

INSTALLATION MANUAL

Single Package Air Conditioner and Electric Heat

Models: PCE4 Series

3 ton to 5 ton - 460 V - Three-Phase



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

List of sections

General information	1	Operation	10
Safety	1	Maintenance	12
Model number nomenclature	2	R-410A quick reference guidelines	12
Installation	3	Typical wiring diagrams	13
Airflow performance	9	Start up sheet	15

List of figures

Component location	3	Typical field power wiring diagram	6
Unit four-point load weight	4	Single-point wiring kit	7
Unit dimensions	4	Measuring external static pressure	11
Bottom duct dimensions (in.)	5	Connection wiring diagram	13
Rear duct dimensions (in.)	5	Ladder wiring diagram	14
Typical field control wiring diagram for air conditioner models	6		

List of tables

Nomenclature	2	Electrical data for 460-3-60 multi-source power	8
Unit limitations	3	Electric heat performance data	8
Application limitations	3	Physical data	8
Weights and dimensions	4	Airflow performance - side duct application	9
Unit dimensions	4	Electric heat minimum supply air	10
Unit clearances	5	Additional static resistance	10
Single-point kit numbers	7	Thermostat signals	11
Electrical data for 460-3-60 single-source power	7		

Section I: General information

PCE units are factory-assembled air conditioners designed for outdoor installation on a roof top or a slab. Field-installed electric heater accessories are available to provide electric heat.

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 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 must 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

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

Table 1: Nomenclature

Model family	PCE	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
Nominal cooling efficiency	4	4 = standard efficiency
		6 = high efficiency
Cabinet size	A	A = small, 35.75 in. x 51.25 in.
		B = large, 45.75 in. x 51.25 in.
Nominal air conditioning cooling capacity Btu/h x 1000	36	24 = 24,000 Btu/h
		30 = 30,000 Btu/h
		36 = 36,000 Btu/h
		42 = 42,000 Btu/h
		48 = 48,000 Btu/h
		60 = 60,000 Btu/h
Gas heating input Btu/h x 1000		050 = 50,000 Btu/h input
		065 = 65,000 Btu/h input
		075 = 75,000 Btu/h input
		100 = 100,000 Btu/h input
		125 = 125,000 Btu/h input
		blank = electric heat
Voltage-phase-frequency	4	2 = 208/230-1-60
		3 = 208/230-3-60
		4 = 460-3-60
NOx approval		X = Low NOx
		blank = not Low NOx
Generation level	4	1 = first generation
		2 = second generation
		3 = third generation
		4 = fourth generation
Revision level	A	A = original release
		B = second release

Nomenclature example: PCE4A3644A is a packaged AC with electric heat, standard efficiency, small cabinet, 3 ton, 460 V, three-phase model, fourth generation, original release.

Section IV: Installation

Limitations

Install these units 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 **Table 11** for unit physical data and **Table 8** and **Table 9** 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.

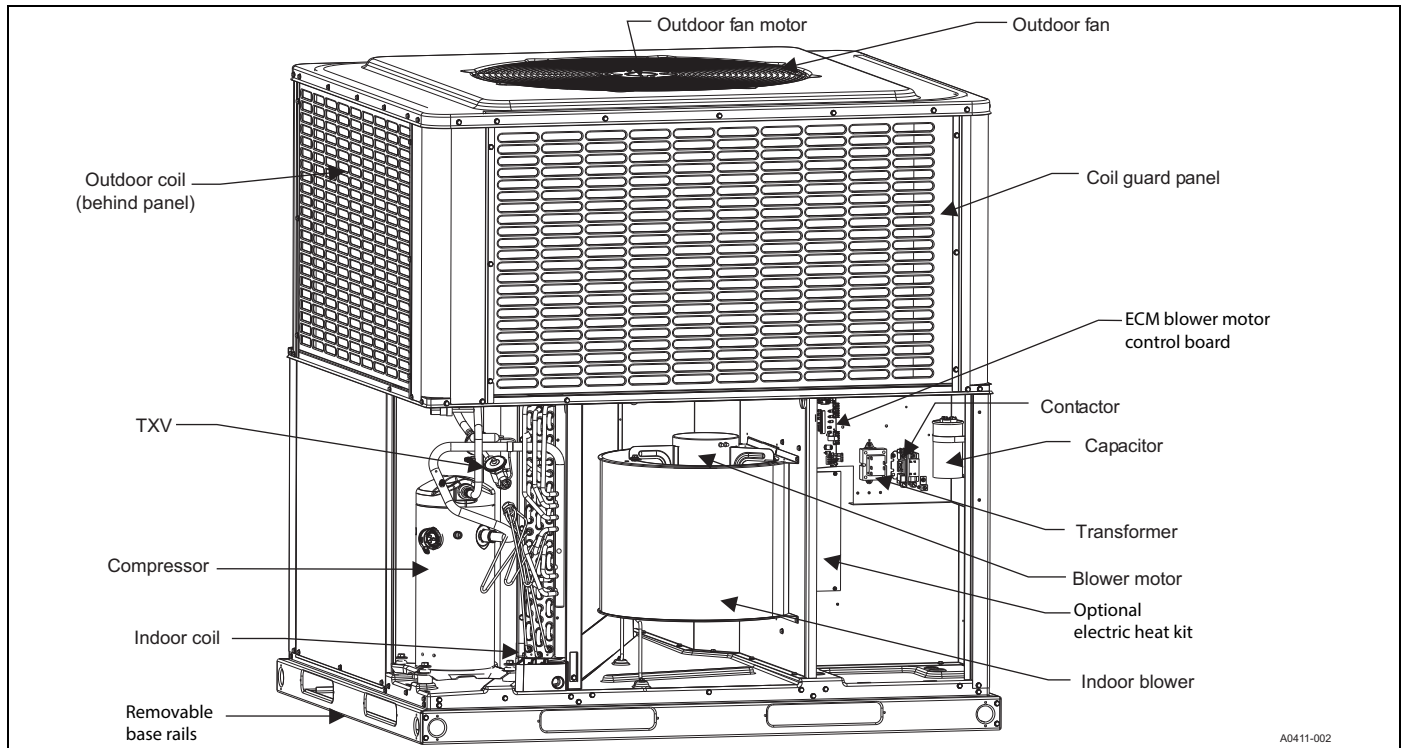
The size of the unit for proposed installation must be based on heat loss/heat gain calculations made in accordance with industry recognized procedures such as the Air Conditioning Contractors of America (Manual J).

Table 2: Unit limitations

Model	Voltage-phase-frequency	Unit limitations		
		Applied voltage (V)		Outdoor DB temperature (°F)
		Minimum	Maximum	Maximum
PCE4A36	460-3-60	432	504	125
PCE4B48	460-3-60	432	504	125
PCE4B60	460-3-60	432	504	125

Table 3: Application limitations

Packaged equipment series	Air temperature at outdoor coil (°F)		Air Temperature at indoor coil (°F)	
	Minimum	Maximum	Minimum	Maximum
	DB Cool	DB Cool	WB Cool	WB Cool
PCE4	55	125	57	72



A0411-002

Figure 1: Component location

Location

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

WARNING

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

- 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. Install the unit 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 unit.

Clearances

All units require certain clearances for correct operation and service. See **Table 6** for the clearances required for construction, servicing, and correct unit operation.

Rigging and handling

⚠ 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.

⚠ 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.

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.

Table 4: Weights and dimensions

Model	Weight (lb)		Center of gravity (in.)		Four-point load location (lb)			
	Shipping	Operating	X	Y	A	B	C	D
PCE4A36	355	350	30	15	130	72	75	73
PCE4B48	436	431	30	19	165	88	94	84
PCE4B60	455	450	29	18	177	94	97	82

⚠ 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.

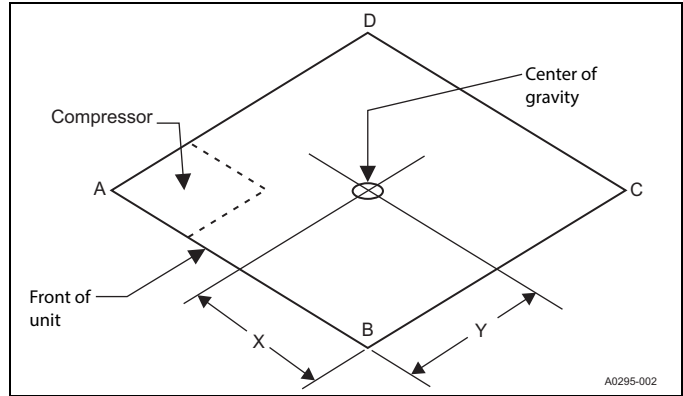


Figure 2: Unit four-point load weight

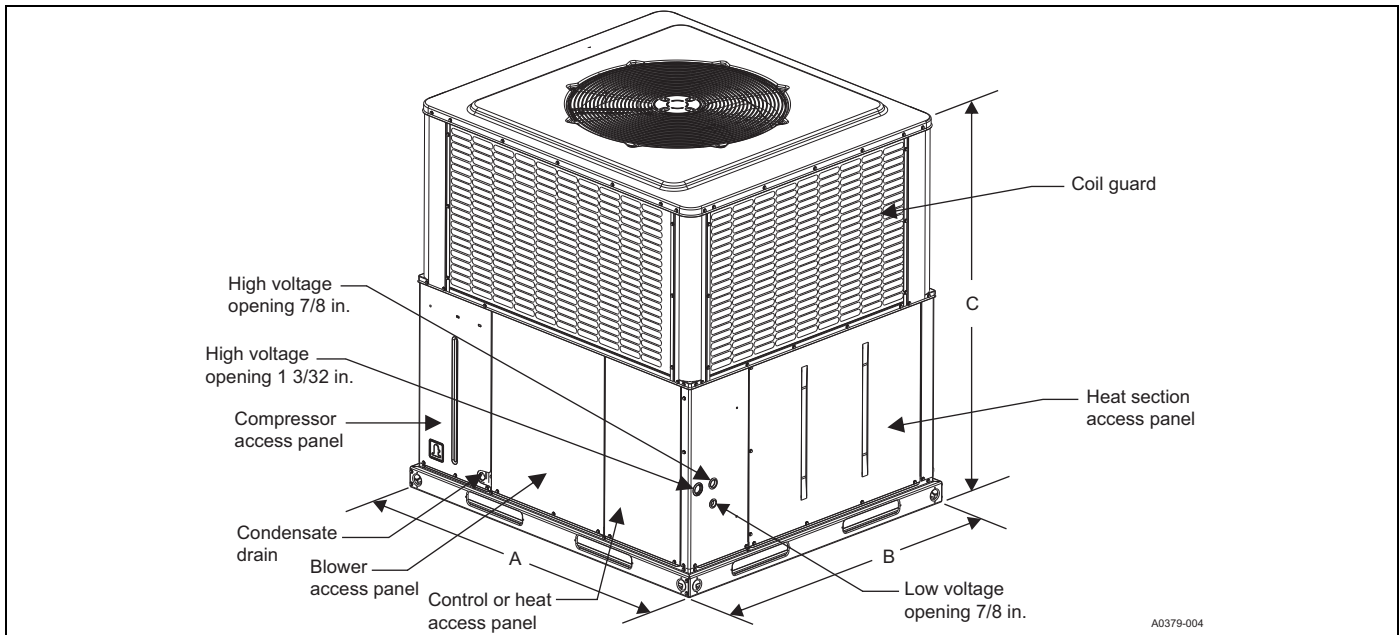


Figure 3: Unit dimensions

Table 5: Unit dimensions

Model	Dimensions (in.)		
	A	B	C
PCE4A36	51 1/4	35 3/4	47
PCE4B48		45 3/4	47
PCE4B60		45 3/4	50

Table 6: 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

- 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 0 in. clearance on all sides for the entire length of the supply air duct.
- Units must be installed outdoors. Overhanging structures or shrubs must not obstruct the outdoor air discharge outlet.
- 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. To convert to downflow, use the following steps:

- 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 next step).
- Install the duct covers (removed in previous step) to the rear supply and return air duct openings. Secure with the four screws removed in previous step.
- Seal 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 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 water-proofed.

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.

It is the responsibility of the installer to secure a filter in the return air ductwork or utilize the filter rack.

A filter rack kit is included with all 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.

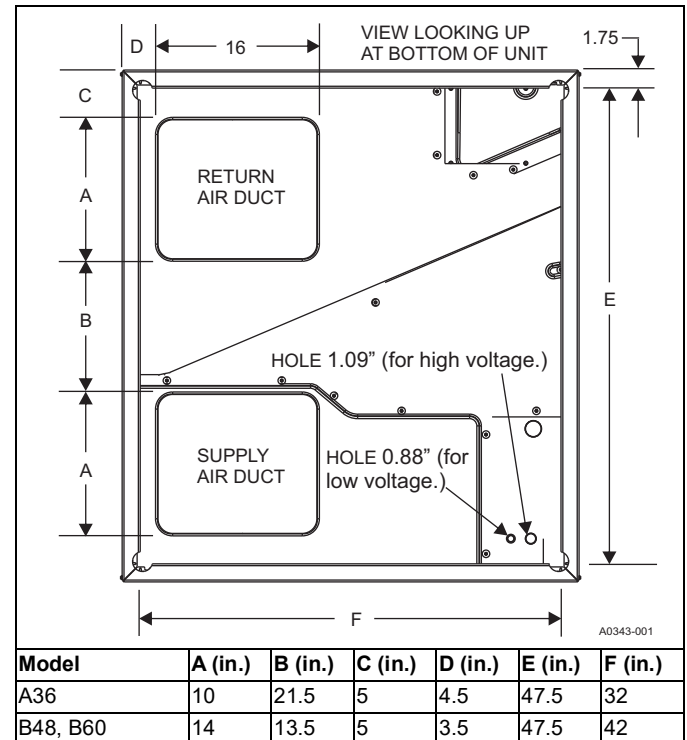


Figure 4: Bottom duct dimensions (in.)

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

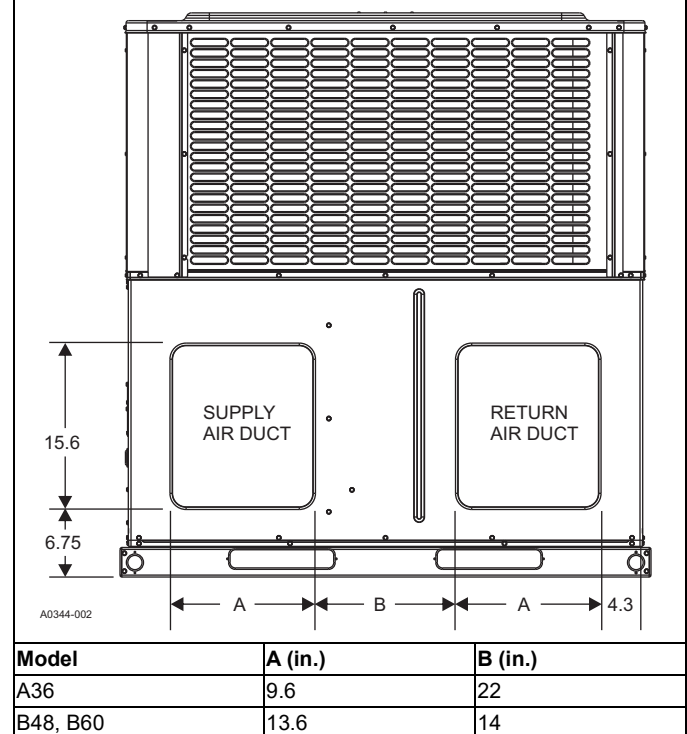


Figure 5: Rear duct dimensions (in.)

Condensate drain

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

⚠ CAUTION*Hand tighten only.***Service access**

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

See **Figure 1** for the location of these access locations and see **Table 6** for minimum clearances.

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

See **R-410A quick reference guidelines on page 12.**

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's 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. Voltage tolerances that must be maintained at the compressor terminals during starting and running conditions are indicated on the unit rating plate and **Table 3**.

The wiring entering the cabinet must be provided 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.

Single-point wiring requires the use of the single-point wiring kit accessory.

The unit comes wired for 460 V power.

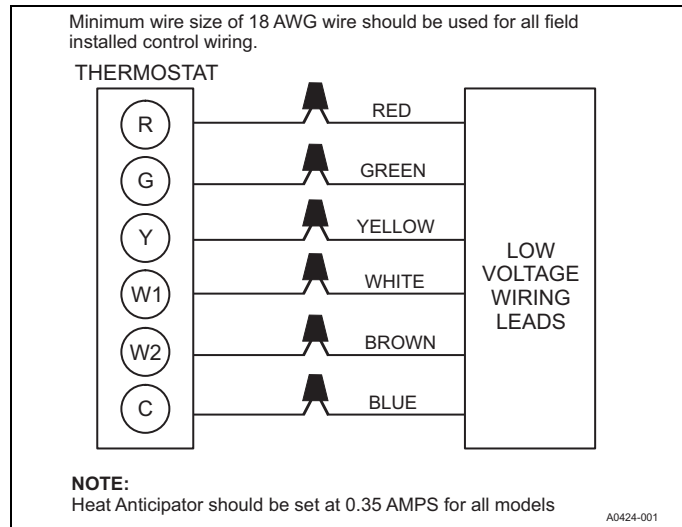


Figure 6: Typical field control wiring diagram for air conditioner models

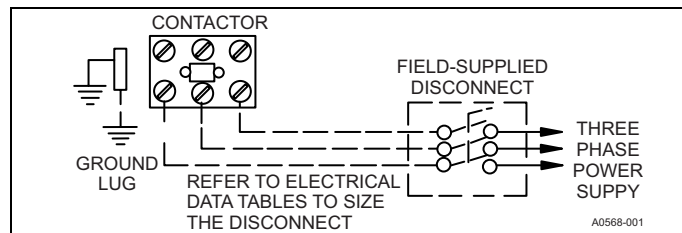


Figure 7: Typical field power wiring diagram

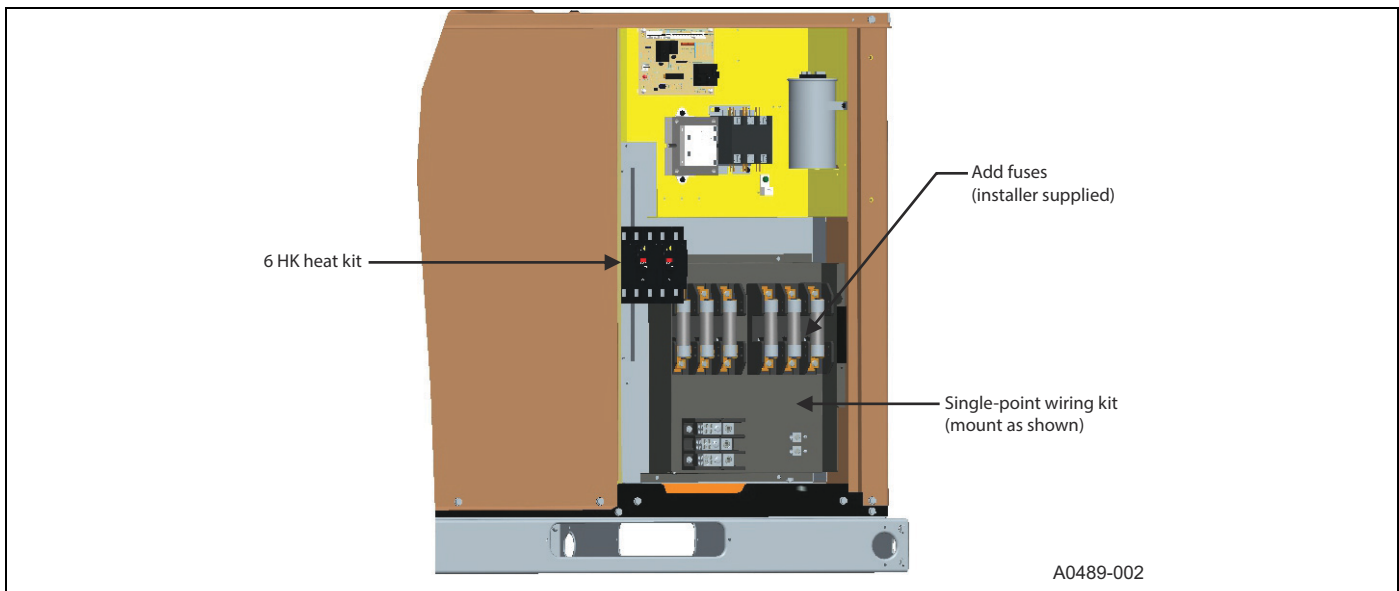


Figure 8: Single-point wiring kit

Table 7: Single-point kit numbers

Unit model number	Voltage-phase-frequency	Heat kit	Single-point wiring kit	Unit fuse size (A)	Heater fuse size (A)
PCE4A36	460-3-60	6HK06501046	S1-2SPWK036	15	15
		6HK06501546	S1-2SPWK036	15	25
PCE4B48	460-3-60	6HK06501046	S1-2SPWK036	15	15
		6HK06501546	S1-2SPWK036	15	25
		6HK06502046	S1-2SPWK036	15	30
PCE4B60	460-3-60	6HK06501046	S1-2SPWK036	15	15
		6HK06501546	S1-2SPWK036	15	25
		6HK06502046	S1-2SPWK036	15	30
		6HK06502546	S1-2SPWK037	15	35

Table 8: Electrical data for 460-3-60 single-source power

Model	Compressor			OD fan motor FLA	Blower motor FLA	Electric heat option				MCA ¹ (total unit)	Max fuse ² or breaker size ³ (total unit)	MCA ¹ (unit minus heater)	Max fuse ² or breaker size ³ (unit minus heater)
	RLA	LRA	MCC			Heater kit ⁴	Heater (kW)	Stages	Heater (A)				
PCE4A36	3.8	31.0	6.0	0.87	1.95	none	—	—	—	7.6	15	7.6	15
						6HK06501046	8.8	1	11.1	16.3	20	7.6	15
						6HK06501546	13.2	1	16.6	23.2	25	7.6	15
PCE4B48	6.0	60.0	9.3	0.87	3.15	none	—	—	—	11.5	15	11.5	15
						6HK06501046	8.8	1	11.1	17.8	20	11.5	15
						6HK06501546	13.2	1	16.6	24.7	25	11.5	15
PCE4B60	6.3	60.0	9.9	0.87	3.15	none	—	—	—	12.0	15	12.0	15
						6HK06501046	8.8	1	11.1	17.8	20	12.0	15
						6HK06501546	13.2	1	16.6	24.7	25	12.0	15
						6HK06502046	17.6	1	22.1	31.6	35	12.0	15
						6HK06502546	22.0	1	27.7	38.5	40	12.0	15

1. 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.

Note: Single source power MCA and MOP requirements are given here for reference if the unit is to be installed with a field-installed single-point power modification.

Table 9: Electrical data for 460-3-60 multi-source power

Model	Compressor			OD fan motor	Blower motor	Electric heat option				Circuit 1 unit minus heaters		Circuit 2 heaters	
	RLA	LRA	MCC	FLA	FLA	Heater kit	Heater (kW)	Stages	Heater (A)	MCA ¹ (A)	Max fuse ² or breaker size ³	MCA ¹ (A)	Max fuse ² or breaker size ³
PCE4A36	3.8	31.0	6.0	0.9	2.0	none	—	—	—	7.6	15	—	—
						6HK06501046	8.8	1	11.1	7.6	15	13.8	15
						6HK06501546	13.2	1	16.6	7.6	15	20.7	25
PCE4B48	6.0	60.0	9.3	0.9	3.2	none	—	—	—	11.5	15	—	—
						6HK06501046	8.8	1	11.1	11.5	15	13.8	15
						6HK06501546	13.2	1	16.6	11.5	15	20.7	25
						6HK06502046	17.6	1	22.1	11.5	15	27.7	30
PCE4B60	6.3	60.0	9.9	0.9	3.2	none	—	—	—	12.0	15	—	—
						6HK06501046	8.8	1	11.1	12.0	15	13.8	15
						6HK06501546	13.2	1	16.6	12.0	15	20.7	25
						6HK06502046	17.6	1	22.1	12.0	15	27.7	30
						6HK06502546	22.0	1	27.7	12.0	15	34.6	35

1. Minimum circuit ampacity.

2. Maximum overcurrent protection per standard UL 1995.

3. Fuse or HACR circuit breaker is field installed.

Table 10: Electric heat performance data

Heater models ¹	Nominal kW at 480 V	Total heat	
		kW 460 V	MBH 460 V
6HK06501046	9.6	8.8	30.1
6HK06501546	14.4	13.2	45.1
6HK06502046	19.2	17.6	60.2
6HK06502546	24.0	22.0	75.2

1. 6HK0 = no service disconnect.

Table 11: Physical data

Models	PCE4A36	PCE4B48	PCE4B60	
Nominal tonnage	3.0	4.0	5.0	
Refrigerant information	Refrigerant type	R-410A	R-410A	
	Refrigerant charge (lb-oz)	7-0	7-14	10-2
Dimensions (in.)	Length	51 1/4	51 1/4	
	Width	35 3/4	45 3/4	45 3/4
	Height	47	47	50
Operating weight (lb)	350	431	450	
Compressor type	Scroll	Scroll	Scroll	
Outdoor coil data	Face area (sq ft)	15.3	17.5	21.1
	Rows	2	2	2
	Fins per inch	22	22	22
	Tube diameter (mm)	7	7	7
	Circuitry type	Interlaced	Interlaced	Interlaced
Indoor coil data	Face area (sq ft)	4.6	6.2	6.2
	Rows	3	3	4
	Fins per in.	16	16	16
	Tube diameter (in.)	3/8	3/8	3/8
	Circuitry type	Interlaced	Interlaced	Interlaced
	Refrigerant control	TXV	TXV	TXV

Table 11: Physical data (Continued)

Outdoor fan data	Fan diameter (in.)	24	26	26
	Type	Prop	Prop	Prop
	Drive type	Direct	Direct	Direct
	Number of speeds	1	1	1
	Motor (hp)	1/3	1/3	1/3
	RPM	850	850	850
	Nominal total CFM	2400	3200	3200
Direct drive indoor blower data	Blower size (in.)	11 x 10	11 x 10	11 x 10
	Type	Centrifugal	Centrifugal	Centrifugal
	Motor (hp)	1/2	3/4	1
	RPM	1400 Maximum	1400 Maximum	1400 Maximum
	Frame size	48	48	48
Filter size	A	B	B	

Note: Field-supplied external filters must be sized so as not to exceed 300 fpm air velocity through disposable filters. All three-phase models include an internal filter rack kit and washable filters. 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 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 such as filter drier, pressure switch, metering device, or coil

⚠ CAUTION

Do not loosen compressor mounting bolts.

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

Phasing

Three-phase, scroll compressors operate in only one direction. If the scroll is drawing low amperage, has similar suction and discharge pressures, or is producing a high noise level, the scroll compressor motor may be experiencing out-of-phase rotation and must be corrected.

⚠ CAUTION

Scroll compressors require proper rotation to operate properly. Failure to check and correct rotation may result in property damage.

Check the compressor rotation. If the scroll compressor motor is experiencing out-of-phase rotation, change the incoming line connection phasing to obtain the correct rotation.

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
PCE4A36	Low (1)	850	790	710	660	610	560	510	450	400
	Medium Low (2)	1100	1050	1010	960	900	840	790	750	660
	Medium (3)	1270	1230	1190	1150	1110	1060	1000	960	860
	Medium High (4)	1370	1340	1300	1260	1220	1180	1130	1070	980
	High (5)	1490	1450	1420	1380	1340	1300	1260	1210	1120

Table 12: Airflow performance - side duct application (Continued)

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
PCE4B48	Low (1)	1150	1090	1030	980	910	840	780	720	620
	Medium Low (2)	1350	1300	1260	1210	1160	1130	1070	1010	890
	Medium (3)	1680	1640	1610	1570	1530	1490	1450	1420	1340
	Medium High (4)	1780	1740	1710	1670	1630	1600	1560	1520	1450
	High (5)	2010	1980	1950	1910	1870	1840	1800	1760	1680
PCE4B60	Low (1)	1300	1240	1200	1150	1090	1050	1000	940	820
	Medium Low (2)	1610	1570	1540	1500	1450	1420	1380	1340	1260
	Medium (3)	1870	1840	1810	1770	1730	1690	1650	1620	1540
	Medium High (4)	2000	1970	1930	1890	1860	1830	1780	1740	1670
	High (5)	2240	2210	2180	2150	2100	2070	2040	2010	1940

Notes:

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.

Heating applications are tested at 0.5 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-phase-frequency	Minimum blower speed for electric heat			
		Heater kW			
		10	15	20	25
PCE4A36	460-3-60	Medium high (4)	High (5)	—	—
PCE4B48	460-3-60	Medium (3)	Medium (3)	Medium (3)	—
PCE4B60	460-3-60	Medium low (2)	Medium low (2)	Medium low (2)	Medium high (4)

Table 14: Additional static resistance

Size (ton)	CFM	Wet indoor coil	Economizer ¹	Filter/frame kit
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
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 delivers 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 air conditioning thermostat.

Cooling sequence of operation

- On a call for cooling, the wall thermostat sends a 24 V Y signal to the unit. The unit contactor closes, which energizes the outdoor fan and the compressor. The 24 V signal is also sent to the indoor blower motor, which runs at the selected cooling speed.
- When the demand for cooling has been satisfied, the wall thermostat removes the 24 V Y signal from the unit. The contactor opens and the outdoor fan and the compressor stop. The indoor blower has a built-in delay and continues to run for 60 s after the cooling signal is removed.

Heating sequence of operation

Note: This section applies to units with an optional electric heat kit.

- On a call for heating, the wall thermostat sends a 24 V W signal to the unit. The indoor blower starts to run at the selected heating speed. The 24 V signal also goes to the sequencers or relays in the electric heat kit and turns on the electric heating elements.
- When the demand for heating is removed, the wall thermostat removes the W signal. When the 24 V signal is removed from the electric heat sequencer, the heating elements turn off. The indoor blower continues to run for 60 s after the call for heat is removed.

Electric heat limit switch operation

6HK three-phase heat kits use a normally closed low-voltage limit switch, 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.

When the limit switch opens, the heating elements turn off. The indoor blower continues to run. The limit switch automatically resets when the temperature falls to a normal level, at which time the heating elements turn on again.

Table 15: Thermostat signals

Signal	State	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	Indoor blower switches to continuous fan speed
G and Y	ON	Outdoor fan on
		Indoor blower instant on in cooling speed
		Compressor on
		System operates in cooling mode
	Y OFF	Compressor instant off
		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 unit charge:

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 discharge line temperature and discharge pressure. Using an R-410A temperature pressure chart, convert 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 readings taken to the unit charging chart.

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. Turn on the unit electrical power.
4. 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.
5. Measure the total external static pressure and set the blower motor cooling speed appropriately. See **Table 12**
6. If an optional electric heat kit is installed, make sure the W blower speed is set at or above required speed. See **Table 13**.
7. Make sure all units panels are in place and secured, and that an air filter is installed.

Compressor rotation

Three-phase, scroll compressors operate in only one direction. If the scroll is drawing low amperage, has similar suction and discharge pressures, or is producing a high noise level, the scroll is out of phase.

CAUTION

Scroll compressors require proper rotation to operate properly. Failure to check and correct rotation may result in property damage.

If necessary, change the incoming line connection phasing to obtain the correct rotation.

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.

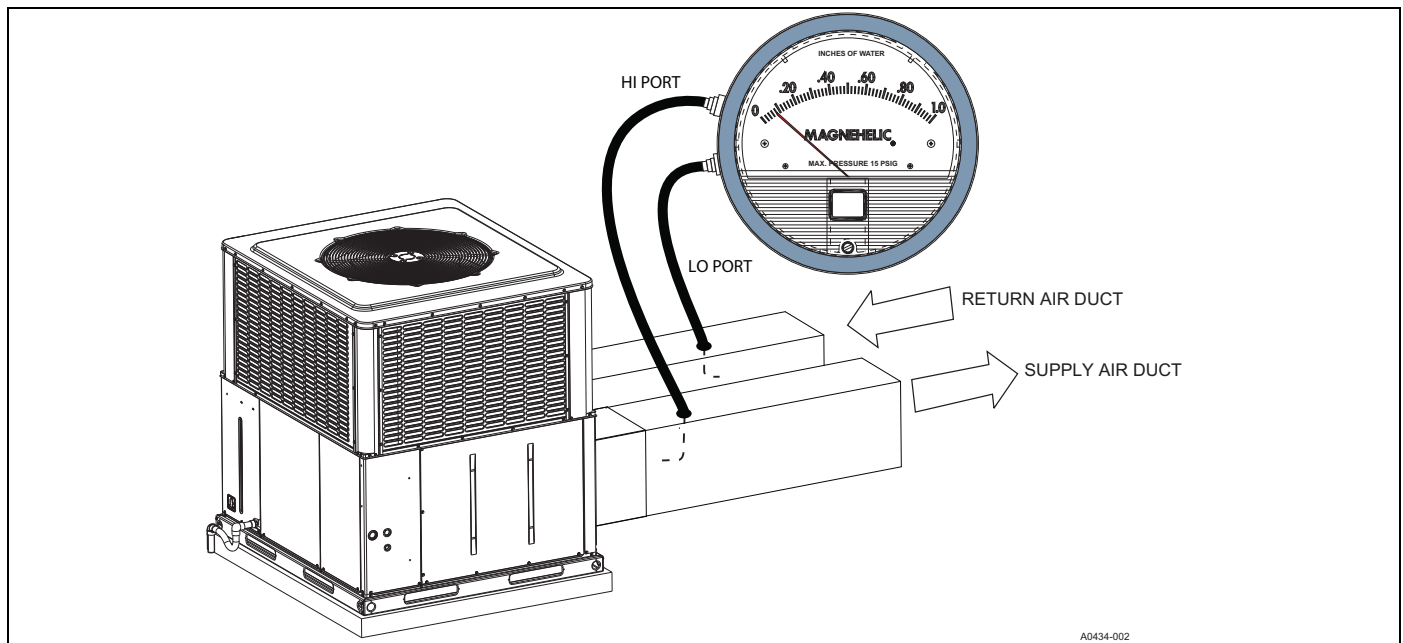


Figure 9: Measuring external static pressure

Section VII: Maintenance

Normal maintenance

⚠ WARNING

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

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

Filters

Inspect 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.

⚠ 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.*

Outdoor coil

Do not allow dirt to accumulate on the outdoor coil surface or other parts in the air circuit. Clean the coil as often as necessary to keep the coil clean. If using water to clean the coil, ensure that the power to the unit is shut off 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: R-410A quick reference guidelines

See the installation instructions for specific installation requirements. It is important to be aware of the following:

- R-410A refrigerant operates at 50% to 70% higher pressures than R-22 refrigerant. Make sure that servicing equipment and replacement components are designed to operate with R-410A.
- R-410A refrigerant cylinders are rose-colored.
- The recovery cylinder service pressure rating must be 400 psig per 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, gauges, recovery cylinders, charging cylinders, and recovery equipment must be dedicated for use only on R-410A systems.
- 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 of metering device in the manifold hose.
- R-410A can be used with only POE type oils.
- POE type oils rapidly absorb moisture from the atmosphere.
- Vacuum pumps do **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 an R-22 TXV. If a TXV is used, it must be an R-410A TXV.
- Never open the system to the atmosphere when under a vacuum.

If the system must be opened for service, evacuate the system, then break the vacuum with dry nitrogen and replace all the filter driers.

Third-Party Trademarks Notice: For information about third-party trademarks, refer to the relevant company websites.

Section IX: Typical wiring diagrams

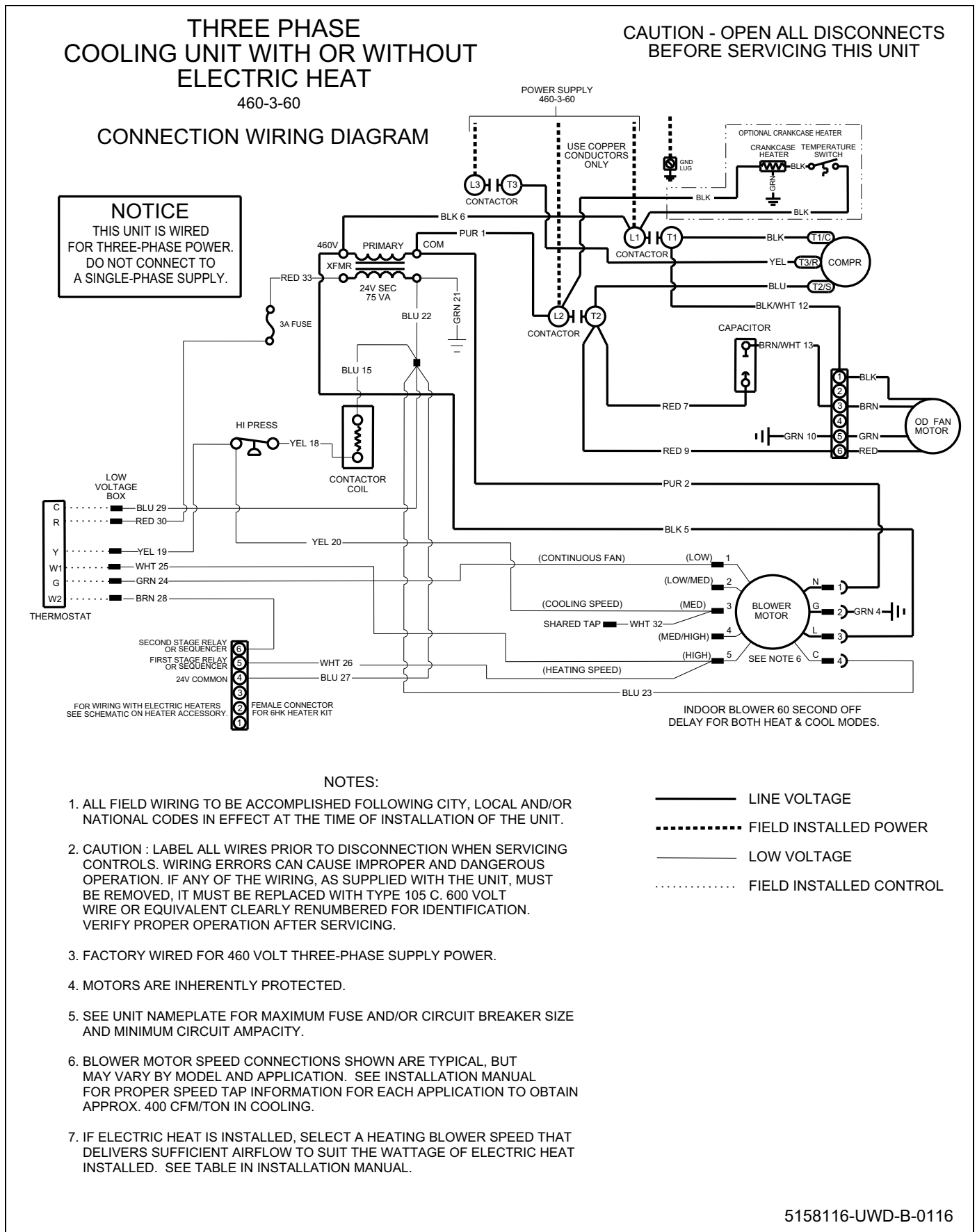


Figure 10: Connection wiring diagram

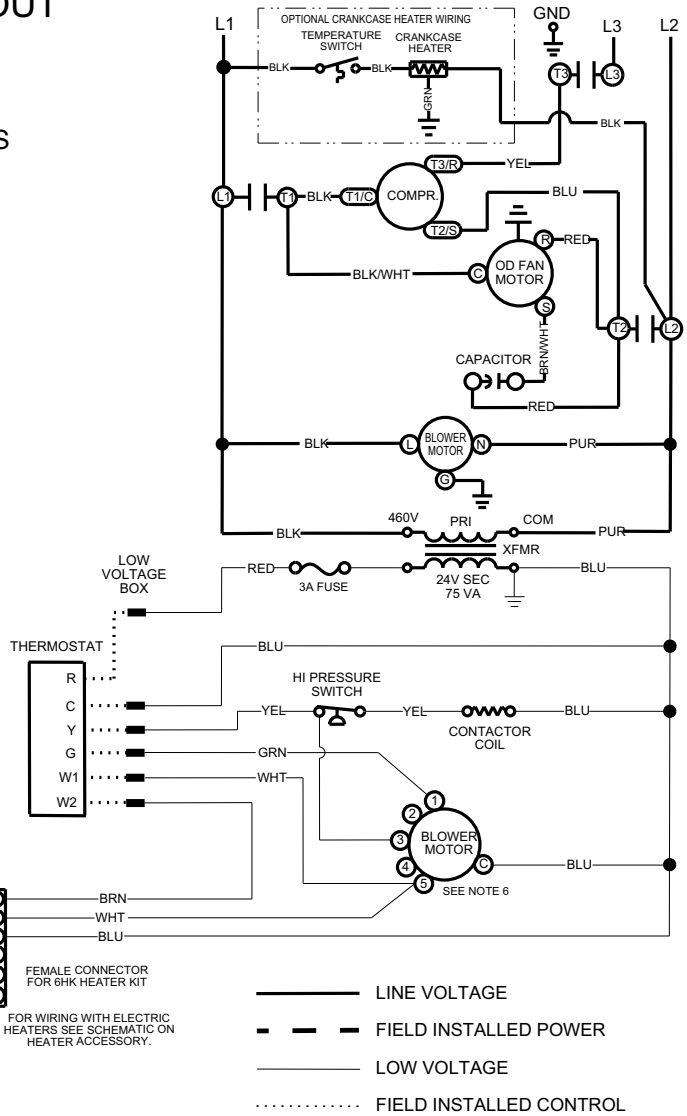
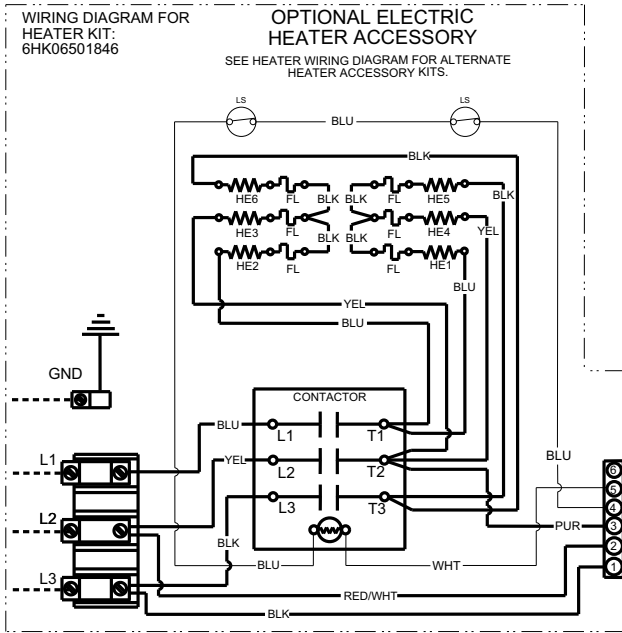
THREE PHASE COOLING UNIT WITH OR WITHOUT ELECTRIC HEAT

460-3-60

CAUTION - OPEN ALL DISCONNECTS BEFORE SERVICING THIS UNIT

NOTICE
THIS UNIT IS WIRED FOR THREE-PHASE POWER. DO NOT CONNECT TO A SINGLE-PHASE SUPPLY.

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 460 VOLT THREE-PHASE SUPPLY POWER.
4. MOTORS ARE INHERENTLY PROTECTED.
5. SEE UNIT NAMEPLATE FOR MAXIMUM FUSE AND/OR CIRCUIT BREAKER SIZE AND MINIMUM CIRCUIT AMPACITY.
6. BLOWER MOTOR SPEED CONNECTIONS SHOWN ARE TYPICAL, BUT MAY VARY BY MODEL AND APPLICATION. SEE INSTALLATION MANUAL FOR PROPER SPEED TAP INFORMATION FOR EACH APPLICATION TO OBTAIN APPROX. 400 CFM/TON IN COOLING.
7. IF ELECTRIC HEAT IS INSTALLED, SELECT A HEATING BLOWER SPEED THAT DELIVERS SUFFICIENT AIRFLOW TO SUIT THE WATTAGE OF ELECTRIC HEAT INSTALLED. SEE TABLE IN INSTALLATION MANUAL.

5158116-UWD-B-0116

Figure 11: Ladder wiring diagram

Section X: Start up sheet**Residential Package Unit Cooling With Electric Heat Start-Up Sheet**

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

Start-Up Date	<input type="text"/>	Company Name	<input type="text"/>	Start-Up Technician	<input type="text"/>
---------------	----------------------	--------------	----------------------	---------------------	----------------------

Owner Information

Name	<input type="text"/>	Address	<input type="text"/>	Daytime Phone	<input type="text"/>
City	<input type="text"/>	State or Province	<input type="text"/>	Zip or Postal Code	<input type="text"/>

Equipment Data

Unit Model #	<input type="text"/>	Unit Serial #	<input type="text"/>
--------------	----------------------	---------------	----------------------

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)

<input type="checkbox"/> Unit is level and installed on:	<input type="checkbox"/> Slab	<input type="checkbox"/> Roof curb	<input type="checkbox"/> Duct connections are complete:	<input type="checkbox"/> Supply	<input type="checkbox"/> Return
<input type="checkbox"/> Condensate drain properly connected per the installation instructions	<input type="checkbox"/> Condensate trap has been primed with water				

Filters

<input type="checkbox"/> Filters installed	Number of filters	<input type="text"/>	Filter size	<input type="text"/>	<input type="radio"/> Filter located inside	<input type="radio"/> Filter located outside
--	-------------------	----------------------	-------------	----------------------	---	--

Additional Kits & Accessories Installed (Check all that apply)

<input type="checkbox"/> Refrigerant safety kit	<input type="checkbox"/> Low ambient kit	<input type="checkbox"/> Anti-recycle timer	<input type="checkbox"/> Crank case heater	<input type="checkbox"/> Filter frame kit
<input type="checkbox"/> Transformer kit	<input type="checkbox"/> Economizer	<input type="checkbox"/> Roof curb kit	<input type="checkbox"/> Burglar bar kit	<input type="checkbox"/> Hail guard kit
<input type="checkbox"/> Manual fresh air damper kit	<input type="checkbox"/> Motorized fresh air damper kit			

Electrical Connections & Inspection (Check all that apply)

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

Air Flow Setup / Cooling

Blower Type & Set-Up	<input type="radio"/> 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
	<input type="radio"/> X-13	<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

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

Clean Up Job Site

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

Unit Operation and Cycle Test

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

Owner Education

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

Comments and Additional Job Details