

INSTALLATION MANUAL

**SINGLE PACKAGE
HEAT PUMP/ELECTRIC HEAT
MODELS: PHE4 SERIES
2 TO 5 TONS - 208/230 V - 1 PHASE**



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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. Install this product 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.

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 Ducted Systems parts distribution center for authorized replacement parts.

SECTION III: MODEL NUMBER NOMENCLATURE

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

See Tables 3 and 4 for unit physical data and Tables 6 to 8 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).

Table 1: Unit Limitations

Model	Unit Voltage	Unit Limitations		
		Applied Voltage		Outdoor DB Temp
		Minimum	Maximum	Maximum (°F)
PHE4A24	208/230-1-60	187	252	125
PHE4A30	208/230-1-60	187	252	125
PHE4B36	208/230-1-60	187	252	125
PHE4B42	208/230-1-60	187	252	125
PHE4B48	208/230-1-60	187	252	125
PHE4B60	208/230-1-60	187	252	125

Table 2: Application Limitations

Packaged Equipment Series	Air Temperature at Outdoor Coil (°F)				Air Temperature at Indoor Coil (°F)			
	Minimum		Maximum		Minimum		Maximum	
	DB Cool	DB Heat	DB Cool	DB Heat	WB Cool	DB Heat	WB Cool	DB Heat
14 SEER HP	55	-10	125	75	57	50	72	80

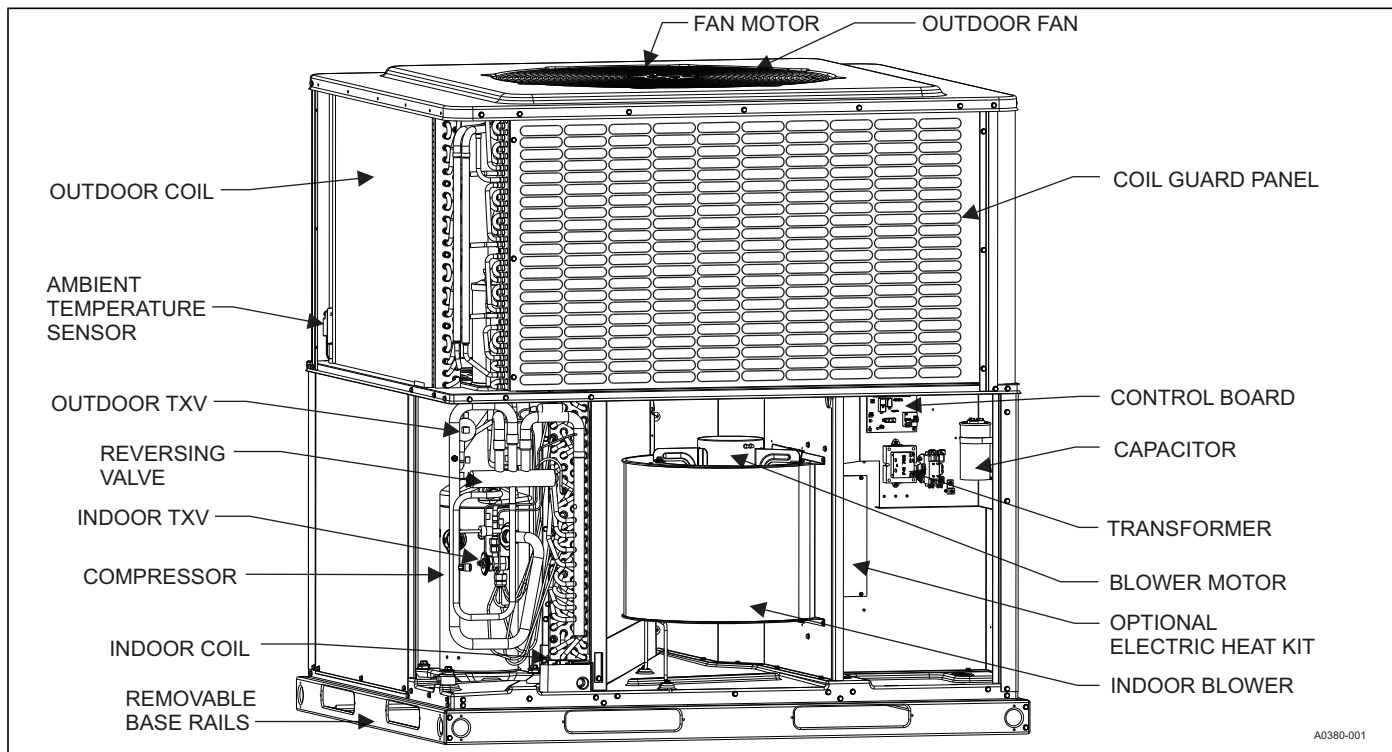


FIGURE 1: Component Location

LOCATION

⚠ WARNING

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

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 the north or east side of the building.
3. Suitable for mounting on roof curb.

⚠ WARNING

Do not attach supply and return duct work to the bottom of the unit base pan as the drain pan could be compromised.

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. The unit must be installed on a solid, level roof curb or appropriate angle iron frame.
6. Maintain level tolerance to 1/8 in. across the entire width and length of unit.

CLEARANCES

All units require certain clearances for proper operation and service. Refer to Table 5 for the clearances required for construction, servicing and proper unit operation.

RIGGING AND HANDLING

⚠ 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.

⚠ CAUTION

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

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.

Table 3: Weights and Dimensions

Model	Weight (lb)		Center of Gravity		4 Point Load Location (lb)			
	Shipping	Operating	X	Y	A	B	C	D
PHE4A24	382	377	29	15	133	88	86	75
PHE4A30	397	392	29	15	127	101	99	70
PHE4B36	453	448	29	15	158	108	101	86
PHE4B42	476	471	30	15	164	119	111	82
PHE4B48	501	496	29	15	168	130	119	84
PHE4B60	528	523	30	15	177	136	128	87

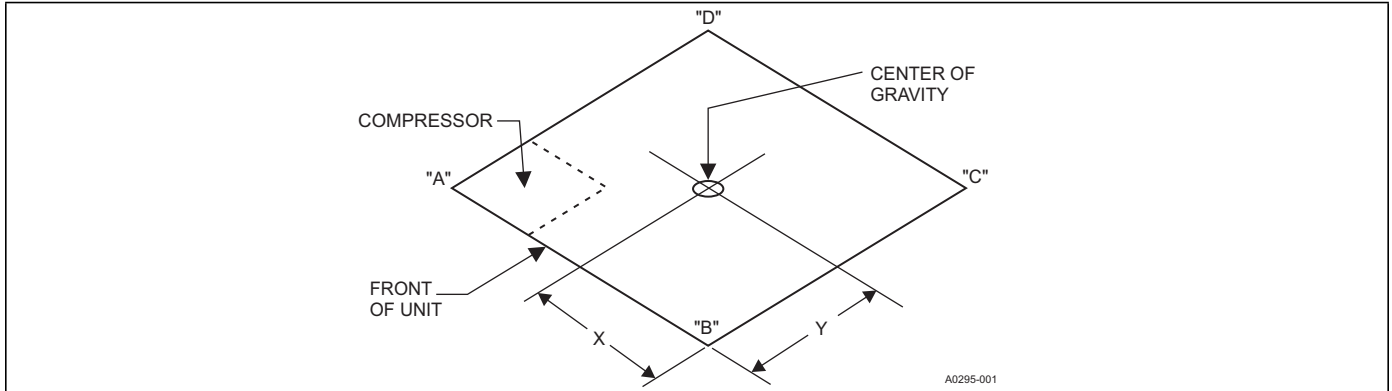
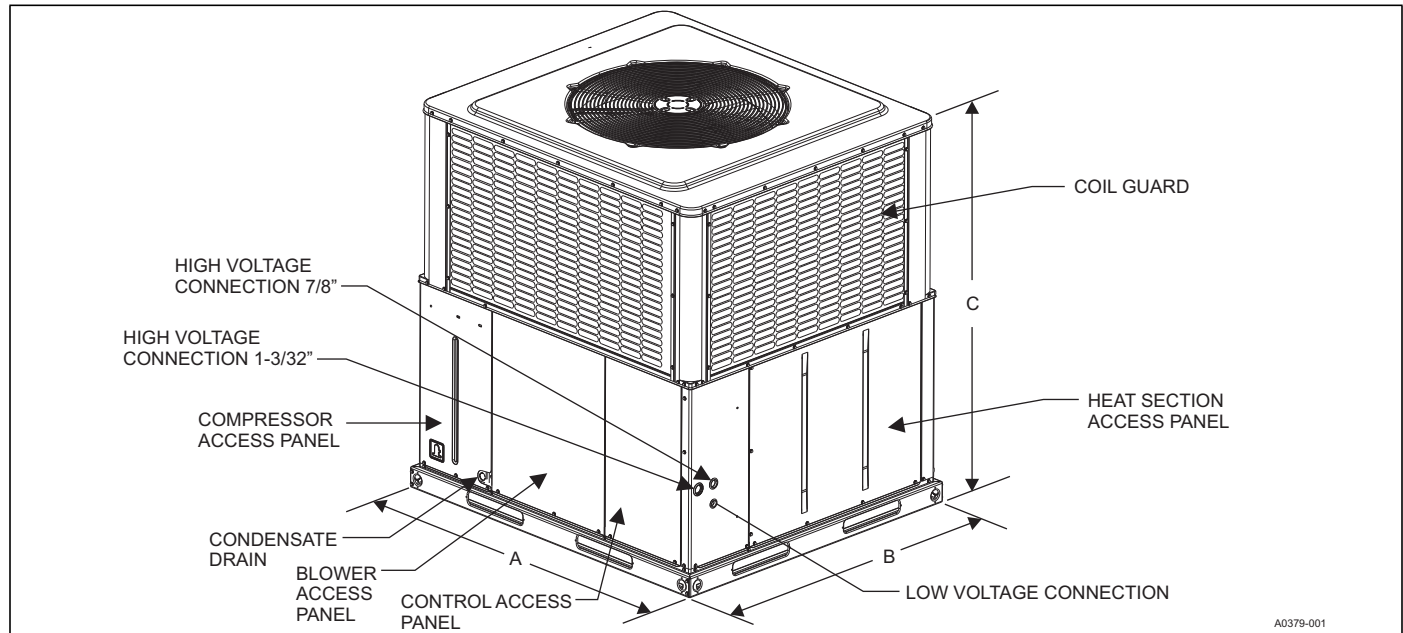


FIGURE 2: Unit 4 Point Load Weight

Table 4: Unit Dimensions

Model	Dimensions (in.)		
	A	B	C
PHE4A24	51-1/4	35-3/4	47
PHE4A30	51-1/4	35-3/4	49
PHE4B36	51-1/4	45-3/4	49
PHE4B42	51-1/4	45-3/4	49
PHE4B48	51-1/4	45-3/4	53
PHE4B60	51-1/4	45-3/4	55



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FIGURE 3: Unit Dimensions**Table 5:** Unit Clearances

Direction	Distance (in.)	Direction	Distance (in.)
Top ¹	36	Right Side	36
Side Opposite Ducts	36	Left Side	24
Duct Panel	0	Bottom ^{2 3}	1

1. There must be a minimum clearance of 1 in. on all sides of the supply air duct for the first 3 ft of the duct for 20 kW and 25 kW heaters (0 in. thereafter). For all other heaters, there must be a 0 in. clearance on all sides for the entire length of the supply air duct.

2. Units must be installed outdoors. Overhanging structures or shrubs must not obstruct the outdoor air discharge outlet.

3. Units can be installed on combustible materials made from wood or class A, B, or C roof covering materials if factory base rails are left in place as shipped.

Note: For units with a roof curb, the minimum clearance between combustible roof curb material and the supply air duct can be reduced from 1 in. to 1/2 in.

DUCTWORK

NOTICE

All units are shipped in the horizontal supply/return configuration. It is important to reduce the possibility of any air leakage through the bottom duct covers (resulting from cut, torn, or rolled gasket) due to improper handling or shipping processes. To ensure a good tight seal, it is recommended that silicone caulk and/or foil tape be applied along the cover edges.

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

Use a closed return duct system. This does not preclude the 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 waterproofed.

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.

Check filters monthly. This is especially important because this unit is used for both heating and cooling.

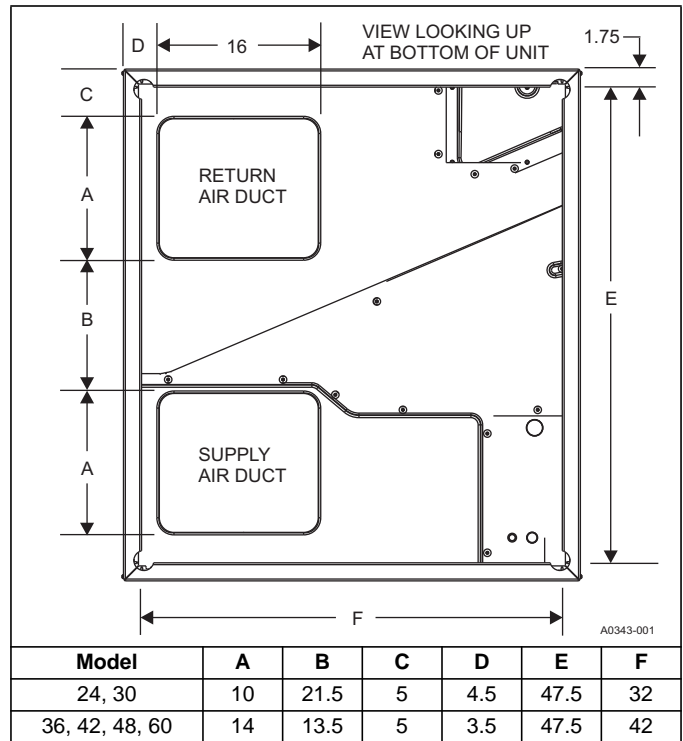


FIGURE 4: Bottom Duct Dimensions (in.)

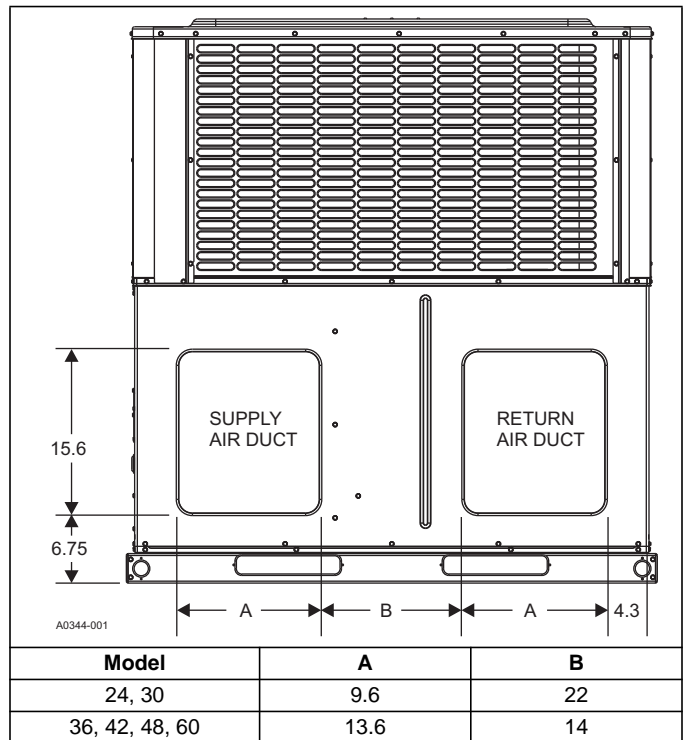


FIGURE 5: Rear Duct Dimensions (in.)

CONDENSATE DRAIN

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

CAUTION

Hand tighten only.

Use Teflon tape or pipe thread compound if needed.

SERVICE ACCESS

WARNING

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

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 5.

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.

Refer to Figure 13 for the R-410A Quick Reference Guide.

THERMOSTAT

The room thermostat should be located on an inside wall approximately 60 in. 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 No.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 V power. If supply power is 208 V, wires connected to the control transformer 230 V tap must be moved to the 208 V tap.

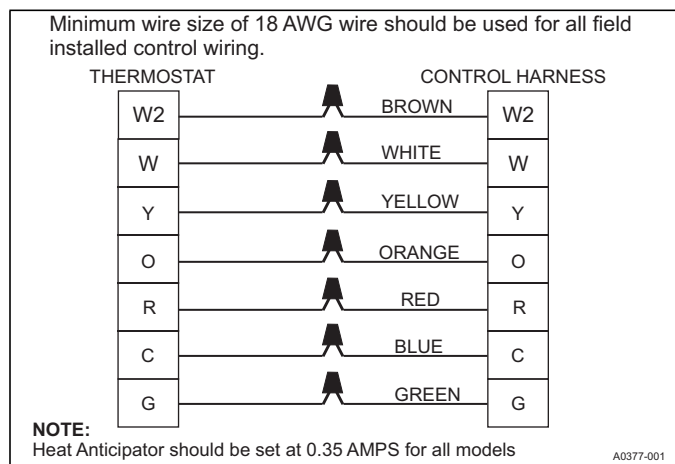


FIGURE 6: Typical Field Control Wiring Diagram for Heat Pump Models

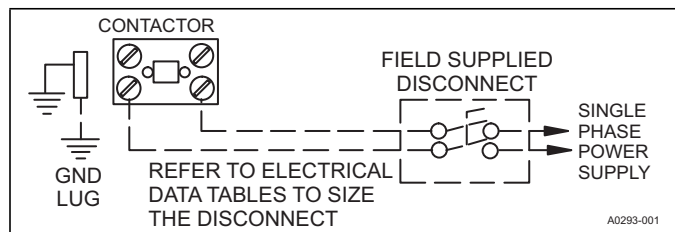


FIGURE 7: Typical Field Power Wiring Diagram

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 UL1995, Article 26.19 (in reference to all circuit breakers).

Table 6: Electrical Data for 208/230-1-60 Single Source Power

Model	Compressor			OD Fan Motor FLA	Blower Motor FLA	Electric Heat Option					MCA ¹ Amps		Max Fuse ² or Breaker Size ³		
	RLA	LRA	MCC			Heater Kit ⁴	Heater kW		Stages	Heater Amps		208	230	208	230
				208	230		208	230							
PHE4A24	10	62	16	0.7	3.8	none	--	--	--	--	--	18.1	18.1	25	25
						6HK16500206	1.8	2.2	1	8.7	9.6	28.2	29.3	35	35
						6HK16500506	3.6	4.4	1	17.3	19.1	39.0	41.3	40	45
						6HK16500806	5.8	7.1	1	27.9	30.9	52.2	56.0	60	60
						6HK16501006	7.2	8.8	1	34.6	38.3	60.6	65.2	70	70
						6HK16501306	9.4	11.5	2	45.2	50.0	73.9	79.9	80	80
PHE4A30	14	73	22	0.6	3.8	none	--	--	--	--	--	22.0	22.0	35	35
						6HK16500206	1.8	2.2	1	8.7	9.6	32.8	34.0	40	45
						6HK16500506	3.6	4.4	1	17.3	19.1	43.7	45.9	50	50
						6HK16500806	5.8	7.1	1	27.9	30.9	56.9	60.6	60	70
						6HK16501006	7.2	8.8	1	34.6	38.3	65.3	69.9	70	70
						6HK16501306	9.4	11.5	2	45.2	50.0	78.5	84.5	80	90
						6HK16501506	10.8	13.2	2	51.9	57.4	86.9	93.8	90	100
PHE4B36	17	79	26	1.7	3.8	none	--	--	--	--	--	26.4	26.4	40	40
						6HK16500206	1.8	2.2	1	8.7	9.6	37.2	38.3	50	50
						6HK16500506	3.6	4.4	1	17.3	19.1	48.0	50.3	60	60
						6HK16500806	5.8	7.1	1	27.9	30.9	61.2	65.0	70	70
						6HK16501006	7.2	8.8	1	34.6	38.3	69.6	74.2	70	80
						6HK16501306	9.4	11.5	2	45.2	50.0	82.9	88.9	90	90
						6HK16501506	10.8	13.2	2	51.9	57.4	91.3	98.1	100	100
PHE4B42	17.90	112	28	1.7	5.4	none	--	--	--	--	--	29.5	29.5	45	45
						6HK16500506	3.6	4.4	1	17.3	19.1	51.1	53.4	60	60
						6HK16500806	5.8	7.1	1	27.9	30.9	64.3	68.1	70	70
						6HK16501006	7.2	8.8	1	34.6	38.3	72.7	77.3	80	80
						6HK16501306	9.4	11.5	2	45.2	50.0	86.0	92.0	90	100
						6HK16501506	10.8	13.2	2	51.9	57.4	94.4	101.2	100	110
						6HK16501806	13.0	15.9	2	62.5	69.1	107.6	115.9	110	125
						6HK16502006	14.4	17.6	2	69.2	76.5	116.0	125.1	125	150
PHE4B48	24.30	117	34	1.7	5.4	none	--	--	--	--	--	34.4	34.4	50	50
						6HK16500506	3.6	4.4	1	17.3	19.1	56.0	58.3	70	70
						6HK16500806	5.8	7.1	1	27.9	30.9	69.2	72.9	80	80
						6HK16501006	7.2	8.8	1	34.6	38.3	77.6	82.2	90	90
						6HK16501306	9.4	11.5	2	45.2	50.0	90.8	96.9	100	100
						6HK16501506	10.8	13.2	2	51.9	57.4	99.3	106.1	100	110
						6HK16501806	13.0	15.9	2	62.5	69.1	112.5	120.8	125	125
						6HK16502006	14.4	17.6	2	69.2	76.5	120.9	130.0	125	150
PHE4B60	24.40	144	38	1.7	7	none	--	--	--	--	--	39.2	39.2	60	60
						6HK16500506	3.6	4.4	1	17.3	19.1	60.8	63.1	80	80
						6HK16500806	5.8	7.1	1	27.9	30.9	74.1	77.8	90	90
						6HK16501006	7.2	8.8	1	34.6	38.3	82.5	87.0	90	100
						6HK16501306	9.4	11.5	2	45.2	50.0	95.7	101.7	100	110
						6HK16501506	10.8	13.2	2	51.9	57.4	104.1	110.9	110	125
						6HK16501806	13.0	15.9	2	62.5	69.1	117.3	125.6	125	150
						6HK16502006	14.4	17.6	2	69.2	76.5	125.7	134.9	150	150

1. MCA = Minimum Circuit Ampacity.

2. Maximum Overcurrent Protection per standard UL 1995.

3. Fuse or HACR circuit breaker is field installed.

4. Single Point Connection Kit required.

Table 7: 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									
Multi Source: Compressor Circuit and Heat Circuits						Multi Source:	Circuit 1 Compressor Circuit				MCA ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²
							Circuit 2 Heat											
							Circuit 3 Heat											
							Circuit 4 Heat											
										Circuit 1	Circuit 2	Circuit 3	Circuit 4					
PHE4A24	10.30	45	14	0.7	3.8	none	--	--	--	18.1	25	--	--	--	--	--	--	
						6HK(0,1)6500206	1.8	1	8.7	18.1	25	10.8	15	--	--	--	--	
						6HK(0,1)6500506	3.6	1	17.3	18.1	25	21.6	25	--	--	--	--	
						6HK(0,1)6500806	5.8	1	27.9	18.1	25	34.9	40	--	--	--	--	
						6HK(0,1)6501006	7.2	1	34.6	18.1	25	43.3	45	--	--	--	--	
						6HK16501306	9.4	2	45.2	18.1	25	37.2	40	18.8	20	--	--	
						6HK26501306	9.4	2	45.2	18.1	25	56.5	60	--	--	--	--	
PHE4A30	14.10	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	2	45.2	22.0	35	56.5	60	--	--	--	--	
6HK26501506	10.8	2	51.9	22.0	35	64.9	70	--	--	--	--							
PHE4B36	16.70	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	2	45.2	26.4	40	56.5	60	--	--	--	--	
6HK26501506	10.8	2	51.9	26.4	40	64.9	70	--	--	--	--							
PHE4B42	17.90	112	28	1.7	5.4	none	--	--	--	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	37.7	40	18.8	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	39.1	40	39.1	40	--	--	
						6HK16502006	14.4	2	69.2	29.5	45	43.3	45	43.3	45	--	--	
						6HK26501306	9.4	2	45.2	29.5	45	56.5	60	--	--	--	--	
						6HK26501506	10.8	2	51.9	29.5	45	64.9	70	--	--	--	--	
						6HK26501806	13.0	2	62.5	29.5	45	78.1	80	--	--	--	--	
6HK26502006	14.4	2	69.2	29.5	45	86.5	90	--	--	--	--							
PHE4B48	21.80	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	37.7	40	18.8	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	39.1	40	39.1	40	--	--	
						6HK16502006	14.4	2	69.2	34.4	50	43.3	45	43.3	45	--	--	
						6HK26501306	9.4	2	45.2	34.4	50	56.5	60	--	--	--	--	
						6HK26501506	10.8	2	51.9	34.4	50	64.9	70	--	--	--	--	
						6HK26501806	13.0	2	62.5	34.4	50	78.1	80	--	--	--	--	
6HK26502006	14.4	2	69.2	34.4	50	86.5	90	--	--	--	--							

For notes, see end of table on next page.

Table 7: 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 ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²
							Circuit 2 Heat											
							Circuit 3 Heat											
							Circuit 4 Heat											
PHE4B60	24.00	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	37.2	40	18.8	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	39.1	40	39.1	40	--	--	
						6HK16502006	14.4	2	69.2	39.2	60	43.3	45	43.3	45	--	--	
						6HK26501306	9.4	2	45.2	39.2	60	56.5	60	--	--	--	--	
						6HK26501506	10.8	2	51.9	39.2	60	64.9	70	--	--	--	--	
						6HK26501806	13.0	2	62.5	39.2	60	78.1	80	--	--	--	--	
						6HK26502006	14.4	2	69.2	39.2	60	86.5	90	--	--	--	--	
						6HK16502506	18.0	2	86.5	39.2	60	43.3	45	43.3	45	21.6	25	
6HK26502506	18.0	2	86.5	39.2	60	108.2	110	--	--	--	--							

1. MCA = Minimum Circuit Ampacity.
2. MOP = Maximum Overcurrent Protection device. Must be HACR type circuit breaker or time delay fuse.

Table 8: 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 ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²
							Circuit 2 Heat											
							Circuit 3 Heat											
							Circuit 4 Heat											
PHE4A24	10.30	45	14	0.7	3.8	none	--	--	--	18.1	25	--	--	--	--	--		
						6HK(0,1)6500206	2.2	1	9.6	18.1	25	12.0	15	--	--	--	--	
						6HK(0,1)6500506	4.4	1	19.1	18.1	25	23.9	25	--	--	--	--	
						6HK(0,1)6500806	7.1	1	30.9	18.1	25	38.6	40	--	--	--	--	
						6HK(0,1)6501006	8.8	1	38.3	18.1	25	47.8	50	--	--	--	--	
						6HK16501306	11.5	2	50.0	18.1	25	41.7	45	20.8	25	--	--	
						6HK26501306	11.5	2	50.0	18.1	25	62.5	70	--	--	--	--	
						6HK26501506	13.2	2	57.4	18.1	25	71.7	80	--	--	--	--	
PHE4A30	14.10	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	--	--	
						6HK26501506	13.2	2	57.4	22.0	35	71.7	80	--	--	--	--	
PHE4B36	16.70	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	--	--	
						6HK26501506	13.2	2	57.4	26.4	40	71.7	80	--	--	--	--	

For notes, see end of table on next page.

Table 8: Electrical Data for 230-1-60 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	230	230	230	230	230	230	230		
							230		230									
Multi Source: Compressor Circuit and Heat Circuits						Multi Source:	Circuit 1 Compressor Circuit				MCA ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²	MCA ¹ Amps	MOP ²
							Circuit 2 Heat											
							Circuit 3 Heat											
							Circuit 4 Heat											
						none	--	--	--	29.5	45	--	--	--	--	--	--	
PHE4B42	17.90	112	28	1.7	5.4	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	41.7	45	20.8	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	43.2	45	43.2	45	--	--	
						6HK16502006	17.6	2	76.5	29.5	45	47.8	50	47.8	50	--	--	
						6HK26501306	11.5	2	50.0	29.5	45	62.5	70	--	--	--	--	
						6HK26501506	13.2	2	57.4	29.5	45	71.7	80	--	--	--	--	
						6HK26501806	15.9	2	69.1	29.5	45	86.4	90	--	--	--	--	
						6HK26502006	17.6	2	76.5	29.5	45	95.7	100	--	--	--	--	
PHE4B48	21.80	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	41.7	45	20.8	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	43.2	45	43.2	45	--	--	
						6HK16502006	17.6	2	76.5	34.4	50	47.8	50	47.8	50	--	--	
						6HK26501306	11.5	2	50.0	34.4	50	62.5	70	--	--	--	--	
						6HK26501506	13.2	2	57.4	34.4	50	71.7	80	--	--	--	--	
						6HK26501806	15.9	2	69.1	34.4	50	86.4	90	--	--	--	--	
6HK26502006	17.6	2	76.5	34.4	50	95.7	100	--	--	--	--							
PHE4B60	24.00	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	41.7	45	20.8	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	43.2	45	43.2	45	--	--	
						6HK16502006	17.6	2	76.5	39.2	60	47.8	50	47.8	50	--	--	
						6HK26501306	11.5	2	50.0	39.2	60	62.5	70	--	--	--	--	
						6HK26501506	13.2	2	57.4	39.2	60	71.7	80	--	--	--	--	
						6HK26501806	15.9	2	69.1	39.2	60	86.4	90	--	--	--	--	
6HK26502006	17.6	2	76.5	39.2	60	95.7	100	--	--	--	--							
6HK16502506	22.0	2	95.7	39.2	60	47.8	50	47.8	50	23.9	25							
6HK26502506	22.0	2	95.7	39.2	60	119.6	125	--	--	--	--							

1. MCA = Minimum Circuit Ampacity.
 2. MOP = Maximum Overcurrent Protection device. Must be HACR type circuit breaker or time delay fuse.

Table 9: Electric Heat Performance Data: 208/230-1-60

Heater Models ^{1,2}		Nominal kW @240 V	Total Heat				kW Staging			
			kW		MBH		W1 Only		W1 + W2	
			208 V	230 V	208 V	230 V	208 V	230 V	208 V	230 V
1PH	6HK(0,1)6500206	2.4	1.8	2.2	6.2	7.5	1.8	2.2	1.8	2.2
	6HK(0,1)6500506	4.8	3.6	4.4	12.3	15	3.6	4.4	3.6	4.4
	6HK(0,1)6500806	7.7	5.8	7.1	19.7	24.1	5.8	7.1	5.8	7.1
	6HK(0,1)6501006	9.6	7.2	8.8	24.6	30.1	7.2	8.8	7.2	8.8
	6HK(1,2)6501306	12.5	9.4	11.5	32	39.2	3.1	3.8	9.4	11.5
	6HK(1,2)6501506	14.4	10.8	13.2	36.9	45.1	3.6	4.4	10.8	13.2
	6HK(1,2)6501806	17.3	13	15.9	44.3	54.2	6.5	7.9	13	15.9
	6HK(1,2)6502006	19.2	14.4	17.6	49.2	60.2	7.2	8.8	14.4	17.6
6HK(1,2)6502506	24.0	18	22	61.5	75.2	7.2	8.8	18	22	

- (0,1) - 0 = no service disconnect OR 1 = with service disconnect.
- (1,2) - 1 = with service disconnect, no breaker jumper bar OR 2 = with service disconnect and breaker jumper bar.

Table 10: Single Point Kit Numbers

Single Point Kit P/N	Unit Model Number	Breaker Size	Heat Kit
S1-2SPWK006	PHE4A24	25 A	Up to 13 kW
S1-2SPWK002	PHE4A30	35 A	Up to 15 kW
S1-2SPWK007	PHE4B36	40 A	Up to 15 kW
S1-2SPWK003	PHE4B42	45 A	Up to 20 kW
S1-2SPWK004	PHE4B48	50 A	Up to 20 kW
S1-2SPWK005	PHE4B60	60 A	Up to 20 kW

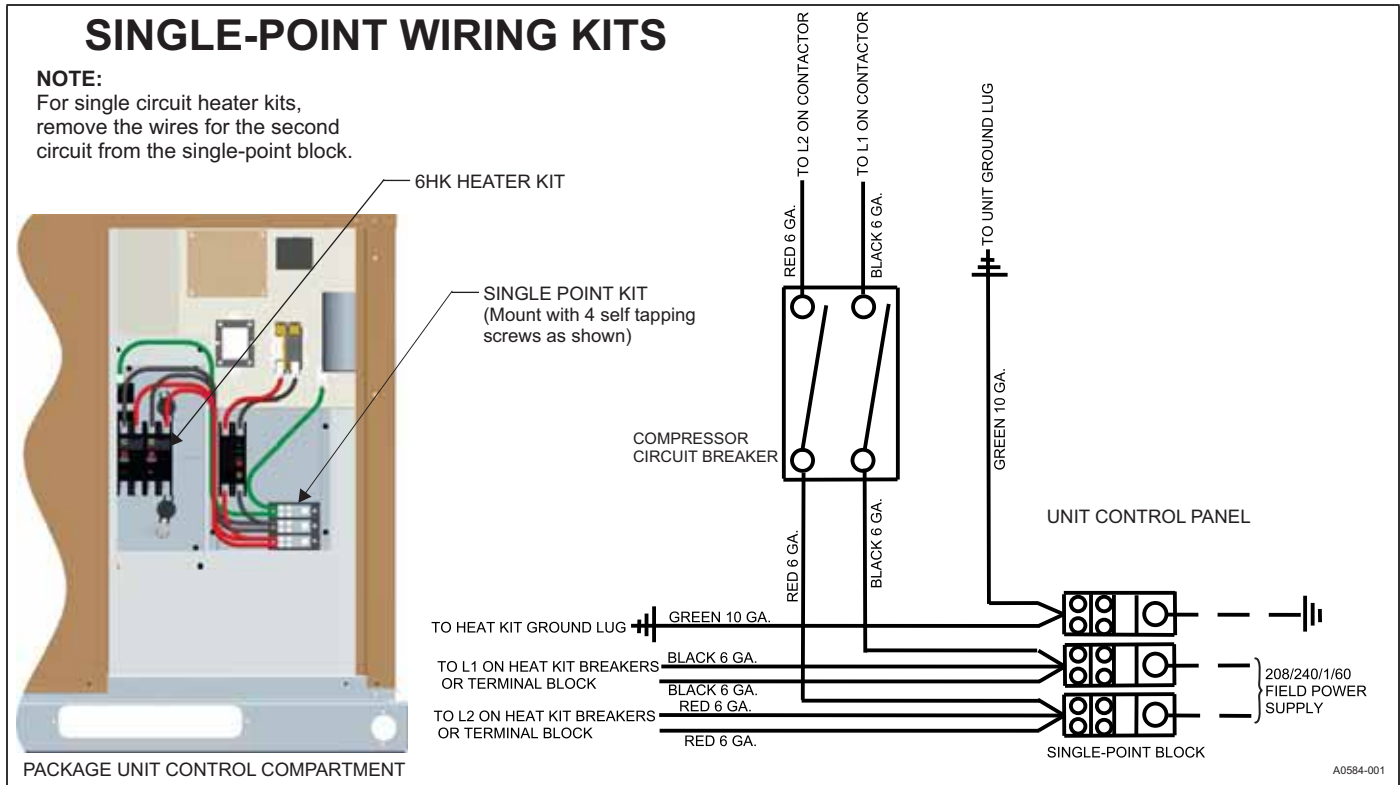


FIGURE 8: Single Point Wiring Kits

Table 11: Physical Data

NOMINAL TONNAGE	MODELS					
	PHE4A24	PHE4A30	PHE4B36	PHE4B42	PHE4B48	PHE4B60
	2.0	2.5	3.0	3.5	4.0	5.0
AHRI Cooling Performance						
Gross Capacity @ AHRI A point (MBH)	24.1	30.1	36.4	42.3	48.2	59.9
AHRI net capacity (MBH)	23.8	29.6	35.8	41.5	47.0	58.0
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	1800
System power (kW)	1.8	2.2	2.8	3.2	3.7	4.7
Refrigerant type	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A
Refrigerant charge (lb-oz)	8-5	9-8	11-13	13-0	12-13	15-8
AHRI Heating Performance						
47°F Capacity Rating (MBH)	22.0	27.2	33.8	38.0	45.5	56.0
System Power (kW/COP)	3.7	3.6	3.6	3.6	3.7	3.6
17°F Capacity Rating (MBH)	12.0	14.8	19.6	22.0	26.0	32.0
HSPF (BTU/Watts-hr.)	8.0	8.0	8.0	8.0	8.0	8.0
Dimensions (in.)						
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
Operating Weight (lb)	377	392	448	471	496	523
Compressors						
Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Outdoor Coil Data						
Face area (sq. ft)	15.1	16.9	19.4	19.4	23.8	25.9
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
Indoor Coil Data						
Face area (sq. ft)	4.6	4.6	6.3	6.3	6.3	6.3
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
Outdoor Fan Data						
Fan diameter (in.)	24	24	26	26	26	26
Type	Prop	Prop	Prop	Prop	Prop	Prop
Drive type	Direct	Direct	Direct	Direct	Direct	Direct
Number of 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
Direct Drive Indoor Blower Data						
Fan Size (in.)	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
Filters						
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 = 20 x 20, B = 20 x 30.					

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.

⚠ CAUTION

Do not loosen compressor mounting bolts.

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

SECTION V: AIRFLOW PERFORMANCE

Table 12: Airflow Performance - Side Duct Application

Model	Motor Speed	External Static Pressure (in. W.C.)								
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0
		SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
PHE4A24	Low (1)	791	739	727	668	614	564	518	439	279
	Medium Low (2)	849	801	789	733	683	635	590	512	356
	Medium (3)	927	882	871	819	772	727	683	607	456
	Medium High (4)	999	958	948	899	855	812	769	696	549
	High (5)	1176	1143	1133	1092	1052	1014	976	908	771
PHE4A30	Low (1)	768	715	702	642	586	536	490	409	248
	Medium Low (2)	941	898	887	836	789	744	701	625	475
	Medium (3)	1026	987	977	930	886	844	802	729	584
	Medium High (4)	1112	1076	1067	1023	982	942	902	832	692
	High (5)	1176	1143	1133	1092	1052	1014	976	908	771
PHE4B36	Low (1)	1108	1050	984	921	857	791	726	660	528
	Medium Low (2)	1283	1225	1168	1115	1054	993	924	860	733
	Medium (3)	1362	1308	1252	1199	1142	1079	1015	979	905
	Medium High (4)	1403	1347	1290	1235	1177	1118	1058	995	869
	High (5)	1623	1569	1519	1470	1418	1362	1306	1246	1125
PHE4B42	Low (1)	1436	1382	1342	1304	1262	1220	1179	1131	1035
	Medium Low (2)	1544	1492	1455	1416	1376	1336	1294	1248	1156
	Medium (3)	1573	1523	1484	1445	1408	1367	1327	1279	1183
	Medium High (4)	1681	1640	1599	1557	1517	1478	1436	1393	1307
	High (5)	1935	1887	1834	1788	1743	1701	1651	1591	1471
PHE4B48	Low (1)	1620	1564	1517	1466	1418	1360	1308	1206	1002
	Medium Low (2)	1694	1630	1580	1530	1482	1430	1380	1292	1116
	Medium (3)	1798	1722	1669	1620	1572	1527	1480	1413	1280
	Medium High (4)	1835	1758	1703	1653	1604	1558	1511	1442	1304
	High (5)	2146	2085	2025	1960	1872	1862	1798	1735	1609
PHE4B60	Low (1)	1730	1682	1628	1592	1552	1517	1479	1439	1359
	Medium Low (2)	1858	1807	1749	1710	1667	1629	1589	1546	1460
	Medium (3)	2054	1998	1934	1890	1843	1801	1757	1710	1616
	Medium High (4)	2195	2144	2098	2049	2003	1955	1883	1868	1838
	High (5)	2445	2388	2306	2293	2235	2178	2129	2077	1973

Notes:

Airflow tested with dry coil conditions, without air filters, at 230 V.

Applications above 0.8 in. W.C. external static pressure are not recommended.

Brushless DC high efficiency standard ECM blower motor used for all indoor blower assemblies.

Minimal variations in airflow performance data result from operating at 208 V. Data above may be used in those cases.

Heating applications tested at 0.50 in. W.C. esp and cooling applications tested at 0.30 in. W.C. esp per standards.

Table 13: Airflow Performance - Bottom Duct Application

Model	Motor Speed	External Static Pressure (in. W.C.)								
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0
		SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
PHE4A24	Low (1)	791	755	745	686	632	585	537	455	290
	Medium Low (2)	851	813	801	743	692	648	603	524	367
	Medium (3)	938	905	890	836	788	745	702	623	465
	Medium High (4)	1069	978	969	921	872	830	787	713	565
	High (5)	1207	1182	1185	1122	1106	1066	1023	952	810
PHE4A30	Low (1)	768	730	720	659	604	555	508	424	258
	Medium Low (2)	943	911	900	847	800	759	716	641	490
	Medium (3)	1039	1013	998	949	905	865	825	748	596
	Medium High (4)	1190	1099	1090	1048	1002	963	923	853	713
	High (5)	1207	1182	1185	1122	1106	1066	1023	952	810
PHE4B36	Low (1)	1127	1082	1021	952	889	825	759	689	549
	Medium Low (2)	1306	1265	1205	1154	1094	1029	963	892	751
	Medium (3)	1354	1315	1259	1212	1153	1093	1024	990	920
	Medium High (4)	1397	1348	1297	1256	1195	1135	1077	1014	888
	High (5)	1634	1591	1548	1497	1446	1382	1309	1250	1131
PHE4B42	Low (1)	1455	1414	1379	1335	1294	1254	1212	1160	1056
	Medium Low (2)	1566	1532	1492	1455	1416	1372	1333	1280	1174
	Medium (3)	1565	1530	1491	1458	1419	1381	1336	1290	1198
	Medium High (4)	1675	1641	1606	1578	1535	1495	1455	1412	1326
	High (5)	1946	1909	1863	1815	1771	1721	1654	1595	1477
PHE4B48	Low (1)	1598	1548	1502	1454	1410	1362	1307	1251	1139
	Medium Low (2)	1663	1612	1568	1522	1476	1422	1370	1297	1152
	Medium (3)	1789	1733	1670	1650	1596	1578	1535	1483	1379
	Medium High (4)	1931	1814	1808	1736	1673	1650	1597	1519	1362
	High (5)	2131	2058	1998	1949	1892	1840	1788	1728	1608
PHE4B60	Low (1)	1655	1612	1596	1531	1461	1462	1429	1391	1316
	Medium Low (2)	1766	1720	1667	1629	1632	1539	1537	1498	1421
	Medium (3)	1987	1933	1861	1817	1820	1715	1725	1651	1504
	Medium High (4)	2114	2050	2047	1974	1899	1889	1920	1866	1758
	High (5)	2369	2308	2249	2183	2126	2088	2034	1990	1902

Notes:

Airflow tested with dry coil conditions, without air filters, at 230 V.

Applications above 0.8 in. W.C. external static pressure are not recommended.

Brushless DC high efficiency standard ECM blower motor used for all indoor blower assemblies.

Minimal variations in airflow performance data result from operating at 208 V. Data above may be used in those cases.

Heating applications tested at 0.50 in. W.C. esp and cooling applications tested at 0.30 in. W.C. esp per standards.

Table 14: Electric Heat Minimum Supply Air

Model	Voltage	Minimum Blower Speed for Electric Heat								
		Heater kW								
		2	5	8	10	13	15	18	20	25
PHE4A24	208/230-1-60	Low (1)	Low (1)	Medium Low (2)	Medium (3)	Medium High (4)	--	--	--	--
PHE4A30	208/230-1-60	Low (1)	Low (1)	Low (1)	Medium Low (2)	Medium (3)	High (5)	--	--	--
PHE4B36	208/230-1-60	Low (1)	Low (1)	Low (1)	Low (1)	Medium Low (2)	High (5)	--	--	--
PHE4B42	208/230-1-60	--	Low (1)	Low (1)	Low (1)	Low (1)	Medium Low (2)	Medium High (4)	High (5)	--
PHE4B48	208/230-1-60	--	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Medium Low (2)	Medium High (4)	--
PHE4B60	208/230-1-60	--	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Low (1)	Medium Low (2)	Medium High (4)

Table 15: Electric Heat Multipliers

Nominal	Voltage	kW Capacity Multipliers ¹
	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 16: Additional Static Resistance

Size (Tons)	CFM	Wet Indoor Coil	Economizer ¹	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
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.

Note: 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 V 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 V to "Y" and "O" to the defrost control board. The reversing valve solenoid is energized, and after the anti-short 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 V "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 s delay.

HEATING SEQUENCE OF OPERATION

- When the fan switch on the thermostat is in the "ON" position, the 24 V 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 V to "Y" on the defrost control board. After the anti-short cycle period is complete, the 24 V 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 V. This signal is sent through the defrost control terminals "W" to "Wout" an energizes the WSPD. The 24 V signal energizes 1st stage of electric heat.
- When the heating demand is satisfied, the electric heat is de-energized when the 24 V "W" signal is removed, and the M contactor is de-energized when the 24 V "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 s delay.

See Table 15 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 min, the heat pump is put into a defrost cycle. This 4-1/2 min 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 min after the initiation of the previous defrost. After the 40 min inhibit time has expired, temperature conditions must call for defrost continuously for 4-1/2 min 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 h and 4 min 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 V 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 s while “Y” is energized. After removing the short, defrost will terminate normally during the “TEST” mode.

Table 17: Demand Defrost Selection

Unit	Pin Position
024 - 060	2
024 - 060	4*

* For extreme environments as necessary only.

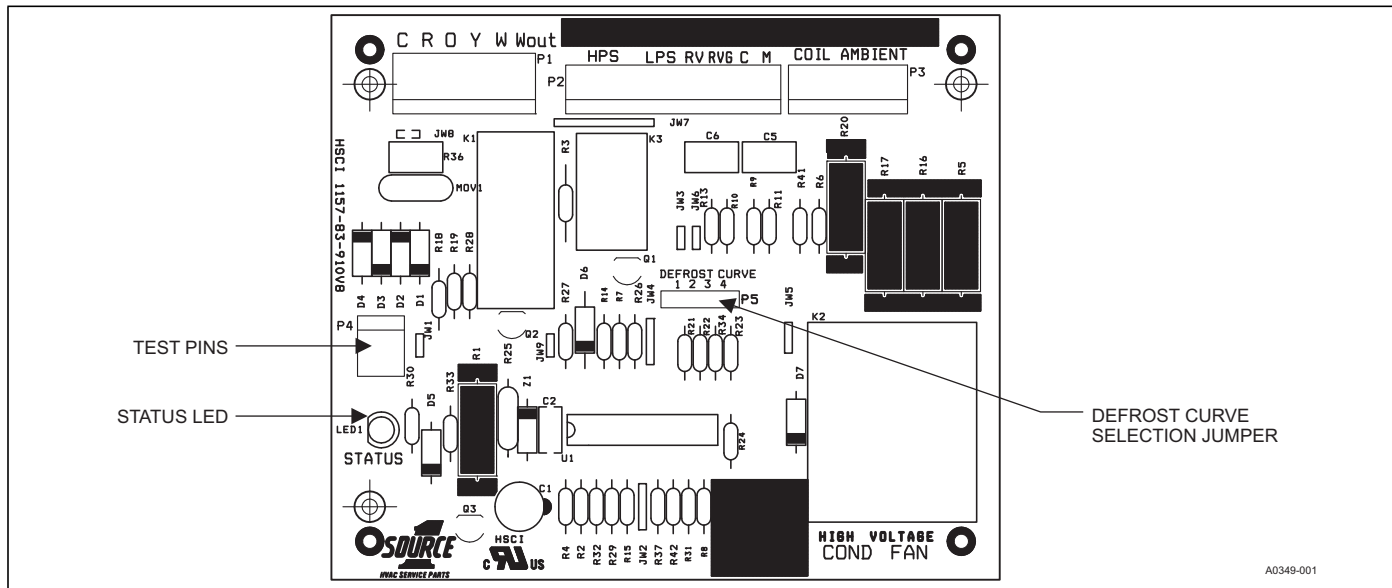


FIGURE 9: Demand Defrost Control

Heat Pump Safety Switch Operation

The unit is equipped with a safety package. The high pressure switch prevents the pressure in the refrigeration system from becoming too high. The loss of charge switch protects against loss of charge due to a leak in the refrigeration system. If either of these safety switches open, the unit will be shut off for the 5 min anti-short cycle time. Once this has expired, a 6 h elapsed run timer begins. If a second opening of a safety switch occurs during this 6 h 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 s.
2. Removing power from “R” for more than 2 s.
3. Shorting the “TEST” pins together for more than 2 s while “Y” is energized.
4. Shorting the “TEST” pins together for more than 5 s while “Y” is de-energized.

Table 18: Test Pins

Test Pin Shorted	With Y Call	Without Y Call
Greater than 2 s	Bypass ASCD	Display error codes
Greater than 5 s	Forced defrost	Clear error codes

Table 19: 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 (<19.2 VAC) preventing further relay outputs for > 2 s	6 Flashes
Low Voltage (<16 VAC) stopped current relay outputs for > 2 s	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 20: Thermostat Signals

Signal	State	Board Function
G	ON	Indoor blower instant on
	OFF	Indoor blower off after 60 s delay
W	ON	Indoor blower instant on
		Electric heat stages on (if so equipped)
	OFF	Indoor blower off after 60 s delay
G and W	ON	Indoor blower instant on in heating speed Electric heat stages on (if so equipped)
	W OFF	Electric heat stages off (if so equipped) Indoor blower switches to continuous fan speed
G and 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 Indoor blower switches to continuous fan speed
G, Y, and 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 and O OFF	Compressor instant off
		Outdoor fan instant off
		Reversing valve de-energized Indoor blower switches to continuous fan speed

* Motor program has 60 s 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 V 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 14 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:

1. Measure the supply air static pressure and record this positive number.
2. Measure the return air static pressure and record this negative number.
3. Treat the negative number as a positive and add the two numbers together. This is total system static.

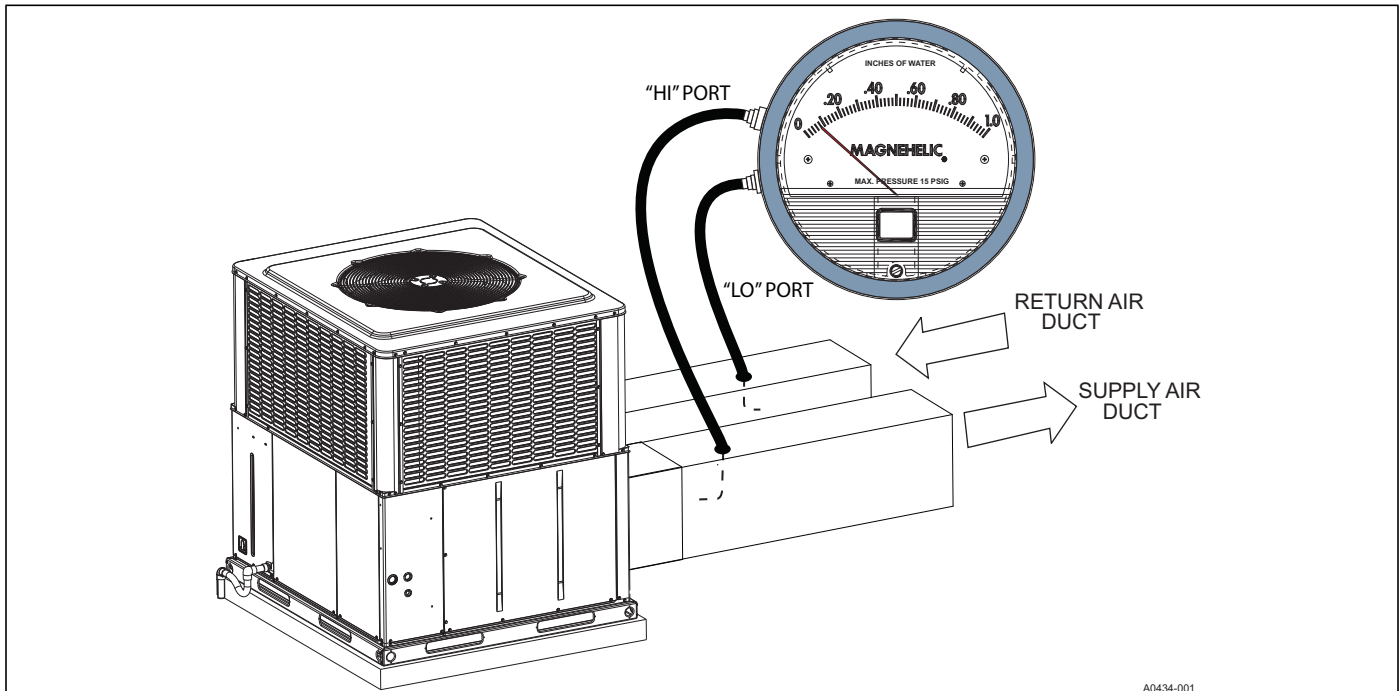


FIGURE 10: Measuring External Static Pressure

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.

⚠ 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.

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, ensure to shut off the unit power before cleaning.

NOTICE

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

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

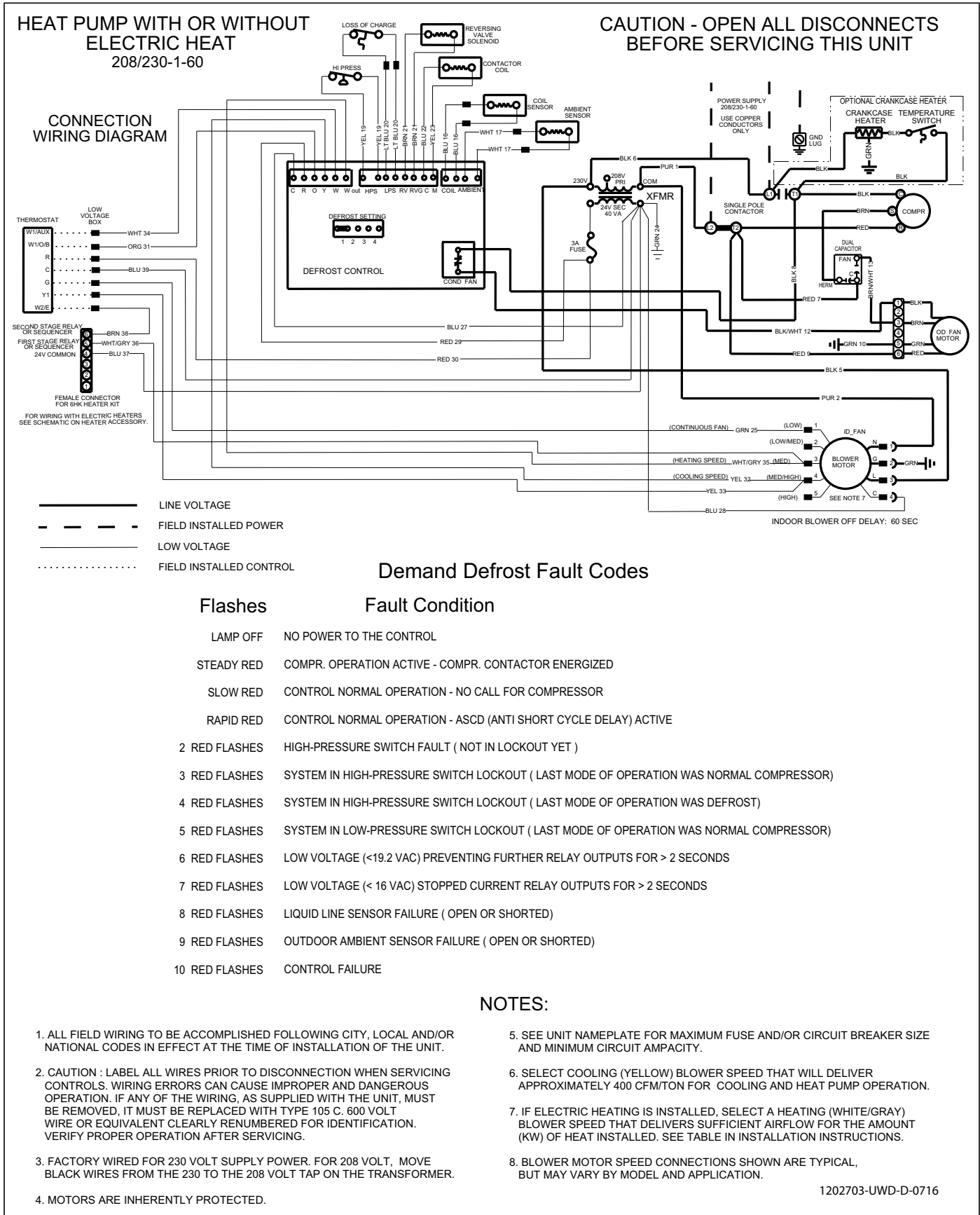


FIGURE 11: Connection Wiring Diagram

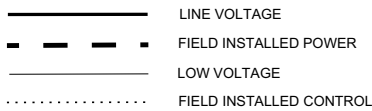
HEAT PUMP WITH OR WITHOUT ELECTRIC HEAT

208/230-1-60

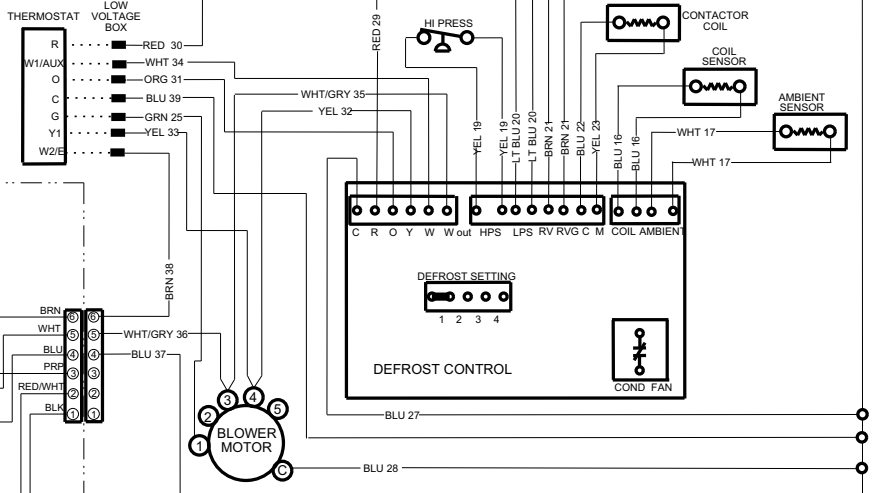
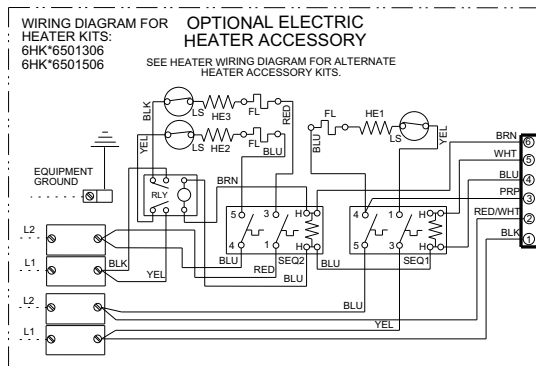
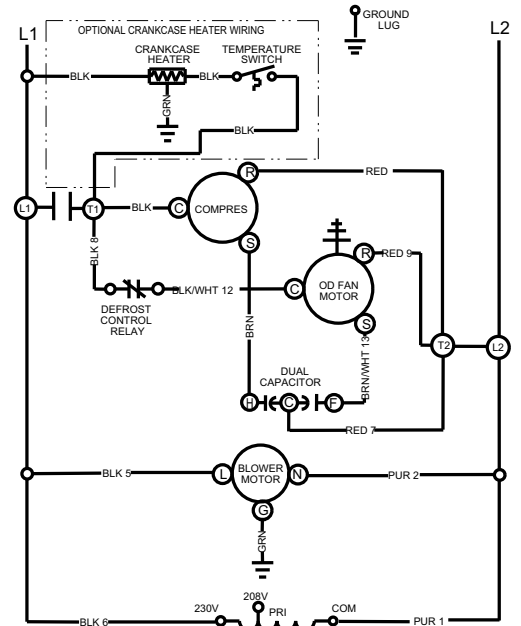
CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT

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:

1. ALL FIELD WIRING TO BE ACCOMPLISHED FOLLOWING CITY, LOCAL AND/OR NATIONAL CODES IN EFFECT AT THE TIME OF INSTALLATION OF THE UNIT.
2. 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.
3. FACTORY WIRED FOR 230 VOLT SUPPLY POWER. FOR 208 VOLT, MOVE BLACK WIRES FROM THE 230 TO THE 208 VOLT TAP ON THE TRANSFORMER.
4. MOTORS ARE INHERENTLY PROTECTED.
5. SEE UNIT NAMEPLATE FOR MAXIMUM FUSE AND/OR CIRCUIT BREAKER SIZE AND MINIMUM CIRCUIT AMPACITY.
6. SELECT COOLING (YELLOW) BLOWER SPEED THAT WILL DELIVER APPROXIMATELY 400 CFM/TON FOR COOLING AND HEAT PUMP OPERATION.
7. 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.
8. BLOWER MOTOR SPEED CONNECTIONS SHOWN ARE TYPICAL, BUT MAY VARY BY MODEL AND APPLICATION.

1202703-UWD-D-0716

FIGURE 12: 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 13: R-410A Quick Reference Guide

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

Blower Type & Set-Up	<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

Job site has been cleaned, indoor and outdoor debris removed from job site

Tools have been removed from unit

All panels have been installed

Unit Operation and Cycle Test

Operate the unit through continuous fan cycles from the thermostat, noting and correcting any problems

Operate the unit through cooling cycles from the thermostat, noting and correcting any problems

Operate the unit through mechanical heating cycles from the thermostat, noting and correcting any problems

Operate the unit through emergency heating cycles from the thermostat, noting and correcting any problems

Owner Education

Provide owner with the owner's manual

Explain operation of system to equipment owner

Explain thermostat use and programming (if applicable) to owner

Explain the importance of regular filter replacement and equipment maintenance

Comments and Additional Job Details