

# INSTALLATION MANUAL

**SINGLE PACKAGE  
AIR CONDITIONER/GAS HEAT  
MODELS: PCG4 SERIES  
2 TONS TO 5 TONS - 208/230 V - 1 PHASE**



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## SECTION I: GENERAL INFORMATION

These are electric cooling/gas heating units designed for outdoor installation. Only gas piping, electric power, and duct connections are required at the point of installation.

The gas-fired heaters have spark ignition.

The refrigerant system is fully charged with R-410A refrigerant, tested, and factory sealed.

## 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.

**⚠ WARNING**

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

**WHAT TO DO IF YOU SMELL GAS:**

1. Do not try to light any appliance.
2. Do not touch any electrical switch; do not use any phone in your building.
3. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
4. If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

Due to system pressure, moving parts, and electrical components, installation and servicing of air conditioning equipment can be hazardous. Only qualified, trained service personnel must install, repair, or service this equipment. Untrained 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. Ensure to follow all other applicable safety precautions and codes including ANSI Z223.1 or CSA-B149.1 (latest edition).

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

**SECTION III: MODEL NUMBER NOMENCLATURE**

PCG	4	A	24	050	2	X	4	A
1	2	3	4	5	6	7	8	9
<p><b>1. Model Family</b>                      PCG - packaged A/C with gas heat                      PHG - packaged heat pump with gas heat                      PCE - packaged A/C with electric heat                      PHE - packaged heat pump with electric heat</p> <p><b>2. Nominal Cooling Efficiency</b>                      4 = 14 SEER, 6 = 16 SEER</p> <p><b>3. Cabinet Size</b>                      A = small 35.75 x 51.25, B = large 45.75 x 51.25</p> <p><b>4. Nominal Air Conditioning Cooling Capacity BTU/Hr x 1000</b>                      24 = 24,000 BTU/Hr, 30 = 30,000 BTU/Hr</p> <p><b>Example:</b>                      PCG4A240502X4A is a packaged A/C with gas heat, 14 SEER, small cabinet, 2 ton, single-stage heat, 50,000 BTU/Hr gas heat, 208/230 V, single-phase, Low NOx model, fourth generation, original release.</p>					<p><b>5. Gas Heating Input BTU/Hr x 1000</b>                      050 = 50,000 BTU/Hr input, blank = electric heat</p> <p><b>6. Voltage-Phase-Frequency</b>                      2 = 208/230-1-60, 3 = 208/230-3-60, 4 = 460-3-60</p> <p><b>7. NOx Approval</b>                      X = Low NOx, blank = not Low NOx</p> <p><b>8. Generation Level</b>                      1 = first generation 2 = second generation</p> <p><b>9. Revision Level</b>                      A = original release, B = second release</p>			

**SECTION IV: INSTALLATION**

**INSTALLATION SAFETY INFORMATION**

Read these instructions before continuing the unit installation. This is an outdoor combination heating and cooling unit. Give the instructions to the homeowner, and instruct the homeowner to retain them for future reference.

Adhere to the following:

- Refer to the unit rating plate for the approved type of gas for this product.
- Install the unit only in a location and position specified on page 4 of these instructions.
- Never test for gas leaks with an open flame. Use commercially available soap solution made specifically for the detection of leaks when checking all connections, as specified on page 9 of these instructions.

- Install the unit to operate within the unit's intended temperature rise range with the duct system and within the allowable external static pressure range, as specified on the unit name/rating plate and in Table 7.
- Do not use this equipment for temporary heating of buildings or structures under construction.

**⚠ WARNING**

**FIRE OR EXPLOSION HAZARD**  
*Failure to follow the safety warning exactly could result in serious injury, death, or property damage.*  
*Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury, or loss of life.*

**LIMITATIONS**

These units must be installed in accordance with the following:

**In U.S.**

- National Electrical Code, ANSI/NFPA No. 70 - Latest Edition
- National Fuel Gas Code, ANSI Z223.1 - Latest Edition
- Gas-Fired Central Furnace Standard, ANSI Z21.47a. - Latest Edition
- Local building codes
- Local gas utility requirements

**In Canada**

- Canadian Electrical Code, CSA C22.1
- Installation Codes, CSA - B149.1
- Local plumbing and wastewater codes
- Other applicable local codes

See the unit application data in this document.

After installation, adjust gas-fired units to obtain a temperature rise within the range specified on the unit rating plate.

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 calculation made according to the methods of the Air Conditioning Contractors of America (ACCA).

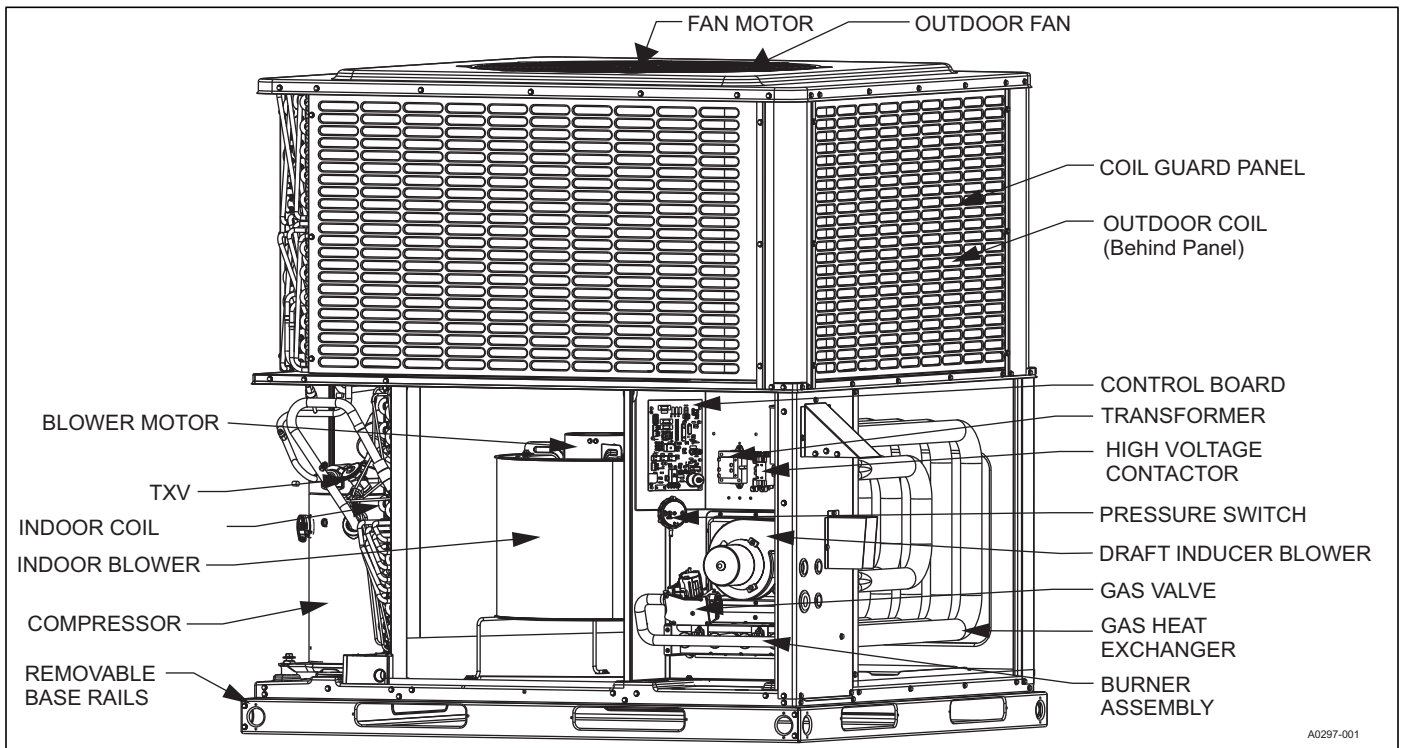
Do not use this furnace for temporary heating of buildings or structures under construction.

**Table 1: Unit Limitations**

Model	Unit Voltage	Unit Limitations		
		Applied Voltage		Outdoor DB Temperature
		Minimum	Maximum	Maximum (°F)
PCG4A24	208/230-1-60	187	252	125
PCG4A30	208/230-1-60	187	252	125
PCG4A36	208/230-1-60	187	252	125
PCG4A42	208/230-1-60	187	252	125
PCG4B48	208/230-1-60	187	252	125
PCG4B60	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 Cool	WB Cool	WB Cool
14 SEER AC	55	125	57	72



**Figure 1: Component Location**

## LOCATION

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. 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 the unit.

### ⚠ WARNING

*Excessive exposure of this unit to contaminated combustion air may result in equipment damage or personal injury. Typical contaminants include: permanent wave solution, chlorinated waxes and cleaners, chlorine based swimming pool chemicals, water softening chemicals, carbon tetrachloride, Halogen type refrigerants, cleaning solvents (for example, perchloroethylene), printing inks, paint removers, varnishes, hydrochloric acid, cements and glues, anti-static fabric softeners for clothes dryers, masonry acid washing materials.*

## CLEARANCES

### ⚠ WARNING

*Do not permit overhanging structures or shrubs to obstruct outdoor air discharge outlet, combustion air inlet, or vent outlets.*

All units require particular clearances for proper operation and service. Make provisions for adequate combustion and ventilation air in accordance with the following:

- Section 5.3 of Air for Combustion and Ventilation of the National Fuel Gas Code, ANSI Z223.1 - Latest Edition (in U.S.)
- Sections 7.2, 7.3, or 7.4 of Gas Installation Codes, CSA-B149.1 - Latest Edition (in Canada)
- Applicable provisions of local building codes

See Table 5 for the clearances required for combustible construction, servicing, and proper unit operation.

## RIGGING AND HANDLING

### ⚠ CAUTION

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

### ⚠ CAUTION

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

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails.

**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
PCG4A24050	321	316	29	15	118	63	76	59
PCG4A24075	341	336	28	15	119	79	76	62
PCG4A30050	357	352	28	15	119	87	76	70
PCG4A30075	377	372	28	15	122	89	83	78
PCG4A36050	364	359	28	15	123	84	79	73
PCG4A36075	384	379	27	16	121	92	85	81
PCG4A36100	388	383	27	16	120	95	87	81
PCG4A42075	403	398	28	15	143	93	88	74
PCG4A42100	407	402	28	15	137	96	90	79
PCG4B48065	455	450	28	18	165	107	99	79
PCG4B48100	461	456	28	18	163	110	99	84
PCG4B48125	465	460	28	18	163	112	101	84
PCG4B60065	474	469	27	18	167	118	102	82
PCG4B60100	480	475	27	18	165	121	102	87
PCG4B60125	484	479	27	18	165	122	104	88

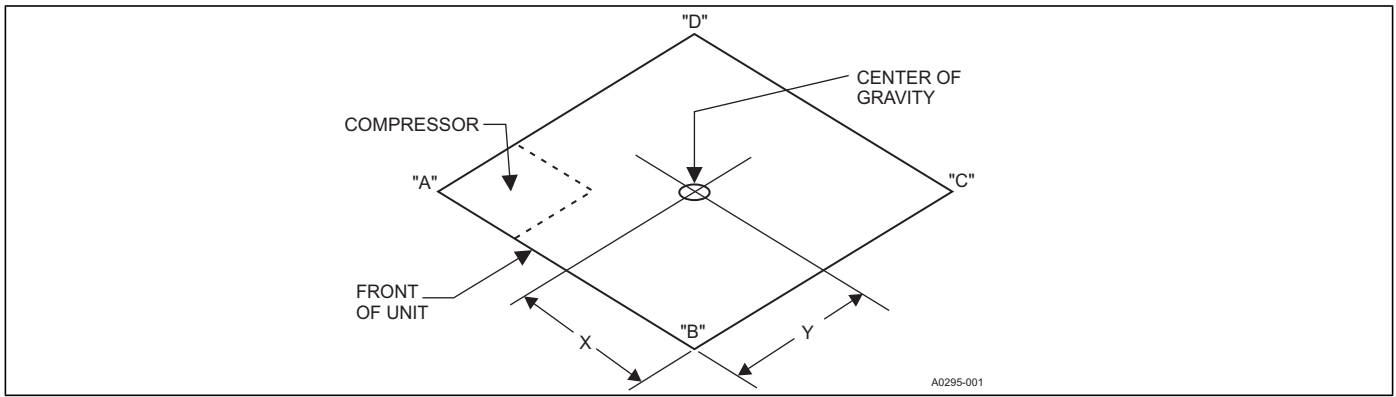


Figure 2: Center of Gravity Location

Table 4: Unit Dimensions

Model	Dimensions (in.)		
	A	B	C
PCG4A24	51 1/4	35 3/4	44
PCG4A30	51 1/4	35 3/4	45
PCG4A36	51 1/4	35 3/4	47
PCG4A42	51 1/4	35 3/4	47
PCG4B48	51 1/4	45 3/4	47
PCG4B60	51 1/4	45 3/4	50

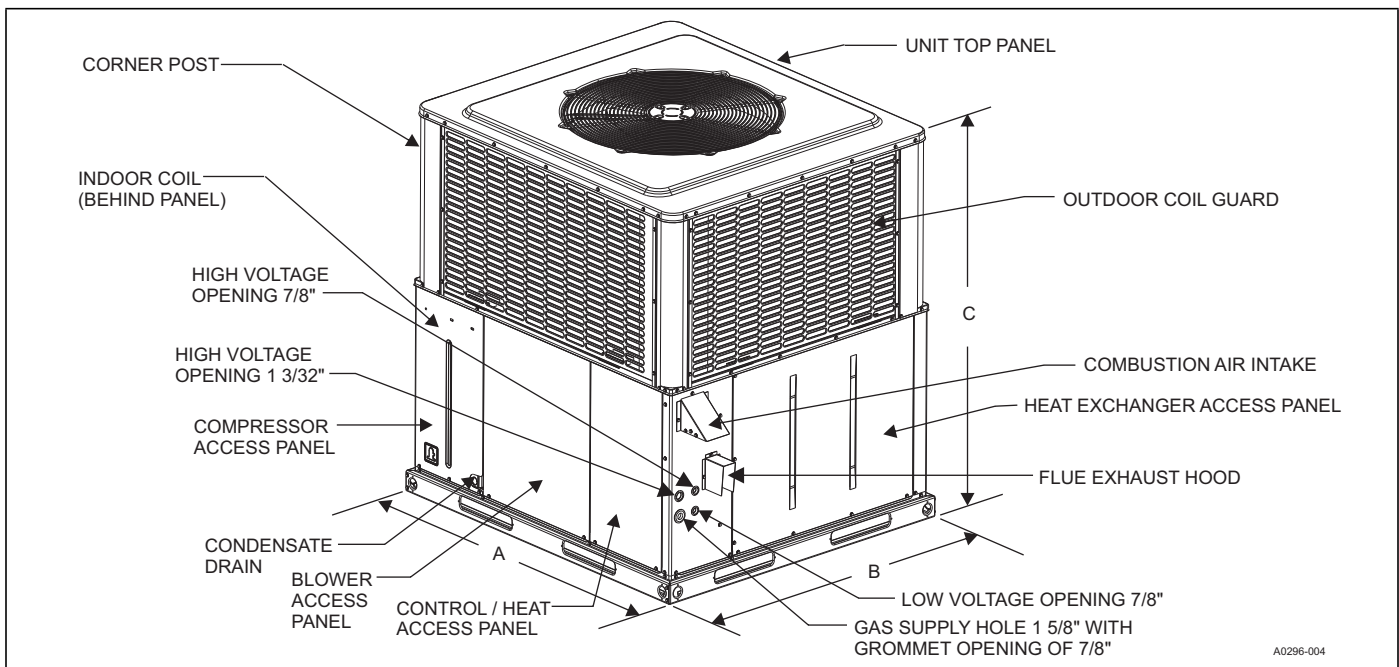


Figure 3: Unit Dimensions

Table 5: Unit Clearances<sup>1,2</sup>

Direction	Distance (in.)	Direction	Distance (in.)
Top <sup>3</sup>	36	Power Entry (Right Side)	36
Side Opposite Ducts	36	Left Side	24
Duct Panel	0	Bottom <sup>4</sup>	1

1. Provide a 1-in. clearance between any combustible material and the supply air duct work.
2. Do not allow the products of combustion to accumulate within a confined space and recirculate.
3. Install units outdoors. Make sure that overhanging structures or shrubs do not obstruct the outdoor air discharge outlet.
4. You can install units 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.

DUCT WORK

**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:
1. Remove the duct covers found in the bottom return and supply air duct openings.
  2. Install the duct covers removed in Step 1 to the rear supply and return air duct openings.
  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 use of economizers or ventilation air intake. It is best practice to use flexible joints in the supply and return duct work to minimize the transmission of vibration and noise.

**NOTICE**

*Be sure to note supply and return openings.*

See Figures 4 and 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.

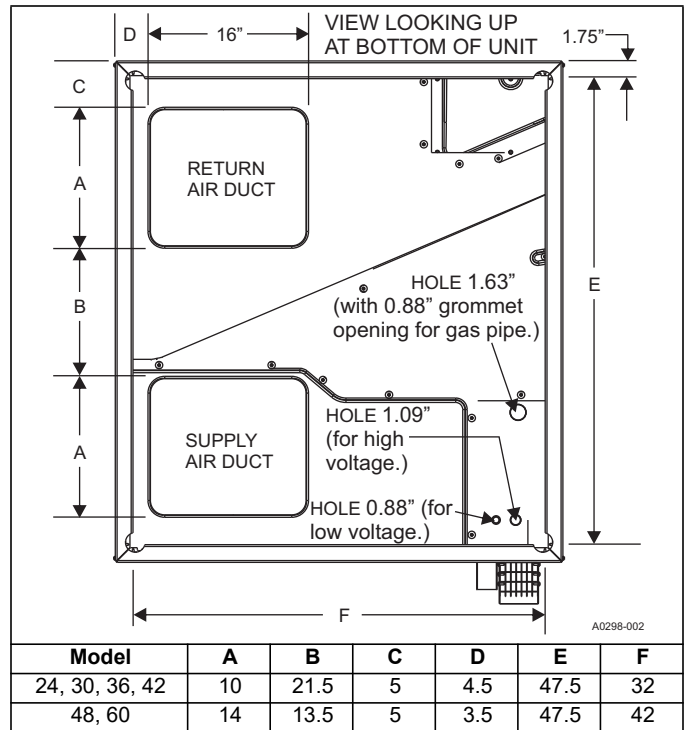


Figure 4: Bottom Duct Dimensions (in.)

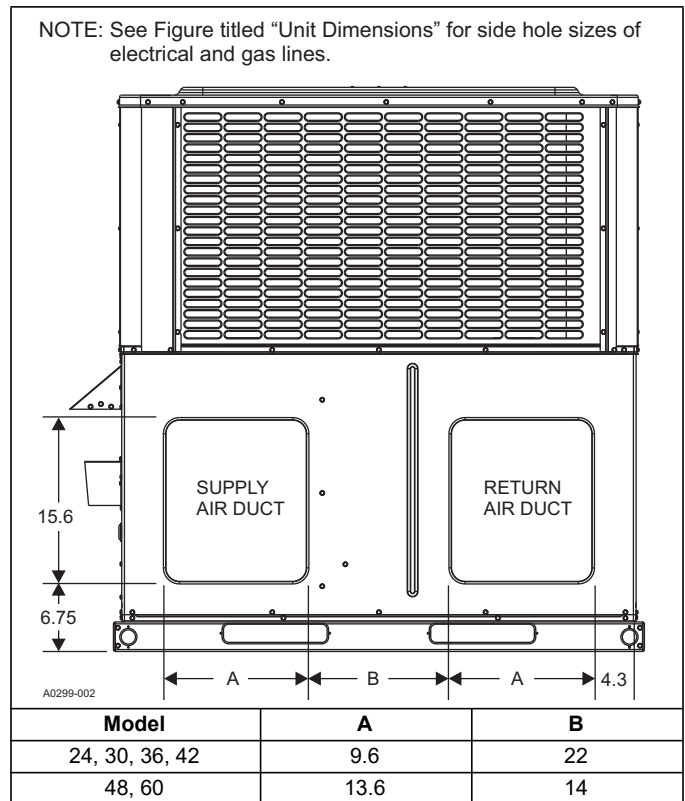


Figure 5: Rear Duct Dimensions (in.)

**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
- Heat exchanger 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. 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.*

**⚠ WARNING**

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

See Figure 14 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'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**

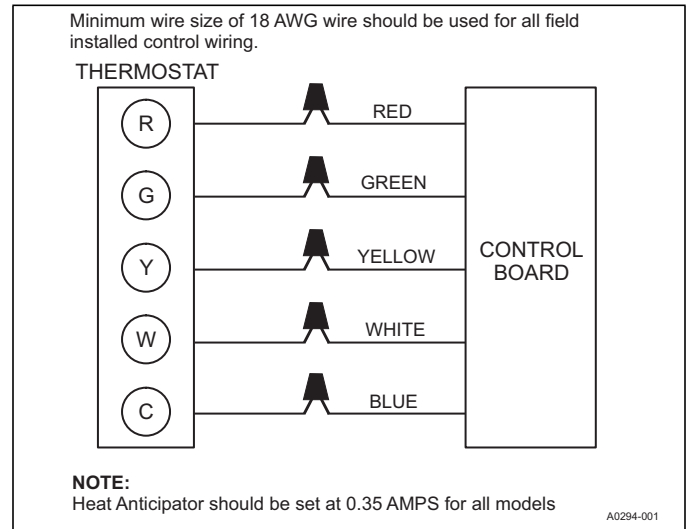
Field wiring to the unit must conform to provisions of the current NEC ANSI/NFPA No. 70 or CEC and/or local ordinances. The unit must be electrically grounded in accordance with local codes or, in their absence, with the NEC/CEC. Voltage tolerances that must be maintained at the compressor terminals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

Provide the wiring entering the cabinet with mechanical strain relief.

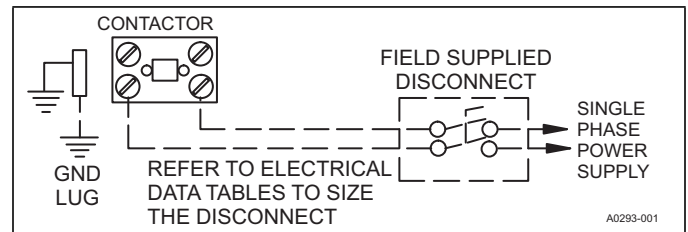
A fused disconnect switch must be field provided for the unit. If any of the wire supplied with the unit needs to be replaced, replacement wire must be of the type shown on the wiring diagram.

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

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



**Figure 6:** Typical Field Control Wiring Diagram for Gas Heat - AC Models



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

**Table 6:** Electrical Data - PCG4

Model	Voltage	Compressor			Outdoor Fan Motor	Indoor Blower Motor	MCA <sup>1</sup> (Amps)	Max Fuse <sup>2</sup> / Breaker <sup>3</sup> Size (Amps)
		RLA	LRA	MCC	FLA	FLA		
24050	208/230-1-60	10.8	55.0	16.8	0.8	2.6	16.9	25
24075	208/230-1-60	10.8	55.0	16.8	0.8	3.8	18.1	25
30050	208/230-1-60	12.3	63.0	19.2	0.8	2.6	18.8	30
30075	208/230-1-60	12.3	63.0	19.2	0.8	3.8	20.0	30
36050, 36075	208/230-1-60	14.7	75.0	22.9	1.7	3.8	23.9	35
36100	208/230-1-60	14.7	75.0	22.9	1.7	5.4	25.5	40
42075, 42100	208/230-1-60	15.9	112.3	24.8	1.7	5.4	27.0	40
48065, 48100, 48125	208/230-1-60	18.3	108.0	28.5	1.7	5.4	30.0	45
60065, 60100, 60125	208/230-1-60	22.2	127.9	34.7	1.7	7.0	36.5	50

1. Minimum Circuit Ampacity.  
 2. Maximum Overcurrent Protection per standard UL 1995.  
 3. Fuse or HACR circuit breaker is field installed.

Table 7: Physical Data

NOMINAL TONNAGE	MODELS														
	PCG4A24		PCG4A30		PCG4A36			PCG4A42		PCG4B48			PCG4B60		
	2.0		2.5		3.0			3.5		4.0			5.0		
<b>Refrigerant Information</b>															
Refrigerant Type	R-410A		R-410A		R-410A			R-410A		R-410A			R-410A		
Refrigerant Charge (lb-oz)	3-10		6-10		6-14			7-0		7-14			10-2		
<b>AHRI Gas Heat Performance</b>															
Heating Model	50	75	50	75	50	75	100	75	100	65	100	125	65	100	125
Heat Input (KBTU)	50.0	75.0	50.0	75.0	50.0	75.0	100.0	75.0	100.0	65.0	100.0	125.0	65.0	100.0	125.0
Heat Output (KBTU)	40	60	40	60	40	60	80	60	80	52	80	100	52	80	100
AFUE (%)	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0
Number of Burners	2	3	2	3	2	3	4	3	4	2	3	4	2	3	4
Number of Stages	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Temperature Rise Range (°F)	40-70		40-70		35-65			40-70		40-70			40-70		
Maximum Static Pressure W.C.	0.5		0.5		0.5			0.5		0.5			0.5		
Maximum Outlet Air Temperature (°F)	180		180		180			180		180			180		
Gas Piping Connection (in.)	1/2		1/2		1/2			1/2		1/2			1/2		
<b>Dimensions (in.)</b>															
Length	51 1/4		51 1/4		51 1/4			51 1/4		51 1/4			51 1/4		
Width	35 3/4		35 3/4		35 3/4			35 3/4		45 3/4			45 3/4		
Height	44		45		47			47		47			50		
Operating Weight (lb)	316	336	352	372	359	379	383	398	402	450	456	460	469	475	479
<b>Compressors</b>															
Type	Scroll		Scroll		Scroll			Scroll		Scroll			Scroll		
<b>Outdoor Coil Data</b>															
Face Area (sq. ft)	12.3		13.8		15.3			15.3		17.5			21.1		
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	Straight		Interlaced		Interlaced			Interlaced		Interlaced			Interlaced		
<b>Indoor Coil Data</b>															
Face Area (sq. ft)	4.6		4.6		4.6			4.6		6.2			6.2		
Rows	2		2		3			3		3			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		
<b>Outdoor Fan Data</b>															
Fan Diameter (in.)	24		24		24			24		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	1/8		1/8		1/3			1/3		1/3			1/3		
RPM	790		790		850			850		850			850		
Nominal Total CFM	2400		2400		2400			2400		3200			3200		
<b>Direct Drive Indoor Blower Data</b>															
Blower 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	1/3	1/2	1/3	1/2	1/2	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	1
RPM	1400 Max		1400 Max		1400 Max			1400 Max		1400 Max			1400 Max		
Frame Size	48		48		48			48		48			48		
<b>Filters</b>															
Filter Size	A		A		A			A		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 to compressor oil, 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.

## GAS HEAT

These single-stage gas-fired heat sections have direct spark ignition.

## GAS PIPING

Correct sizing of gas piping depends on the cubic feet per hour of gas flow required, the specific gravity of the gas, and the length of run. Follow National Fuel Gas Code Z223.1 or CSA B149.1 in all cases unless superseded by local codes or gas company requirements. See Tables 8 and 9.

The BTU content of the gas may differ with locality. Check the value with the local gas utility.

## NOTICE

*There may be a local gas utility requirement specifying a minimum diameter for gas piping. All units require a 1/2-in. pipe connection at the gas valve.*

## GAS CONNECTION

Route the gas supply line through the 1 5/8-in. hole located on the right side of the unit. See Figure 3 for the location. The unit is supplied with a rubber grommet that fits in this hole and is used to seal around the gas pipe.

**Note:** Install the rubber grommet to prevent leakage of air and water into the heating/controls compartment.

## Gas piping requirements:

- Install a drip leg and a ground joint union in the gas piping.
- When required by local codes, install a manual shut-off valve outside of the unit.
- Use wrought iron or steel pipe for all gas lines. Apply pipe thread sealant sparingly to male threads only.

**Table 8:** Natural Gas Pipe Sizing Chart<sup>1</sup>

Length (ft)	Nominal Inches Iron Pipe Size			
	1/2 in.	3/4 in.	1 in.	1 1/4 in.
10	132	278	520	1,050
20	92	190	350	730
30	73	152	285	590
40	63	130	245	500
50	56	115	215	440
60	50	105	195	400
70	46	96	180	370
80	43	90	170	350
90	40	84	160	320
100	38	79	150	305

1. Maximum capacity of pipe in cubic feet of gas per hour (based upon a pressure drop of 0.3 in. W.C. and 0.6 specific gravity gas).

**Table 9:** Propane (LP) Gas Pipe Sizing Chart<sup>1</sup>

Length (ft)	Nominal Inches Iron Pipe Size			
	1/2 in.	3/4 in.	1 in.	1 1/4 in.
10	275	567	1071	2,205
20	189	393	732	1496
30	152	315	590	1212
40	129	267	504	1039
50	114	237	448	913
60	103	217	409	834
70	96	196	378	771
80	89	185	346	724
90	83	173	322	677
100	78	162	307	630

1. Maximum capacity of pipe in thousands of BTU per hour (based upon a pressure drop of 0.5 in. W.C.).

### ⚠ CAUTION

*If flexible stainless steel tubing is allowed by the authority having jurisdiction, wrought iron or steel pipe must be installed at the gas valve and extend a minimum of 2 in. outside of the unit casing.*

### ⚠ WARNING

*Natural gas may contain some propane. Propane being an excellent solvent, will quickly dissolve white lead or most standard commercial compounds. Therefore, a special pipe thread sealant must be applied when wrought iron or steel pipe is used. Compounds such as RectorSeal No. 5 or equivalent compounds may be used.*

- Clean all piping of dirt and scale by hammering on the outside of the pipe and blowing out the loose dirt and scale. Before initial start-up, ensure that all of the gas lines external to the unit have been purged of air.
- The gas supply must be a separate line and installed in accordance with all applicable safety codes. After the gas connections have been completed, open the main shut-off valve admitting normal gas pressure to the gas valve. Check all joints for leaks with soap solution or other material suitable for the purpose.

**Note:** Never test for gas leaks with an open flame.

**⚠ WARNING****FIRE OR EXPLOSION HAZARD**

Failure to follow the safety warning exactly could result in serious injury, death, or property damage.

Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury, or loss of life.

- Disconnect the unit and its equipment shutoff valve from the gas supply system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.48 kPa).

- Isolate the unit from the gas supply piping system by closing its individual manual shut-off valve before conducting any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig (3.48 kPa).

**HIGH-ALTITUDE GAS CONVERSION**

The furnace is constructed at the factory for natural gas-fired operation at altitudes up to 2,000 ft above sea level. For installations located above 2,000 ft, reduce the gas input rate to the burners by 4% per 1,000 ft above sea level. It may be necessary to change to smaller orifices at high altitude. See Table 10 for the correct orifice size to use.

**Table 10:** High-Altitude Gas Orifice Sizing

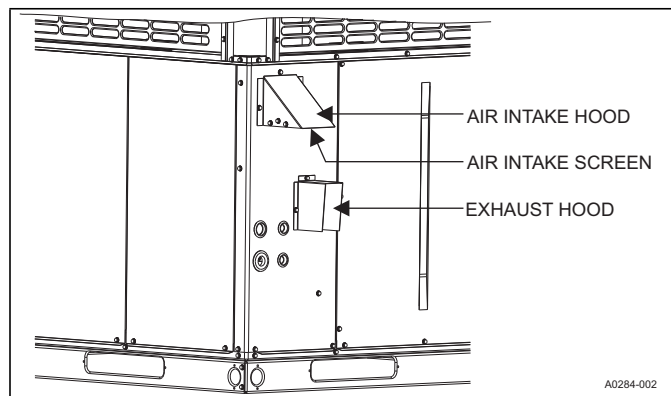
Gas Type	Cabinet Size	Elevation Above Sea Level (ft)								
		0–2000 (Factory)	2001–3000	3001–4000	4001–5000	5001–6000	6001–7000	7001–8000	8001–9000	9001–10000
Natural Gas Orifice Sizes	B	36	37	38	38	39	40	41	41	42
	A	42	42	43	43	43	44	44	45	46
LP Gas Orifice Sizes	B	51	51	52	52	52	52	53	53	53
	A	54	54	55	55	55	55	55	56	56

**FLUE VENT AND AIR INTAKE HOOD****⚠ WARNING**

Flue hood surfaces may be hot.

**⚠ CAUTION**

The flue exhaust hood must be properly installed and within the recommended clearances. Further communications and action must be given to the home or building owners to eliminate any unauthorized human contact around this area during the heating cycle. Flue hood surfaces and the immediate area reach high temperatures during the heating cycle.

**Figure 8:** Flue Vent Outlet Air Hood

The flue vent hood and air intake hoods are shipped loose. Install these hoods to ensure proper unit operation. Fasten the hoods to the outside of the side gas control/electrical compartment with the screws provided. See Figure 8.

**Table 11:** Natural Gas Application Data - PCG4

Available on Models	Input (MBH) <sup>1</sup>	Output (MBH)	Gas Rate <sup>2</sup> ft <sup>3</sup> /h	Number of Burners	Temperature Rise °F at Full Input <sup>3</sup>	
					Minimum	Maximum
2 tons, 2 1/2 tons	50	41	46	2	40	70
3 tons	50	41	46	2	35	65
4 tons, 5 tons	65	53	60	2	40	70
2 tons, 2 1/2 tons, 3 tons, 3 1/2 tons	75	61	70	3	40	70
3 tons, 3 1/2 tons	100	81	93	4	40	70
4 tons, 5 tons	100	81	93	3	40	70
4 tons, 5 tons	125	101	116	4	40	70

1. Heating capacity is valid for elevations up to 2,000 ft above sea level. For elevations above 2,000 ft, reduce the rated capacity by 4% for each 1,000 ft above sea level.

2. Based on 1,075 BTU/ft<sup>3</sup>.

3. The airflow must be adequate to obtain a temperature rise within the range shown. The continuous return air temperature must not be below 55°F.

**Table 12:** Propane<sup>1</sup> (LP) Gas Application Data - PCG4

Available on Models	Input (MBH) <sup>2</sup>	Output (MBH)	Gas Rate <sup>3</sup> ft <sup>3</sup> /h High Fire/Low Fire	Number of Burners	Temperature Rise °F at Full Input <sup>4</sup>		Propane Conversion Accessory Kit
					Minimum	Maximum	
2 tons, 2 1/2 tons	50	41	20	2	40	70	S1-1NP0703
3 tons	50	41	20	2	35	65	S1-1NP0703
4 tons, 5 tons	65	53	26	2	40	70	S1-1NP0704
2 tons, 2 1/2 tons, 3 tons, 3 1/2 tons	75	61	30	3	40	70	S1-1NP0703
3 tons, 3 1/2 tons	100	81	40	4	40	70	S1-1NP0703
4 tons, 5 tons	100	81	40	3	40	70	S1-1NP0704
4 tons, 5 tons	125	101	50	4	40	70	S1-1NP0704

1. Propane applications are accomplished by field installation of a propane conversion accessory kit. For more information, refer to the *APPLICATIONS AND ACCESSORIES* section in the *Technical Guide*.

2. Heating capacity is valid for elevations up to 2,000 ft above sea level. For elevations above 2,000 ft, reduce the rated capacity by 4% for each 1,000 ft above sea level.

3. Based on 2,500 BTU/ft<sup>3</sup>.

4. The airflow must be adequate to obtain a temperature rise within the range shown. The continuous return air temperature must not be below 55°F.

## SECTION V: AIRFLOW PERFORMANCE

**Table 13:** 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
PCG4A24050	Low (1)	560	520	480	410	370	320	270	220	120
	Medium Low (2)	720	690	640	590	530	490	440	400	300
	Medium (3)	810	770	730	690	630	590	540	500	420
	Medium High (4)	880	840	810	770	720	670	630	590	500
	High (5)	960	920	890	850	810	770	720	680	600
PCG4A24075	Low (1)	580	550	500	440	390	350	290	240	130
	Medium Low (2)	800	760	720	680	630	570	530	480	400
	Medium (3)	910	870	840	810	770	730	680	620	540
	Medium High (4)	1120	1080	1060	1030	1000	970	930	890	820
	High (5)	1180	1160	1130	1100	1070	1050	1010	980	910
PCG4A30050	Low (1)	680	640	600	550	490	440	390	350	250
	Medium Low (2)	750	710	670	620	560	510	460	430	330
	Medium (3)	880	840	810	770	720	670	630	590	500
	Medium High (4)	1000	970	930	900	860	820	780	730	650
	High (5)	1120	1090	1050	1020	990	960	920	880	800
PCG4A30075	Low (1)	690	660	620	570	520	460	410	360	270
	Medium Low (2)	1040	1010	980	940	910	880	840	800	700
	Medium (3)	1120	1080	1060	1030	1000	970	930	890	820
	Medium High (4)	1150	1120	1090	1060	1030	1000	970	930	870
	High (5)	1180	1160	1130	1100	1070	1050	1010	980	910
PCG4A36050	Low (1)	850	790	710	660	610	560	510	450	400
	Medium Low (2)	1000	950	900	840	790	730	680	640	550
	Medium (3)	1140	1100	1060	1010	960	900	850	800	710
	Medium High (4)	1270	1230	1190	1150	1110	1060	1000	960	860
	High (5)	1370	1340	1300	1260	1220	1180	1130	1070	980
PCG4A36075	Low (1)	850	790	710	660	610	560	510	450	400
	Medium Low (2)	1130	1090	1050	1000	940	890	830	790	700
	Medium (3)	1230	1190	1150	1110	1060	1010	960	910	820
	Medium High (4)	1270	1230	1190	1150	1110	1060	1000	960	860
	High (5)	1370	1340	1300	1260	1220	1180	1130	1070	980
PCG4A36100	Low (1)	870	800	730	670	610	560	510	450	230
	Medium Low (2)	1220	1170	1130	1080	1030	970	920	860	780
	Medium (3)	1390	1350	1310	1270	1220	1180	1130	1080	970
	Medium High (4)	1520	1480	1440	1400	1360	1320	1270	1220	1110
	High (5)	1600	1560	1520	1490	1440	1400	1360	1310	1200

Continued on next page

**Table 13:** 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
PCG4A42075	Low (1)	960	910	840	780	720	670	610	570	420
	Medium Low (2)	1150	1100	1050	1000	940	880	830	780	690
	Medium (3)	1270	1230	1190	1140	1090	1030	980	930	840
	Medium High (4)	1610	1570	1540	1500	1460	1420	1370	1330	1230
	High (5)	1640	1600	1570	1530	1490	1450	1410	1360	1270
PCG4A42100	Low (1)	960	910	840	780	720	670	610	570	420
	Medium Low (2)	1520	1480	1440	1400	1360	1320	1270	1220	1110
	Medium (3)	1580	1540	1510	1470	1430	1390	1340	1290	1180
	Medium High (4)	1610	1570	1540	1500	1460	1420	1370	1330	1230
	High (5)	1640	1600	1570	1530	1490	1450	1410	1360	1270
PCG4B48065	Low (1)	1090	1040	990	930	870	800	720	670	540
	Medium Low (2)	1140	1090	1030	980	920	850	780	730	600
	Medium (3)	1430	1380	1340	1290	1240	1200	1150	1100	980
	Medium High (4)	1690	1650	1600	1570	1530	1490	1440	1400	1310
	High (5)	1800	1760	1720	1680	1650	1610	1560	1520	1440
PCG4B48100	Low (1)	1140	1090	1030	980	920	850	780	730	600
	Medium Low (2)	1520	1470	1430	1390	1340	1300	1250	1210	1090
	Medium (3)	1600	1560	1510	1470	1430	1390	1350	1300	1200
	Medium High (4)	1690	1650	1600	1570	1530	1490	1440	1400	1310
	High (5)	1800	1760	1720	1680	1650	1610	1560	1520	1440
PCG4B48125	Low (1)	1140	1090	1030	980	920	850	780	730	600
	Medium Low (2)	1690	1650	1600	1570	1530	1490	1440	1400	1310
	Medium (3)	1800	1760	1720	1680	1650	1610	1560	1520	1440
	Medium High (4)	1870	1840	1790	1760	1730	1690	1640	1600	1520
	High (5)	1960	1920	1880	1840	1810	1770	1730	1690	1620
PCG4B60065	Low (1)	1090	1020	960	910	840	750	690	640	550
	Medium Low (2)	1160	1100	1050	990	930	860	800	740	640
	Medium (3)	1570	1530	1490	1450	1410	1370	1330	1290	1200
	Medium High (4)	1870	1840	1810	1770	1730	1690	1650	1620	1540
	High (5)	2000	1970	1930	1890	1860	1830	1780	1740	1670
PCG4B60100	Low (1)	1300	1240	1200	1150	1090	1050	1000	940	820
	Medium Low (2)	1510	1470	1430	1390	1340	1310	1260	1220	1130
	Medium (3)	1600	1560	1530	1480	1440	1410	1370	1330	1240
	Medium High (4)	1870	1840	1810	1770	1730	1690	1650	1620	1540
	High (5)	2000	1970	1930	1890	1860	1830	1780	1740	1670
PCG4B60125	Low (1)	1300	1240	1200	1150	1090	1050	1000	940	820
	Medium Low (2)	1700	1670	1630	1590	1550	1520	1480	1440	1370
	Medium (3)	1870	1840	1810	1770	1730	1690	1650	1620	1540
	Medium High (4)	1950	1920	1880	1840	1800	1770	1730	1690	1620
	High (5)	2000	1970	1930	1890	1860	1830	1780	1740	1670

**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 14:** Additional Static Resistance

Size (Tons)	CFM	Wet Indoor Coil	Economizer <sup>1</sup>	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
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
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 based on standard filter media tested at velocities not to exceed 300 ft/min.

## SECTION VI: OPERATION

The unit is controlled by a conventional heating/cooling thermostat. If an electronic thermostat is used, make sure it has a common connection.  
**Note:** Do not use a power stealing thermostat.

### HEATING SEQUENCE OF OPERATION

#### Heating

The control board begins a call for heat when W is energized (connected to R). The control board checks if the pressure switch is open. If the pressure switch is closed, the LED on the control board emits 2 red flashes, and the control board waits indefinitely for the pressure switch to open. When the pressure switch is sensed as open, the control board begins the pressure switch proving period. If the call for heat is removed, the control board goes back to standby.

#### Pressure Switch Proving

The control board energizes the induced draft motor and waits for the pressure switch to close. When the pressure switch closes, the control board begins the pre-purge period. If the call for heat is removed, the control board de-energizes the inducer without a post-purge period and returns to standby.

If the pressure switch does not close within 5 s of the inducer energizing, the LED on the control board emits 3 red flashes. If the pressure switch does not close within 60 s of the inducer energizing, the control board shuts off the inducer for 60 s, then energizes the inducer for another 60 s in an attempt to close the pressure switch. This cycle continues indefinitely until the pressure switch is proved to be closed or the call for heat ends.

#### Pre-Purge

The control board monitors the pressure switch and ensures it remains closed during the pre-purge period. If the pressure switch opens, the control board returns to pressure switch proving mode. The control board waits for a 15-s pre-purge period, then begins the ignition trial.

#### Ignition Trial

The control board energizes the gas valve and spark outputs for a 5-s ignition trial. The control board de-energizes the spark when the flame is sensed and enters a flame stabilization period.

If the flame is not established within the ignition trial, the control board de-energizes the spark and gas valve and begins an inter-purge period before attempting another ignition trial.

If the call for heat is removed during an ignition trial, the control board immediately de-energizes spark and gas. The control board runs the induced draft motor through a post-purge period before de-energizing.

If the pressure switch opens during an ignition trial, the control board immediately de-energizes spark and gas. The control board begins pressure switch proving before an inter-purge and re-ignition attempt.

#### Heat Blower On Delay

The control board waits for 30 s and then energizes the indoor blower heat speed. The blower on delay time begins at the start of the flame proving period in the ignition trial.

If the thermostat demand for heat is removed, the control board de-energizes the gas valve, energizes the blower on heat speed, and initiates a post-purge period and heat blower off delay.

#### Main Burner Operation

The control board keeps the main gas valve and induced draft motor energized while continuously monitoring the call for heat, pressure switch, and flame status.

If the call for heat (W) is removed, the control board de-energizes the gas valve, and begins the post-purge period and heat blower off delay.

If the pressure switch opens, the control board de-energizes the gas valve and begins pressure switch proving mode.

If the flame is removed, the control board de-energizes the gas valve within 2.0 s and counts the flame loss. If the flame has been lost less than five times, the control attempts re-ignition after a 15-s inter-purge period. If the flame has been lost five times within the same call for heat, the control board locks out, and the LED on the control board emits 8 red flashes.

## Post-Purge

The control board runs the induced draft motor for a 15-s post-purge period, and then de-energizes the inducer. If a call for heat occurs during the post-purge period, the control board finishes the post-purge period, and begins the next ignition sequence immediately.

## Heat Blower Off Delay

After a heating sequence, the control board de-energizes the indoor blower motor after a delay time as selected by a movable shunt (60 s, 90 s, 120 s, or 180 s). The blower off timing begins when the thermostat is satisfied and removes (W) the call for heat. The control board returns to standby when the blower off delay is complete.

If a thermostat call for heat occurs before the blower off delay is complete, the control board begins an ignition sequence, starting with the pre-purge period, while the blower off delay continues.

## Lockout

During a lockout, the control board keeps the main gas valve and induced draft motor de-energized.

You can reset lockouts resulting from failed ignition or flame losses by removing the call for heat (W) for more than 1 s or removing power from the control board for over 0.25 s. The control board automatically resets after 60 min.

Lockouts resulting from the detection of internal control faults reset after 60 min or power interruption. Cooling operations are available during a heating lockout.

## High-Temperature Limit Switch

Any time the high-temperature limit switch is open for less than 5 min, the control board runs the indoor blower motor on heat speed, runs the inducer, and de-energizes the gas valve, and the LED on the control board emits 4 red flashes. When the high-temperature limit switch closes, the control board restarts the ignition sequence, beginning with the pre-purge period.

If the high-temperature limit switch is open for more than 5 min, the control board de-energizes the inducer and continues to operate the indoor blower motor on heat speed, and the LED on the control board emits 11 red flashes.

## Rollout Switch

If the limit circuit is open for more than 15 min, the LED on the control board emits 5 red flashes. The blower output is energized when the rollout switch is open.

If the rollout switch is reset, the control board remains locked out until power is removed or a call for heat (W) is removed.

A rollout switch lockout does not reset automatically.

## Power Interruptions

Power interruptions of any duration do not cause a lockout or any operation requiring manual intervention.

## Flame Present with Gas Off

If the flame is sensed for longer than 4.0 s during a period when the gas valve should be closed, the control board enters lockout, and the LED on the control board emits 1 red flash. The control board energizes the inducer blower while the flame is sensed.

## GAS VALVE FAULT

If the main valve output is sensed as energized for more than 1 s when commanded to be off, the control board de-energizes the induced draft motor (if the flame is not present) to attempt to open the pressure switch to de-energize the gas valve. If the main gas valve is still sensed as energized after the inducer has been off for 10 s, the control board re-energizes the inducer to vent the unburned gas. The control board enters a hard lockout, and the LED on the control board emits 10 red flashes.

The only way to recover from a hard lockout is to remove and reapply 24-VAC power to the control board.

## Safety Controls

The control circuit includes the following safety controls:

- **High-temperature limit switch** - This is located inside the blower compartment and protrudes into the heat exchanger compartment. The high-temperature limit switch is set to open at a temperature selected to prevent the outlet air temperature from exceeding the maximum shown on the unit rating plate. It resets automatically. The high-temperature limit switch operates when a high-temperature condition occurs. The high-temperature limit switch shuts down the ignition control, closes the main gas valve, and energizes the blower.
- **Pressure switch** - If the induced draft motor fails, the pressure switch prevents the ignition control and gas valve from being energized.
- **Flame sensor** - The flame sensor is located on the left-most burner. If an ignition control fails to detect a signal from the flame sensor indicating the flame is properly ignited, the main gas valve closes.
- **Rollout switch** - This is located on the burner assembly. In the event of a sustained main burner flame rollout, the rollout switch closes the main gas valve. This is a manual reset switch.

## NOTICE

*The manual reset Rollout Switch (RS) must be reset before allowing furnace operation.*

## GAS HEATING FAULT CODES

The gas heating section has built-in self-diagnostic capability. A blinking LED light on the control board can flash red, green, or amber to indicate various conditions. The control board continuously monitors its own operation and the operation of the system. If a fault occurs, the LED light indicates the fault code.

The slow flash speed is 2 s on and 2 s off. The other flash codes listed below have the following timing: the LED light turns on for 1/3 s and turns off for 1/3 s. This pattern is repeated the number of times equal to the code. There is a 2-s pause between codes. For example, the 6 Red Flashes fault code means the LED light flashes on and off six times and then remains off for 2 s. This pattern repeats as long as the fault condition remains. The continuous flash codes listed below mean the LED light flashes on and off continuously with no breaks or longer pauses.

**Slow Green Flash:** Indicates normal operation with no thermostat calls. Standby mode.

**Rapid Green Flashes:** Indicates the control board is in factory test mode.

**Slow Amber Flash:** Indicates normal operation with a thermostat call for heat.

**LED Steady Off:** If the LED light does not flash at all, check that there is power to the control board and check for an open fuse on the control board. If the control board is correctly powered and the fuse is not open, the control board may need to be replaced.

**Steady on Red:** Indicates a possible control board failure. Turn off the power to the unit and turn on the power to the unit again. If the fault code recurs, replace the control board. The control board is not field-repairable.

**Rapid Amber Flash:** Indicates the flame sense current is below 1.5 VDC. Do the following:

- Check and clean the flame sensor.
- Check for proper gas flow.
- Verify that the current is greater than 1.5 VDC at the flame current test pad.

**4 Amber Flashes:** Indicates the control board is receiving a Y signal from the thermostat without a G signal. The furnace operates normally during heating and cooling, but this fault code is displayed to alert the user that there is a wiring problem. Verify that the G wire from the thermostat is connected properly.

**1 Red Flash:** Indicates the flame was sensed when there was no call for heat. The control board turns on both the induced draft motor and supply air blower. Check for a leaking or slow-closing gas valve.

**2 Red Flashes:** Indicates the pressure switch is closed when it should be open. The control board confirms the pressure switch contacts are open at the beginning of each heat cycle. The control board prevents the ignition sequence from continuing if the pressure switch contacts are closed when they should be open. Check for a faulty pressure switch or miswiring.

**3 Red Flashes:** Indicates the pressure switch contacts are open when they should be closed. Check for the following:

- Faulty inducer
- Blocked vent
- Broken pressure switch hose
- Disconnected pressure switch or inducer wires
- Faulty pressure switch

**4 Red Flashes:** Indicates the high-temperature limit switch or rollout switch has opened its contacts, which are normally closed. The control board turns on the supply air blower and inducer. Check for the following:

- Dirty filter
- Incorrectly sized duct system
- Incorrect blower speed setting
- Incorrect firing rate
- Loose high-temperature limit switch or rollout switch wiring
- Faulty blower motor

If the high-temperature limit switch does not close within 5 min, the control board operates as if the blower is not functioning. The control board starts a hard lockout and the LED on the control board emits 11 red flashes. If the high-temperature limit switch does not close after 15 min, the control board operates as if a manual reset rollout switch has opened, and the LED on the control board emits 5 red flashes. See the 5 Red Flashes and 11 Red Flashes descriptions below. If the high-temperature limit switch opens five times within a call for heat, the LED on the control board emits 4 red flashes, and the control board enters a 1-h soft lockout.

**5 Red Flashes:** Indicates the limit circuit has been open for more than 15 min, usually meaning that a manual reset rollout switch has opened. Check for the following:

- Proper combustion air
- Correct inducer operation
- Primary heat exchanger failure
- Burner problem

The control board enters a hard lockout. When the problem is corrected, you must turn off the power to the unit and turn on the power to the unit again to reset the control.

**6 Red Flashes:** Indicates that while the unit was operating, the pressure switch opened four times during the call for heat. Check for a faulty inducer, blocked vent, or faulty pressure switch. The furnace locks out for 1 h and then restarts.

**7 Red Flashes:** Indicates the flame could not be established during three attempts for ignition. Check that the gas valve switch is in the ON position. Check for the following:

- Low gas pressure or no gas pressure
- Faulty gas valve
- Dirty or faulty flame sensor
- Faulty hot surface ignitor
- Loose wires
- Burner problem

The furnace locks out for 1 h and then restarts.

**8 Red Flashes:** Indicates the flame has been lost five times (four recycles) during the heating cycle. Check for low gas pressure, a dirty or faulty flame sensor, or a faulty gas valve. The furnace locks out for 1 h and then restarts.

**9 Red Flashes:** Indicates reversed line voltage polarity, a grounding problem, or reversed low-voltage transformer wires. Do the following:

- Check the polarity at the furnace and branch.
- Check the furnace grounding.
- Check that the flame probe is not shorted to the chassis.

The furnace does not start the ignition sequence until the problem is corrected.

**10 Red Flashes:** Indicates the gas valve is energized with no call for heat. The main blower and inducer blower run and no ignition sequence starts as long as this condition exists. Check the gas valve and gas valve wiring.

**11 Red Flashes:** Indicates the limit circuit has remained open for more than 5 min and less than 15 min. This condition is usually caused by a failed blower motor or blower wheel. The control board enters a hard lockout. When the problem is corrected, you must turn off the power to the unit and turn on the power to the unit again to reset the control board.

**Soft Lockout:** The control includes a soft lockout that resets automatically after 1 h. This provides protection for an unoccupied structure if a temporary condition causes a furnace malfunction, for example, if a temporary interruption in gas supply prevents the furnace from lighting. The control board keeps trying to light each hour and resumes normal operation if the gas supply is restored.

**Hard Lockout:** Some fault conditions cause a hard lockout, and you must turn off the power to the unit and turn on the power to the unit again to reset the control board. The control board does not automatically restart.

## COOLING SEQUENCE OF OPERATIONS

When the thermostat calls for COOL, the thermostat terminals G and Y are energized, which signals the compressor, outdoor fan, and indoor blower to run.

With a call for Y, the indoor circulating blower is energized at cooling speed.

When the thermostat is satisfied, terminals G and Y are de-energized, de-energizing the compressor and outdoor fan.

After a cool fan off delay timing of 30 s, the indoor circulating blower is de-energized.

## Safety Controls

The control circuit includes the following safety control:

- High-pressure switch - This switch protects against excessive discharge pressures due to a blocked outdoor coil or an outdoor motor failure (opens at  $650 \pm 25$  psig and closes at  $450 \pm 25$  psig).

The high-pressure switch is specifically designed to operate with R-410A systems. Do not use R-22 pressure switches as replacements for R-410A pressure switches.

## WARNING

*The ability to properly perform maintenance on this equipment requires certain expertise, mechanical skills, tools, and equipment. If you do not possess these, do not attempt to perform any maintenance other than those procedures recommended in this Installation Manual. Failure to heed this warning could result in serious injury and possible damage to this equipment.*

## INDOOR CIRCULATING BLOWER

When the thermostat calls for FAN, the thermostat terminal G is energized, signaling the indoor circulating blower to run at the G-speed airflow.

If a call for COOL occurs (Y), the indoor circulating blower switches to run at the Y-speed airflow.

If a call for HEAT occurs (W), the indoor circulating blower switches to run at the W-speed airflow after a 30-s delay.

When the thermostat ends the call for FAN, the thermostat terminal G is de-energized, de-energizing the indoor circulating blower.

## 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 R410A 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.

## START-UP

### Prestart Check List

Complete the following checks before starting the unit:

- Check the type of gas being supplied. Ensure that it is the same as listed on the unit nameplate.
- Make sure that the vent outlet air hood and air intake hood have been properly installed.

### Operating Instructions

**Note:** Before you begin, stop and read the safety information on the unit label.

1. Set the thermostat to the OFF position.
2. Turn off all electrical power to the unit.

**Note:** Do not try to light the burners by hand. The unit is equipped with an ignition device that automatically lights the burners.

3. Remove the control access panel.
4. Set the gas valve switch to the OFF position.
5. Wait 5 min to clear out any gas.  
If you then smell gas, STOP. Follow B in the safety information on the unit label.

#### Or

If you don't smell gas, go to the next step.

6. Set the gas valve switch to the ON position.
7. Replace the control access panel.
8. Turn on all electric power to the unit.
9. Set the thermostat to the required setting.
10. If the unit does not operate, follow the instructions in the To Turn Off Gas to Unit section and call your service technician or gas supplier.

### To Turn Off Gas to Unit

1. Set the thermostat to the OFF position.
2. Turn off all electric power to the unit if service is to be performed.
3. Remove the control access panel.
4. Set the gas valve switch to the OFF position.  
**Note:** Do not force the gas valve switch.
5. Replace the control access panel.

### Post Start Check List

When the entire control circuit has been energized and the heating section is operating, make the following checks:

- Check for gas leaks in the unit piping as well as the supply piping.
- Check for correct manifold gas pressures. See the CHECKING GAS HEAT INPUT section.
- Check the supply gas pressure. It must be within the limits shown on the rating nameplate. You must check supply pressure with all gas appliances in the building at full fire. The standby gas line pressure must not exceed 13.5 in. W.C. and the operating pressure must not drop below 4.5 in. W.C. at any time for natural gas units. If gas pressure is outside these limits, contact the local gas utility for corrective action.

## ADJUSTMENT OF MANIFOLD GAS PRESSURE AND INPUT RATE

You can measure inlet gas pressure and manifold gas pressure by connecting the U-tube manometer to the gas valve with a piece of tubing. Complete the steps in the Preparing to Read Gas Pressure section and follow the steps in the Reading the Inlet Gas Pressure section or the Reading the Manifold Gas Pressure section as required. See Figure 9 for the locations of the pressure ports on the gas valve.

### Preparing to Read Gas Pressure

1. Turn off gas at the ball valve or gas cock on the gas supply line before the gas valve, and turn off the electrical supply.
2. Find the pressure ports on the gas valve marked OUT P and IN P.  
You take the manifold pressure reading at the port marked OUT P.  
You take the gas line pressure reading at the port marked IN P.
3. Using a 3/32 in. (2.4 mm) hex head wrench, loosen the set screw by turning it one turn counter clockwise.

**Note:** Do not remove the set screw from the pressure port.

### Reading the Inlet Gas Pressure

1. Make sure that you have completed the steps in the Preparing to Read Gas Pressure section.
2. Connect the positive side of the manometer to the IN P tap on the gas valve. Do not connect any tubing to the negative side of the manometer, because it references atmospheric pressure. See Figures 9 and 10 for connection details.
3. Turn on gas and electrical supplies and follow the operating instructions to place the unit back in operation.

**Table 15:** Inlet Gas Pressure Range

Inlet Gas Pressure Range		
	Natural Gas	Propane (LP)
Minimum	4.5 in. W.C. (1.12 kPa)	8.0 in. W.C. (1.99 kPa)
Maximum	10.5 in. W.C. (2.61 kPa)	13.0 in. W.C. (3.24 kPa)

**IMPORTANT:** The inlet gas pressure operating range table specifies what the minimum and maximum gas line pressures must be for the furnace to operate correctly. The gas line pressure **MUST BE** a minimum of:

- 7 in. W.C. (1.74 kPa) for Natural Gas
- 11 in. W.C. (2.74 kPa) for Propane (LP) Gas

This is in order to obtain the BTU input specified on the rating plate and/or the nominal manifold pressure specified in these instructions and on the rating plate.

4. When the correct inlet gas pressure has been established (see Table 15), turn the gas valve to OFF and turn the electrical supply switch to OFF. Remove the flexible tubing from the gas valve pressure tap and tighten the pressure tap plug using the 3/32 in. (2.4 mm) hex head wrench.
5. Turn on the electrical and gas supplies, and with the burners in operation, check for gas leakage around the gas valve pressure port using an approved non-corrosive gas leak detection fluid or other non-flammable leak detection methods.

### Reading the Manifold Gas Pressure

1. Make sure that you have completed the steps in the Preparing to Read Gas Pressure section.
2. Connect the positive side of the manometer to the OUT P tap on the gas valve. Do not connect any tubing to the negative side of the manometer, because it references atmospheric pressure. See Figures 9 and 10 for connection details.

**IMPORTANT:** The cap for the pressure regulator must be removed entirely to gain access to the adjustment screw. Loosening or tightening the cap does not adjust the flow of gas.



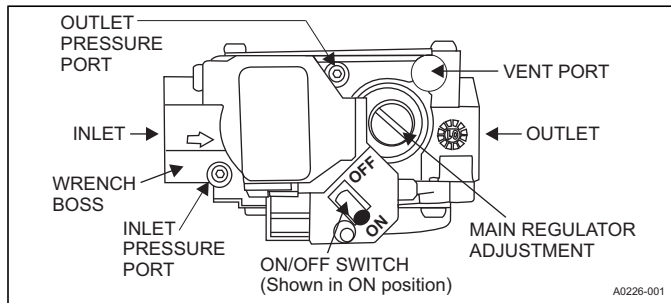
## NOTICE

*The regulated outlet pressure has been calibrated at the factory. Additional pressure adjustment should not be necessary. If adjustment is necessary, set to the following specifications. After adjustment, check for gas leakage.*

3. See Figure 9 for the location of the pressure regulator adjustment cap and adjustment screws on the main gas valve.
4. Turn on gas and electrical supplies and follow the operating instructions to place the unit back in operation.
5. Adjust the manifold pressure by adjusting the gas valve regulator screw for the appropriate gas per Table 16.

**Table 16:** Nominal Manifold Pressure

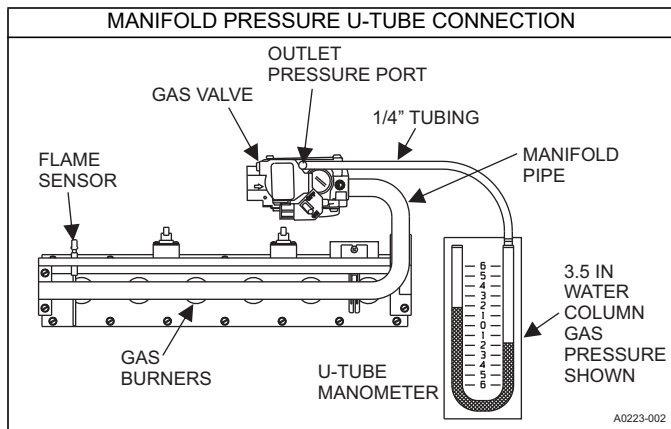
Nominal Manifold Pressure	
Natural Gas	3.5 in. W.C. (0.87 kPa)
Propane (LP) Gas	10.0 in. W.C. (2.488 kPa)



**Figure 9:** Gas Valve

**IMPORTANT:** If gas valve regulator is turned in (clockwise), manifold pressure increases. If the screw is turned out (counterclockwise), manifold pressure decreases.

6. When the manifold pressure has been adjusted, re-calculate the furnace input to make sure you have not exceeded the specified input on the rating plate. See Natural Gas in the CHECKING GAS HEAT INPUT section.
7. When the correct BTU (kW) input has been established, turn the gas valve to OFF and turn the electrical supply switch to OFF. Remove the flexible tubing from the gas valve pressure tap and tighten the pressure tap plug using the 3/32 in. (2.4 mm) hex head wrench.
8. Turn on the electrical and gas supplies, and with the burners in operation, check for gas leakage around the gas valve pressure port using an approved non-corrosive gas leak detection fluid or other non-flammable leak detection methods.



**Figure 10:** Reading Gas Pressure

## AIRFLOW SETTINGS

### Cooling Airflow Settings

The unit is equipped with a five-speed blower motor. Select the required cooling airflow by connecting the required motor speed tap wire to the yellow COOL speed wire coming from the control board. Select the speed to deliver approximately 350 CFM to 400 CFM per ton of A/C cooling capacity. Use of airflow outside of this range may cause diminished air conditioning performance, lower overall energy efficiency, and higher electric utility bills. See Table 17 for default cooling blower settings.

**Table 17:** Default Blower Speeds

Model Number	Default Blower Speeds		
	Heat (White Wire)	Cool (Yellow Wire)	Continuous Fan (Red Wire)
PCG4A24050	Medium Low (2)	High (5)	Low (1)
PCG4A24075	Medium High (4)	High (5)	Low (1)
PCG4A30050	Low (1)	High (5)	Low (1)
PCG4A30075	Medium Low (2)	High (5)	Low (1)
PCG4A36050	Low (1)	High (5)	Low (1)
PCG4A36075	Medium Low (2)	High (5)	Low (1)
PCG4A36100	Medium (3)	High (5)	Low (1)
PCG4A42075	Medium Low (2)	High (5)	Low (1)
PCG4A42100	Medium Low (2)	High (5)	Low (1)
PCG4B48065	Low (1)	High (5)	Low (1)
PCG4B48100	Medium Low (2)	High (5)	Low (1)
PCG4B48125	Medium Low (2)	High (5)	Low (1)
PCG4B60065	Low (1)	High (5)	Low (1)
PCG4B60100	Medium Low (2)	High (5)	Low (1)
PCG4B60125	Medium Low (2)	High (5)	Low (1)

### Continuous Fan Airflow Settings

The default blower speed for continuous fan operation is Low speed. To operate the furnace in continuous fan mode, set the wall thermostat fan switch to ON. To select the required continuous fan airflow, connect the required motor speed tap wire to the red FAN speed wire coming from the control board.

The default position is with the red (Low) blower speed wire connected to the red FAN speed wire coming from the control board. In certain circumstances, it may be necessary to move the continuous fan speed to a different speed tap. However, this is not best practice because it causes higher electrical energy usage and higher electric utility bills.

### Gas Heating Airflow Settings

See Table 17 for the default heating blower speed. The unit is equipped with a five-speed blower motor. See Table 17 for the default heating blower speed for each model.

In certain circumstances, it may be necessary to move the heating blower speed to a different motor speed tap.

**Note:** Not all of the five motor speeds are appropriate for gas heating operation.

The use of heating airflow at a speed other than the default speed causes diminished heating performance and may cause the furnace temperature limit controls to shut down the furnace.

## Measurement of Temperature Rise

### **⚠ DANGER**

The temperature rise, or temperature difference between the return air and the supply (heated) air from the furnace, must be within the range shown on the furnace rating plate and within the application limitations shown in Table 7.

The supply air temperature cannot exceed the **“Maximum Supply Air Temperature”** specified in these instructions and on the furnace rating plate. Under NO circumstances can the furnace be allowed to operate above the Maximum Supply Air Temperature. Operating the furnace above the Maximum Supply Air Temperature will cause premature heat exchanger failure, high levels of Carbon Monoxide, a fire hazard, personal injury, property damage, and/or death.

After about 5 min of operation, determine the furnace temperature rise. Measure the temperature of the return air and the heated air in the ducts about 6 ft (1.83 m) from the furnace, where they are not affected by radiant heat. Increase the blower speed to decrease the temperature rise. Decrease the blower speed to increase the temperature rise.

The blower speed tap connections are located on the motor plug in the blower compartment. To change the blower speed, see Table 13 and the unit wiring diagram. To use the same speed tap for heating and cooling, connect the white HEAT speed wire and the yellow COOL speed wire terminal to the required motor lead using a jumper wire or Y terminal.

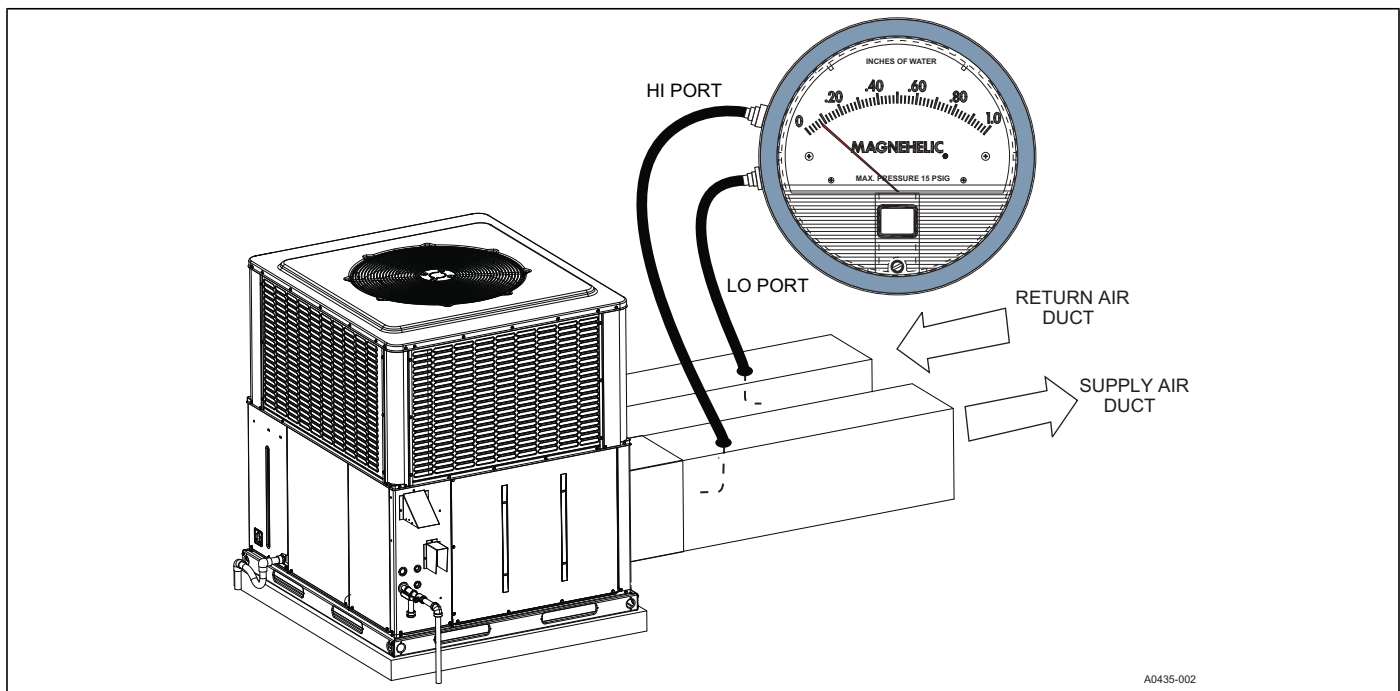
### DIRECT DRIVE BLOWER

All units have direct drive, multispeed standard ECM blower motors.

Connect the manometer as shown in the MEASURING EXTERNAL STATIC PRESSURE section. Place the unit in cooling mode and adjust the blower speed accordingly as per Table 13.

### 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



**Figure 11:** Measuring External Static Pressure

## CHECKING GAS HEAT INPUT

## Natural Gas

1. Turn off all other gas appliances connected to the gas meter.
2. With the unit turned on, measure the time needed for one revolution of the hand on the smallest dial on the meter. A typical gas meter usually has a 1/2 ft<sup>3</sup> or a 1 ft<sup>3</sup> test dial.
3. Using the number of seconds for each revolution and the size of the test dial increment, find the cubic feet of gas consumed per hour from Table 18.

If the actual input is not within 5% of the unit heating rating with allowance being made for the permissible range of the regulator setting, replace the orifice spuds with spuds of the proper size.

## NOTICE

*To find the BTU input, multiply the number of cubic feet of gas consumed per hour by the BTU content of the gas in your particular locality. Contact your gas company for this information since it varies widely from city to city.*

**Table 18:** Gas Rate (ft<sup>3</sup>/h)<sup>1</sup>

Seconds for One Revolution	Size of Test Dial	
	1/2 ft <sup>3</sup>	1 ft <sup>3</sup>
10	180	360
12	150	300
14	129	257
16	113	225
18	100	200
20	90	180
22	82	164
24	75	150
26	69	138
28	64	129
30	60	120
32	56	113
34	53	106
36	50	100
38	47	95
40	45	90
42	43	86
44	41	82
46	39	78
48	37	75
50	36	72
52	35	69
54	34	67
56	32	64
58	31	62
60	30	60

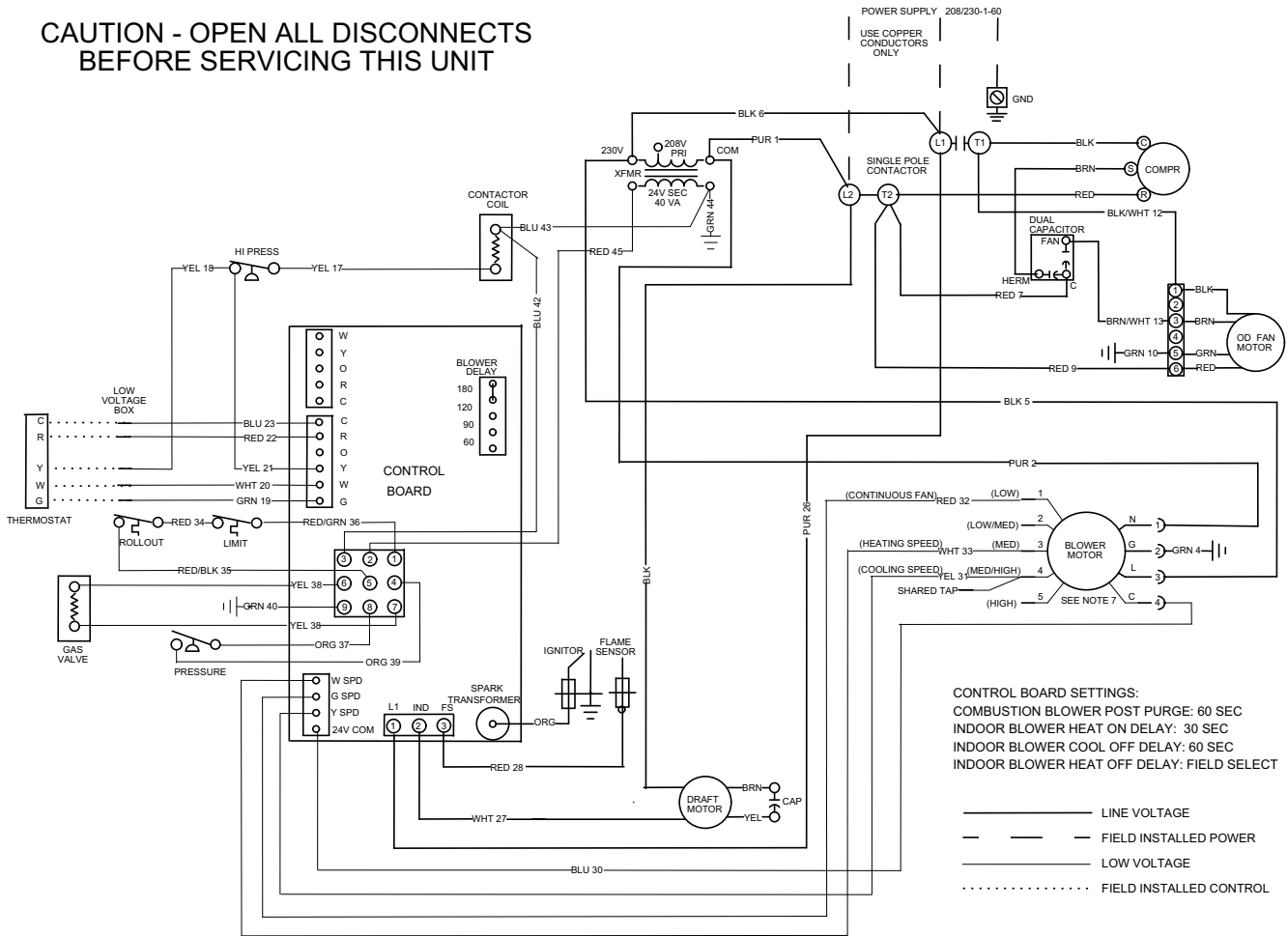
1. **Example:** By actual measurement, it takes 38 s for the hand on the 1 ft<sup>3</sup> dial to make a revolution with just a 100,000 BTUH furnace running. Using this information, locate 38 s in the first column of Table 18. Read across to the 1 ft<sup>3</sup> column, where you see that 95 ft<sup>3</sup>/h of gas are consumed by the furnace at that rate. Multiply 95 x 1050 (or the BTU rating of the gas obtained from the local gas company). The result is 99,750 BTUH, which is close to the 100,000 BTUH rating of the unit.

SECTION VII: TYPICAL WIRING DIAGRAMS

CONNECTION WIRING DIAGRAM  
COOLING UNIT WITH GAS HEAT

208/230-1-60

CAUTION - OPEN ALL DISCONNECTS  
BEFORE SERVICING THIS UNIT



CONTROL BOARD SETTINGS:  
COMBUSTION BLOWER POST PURGE: 60 SEC  
INDOOR BLOWER HEAT ON DELAY: 30 SEC  
INDOOR BLOWER COOL OFF DELAY: 60 SEC  
INDOOR BLOWER HEAT OFF DELAY: FIELD SELECT

— LINE VOLTAGE  
- - - FIELD INSTALLED POWER  
— LOW VOLTAGE  
..... FIELD INSTALLED CONTROL

DSI Fault Codes

Normal Operation

- Green Heartbeat Standby mode
- Amber Heartbeat Call for furnace heat active
- Rapid Green Flashes Control in Factory Test mode

Operational Fault Codes

Flashes	Fault Condition
None	Power Off or open fuse
Slow Green Flashes	Normal Operation
Slow Amber Flashes	Normal Operation with call for heat
Rapid Amber Flashes	Low flame sense current
4 Amber Flashes	No G from the thermostat with Y call
Steady on Red	Control Failure
1 Red Flash	Flame present with gas off
2 Red Flashes	Check pressure switch wiring
3 Red Flashes	Vent OR termination problem
4 Red Flashes	Airflow problem
5 Red Flashes	Flame Rollout
6 Red Flashes	Repeated pressure switch cycles
7 Red Flashes	Failed to light burners
8 Red Flashes	Loss of flame during call for heat
9 Red Flashes	Incorrect polarity OR Don't have neutral
10 Red Flashes	Gas valve shorted "ON"
11 Red Flashes	Check blower motor/wiring

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 INDOOR BLOWER SPEED TO REMAIN WITHIN THE TEMPERATURE RISE RANGE ON THE NAMEPLATE IN HEATING AND TO OBTAIN APPROX. 400 CFM/TON IN COOLING.
7. BLOWER MOTOR SPEED CONNECTIONS SHOWN ARE TYPICAL, BUT MAY VARY BY MODEL AND APPLICATION.

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Refer to Installation Manual for more detailed information.

Figure 12: Connection Wiring Diagram

# LADDER WIRING DIAGRAM COOLING UNIT WITH GAS HEAT

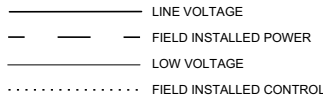
208/230-1-60

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

**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 WIRE 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 INDOOR BLOWER SPEED TO REMAIN WITHIN THE TEMPERATURE RISE RANGE ON THE NAMEPLATE IN HEATING AND TO OBTAIN APPROX. 400 CFM/TON IN COOLING.
7. BLOWER MOTOR SPEED CONNECTIONS SHOWN ARE TYPICAL, BUT MAY VARY BY MODEL AND APPLICATION.

**CONTROL BOARD SETTINGS:**  
 COMBUSTION BLOWER POST PURGE: 60 SEC  
 INDOOR BLOWER HEAT ON DELAY: 30 SEC  
 INDOOR BLOWER COOL OFF DELAY: 60 SEC  
 INDOOR BLOWER HEAT OFF DELAY: FIELD SELECT

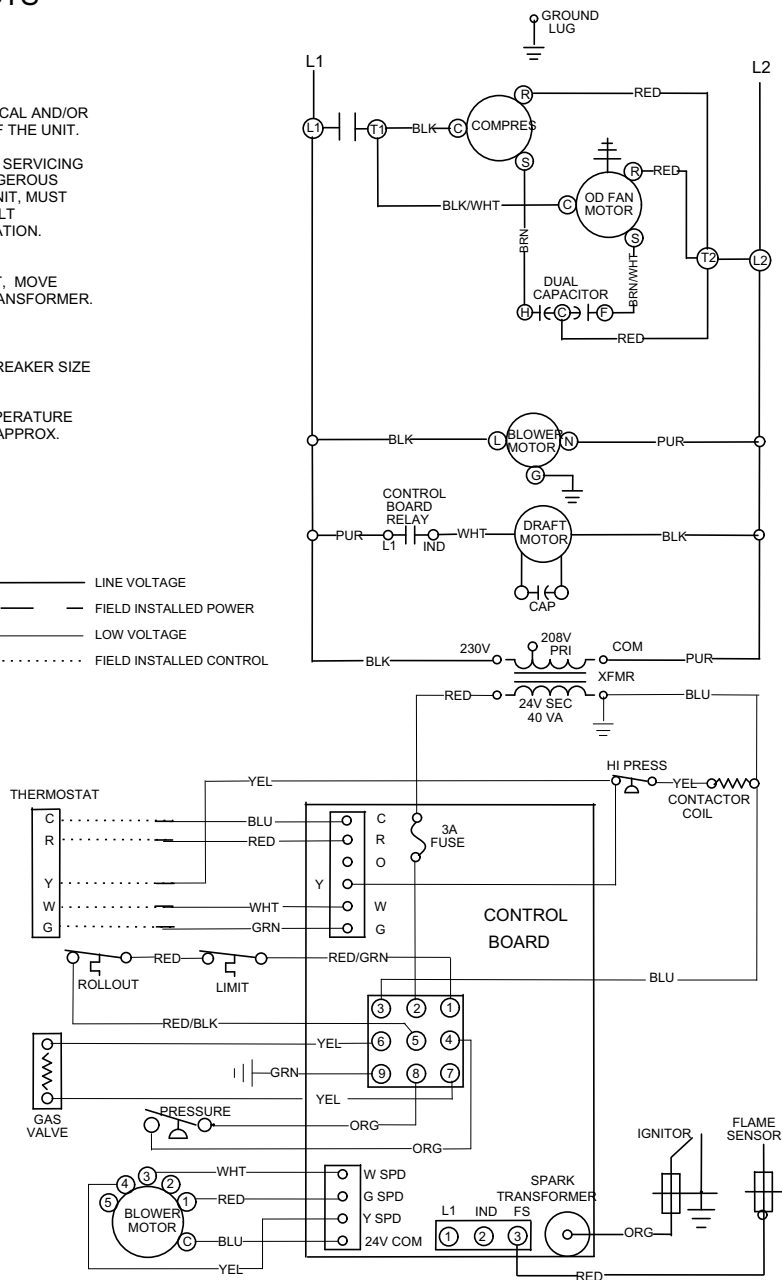


**DSI Fault Codes**

- Green Heartbeat Standby mode
- Amber Heartbeat Call for furnace heat active
- Rapid Green Flashes Control in Factory Test mode

**Operational Fault Codes**

Flashes	Fault Condition
None	Power Off or open fuse
Slow Green Flashes	Normal Operation
Slow Amber Flashes	Normal Operation with call for heat
Rapid Amber Flashes	Low flame sense current
4 Amber Flashes	No G from thermostat with Y call
Steady on Red	Control Failure
1 Red Flash	Flame present with gas off
2 Red Flashes	Check pressure switch wiring
3 Red Flashes	Vent OR termination problem
4 Red Flashes	Airflow problem
5 Red Flashes	Flame Rollout
6 Red Flashes	Repeated pressure switch cycles
7 Red Flashes	Failed to light burners
8 Red Flashes	Loss of flame during call for heat
9 Red Flashes	Incorrect polarity OR Don't have neutral
10 Red Flashes	Gas valve shorted "ON"
11 Red Flashes	Check blower motor/wiring



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Refer to Installation Manual for more detailed information.

Figure 13: Ladder Wiring Diagram

## R-410A QUICK REFERENCE GUIDE

### Refer to Installation Instructions for specific installation requirements

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

Figure 14: R-410A Quick Reference Guide

SECTION VIII: START UP SHEET

Residential Package Unit Cooling / Gas Heat Start-Up Sheet

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

Print Form

Reset Form

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  Commercial  New Construction  Retrofit  Roof level  Grade level  Down flow  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  Base rail hole blockage 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 / Cooling**

<b>Blower Type &amp; Set-Up</b>	<input type="radio"/> V.S. 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"/> ECM <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5	
<input type="radio"/> PSC <input type="radio"/> Low <input type="radio"/> Medium Low <input type="radio"/> Medium <input type="radio"/> Medium High <input type="radio"/> High		

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

**Refrigerant Charge and Metering Device**

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

**Gas Heat**

<input type="radio"/> Single Stage <input type="radio"/> Two Stage	<input type="radio"/> Natural Gas <input type="radio"/> Propane LP (Requires LP Conversion Kit)		
LP Gas Conversion Kit # <input type="text"/>	LP Conversion Kit Installed By <input type="text"/>	Inlet Gas Pressure (w.c.) <input type="text"/>	
Manifold Pressure at 100% Firing Rate (w.c.) <input type="text"/>	Measured BTU/H (Clock Gas Meter Nat Gas) <input type="text"/>	Rated BTU/H <input type="text"/>	
Manifold Pressure / Low Fire Rate (w.c.) <input type="text"/>	Return Air Dry Bulb Temp <input type="text"/>	Supply Air Dry Bulb Temp <input type="text"/>	Temp Rise <input type="text"/>
<input type="checkbox"/> Burner Flame Inspection - Blue flames extending directly into the primary heat exchanger cells			

**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**