INSTALLATION MANUAL

Single Package Heat Pump/Electric Heat

Models: PHE4 Series

2 ton to 5 ton - 208/230 V - Single-Phase

Assembled at a facility with an ISO 9001:2015-certified Quality Management System

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Section I: General information

PHE units are factory assembled heat pumps designed for outdoor installation on a rooftop 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. 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.

⚠ CAUTION

If performing any brazing in or around the unit, use a heat shield to prevent damage to the unit wiring, gaskets, and insulating materials. If you do not use a heat shield, damage to the unit and unit failure can occur.

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

Observe all precautions in the literature, labels, and tags accompanying the equipment when 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

On receiving a unit, inspect the unit for possible damage during transit. If damage is evident, note the extent of the damage on the carrier's freight bill. Make a separate request for inspection by the carrier's agent 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		4	A
1	2	3	4	5	6	7	8	9

1. Model family
PHE - packaged heat pump with electric heat
PCG - packaged AC with gas heat
PHG - packaged heat pump with gas heat
PCE - packaged AC with electric heat

2. Nominal cooling efficiency
4 = standard efficiency, 6 = high efficiency

3. Cabinet size
A = small 35.75 in. x 51.25 in., B = large 45.75 in. x 51.25 in.

4. Nominal air conditioning cooling capacity Btu/h x 1000
24 = 24,000 Btu/h, 30 = 30,000 Btu/h

5. Gas heating input Btu/h x 1000
050 = 50,000 Btu/h 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, 2 = second generation

9. Revision level
A = original release, B = second release

Examples:
PHE4A2424A is a packaged heat pump, standard efficiency, small cabinet, 2 ton, 208/230 V, single-phase model, fourth generation, original release.

Section IV: Installation

Limitations

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

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

See Table 3 and Table 4 for unit physical data and Table 6 to Table 8 for electrical data.

If it is necessary to add components to a unit to meet local codes, installation is done at the dealer's and/or customer's expense.

The size of the unit for proposed installation must be based on heat loss/heat gain calculations made in accordance with industry recognized procedures such as the Air Conditioning Contractors of America (ACCA) (*Manual J*).

Table 1: Unit limitations

Model	Unit voltage	Unit limitations		
		Applied voltage		Outdoor DB temperature
		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
PHE4*	55	-10	125	75	57	50	72	80

Note: *PHE4A24 models are restricted to operation of 0°F outdoor air temperature.

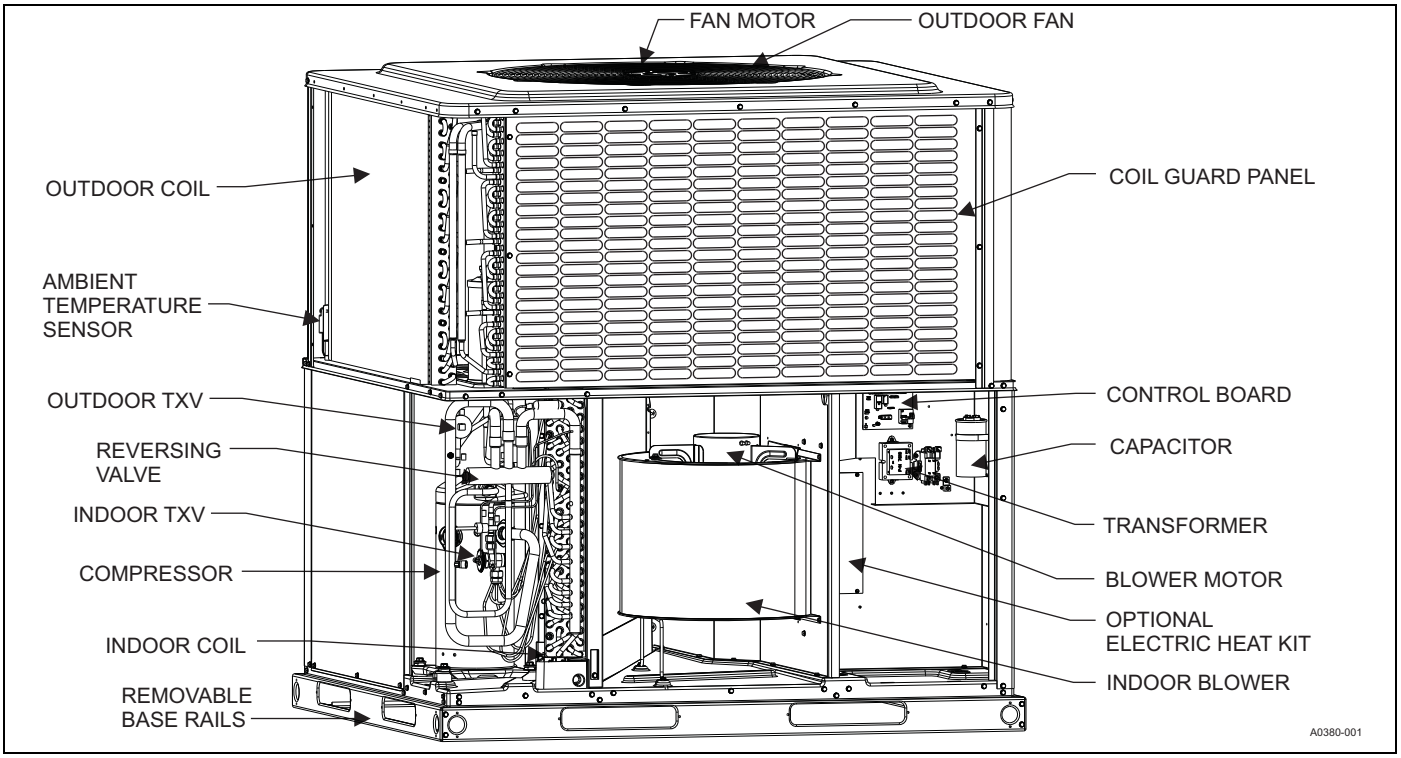


Figure 1: Component location

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:

- The unit is designed for **outdoor installation** only.
- Outdoor coils must have an unlimited supply of air. Where a choice of location is available, position the unit on either the north or east side of the building.
- The unit is suitable for mounting on a 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.

- For ground level installation, use a level pad or slab. The thickness and size of the pad or slab must meet local codes and support the weight of the unit. Do not tie the slab to the building foundation.
- 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 an appropriate angle iron frame.
- Maintain level tolerance to 1/8 in. across the entire width and length of the unit.

Clearances

All units require certain clearances for correct operation and service. See Table 5 for the clearances required for construction, servicing, and correct 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.

Note: Use spreader bars whose length exceeds the largest dimension across the unit 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 can 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	335	330	29	7	153	101	37	34
PHE4A30	360	355	29	7	166	116	37	29
PHE4B36	425	420	29	18	155	90	91	74
PHE4B42	441	436	30	18	172	90	91	74
PHE4B48	484	479	29	19	171	100	100	91
PHE4B60	490	485	29	19	174	106	102	94

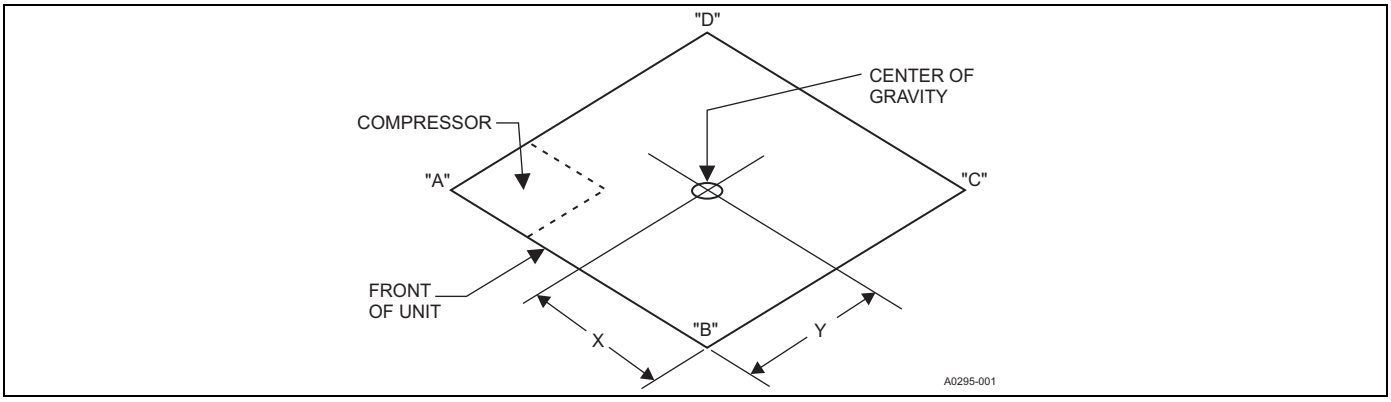


Figure 2: Unit 4-point load weight

Table 4: Unit dimensions

Model	Dimensions (in.)		
	A	B	C
PHE4A24	51 1/4	35 3/4	44
PHE4A30	51 1/4	35 3/4	45
PHE4B36	51 1/4	45 3/4	47
PHE4B42	51 1/4	45 3/4	47
PHE4B48	51 1/4	45 3/4	53
PHE4B60	51 1/4	45 3/4	55

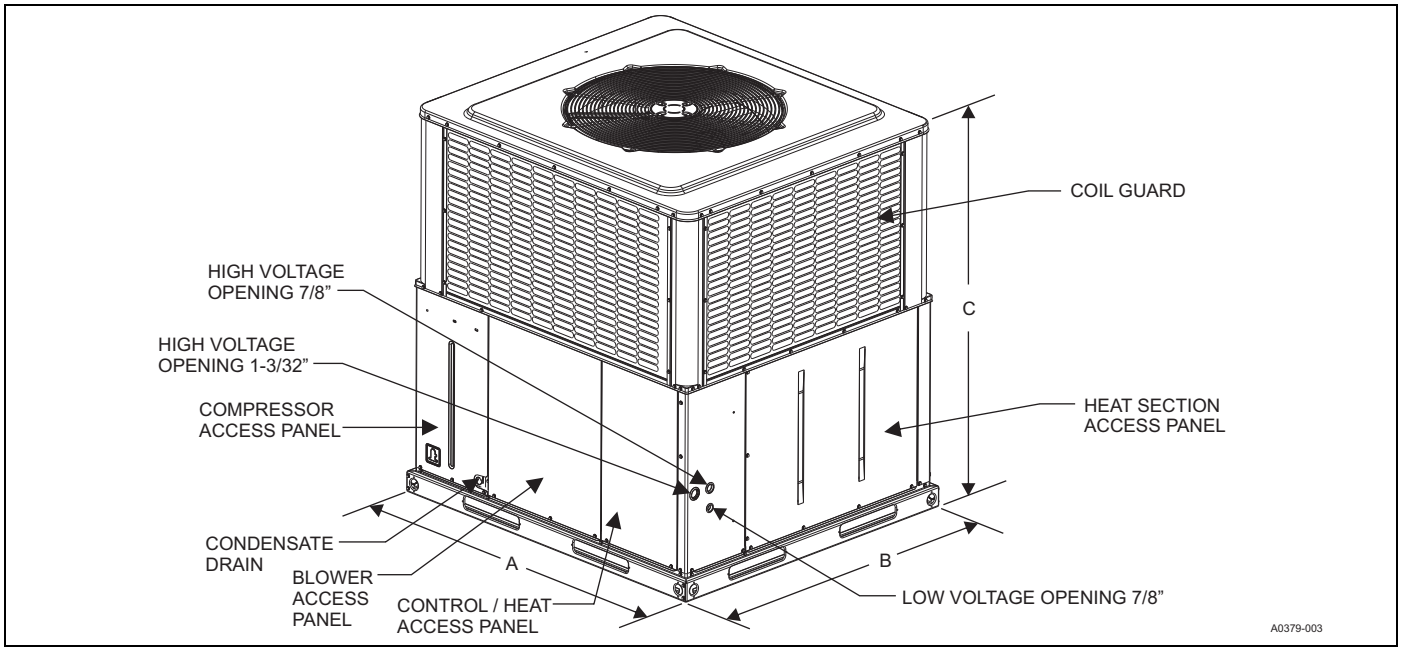


Figure 3: Unit dimensions

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. Provide 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, make sure that there is 0 in. clearance on all sides for the entire length of the supply air duct.
2. Install units outdoors. Make sure that overhanging structures or shrubs do not obstruct the outdoor air discharge outlet.
3. You can install units on combustible materials made from wood or class A, B, or C roof covering materials if the factory base rails are left in place as shipped.

Note: For units installed on a roof curb, you can reduce the minimum clearance between combustible roof curb material and the supply air duct 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. 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 screws securing each duct cover. Save these screws to use in Step 2.
2. Install the duct covers removed in Step 1 to the rear supply and return air duct openings. Secure with the four screws used in Step 1.
3. Seal the duct covers with silicone caulk.

Design and size duct work according to the methods of the Air Conditioning Contractors of America (ACCA), as outlined in their *Manual D*.

Use a closed return duct system. This does not preclude the use of economizers or ventilation air intake. Use flexible duct connectors 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.

See Figure 4 and Figure 5 for information concerning rear and bottom supply and return air duct openings.

Filters

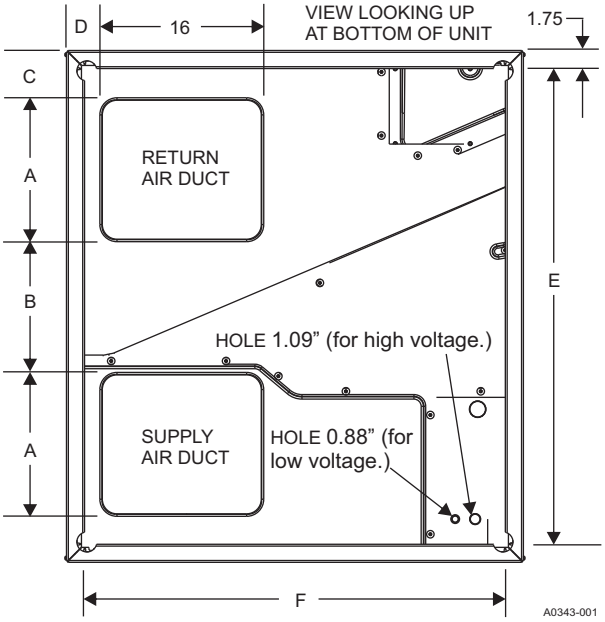
Correct filter size is very important. Always consider filter size, type, and pressure drop during duct system design.

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.

Always use filters and keep filters clean. When filters become dirt laden, insufficient air is delivered by the blower, decreasing your unit's efficiency and increasing operating costs and wear-and-tear on the unit and controls.

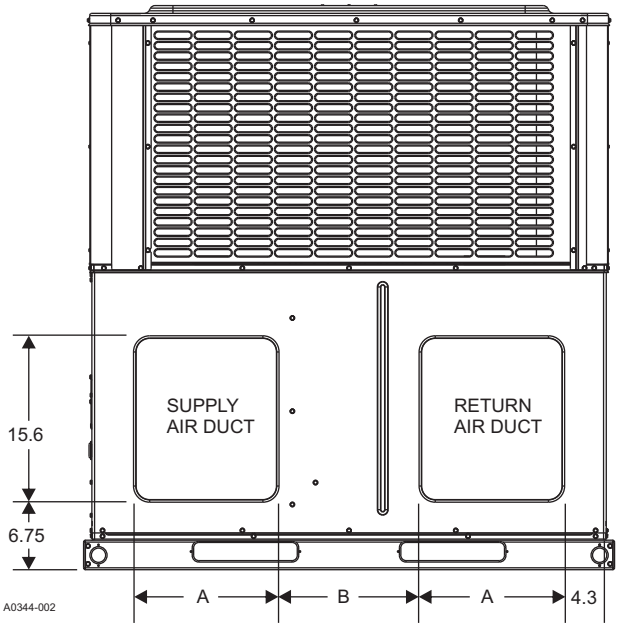
Check filters monthly. This is especially important because the unit can be used for both heating and cooling.



Model	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F (in.)
24, 30	10	21.5	5	4.5	47.5	32
36, 42, 48, 60	14	13.5	5	3.5	47.5	42

Figure 4: Bottom duct dimensions (in.)

NOTE: See Figure titled "Unit Dimensions" for side hole sizes of electrical lines.



Model	A (in.)	B (in.)
24, 30	9.6	22
36, 42, 48, 60	13.6	14

Figure 5: Rear duct dimensions (in.)

Condensate drain

Install a condensate trap in the condensate drain. The plumbing must conform to local codes.

⚠ CAUTION

Hand tighten only.

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

See Figure 3 for the location of these access locations and see Table 5 for minimum clearances.

⚠ 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.

See Figure 13 for the R-410A quick reference guide.

Thermostat

Locate the room thermostat on an inside wall approximately 60 in. above the floor where it is not subject to drafts, sun exposure, or heat from electrical fixtures or appliances. Use sealant behind the thermostat to prevent air infiltration. Follow the manufacturer instructions enclosed with the thermostat for the general installation procedure. Use color coded insulated wires (minimum No.18 AWG) to connect the thermostat to the 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 NEC ANSI/NFPA No. 70 or CEC and/or local ordinances. The unit must be electrically grounded in accordance with local codes or, in their absence, with the NEC/CEC. Refer to the unit rating plate and see Table 1 for voltage tolerances that must be maintained at the compressor terminals during starting and running conditions.

Note: Provide the wiring entering the cabinet with mechanical strain relief.

A fused disconnect switch must 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 correctly to carry the load. Each unit must be wired with a separate branch circuit fed directly from the main distribution panel and correctly fused.

See Figure 6 and Figure 7 for typical field wiring and refer to the appropriate unit wiring diagram for control circuit and power wiring information.

The unit comes wired for 230 V power. If the supply power is 208 V, move the wires connected to the control transformer 230 V tap to the 208 V tap.

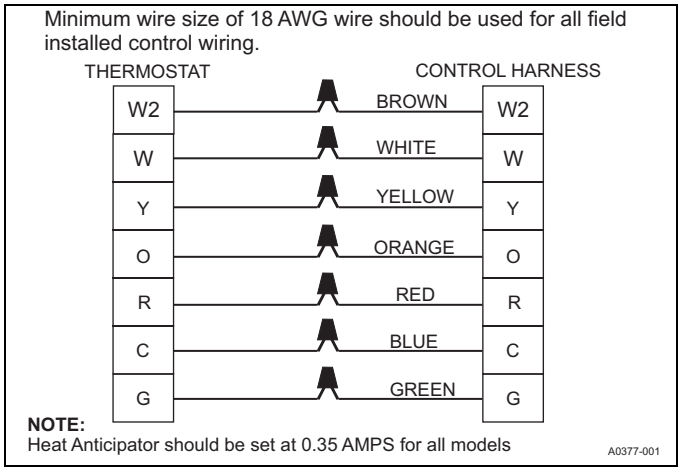


Figure 6: Typical field control wiring diagram for heat pump models

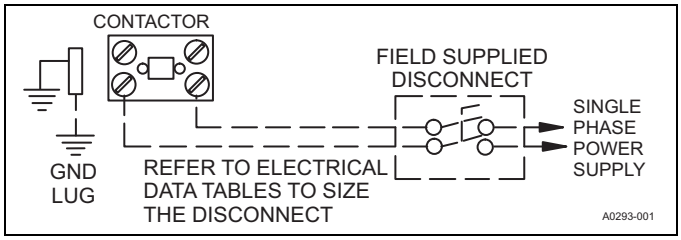


Figure 7: Typical field power wiring diagram

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 UL 1995, 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	Blower motor	Electric heat option					MCA[1] (A)		Max fuse[2] or breaker size[3]	
						Heater kit[4]	Heater (kW)		Stages	Heater (A)				
	RLA	LRA	MCC	FLA	FLA		208	230		208	230	208	230	208	230
PHE4A24	10.8	55.0	16.8	1.3	3.8	none	--	--	--	--	--	18.6	18.6	25	25
						6HK16500506	3.6	4.4	1	17.3	19.2	40.3	42.6	45	45
						6HK16500806	5.8	7.1	1	27.7	30.7	53.3	56.0	60	60
						6HK16501006	7.2	8.8	1	34.7	38.3	61.9	66.5	70	70
PHE4A30	12.3	63.0	19.2	1.3	3.8	none	--	--	--	--	--	20.5	20.5	30	30
						6HK16500506	3.6	4.4	1	17.3	19.2	42.1	44.4	50	50
						6HK16500806	5.8	7.1	1	27.7	30.7	55.1	58.8	60	60
						6HK16501006	7.2	8.8	1	34.7	38.3	63.8	68.4	70	70
						6HK16501506	10.8	13.2	2	52.0	57.5	85.5	92.4	90	100
PHE4B36	14.7	75.0	22.9	1.7	3.8	none	--	--	--	--	--	23.9	23.9	35	35
						6HK16500506	3.6	4.4	1	17.3	19.2	45.5	47.8	50	50
						6HK16500806	5.8	7.1	1	27.7	30.7	58.5	62.2	60	70
						6HK16501006	7.2	8.8	1	34.7	38.3	67.2	71.8	70	80
						6HK16501506	10.8	13.2	2	52.0	57.5	88.9	95.8	90	100
PHE4B42	15.9	112.3	24.8	1.7	5.4	none	--	--	--	--	--	27.0	27.0	40	40
						6HK16500506	3.6	4.4	1	17.3	19.2	48.6	50.9	60	60
						6HK16500806	5.8	7.1	1	27.7	30.7	61.6	65.3	70	70
						6HK16501006	7.2	8.8	1	34.7	38.3	70.3	74.9	80	80
						6HK16501506	10.8	13.2	2	52.0	57.5	92.0	98.9	100	100
						6HK16502006	14.4	17.6	2	69.3	76.7	113.6	122.8	125	125
PHE4B48	18.3	108.0	28.5	1.7	5.4	none	--	--	--	--	--	30.0	30.0	45	45
						6HK16500506	3.6	4.4	1	17.3	19.2	51.6	53.9	60	60
						6HK16500806	5.8	7.1	1	27.7	30.7	64.6	68.3	70	70
						6HK16501006	7.2	8.8	1	34.7	38.3	73.3	77.9	80	80
						6HK16501506	10.8	13.2	2	52.0	57.5	95.0	101.9	100	110
						6HK16502006	14.4	17.6	2	69.3	76.7	116.6	125.8	125	150
PHE4B60	22.2	127.9	34.7	1.7	7.0	none	--	--	--	--	--	36.5	36.5	50	50
						6HK16500506	3.6	4.4	1	17.3	19.2	58.1	60.4	70	70
						6HK16500806	5.8	7.1	1	27.7	30.7	71.1	74.8	80	80
						6HK16501006	7.2	8.8	1	34.7	38.3	79.8	84.4	90	90
						6HK16501506	10.8	13.2	2	52.0	57.5	101.5	108.3	110	110
						6HK16502005	14.4	17.6	2	69.3	76.7	123.1	132.3	125	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 is required.

Table 7: Electrical data for 208-1-60 multi source power

Model	Compressor			OD fan motor	Blower motor	Electric heat option				Multi source							
						Heater kit	Heater (kW)	Stages	Heater (A)								
	RLA	LRA	MCC	FLA	FLA		208		208	208	208	208	208	208	208	208	208
Multi source: compressor circuit and heat circuits						Multi source:	Circuit 1 compressor circuit Circuit 2 heat Circuit 3 heat Circuit 4 heat			MCA[1] (A)	MOP[2]	MCA[1] (A)	MOP[2]	MCA[1] (A)	MOP[2]	MCA[1] (A)	MOP[2]
										Circuit 1		Circuit 2		Circuit 3		Circuit 4	
PHE4A24	10.8	55.0	16.8	1.3	3.8	none	--	--	--	18.6	25	--	--	--	--	--	--
						6HK(0,1)6500506	3.6	1	17.3	18.6	25	21.7	25	--	--	--	--
						6HK(0,1)6500806	5.8	1	27.7	18.6	25	34.7	40	--	--	--	--
						6HK(0,1)6501006	7.2	1	34.7	18.6	25	43.3	45	--	--	--	--
PHE4A30	12.3	63.0	19.2	1.3	3.8	none	--	--	--	20.5	30	--	--	--	--	--	--
						6HK(0,1)6500506	3.6	1	17.3	20.5	30	21.6	25	--	--	--	--
						6HK(0,1)6500806	5.8	1	27.7	20.5	30	34.6	40	--	--	--	--
						6HK(0,1)6501006	7.2	1	34.7	20.5	30	43.4	45	--	--	--	--
						6HK16501506	10.8	2	52.0	20.5	30	21.7	25	43.3	45	--	--
						6HK26501506	10.8	2	52.0	20.5	30	65.0	70	--	--	--	--
PHE4B36	14.7	75.0	22.9	1.7	3.8	none	--	--	--	23.9	35	--	--	--	--	--	--
						6HK(0,1)6500506	3.6	1	17.3	23.9	35	21.6	25	--	--	--	--
						6HK(0,1)6500806	5.8	1	27.7	23.9	35	34.6	40	--	--	--	--
						6HK(0,1)6501006	7.2	1	34.7	23.9	35	43.4	45	--	--	--	--
						6HK16501506	10.8	2	52.0	23.9	35	21.7	25	43.3	45	--	--
						6HK26501506	10.8	2	52.0	23.9	35	65.0	70				
PHE4B42	15.9	112.3	24.8	1.7	5.4	none	--	-	--	27.0	40	--	--	--	--	--	--
						6HK(0,1)6500506	3.6	1	17.3	27.0	40	21.6	25	--	--	--	--
						6HK(0,1)6500806	5.8	1	27.7	27.0	40	34.6	40	--	--	--	--
						6HK(0,1)6501006	7.2	1	34.7	27.0	40	43.4	45	--	--	--	--
						6HK16501506	10.8	2	52.0	27.0	40	21.7	25	43.3	45	--	--
						6HK16502006	14.4	2	69.3	27.0	40	43.3	45	43.3	45	--	--
						6HK26501506	10.8	2	52.0	27.0	40	65.0	70	--	--	--	--
						6HK26502006	14.4	2	69.3	27.0	40	86.5	90	--	--	--	--
PHE4B48	18.3	108.0	28.5	1.7	5.4	none	--	--	--	30.0	45	--	--	--	--	--	--
						6HK(0,1)6500506	3.6	1	17.3	30.0	45	21.6	25	--	--	--	--
						6HK(0,1)6500806	5.8	1	27.7	30.0	45	34.6	40	--	--	--	--
						6HK(0,1)6501006	7.2	1	34.7	30.0	45	43.4	45	--	--	--	--
						6HK16501506	10.8	2	52.0	30.0	45	21.7	25	43.3	45	--	--
						6HK16502006	14.4	2	69.3	30.0	45	43.3	45	43.3	45	--	--
						6HK26501506	10.8	2	52.0	30.0	45	65.0	70	--	--	--	--
						6HK26502006	14.4	2	69.3	30.0	45	86.5	90	--	--	--	--
PHE4B60	22.2	127.9	34.7	1.7	7.0	none	--	--	--	36.5	50	--	--	--	--	--	--
						6HK(0,1)6500506	3.6	1	17.3	36.5	50	21.6	25	--	--	--	--
						6HK(0,1)6500806	5.8	1	27.7	36.5	50	34.6	40	--	--	--	--
						6HK(0,1)6501006	7.2	1	34.7	36.5	50	43.4	45	--	--	--	--
						6HK16501506	10.8	2	52.0	36.5	50	21.7	25	43.3	45	--	--
						6HK16502006	14.4	2	69.3	36.5	50	43.3	45	43.3	45	--	--
						6HK26501506	10.8	2	52.0	36.5	50	65.0	70	--	--	--	--
						6HK26502006	14.4	2	69.3	36.5	50	86.5	90	--	--	--	--
						6HK56502506	18.0	2	86.7	36.5	50	43.4	45	43.4	45	21.6	25
						6HK66502506	18.0	2	86.7	36.5	50	108.1	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							
						Heater kit	Heater (kW)	Stages	Heater (A)								
	RLA	LRA	MCC	FLA	FLA		230		230	230	230	230	230	230	230	230	230
Multi source: compressor circuit and heat circuits						Multi source:	Circuit 1 compressor circuit Circuit 2 heat Circuit 3 heat Circuit 4 heat			MCA[1] (A)	MOP[2]	MCA[1] (A)	MOP[2]	MCA[1] (A)	MOP[2]	MCA[1] (A)	MOP[2]
										Circuit 1		Circuit 2		Circuit 3		Circuit 4	
PHE4A24	10.8	55.0	16.8	1.3	3.8	none	--	--	--	18.6	25	--	--	--	--	--	--
						6HK(0,1)6500506	4.4	1	19.1	18.6	25	23.9	25	--	--	--	--
						6HK(0,1)6500806	7.1	1	30.7	18.6	25	38.6	40	--	--	--	--
						6HK(0,1)6501006	8.8	1	38.3	18.6	25	47.8	50	--	--	--	--
PHE4A30	12.3	63.0	19.2	1.3	3.8	none	--	--	--	20.5	30	--	--	--	--	--	--
						6HK(0,1)6500506	4.4	1	19.1	20.5	30	23.9	25	--	--	--	--
						6HK(0,1)6500806	7.1	1	30.7	20.5	30	38.6	40	--	--	--	--
						6HK(0,1)6501006	8.8	1	38.3	20.5	30	47.8	50	--	--	--	--
						6HK16501506	13.2	2	57.4	20.5	30	23.9	25	47.8	50	--	--
						6HK26501506	13.2	2	57.4	30.0	30	71.7	80	--	--	--	--
PHE4B36	14.7	75.0	22.9	1.7	3.8	none	--	--	--	23.9	35	--	--	--	--	--	--
						6HK(0,1)6500506	4.4	1	19.1	23.9	35	23.9	25	--	--	--	--
						6HK(0,1)6500806	7.1	1	30.7	23.9	35	38.6	40	--	--	--	--
						6HK(0,1)6501006	8.8	1	38.3	23.9	35	47.8	50	--	--	--	--
						6HK16501506	13.2	2	57.4	23.9	35	23.9	25	47.8	50	--	--
						6HK26501506	13.2	2	57.4	23.9	35	71.7	80				
PHE4B42	15.9	112.3	24.8	1.7	5.4	none	--	-	--	27.0	40	--	--	--	--	--	--
						6HK(0,1)6500506	4.4	1	19.1	27.0	40	23.9	25	--	--	--	--
						6HK(0,1)6500806	7.1	1	30.7	27.0	40	38.6	40	--	--	--	--
						6HK(0,1)6501006	8.8	1	38.3	27.0	40	47.8	50	--	--	--	--
						6HK16501506	13.2	2	57.4	27.0	40	23.9	25	47.8	50	--	--
						6HK16502006	17.6	2	76.7	27.0	40	47.8	50	47.8	50	--	--
						6HK26501506	13.2	2	57.4	27.0	40	71.7	80	--	--	--	--
						6HK26502006	17.6	2	76.7	27.0	40	95.7	100	--	--	--	--
PHE4B48	18.3	108.0	28.5	1.7	5.4	none	--	--	--	30.0	45	--	--	--	--	--	--
						6HK(0,1)6500506	4.4	1	19.1	30.0	45	23.9	25	--	--	--	--
						6HK(0,1)6500806	7.1	1	30.7	30.0	45	38.4	40	--	--	--	--
						6HK(0,1)6501006	8.8	1	38.3	30.0	45	47.8	50	--	--	--	--
						6HK16501506	13.2	2	57.4	30.0	45	23.9	25	47.8	50	--	--
						6HK16502006	17.6	2	76.7	30.0	45	47.9	50	47.8	50	--	--
						6HK26501506	13.2	2	57.4	30.0	45	71.7	80	--	--	--	--
						6HK26502006	17.6	2	76.7	30.0	45	95.7	100	--	--	--	--
PHE4B60	22.2	127.9	34.7	1.7	7.0	none	--	--	--	36.5	50	--	--	--	--	--	--
						6HK(0,1)6500506	4.4	1	19.1	36.5	50	23.9	25	--	--	--	--
						6HK(0,1)6500806	7.1	1	30.7	36.5	50	38.4	40	--	--	--	--
						6HK(0,1)6501006	8.8	1	38.3	36.5	50	47.8	50	--	--	--	--
						6HK16501506	13.2	2	57.4	36.5	50	23.9	25	47.8	50	--	--
						6HK16502006	17.6	2	76.7	36.5	50	47.9	50	47.8	50	--	--
						6HK26501506	13.2	2	57.4	36.5	50	71.7	80	--	--	--	--
						6HK26502006	17.6	2	76.7	36.5	50	95.7	100	--	--	--	--
						6HK56502506	22.0	2	95.8	36.5	50	47.9	50	47.9	50	24.0	25
						6HK66502506	22.0	2	95.8	36.5	50	119.8	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[1,2,3]		Nominal kW at 240 V	Total heat				kW staging			
			kW		MBH		W1 only		W2 only	
			208 V	230 V	208 V	230 V	208 V	230 V	208 V	230 V
1 PH	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)6501506	14.4	10.8	13.2	36.9	45.1	3.6	4.4	10.8	13.2
	6HK(1,2)6502006	19.2	14.4	17.6	49.2	60.2	7.2	8.8	14.4	17.6
	6HK(5,6)6502506	24.0	18	22	61.5	75.2	7.2	8.8	18	22

1. (0,1): 0 = no service disconnect **or** 1 = with service disconnect.
2. (1,2): 1 = with service disconnect, no breaker jumper bar **or** 2 = with service disconnect and breaker jumper bar.
3. (5,6): 5 = with service disconnect, no breaker jumper bar **or** 6 = with service disconnect and breaker jumper bar.

Table 10: Single-point kit numbers

Single-point kit part number	Unit model number	Breaker size	Heat kit
S1-2SPWK006	PHE4A24	25 A	Up to 13 kW
S1-2SPWK001	PHE4A30	30 A	Up to 15 kW
S1-2SPWK002	PHE4B36	35 A	Up to 15 kW
S1-2SPWK007	PHE4B42	40 A	Up to 20 kW
S1-2SPWK003	PHE4B48	45 A	Up to 20 kW
S1-2SPWK004	PHE4B60	50 A	Up to 20 kW

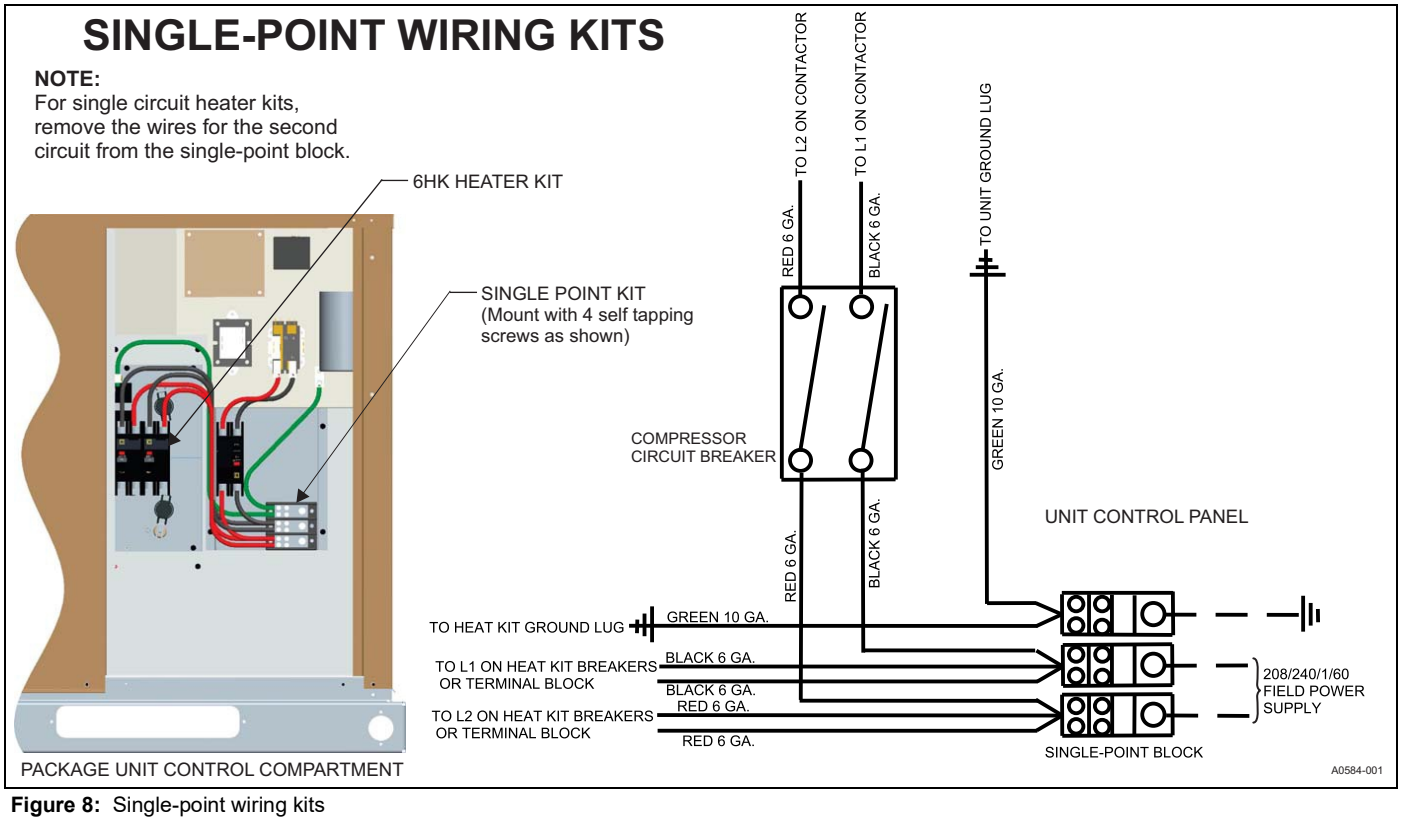


Figure 8: Single-point wiring kits

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
Refrigerant information						
Refrigerant type	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A
Refrigerant charge (lb-oz)	4-9	7-4	9-6	9-6	14-4	11-10
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	44	45	47	47	53	55
Operating weight (lb)	330	355	420	436	479	485
Compressors						
Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Outdoor coil data						
Face area (sq. ft)	12.3	13.8	17.6	17.6	24.2	26.4
Rows	1	2	2	2	2	2
Fins per inch	22	22	22	22	22	22
Tube diameter (mm)	7	7	7	7	7	7
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	4	4
Fins per inch	16	16	16	16	16	16
Tube diameter (in.)	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	1/4	1/4	1/3	1/3	1/3	1/3
RPM	850	850	850	850	850	850
Nominal total CFM	2800	2850	3450	3450	4000	4000
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 maximum	1200 maximum	1200 maximum	1200 maximum	1200 maximum	1200 maximum
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. Refer to the instructions supplied with the kit for replacement filter sizes. Filter sizes: A = 20 in. x 20 in., B = 20 in. x 30 in.					

Compressors

The compressor used in this product is specifically designed to operate with R-410A refrigerant and cannot be interchanged with a different type of compressor.

⚠ 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, Mobil 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 the 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 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 that risk oil leakage include but are not limited to the following:

- Replacing the compressor
- Repairing refrigerant leaks
- Replacing refrigerant components, for example, 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)	590	550	490	440	390	350	290	230	80
	Medium Low (2)	700	660	610	560	500	460	410	360	250
	Medium (3)	860	830	790	740	690	640	590	550	460
	Medium High (4)	950	910	880	840	800	740	690	650	570
	High (5)	1170	1150	1110	1080	1050	1020	980	950	830
PHE4A30	Low (1)	720	680	630	580	520	470	430	380	270
	Medium Low (2)	930	890	850	820	770	710	650	610	530
	Medium (3)	1030	990	960	920	890	850	810	750	660
	Medium High (4)	1120	1090	1050	1020	990	960	920	870	770
	High (5)	1200	1180	1140	1110	1080	1050	1010	980	880
PHE4B36	Low (1)	880	830	770	690	620	550	500	440	200
	Medium Low (2)	1180	1130	1090	1040	990	930	860	780	670
	Medium (3)	1310	1270	1230	1190	1140	1100	1040	970	840
	Medium High (4)	1440	1400	1360	1320	1280	1240	1190	1150	1010
	High (5)	1600	1560	1530	1490	1450	1410	1360	1320	1230
PHE4B42	Low (1)	990	930	870	800	740	670	600	530	390
	Medium Low (2)	1290	1250	1200	1140	1100	1040	990	930	800
	Medium (3)	1480	1440	1390	1350	1300	1260	1210	1170	1050
	Medium High (4)	1620	1580	1540	1500	1460	1410	1370	1330	1230
	High (5)	1900	1870	1820	1790	1760	1720	1670	1630	1560
PHE4B48	Low (1)	1190	1140	1090	1030	970	910	850	790	680
	Medium Low (2)	1370	1330	1290	1240	1200	1140	1090	1030	920
	Medium (3)	1630	1590	1560	1520	1490	1440	1390	1350	1240
	Medium High (4)	1730	1690	1660	1620	1590	1540	1500	1450	1350
	High (5)	2010	1980	1940	1910	1870	1840	1810	1770	1640
PHE4B60	Low (1)	1340	1290	1240	1190	1140	1110	1050	1000	870
	Medium Low (2)	1520	1480	1450	1400	1360	1320	1280	1240	1150
	Medium (3)	1900	1870	1840	1800	1760	1730	1690	1650	1580
	Medium High (4)	2020	1990	1960	1920	1880	1850	1810	1770	1700
	High (5)	2250	2210	2190	2160	2120	2080	2050	2000	1970

Notes:
Airflow is 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 is used for all indoor blower assemblies.
Minimal variations in airflow performance data result from operating at 208 V. The data in the table can be used in those cases.
Heating applications are tested at 0.50 in. W.C. external static pressure. Cooling applications are tested per AHRI Standard 210/240.
The differences between side duct airflows and bottom duct airflows are insignificant.

Table 13: Electric heat minimum supply air

Model	Voltage	Minimum blower speed for electric heat					
		Heater (kW)					
		5	8	10	15	20	25
PHE4A24	208/230-1-60	Medium (3)	Medium (3)	Medium (3)	--	--	--
PHE4A30	208/230-1-60	Medium Low (2)	Medium High (4)	Medium High (4)	High (5)	--	--
PHE4B36	208/230-1-60	Medium High (4)	Medium High (4)	High (5)	High (5)	--	--
PHE4B42	208/230-1-60	Medium Low (2)	Medium Low (2)	Medium Low (2)	Medium High (4)	Medium High (4)	--
PHE4B48	208/230-1-60	Medium Low (2)	Medium Low (2)	Medium Low (2)	Medium (3)	Medium (3)	--
PHE4B60	208/230-1-60	Medium Low (2)	Medium Low (2)	Medium High (4)	Medium High (4)	Medium High (4)	Medium High (4)

Table 14: Electric heat multipliers

Voltage		kW capacity multipliers[1]
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 15: Additional static resistance

Size (ton)	CFM	Wet indoor coil	Economizer[1]	Filter/frame kit
024 (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
030 (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
036 (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
042 (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
048 (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
060 (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 delivers less CFM during full economizer operation.

Note: Filter pressure drop is 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

1. When the fan switch on the thermostat is in the ON position, the 24 V at G 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.
2. On a call for cooling, the thermostat sends 24 V to Y and O on the demand 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 is 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.
3. 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

1. 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.
2. On a call for heating, the thermostat sends 24 V to Y on the demand 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.
3. 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 demand defrost control board terminals W to Wout and energizes the WSPD. The 24 V signal energizes the first stage of electric heat.
4. 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 14 for more information.

Defrost operation

The demand defrost control board implements a temperature differential (”delta-T”) demand defrost algorithm. The heat pump is allowed to operate in heating mode until the combination of outdoor ambient and outdoor coil temperatures indicate that defrosting is necessary. When the 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 runtime 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 demand defrost control board provides a 24 V signal from terminal Wout to energize the first stage of electric heat, if the unit is so equipped.

For troubleshooting 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 terminates normally during the TEST mode.

Table 16: Demand defrost selection

Unit	Pin position
024–060	2
024–060	4*

Note: *For extreme environments as necessary only.

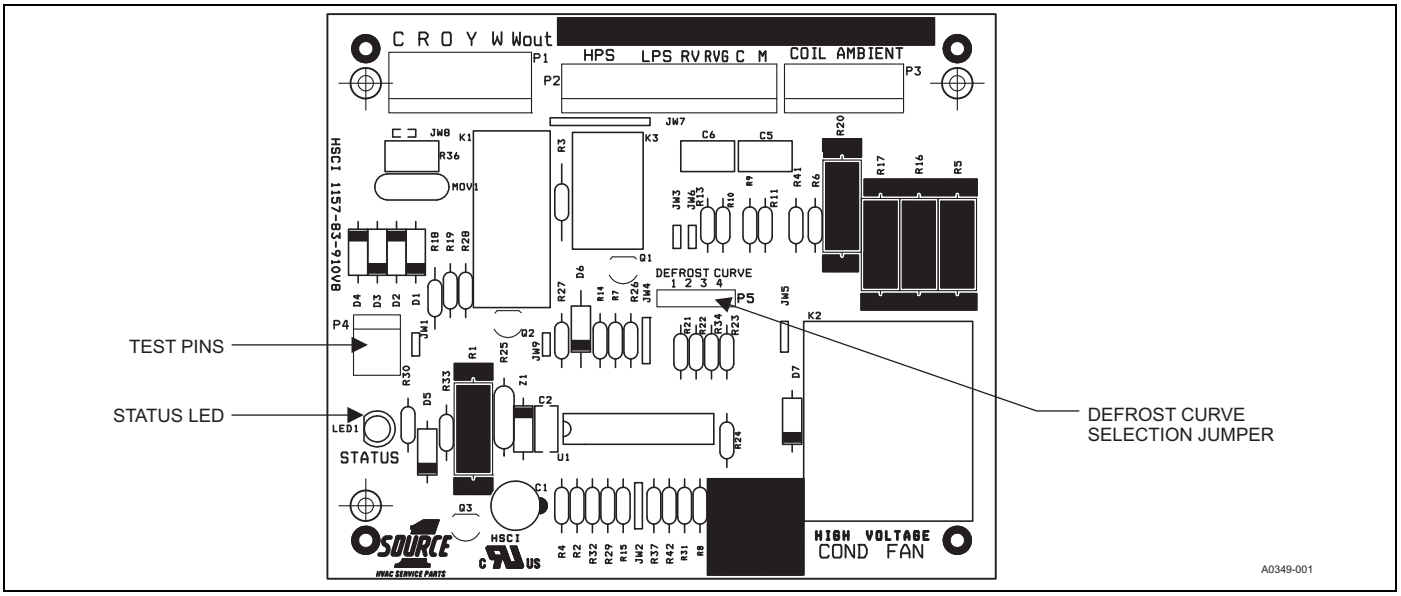


Figure 9: Demand defrost control board

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 is 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 is locked out.

To reset the lockout function, follow these steps:

1. On the demand defrost control board, remove power from the thermostat first-stage (Y) input for more than 2 s.
2. Remove power from R for more than 2 s.
3. Short the TEST pins together for more than 2 s while Y is energized.
4. Short the TEST pins together for more than 5 s while Y is de-energized.

Table 17: Test pins

Test pin shorted	With Y call	Without Y call
> 2 s	Bypass ASCD	Display error codes
> 5 s	Forced defrost	Clear error codes

Table 18: Demand defrost 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 use 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 19: 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	Electric heat stages off (if so equipped)
		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

Note: The motor program has a 60 s blower off delay on all five speed taps.

Charging

To check or adjust the unit charge, follow these steps:

1. Connect a temperature probe to the compressor discharge line approximately 6 in. away from the compressor shell.
2. Connect a high side refrigerant pressure gauge to the unit discharge pressure port.
3. Record the discharge line temperature and discharge pressure. Using an R-410A temperature pressure chart, convert the gauge pressure to saturation temperature. The difference between discharge saturation temperature and discharge line temperature is discharge superheat.
4. Obtain an entering indoor wet bulb temperature reading.
5. Compare the readings taken to the unit charging chart.

Startup

1. Check the electrical supply voltage being supplied. Make sure that it is within the specified range on the unit data plate.
2. Make sure that all electrical connections are tight.
3. If the unit is connected to 208 V supply power, wire the control transformer accordingly.
4. Turn on the electrical power to the unit.
5. Set the room thermostat to the COOL position and set the temperature setting on the thermostat lower than the room temperature to create a call for cooling.
6. Measure the total external static pressure and set the blower motor cooling speed appropriately per Table 12.
7. If an optional electric heat kit is installed, make sure that the minimum blower speed required per Table 13 is set.
8. Make sure that all units panels are in place and secured, and that an air filter is installed.

Measuring 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 the total external static pressure.

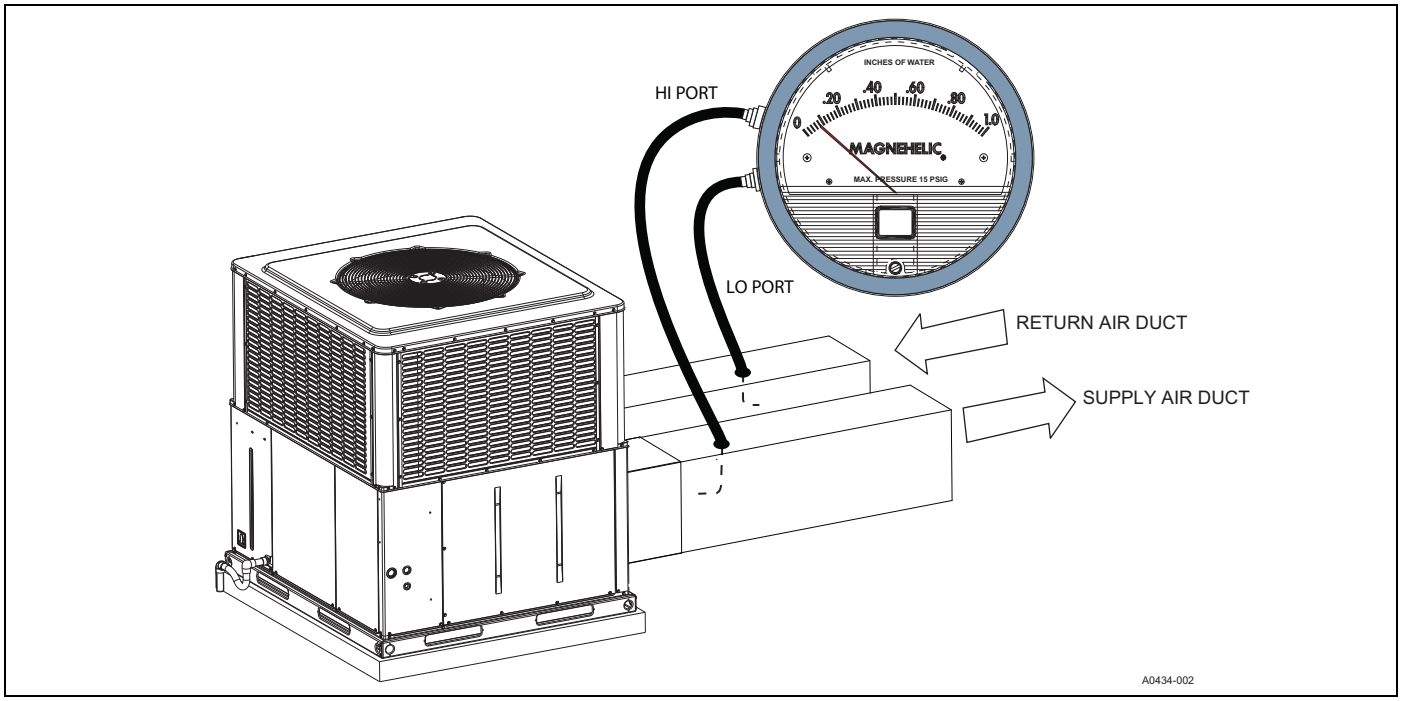


Figure 10: Measuring external static pressure

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 filters once a month. Replace disposable filters or clean permanent filters as necessary.

Note: Do not replace permanent filters with disposable filters.

Motors

The indoor blower motor and outdoor fan motor are permanently lubricated and require no maintenance.

Outdoor Coil

Do not allow dirt to accumulate on the outdoor coil surface or other parts in the air circuit. Clean as often as necessary to keep the coil clean. If using water to clean the coil, make sure that the power to the unit is shut off before cleaning.

⚠ CAUTION

Exercise care when cleaning the coil so that the coil fins are not damaged.
Do not permit the hot outdoor air discharge outlet to be obstructed by overhanging structures or shrubs.

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.

R-410A QUICK REFERENCE GUIDE

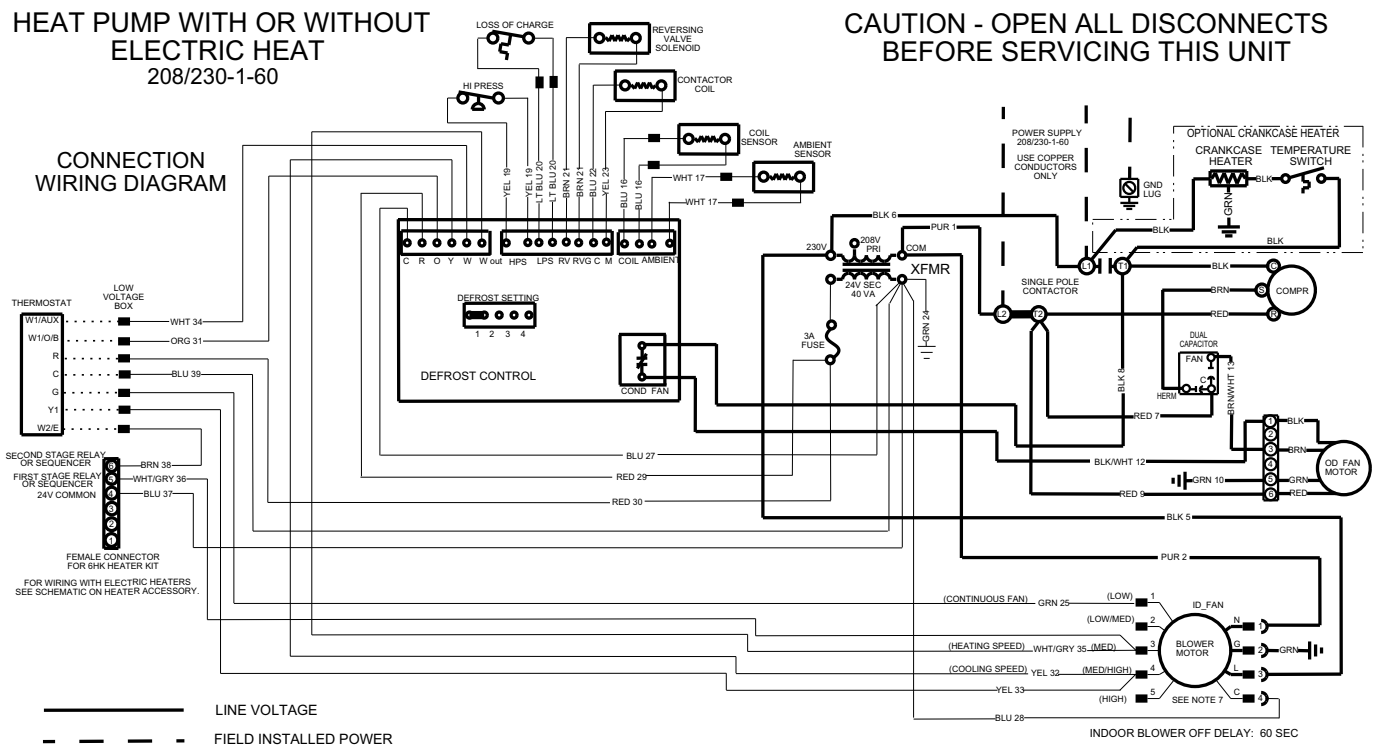
Refer to Installation Instructions for specific installation requirements

- 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 11: R-410A quick reference guide

NOTES

Section VIII: Typical wiring diagrams



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

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: Connection wiring diagram

HEAT PUMP WITH OR WITHOUT ELECTRIC HEAT

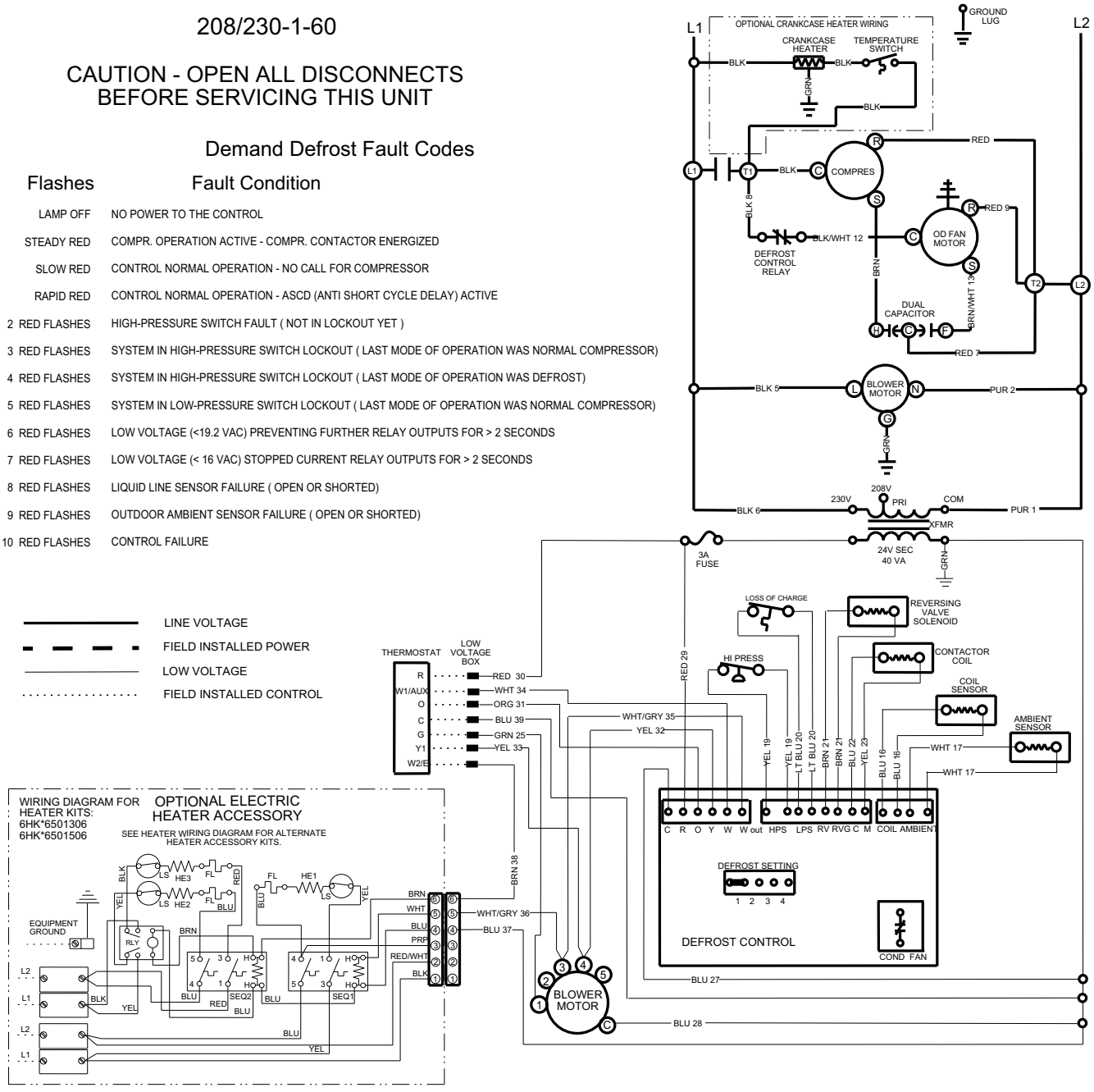
208/230-1-60

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 13: Ladder wiring diagram

Section IX: Start up sheet

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

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)

◯ Residential	◯ New Construction	◯ Roof level	◯ Down flow
◯ Commercial	◯ Retrofit	◯ Grade level	◯ 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	◯ Premium ECM	COOL	◯ A	◯ B	◯ C	◯ D
		ADJUST	◯ A	◯ B	◯ C	◯ D
		DELAY	◯ A	◯ B	◯ C	◯ D
		HEAT	◯ A	◯ B	◯ C	◯ D
	◯ Standard ECM	◯ 1	◯ 2	◯ 3	◯ 4	◯ 5
	◯ PSC	◯ Low	◯ Medium Low	◯ Medium	◯ Medium High	◯ High

Supply static (inches of water column)	Supply air dry bulb temperature	Outside air dry bulb temperature
Return static (inches of water column)	Return air dry bulb temperature	Return air wet bulb temperature
Total external static pressure	Temperature drop	Supply air wet bulb temperature

Refrigerant Charge and Metering Device

○ R-410A ○ R-22	Data plate - lbs / Oz	Suction line temperature	Discharge pressure
○ TXV ○ Fixed Orifice	Discharge line temperature	Suction pressure	Liquid line temperature
TXV# / Orifice size		Superheat	Subcooling

Electric Heat (Supplemental and Emergency Heat)

Electric heat kit - Model number		Serial number		Rated KW	
○ Single Phase ○ Three Phase	Measured Amperage	Heater 1	Heater 2	Heater 3	
		Heater 4	Heater 5	Heater 6	
Number of elements	Measured Voltage	Heater 1	Heater 2	Heater 3	
		Heater 4	Heater 5	Heater 6	
Heating return air dry bulb temperature		Heating supply air dry bulb temperature		Air temperature rise	

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

6310626-UIM-B-0823
Supersedes: 6310626-UIM-A-1122

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