT A HEATING (WHITE/GRAY) BLOWER SPEED THAT DELIVERS SUFFICIENT AIRFLOW FOR THE AMOUNT (KW) OF HEAT INSTALLED. SEE TABLE IN INSTALLATION INSTRUCTIONS.
- BLOWER MOTOR SPEED CONNECTIONS SHOWN ARE TYPICAL, BUT MAY VARY BY MODEL AND APPLICATION.

FIGURE 11: Ladder Wiring Diagram

## R-410A QUICK REFERENCE GUIDE

### Refer to Installation Instructions for specific installation requirements

- R-410A refrigerant operates at 50 - 70 percent higher pressures than R-22. Be sure that servicing equipment and replacement components are designed to operate with R-410A.
- R-410A refrigerant cylinders are rose colored.
- Recovery cylinder service pressure rating must be 400 psig, DOT 4BA400, or DOT BW400.
- Recovery equipment must be rated for R-410A.
- DO NOT use R-410A service equipment on R-22 systems. All hoses, gages, recovery cylinders, charging cylinders and recovery equipment must be dedicated for use on R-410A systems only.
- Manifold sets must be at least 700 psig high side, and 180 psig low side, with 550 psig retard.
- All hoses must have a service pressure rating of 800 psig.
- Leak detectors must be designed to detect HFC refrigerants.
- Systems must be charged with liquid refrigerant. Use a commercial type metering device in the manifold hose.
- R-410A can only be used with POE type oils.
- POE type oils rapidly absorb moisture from the atmosphere.
- Vacuum pumps will **not** remove moisture from R-410A refrigerant oils.
- Do not use liquid line driers with a rated working pressure rating less than 600 psig.
- Do not install suction line driers in the liquid line.
- A liquid line drier is required on every unit.
- Do not use a R-22 TXV. If a TXV is to be used, it must be a R-410A TXV.
- Never open system to atmosphere when under a vacuum.
- If system must be opened for service, evacuate system then break the vacuum with dry nitrogen and replace all filter driers.

FIGURE 12: R-410A Quick Reference Guide

## NOTES



## SECTION IX: START UP SHEET

Print Form

### Residential Package Unit Heat Pump with Electric Heat Start-Up Sheet

Reset Form

Proper start-up is critical to customer comfort and equipment longevity

Start-Up Date  Company Name  Start-Up Technician

#### Owner Information

Name  Address  Daytime Phone   
 City  State or Province  Zip or Postal Code

#### Equipment Data

Unit Model #  Unit Serial #

#### General Information (Check all that apply)

<input type="radio"/> Residential	<input type="radio"/> New Construction	<input type="radio"/> Roof level	<input type="radio"/> Down flow
<input type="radio"/> Commercial	<input type="radio"/> Retrofit	<input type="radio"/> Grade level	<input type="radio"/> Side flow

#### Unit Location and Connections (Check all that apply)

Unit is level and installed on:  Slab  Roof curb  Duct connections are complete:  Supply  Return  
 Condensate drain properly connected per the installation instructions  Condensate trap has been primed with water

#### Filters

Filters installed Number of filters  Filter size   Filter located inside  Filter located outside

#### Additional Kits & Accessories Installed (Check all that apply)

Refrigerant safety kit  Low ambient kit  Anti-recycle timer  Crank case heater  Filter frame kit  
 Transformer kit  Economizer  Roof curb kit  Burglar bar kit  Hail guard kit  
 Manual fresh air damper kit  Motorized fresh air damper kit

#### Electrical Connections & Inspection (Check all that apply)

Single phase  Three phase  208 volts AC  230 volt AC  460 volts AC  575 volts AC  
 Inspect wires and electrical connections  Transformer wired properly for primary supply voltage  Ground connected  
 Low voltage present at control board "R & C" Measured voltage "R" and "C" outdoor unit control board   
 Line voltage present at disconnect Measured voltage "L1 to L2"  "L2 to L3"  "L1 to L3"   
 Compressor amperes "L1"  "L2"  "L3"  Total amperes "L1"  "L2"  "L3"   
 Single stage compressor  Two stage compressor

#### Air Flow Setup

<b>Blower Type &amp; Set-Up</b>	<input type="radio"/> Premium ECM	COOL <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
		ADJUST <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
		DELAY <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
		HEAT <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
	<input type="radio"/> Standard ECM	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
<input type="radio"/> PSC	<input type="radio"/> Low <input type="radio"/> Medium Low <input type="radio"/> Medium <input type="radio"/> Medium High <input type="radio"/> High	

Supply static (inches of water column) <input type="text"/>	Supply air dry bulb temperature <input type="text"/>	Outside air dry bulb temperature <input type="text"/>
Return static (inches of water column) <input type="text"/>	Return air dry bulb temperature <input type="text"/>	Return air wet bulb temperature <input type="text"/>
Total external static pressure <input type="text"/>	Temperature drop <input type="text"/>	Supply air wet bulb temperature <input type="text"/>

### Refrigerant Charge and Metering Device

<input type="radio"/> R-410A <input type="radio"/> R-22	Data plate - lbs / Oz <input type="text"/>	Suction line temperature <input type="text"/>	Discharge pressure <input type="text"/>
<input type="radio"/> TXV <input type="radio"/> Fixed Orifice	Discharge line temperature <input type="text"/>	Suction pressure <input type="text"/>	Liquid line temperature <input type="text"/>
TXV# / Orifice size <input type="text"/>		Superheat <input type="text"/>	Subcooling <input type="text"/>

### Electric Heat (Supplemental and Emergency Heat)

Electric heat kit - Model number <input type="text"/>		Serial number <input type="text"/>		Rated KW <input type="text"/>	
<input type="radio"/> Single Phase	Measured Amperage	Heater 1 <input type="text"/>	Heater 2 <input type="text"/>	Heater 3 <input type="text"/>	
<input type="radio"/> Three Phase		Heater 4 <input type="text"/>	Heater 5 <input type="text"/>	Heater 6 <input type="text"/>	
Number of elements <input type="text"/>	Measured Voltage	Heater 1 <input type="text"/>	Heater 2 <input type="text"/>	Heater 3 <input type="text"/>	
		Heater 4 <input type="text"/>	Heater 5 <input type="text"/>	Heater 6 <input type="text"/>	
Heating return air dry bulb temperature <input type="text"/>		Heating supply air dry bulb temperature <input type="text"/>		Air temperature rise <input type="text"/>	

### Clean Up Job Site

<input type="checkbox"/> Job site has been cleaned, indoor and outdoor debris removed from job site
<input type="checkbox"/> Tools have been removed from unit
<input type="checkbox"/> All panels have been installed

### Unit Operation and Cycle Test

<input type="checkbox"/> Operate the unit through continuous fan cycles from the thermostat, noting and correcting any problems
<input type="checkbox"/> Operate the unit through cooling cycles from the thermostat, noting and correcting any problems
<input type="checkbox"/> Operate the unit through mechanical heating cycles from the thermostat, noting and correcting any problems
<input type="checkbox"/> Operate the unit through emergency heating cycles from the thermostat, noting and correcting any problems

### Owner Education

<input type="checkbox"/> Provide owner with the owner's manual
<input type="checkbox"/> Explain operation of system to equipment owner
<input type="checkbox"/> Explain thermostat use and programming (if applicable) to owner
<input type="checkbox"/> Explain the importance of regular filter replacement and equipment maintenance

### Comments and Additional Job Details