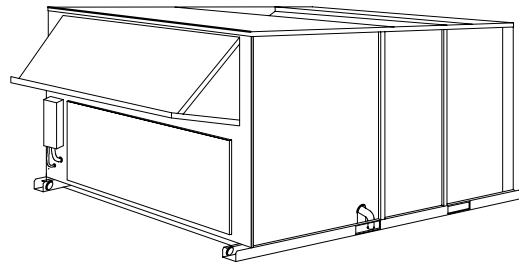


Installation Instructions

- Safety Labeling & Rules
- Installation Requirements
- Location / Clearances
- Gas Supply / Piping
- Wiring
- Air Distribution
- Ductwork Connections
- Start-Up
- Maintenance



Models

**Three Phase
208-230, 460, & 575 Volt**

PGS300H275A	PGE300H275A
PGS300L275A	PGE300L275A
PGS300H360A	PGE300H360A
PGS300L360A	PGE300L360A
PGS300S360A	PGE300S360A

**COMBINATION UNITS
ELECTRIC COOL / GAS HEAT**

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Safety Labeling and Signal Words

Danger, Warning and Caution

The signal words **DANGER**, **WARNING** and **CAUTION** are used to identify levels of hazard seriousness. The signal word **DANGER** is only used on product labels to signify an immediate hazard. The signal words **WARNING** and **CAUTION** will be used on product labels and throughout this manual and other manuals that may apply to the product.

Signal Words

DANGER - Immediate hazards which **WILL** result in severe personal injury or death.

WARNING - Hazards or unsafe practices which **COULD** result in severe personal injury or death.

CAUTION - Hazards or unsafe practices which **MAY** result in minor personal injury or product or property damage.

Signal Words in Manuals

The signal word **WARNING** is used throughout this manual in the following manner:

WARNING

The signal word **CAUTION** is used throughout this manual in the following manner:

CAUTION

Product Labeling

Signal words are used in combination with colors and/or pictures on product labels. Following are examples of product labels with explanations of the colors used.

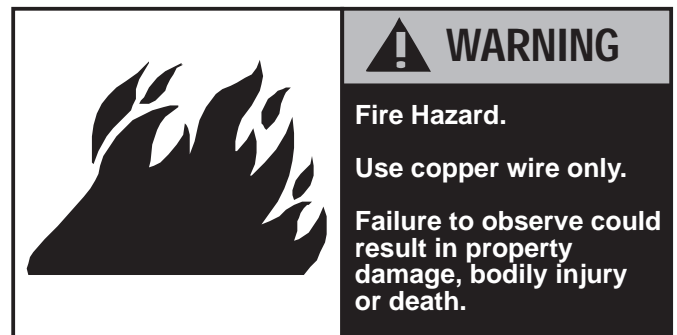
Danger Label

White lettering on a black background except the word **DANGER** which is white with a red background.



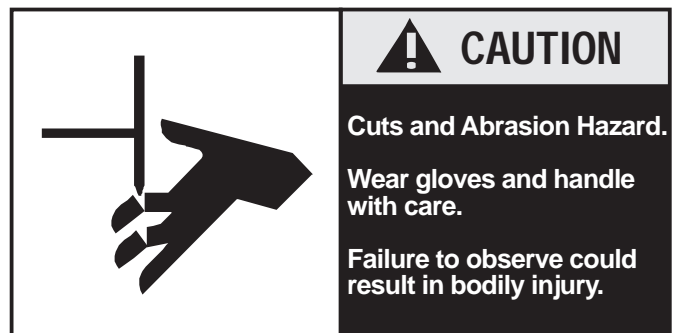
Warning Label

White lettering on a black background except the word **WARNING** which is black with an orange background.





Caution Label

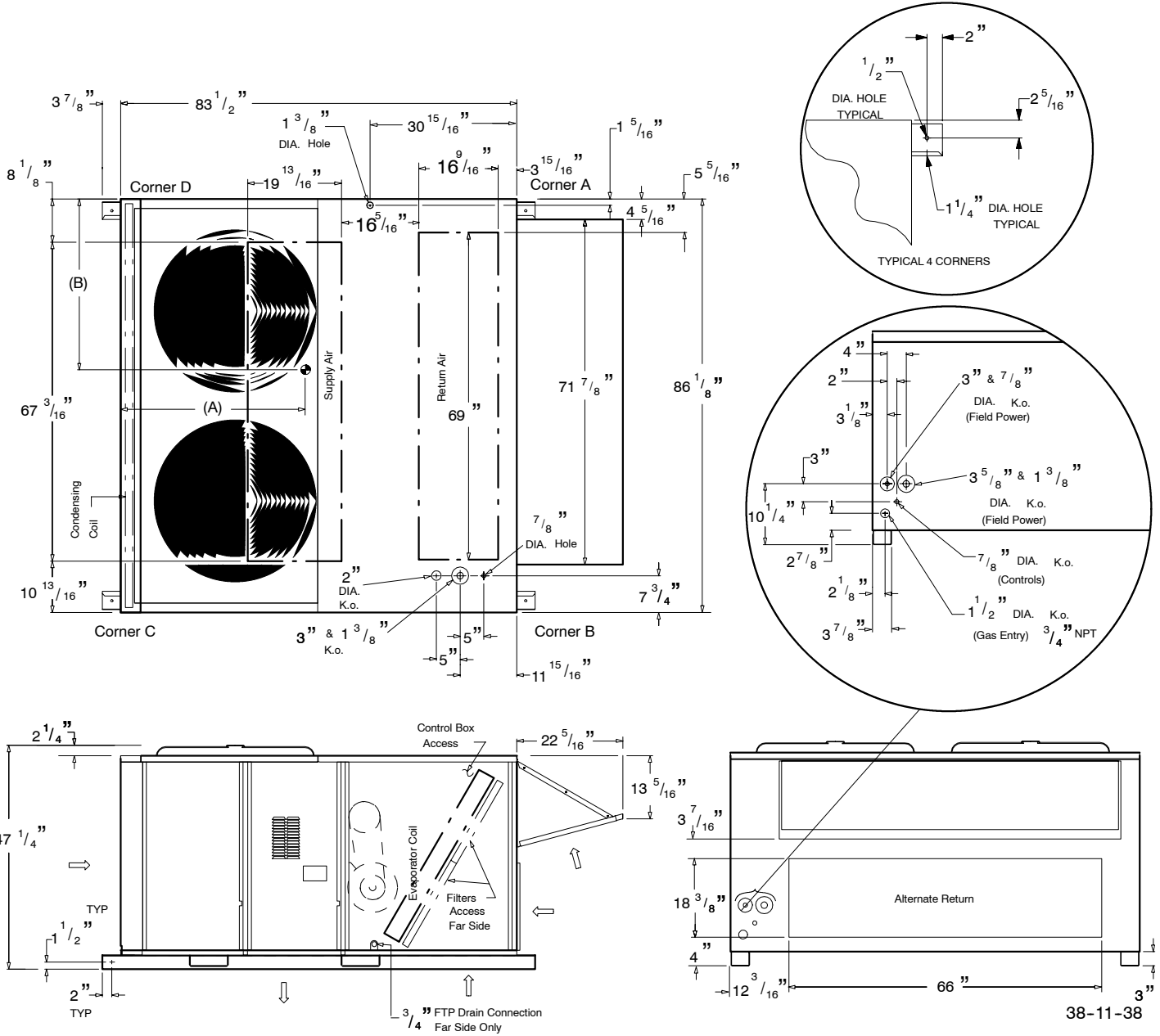
White lettering on a black background except the word **CAUTION** which is black with a yellow background.



PGS300 DIMENSIONS

PGS300	Unit Weight		Corner A		Corner B		Corner C		Corner D		Dim. A		Dim. B	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	ft-in	mm	ft-in	mm
	2000	907	471	214	428	194	526	239	574	260	3-2	965	3-5	1041

1.  Center of Gravity.
2.  Direction of Airflow



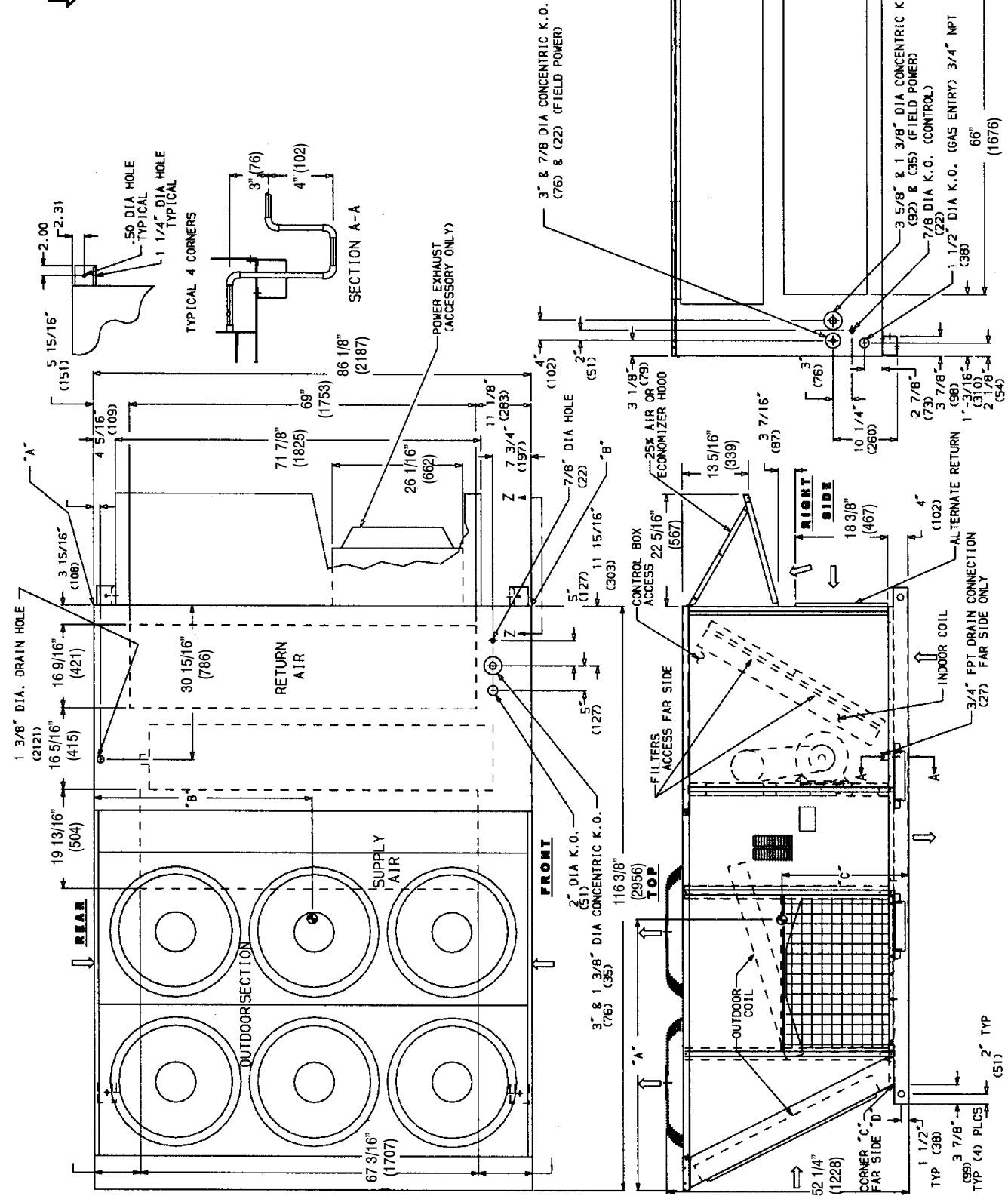
PGE300 UNIT DIMENSIONS

PGE300	Unit Weight		Corner A		Corner B		Corner C		Corner D		Dim. A		Dim. B		Dim. C	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	ft-in	mm	ft-in	mm	ft-in	mm
	2270	1030	532	242	526	239	569	259	593	270	4-	1372	3-7	1099	2-1	641

1. Dimensions in () are in millimeters.

2. Center of Gravity.

3. Direction of Airflow



Safe Installation Requirements

WARNING

Installation or repairs made by unqualified persons could result in hazards to you and others. Installation must conform with local building codes or, in the absence of local codes, with National Fuel Gas Code NFPA 54/ANSI Z223.1 current edition and National Electrical Code ANSI/NFPA 70 current edition. In Canada the National Standard CAN/CGA 1-B149.1 or current edition and CSA C.22.1 - Canadian Electrical Code Part 1 or current edition.

Failure to carefully read and follow all instructions in this manual could result in furnace malfunction, property damage, personal injury and/or death.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures, equipped with the proper tools and test instruments.

- Installation **MUST** conform to the most current version of the following standards or a superseding standard.

In the United States:

- National Fuel Gas Code NFPA 54/ANSI Z223.1
- National Electrical Code ANSI/NFPA 70

In Canada:

- National Standard CAN/CGA 1-B149.1
- CSA C.22.1 - Canadian Electrical Code Part 1.
- Do **NOT** use this furnace as a construction heater.
- Use only the type of gas approved for this furnace (see rating plate).
- Do **NOT** use open flame to test for gas leak.
- Seal supply and return air ducts.

NOTE: It is the personal responsibility and obligation of the customer to contact a qualified installer to ensure that the

installation is adequate and conforms to governing codes and ordinances.

CAUTION

RISK OF REDUCED COMPONENT LIFE

Failure to follow these Caution may result in premature component failure.

It is recommended that a qualified service technician check the heat exchanger integrity a minimum of every two (2) years.

Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air.

Be sure that unit is installed so that snow will not block the combustion intake or flue outlet.

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Locate mechanical draft system flue assembly at least 48 inches from any opening through which combustion products could enter the building, or as local codes dictate, and at least 48 inches from an adjacent building or combustible material. When unit is located adjacent to public walkways, flue assembly must be at least 7 feet above grade.

Flue vent discharge must have a minimum horizontal clearance of 48 inches from electric and gas meters, gas regulators, and gas relief equipment.

Flue gas can deteriorate building materials. Orient unit so that flue gas will not affect building materials.

Adequate combustion-air space must be provided for proper operation of this equipment. Be sure that installation complies with all local codes and Section 5.3, Air for Combustion and Ventilation, NFGC (National Fuel gas Code), ANSI (American National Standards Institute) Z223.1 -latest year and addendum Z223.1A latest year. In Canada, installation must be accordance with CAN1B149.1 and CAN1.B149.2 installation codes for gas burning appliances.

Location And Set-up

The unit is designed for outdoor installation **ONLY**. The unit may be installed on a level concrete mounting base (or other adequate platform) at ground level or on a flat rooftop with an adequate platform. If using as a downflow model, use a roof curb. Typical installations are shown in **Figure 2**.

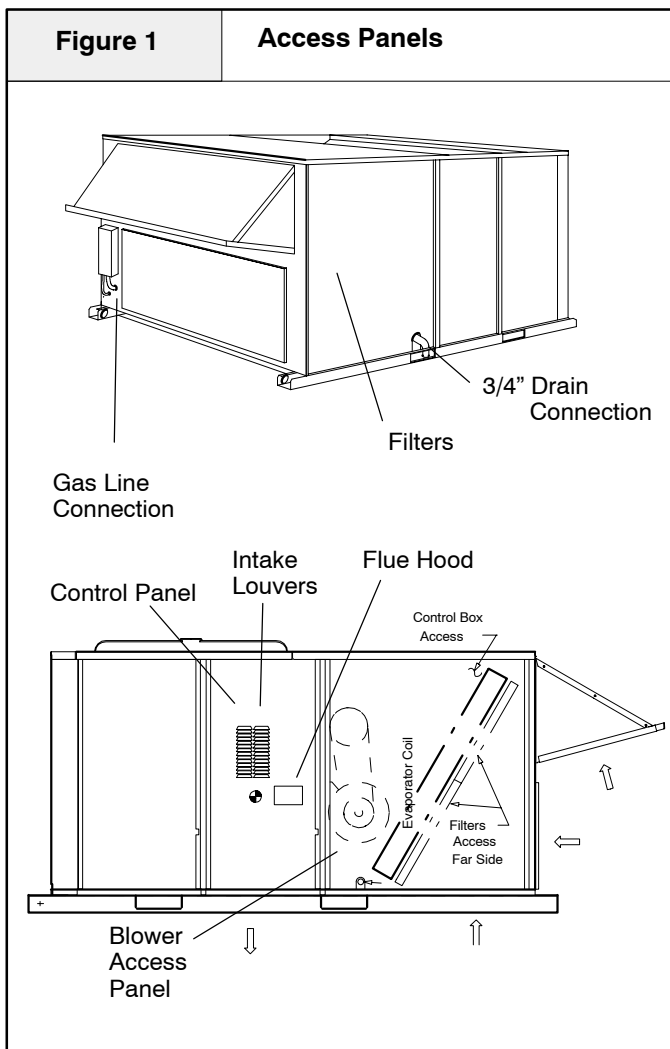
Access Panels

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD.

Failure to keep blower access panels in place could result in bodily injury and/or death.

Keep blower access panels in place.



Clearances

The location **MUST** allow for minimum clearances and should not be adjacent to an area where the unit's operating sound level might be objectionable.

Minimum clearances, as specified below, **MUST** be maintained to provide adequate fire protection, adequate combustion air, and room for service personnel. In addition, local codes **MUST** be observed.

Do **NOT** install the unit in a location that will permit discharged air from the condenser to recirculate to the condenser inlet.

Do **NOT** install the unit in a location that will permit discharged air from the furnace exhaust flue to recirculate into the unit or into the intake vent of any other equipment or ventilation system.

⚠ CAUTION

RISK OF REDUCED COMPONENT LIFE

Failure to follow these Caution may result in premature component failure.

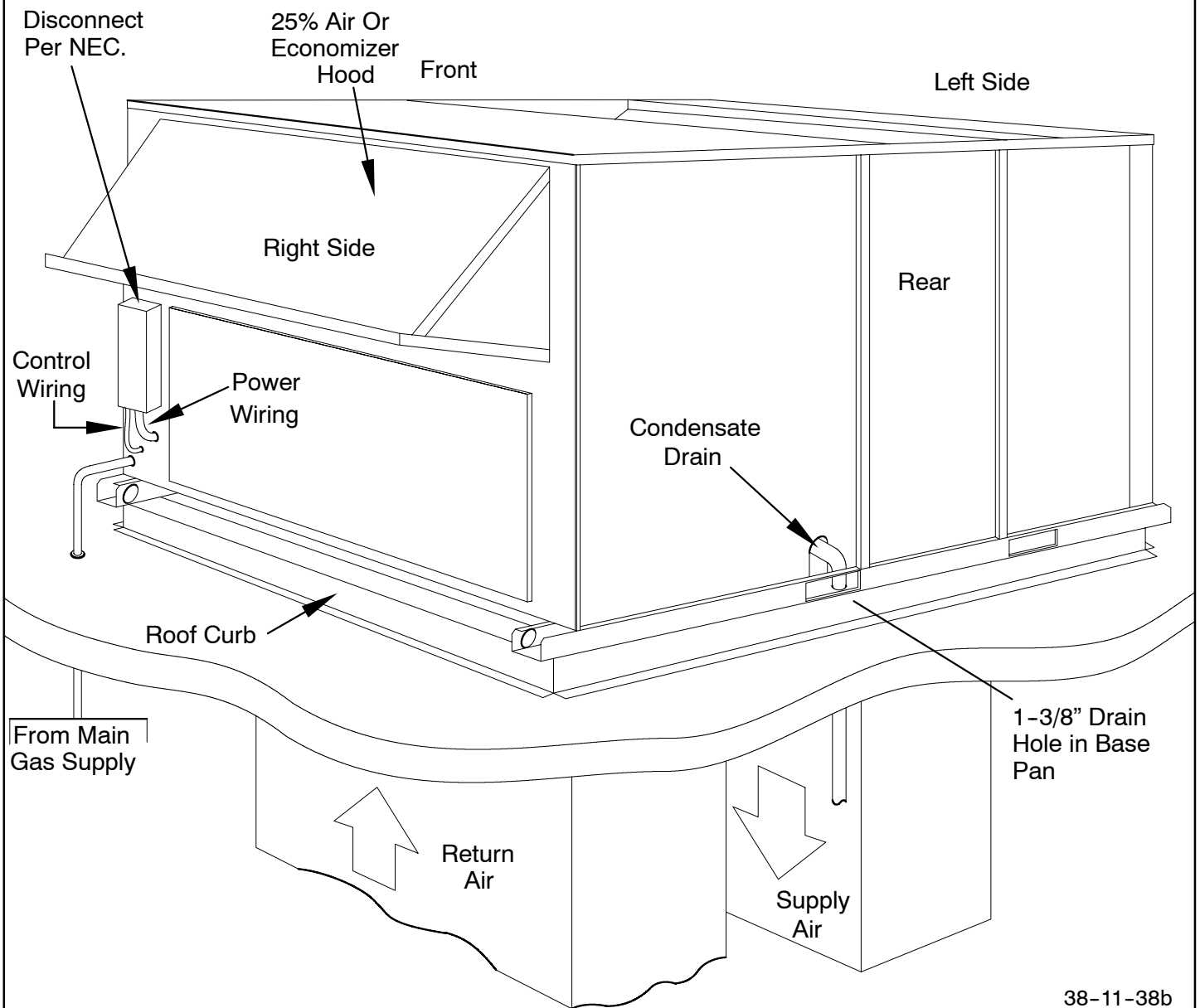
Do **NOT** operate unit in a corrosive atmosphere containing chlorine, fluorine, or any other corrosive chemicals.

Minimum Clearances to Combustible and non-Combustible Construction (Horizontal & DownFlow)

Flue Side and combustible surfaces	48"
Bottom of Unit and combustible surfaces with no curb	1"
Condenser Coil, one side	36"
other side (which side is optional)	12"
Overhead clearance	60"
Control Box Side	42"
Horizontal Duct Connections Side	0"

Figure 2

TYPICAL INSTALLATIONS & CLEARANCES



38-11-38b

CLEARANCES

1. Ductwork to be attached to accessory roof curb only.
2. Minimum clearance:
 - Rear: 7'-0" (2134) for coil removal. This dimension can be reduced to 4'0" (1219) if conditions permit coil removal from the top.
 - 4'0" (1219) to combustible surfaces, all four sides (includes between units).
 - Left Side: 4'-0" (1219) for proper condenser coil airflow.
 - Front: : 4'-0" (1219) for control box access.
 - Right side: 4'-0" (1219) for proper operations of damper and power exhaust if so equipped.
 - Top: 6'-0" (1829) to assure proper condenser fan operation.
 - Bottom: 14" (356) to combustible surfaces (when not using curb).
 - Control Box side: 3'-0" (914) to ungrounded surfaces, non-combustible
 - Control Box Side: 3'-6" (1067) to block or concrete walls, or other grounded surfaces.
 - Local codes or jurisdiction may prevail.
3. With the exception of clearance for the condenser coil as stated in Note 2, a removable fence or barricade requires no clearance.
4. Dimensions are from outside of corner post. Allow 5/16" (8) on each side for top cover drip edge.

Installation

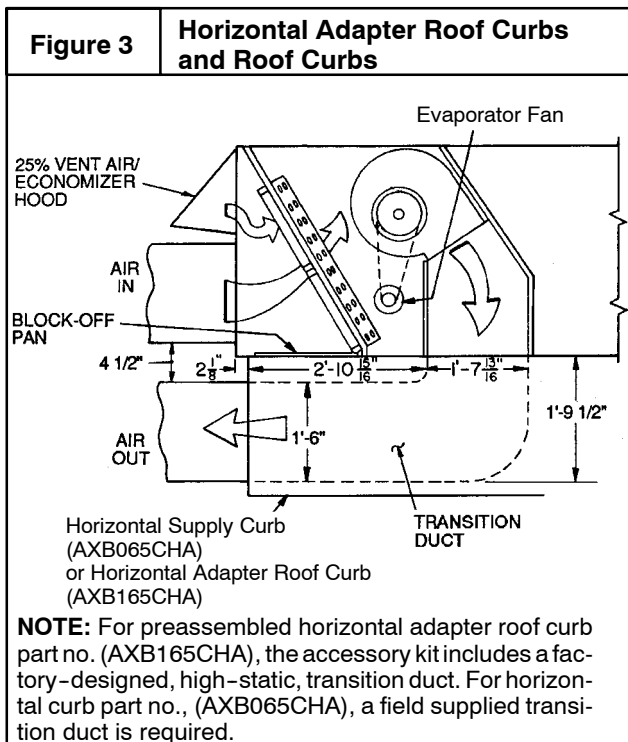
NOTE:

Unit will **NOT** operate properly unless it is installed level front to rear and side to side.

The slope **MUST NOT** be greater than $\frac{1}{16}$ " per foot (10mm per meter). For side to side leveling, the control box side **MUST** always be higher.

Ground Level Installation

ROOF CURB: Assemble and install accessory horizontal adapter roof curb in accordance with instructions shipped with accessory. See Figure 2. Ductwork can be installed to horizontal adapter roof curb before unit is set in place. Adapter roof curb should be level. This is necessary to permit unit drain to function properly. Unit leveling tolerance is $\pm 1/16$ " per linear foot in any direction. Refer to Accessory Horizontal Adapter Roof Curb Installation Instructions for additional information as required. When accessory horizontal adapter roof curb is used, unit may be installed on class A, B, or C roof covering material.



IMPORTANT: The gasketing of the unit to the roof curb or adapter roof curb is critical for a watertight seal. Improperly applied gasket can also result in air leaks and poor unit performance.

ALTERNATE UNIT SUPPORT: When the curb or adapter cannot be used, install unit on a noncombustible surface. Support unit with sleepers, using unit curb support area. If sleepers cannot be used, support long sides or unit with a minimum of 3 equally spaced 4-in. x 4-in. pads on each side.

Rooftop Installation

- The unit **MUST** be situated to provide safe access for servicing.
- The existing roof structure **MUST** be adequate to support the weight of the unit or the roof **MUST** be

reinforced.

Check the weight of the unit in relation to the roof structure and local building codes or ordinances and reinforce roof structure if necessary. See product specification sheet for unit weights and corner weights.

- Support for the unit **MUST** be level and strong enough to carry unit weight. The support may consist of a platform or a combination of platform and roof beams or curb.

The platform may be constructed of pressure treated wood and may be covered with Class A, B or C roof covering.

- Platform **MUST** allow for proper condensate trap installation and drainage. See associated text for more information about condensate drainage.

NOTE: MAKE SURE DOWNFLOW SUPPLY AND RETURN AIR DUCTS ARE FREE OF OBSTRUCTIONS BEFORE INSTALLING UNIT ON ROOF CURB OR ANY DOWNFLOW APPLICATION. Remove all forklift supports, covers, cardboard, etc., from the downflow return and supply air ducts.

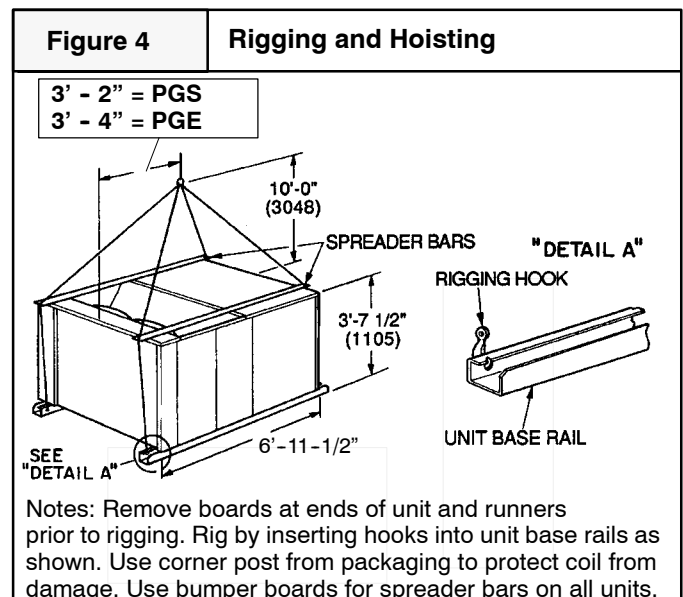
Hoisting

NOTE: All access panels **MUST** be secured in place before hoisting.

The unit should be hoisted with two lifting slings. Attach the slings to rigging shackles that have been hooked through holes in the base rail. See **Figure 4**.

Two spreader bars **MUST** be placed on top of the unit to protect the unit from damage from the pressure exerted by the slings. Make sure that all equipment is adequate to handle the weight of the unit and that the slings will not allow the unit to shift. See **Figure 4**.

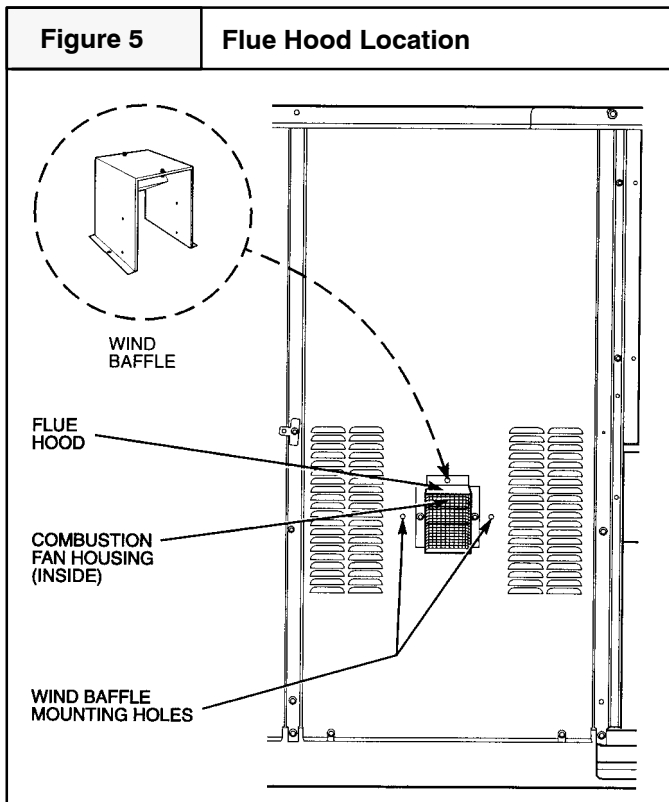
Inspect unit for transportation damage. File any claim with transportation agency. Keep unit upright and do not drop. Spreader bars are not required if top crating is left on unit.



Install Flue Hood and Wind Baffle

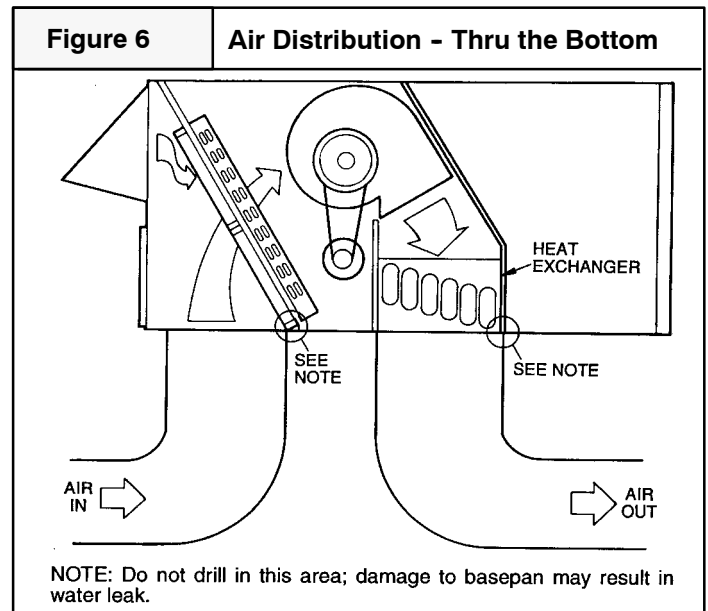
Install flue hood and wind baffle. Flue hood and wind baffle are shipped secured under main control box. To install, secure flue hood to access panel. See **Figure 5**. The wind baffle is then installed over the flue hood.

NOTE: When properly installed, flue hood will line up with combustion fan housing.



Unit Duct Connections

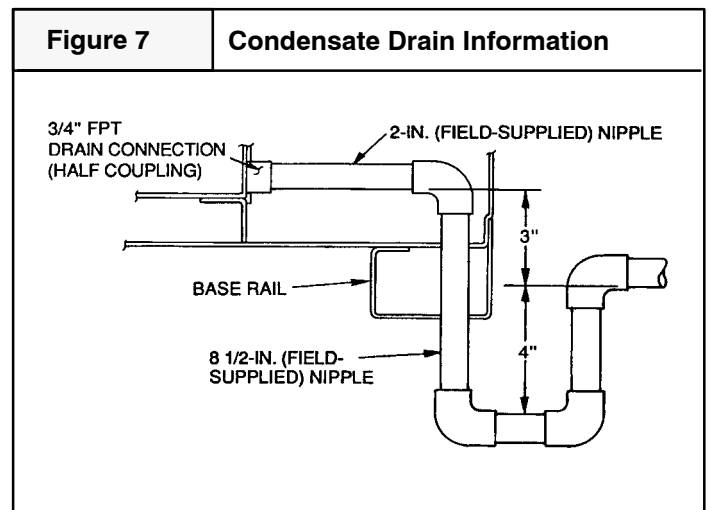
These units are shipped ready for downflow operation but are adaptable to horizontal use. To convert to horizontal operation, refer to Ground Level Installation Section of this manual.



Condensate Drain

The condensate drain outlet is a 3/4 -in. threaded female connection located inside the evaporator section.

The circulating blower and the condenser fan create a negative pressure on the condensate drain line that will prevent the condensate from draining properly without a trap. To combat this negative pressure, a field supplied condensate trap that will allow a standing column of water of at least 4" **MUST** be installed. Bottom of outlet from trap **MUST** be at least 3" below bottom of outlet from unit. An 8-1/2" x 3/4" diameter and 2" x 3/4" pipe nipple, couple to standard 3/4" diameter elbows, provide a straight path down through hole in unit base rails. **See Figure 7**. A 3/4" drain line **MUST** be installed if required by local codes or if location of unit requires it. Run the drain line to an open drain or other suitable disposal point.



Gas Supply and Piping

NOTE: There are many types of liquefied petroleum (LP) gases. In this manual, the term LP gas refers to *propane* gas only.

The UL/CSA rating plate located on the side panel of the unit contains the model number, type of gas, gas input rating, and other important information.

WARNING

FIRE AND/OR EXPLOSION HAZARD.

Failure to follow this warning could result in property damage, personal injury, and/or death.

Make certain the unit is equipped to operate on the type of gas available. Models designated as natural gas are to be used with natural gas only. Models designated for use with liquefied petroleum (LP) gas are shipped with orifices sized for commercially pure propane gas. They MUST NOT be used with butane or a mixture of butane and propane unless properly sized orifices are installed by a licensed LP installer.

Gas Piping

The gas supply line **MUST** be of adequate size to handle the Btu/hr requirements and length of the run for the unit being installed. Determine the minimum pipe size from the tables in **Figures 8 and 9**. Base the length of the run from the gas meter or source to the unit.

Btu ratings of all other gas appliances **MUST** be considered for sizing of main gas line. Check gas line to installation for compliance with local codes or, in the absence of local codes, with the National Fuel Gas Code NFPA/ANSI Z223.1 (current edition) or in Canada the National Standard CAN/CGA 1-B149.1 (current edition).

Figure 8		Gas Pipe Size, Length and Btu/hr Capacity for Schedule 40 Iron Pipe				
English Measurements / NATURAL GAS						
Pipe Length (Includes Fittings)	Btu/hr (in thousands)					
	3/4"	1"	1 1/4"	1 1/2"	2"	
20'	--	350	730	1,100	2,100	
40'	--	245	500	760	1,450	
60'	--	--	400	610	1,150	
80'	--	--	350	530	990	
100'	--	--	305	460	870	
125'	--	--	275	410	780	
150'	--	--	250	380	710	
175'	--	--	225	350	650	
200'	--	--	210	320	610	
LP GAS*						
Pipe Length (Includes Fittings)	Btu/hr (in thousands)					
	1/2"	3/4"	1"	1 1/4"	1 1/2"	
20'	--	393	732	1,496	2,299	
40'	--	267	504	1,039	1,559	
60'	--	217	409	834	1,275	
80'	--	--	346	724	1,086	
100'	--	--	307	630	976	
125'	--	--	275	567	866	
150'	--	--	252	511	787	
* If copper tubing is used, see the following applicable publications to determine type and size requirements: In the United States, the National Fuel Gas Code NFPA 54/ANSI Z223.1 (or current edition). In Canada, the National Standard CAN/CGA 1-B149.1 (or current edition).						

Figure 9		Gas Pipe Size, Length and kW** Capacity for Schedule 40 Iron Pipe				
Metric Measurements / NATURAL GAS						
Pipe Length (Includes Fittings)	kW**					
	3/4"	1"	1 1/4"	1 1/2"	2"	
6.1m	--	103	214	322	615	
12.2m	--	72	147	223	425	
18.3m	--	--	117	179	337	
24.4m	--	--	103	155	290	
30.5m	--	--	89	135	255	
38.1m	--	--	81	120	229	
45.7m	--	--	73	111	208	
53.3m	--	--	66	103	191	
61.0m	--	--	62	94	179	
LP GAS*						
Pipe Length (Includes Fittings)	kW**					
	1/2"	3/4"	1"	1 1/4"	1 1/2"	
6.1m	--	115	215	438	674	
12.2m	--	78	148	305	457	
18.3m	--	64	120	244	374	
24.4m	--	--	101	212	318	
30.5m	--	--	90	185	286	
38.1m	--	--	81	166	254	
45.7m	--	--	74	150	231	
* If copper tubing is used, see the following applicable publications to determine type and size requirements: In the United States, the National Fuel Gas Code NFPA 54/ANSI Z223.1 (or current edition). In Canada, the National Standard CAN/CGA 1-B149.1 (or current edition). **kW (kilowatts) is the metric equivalent of Btu/hr.						

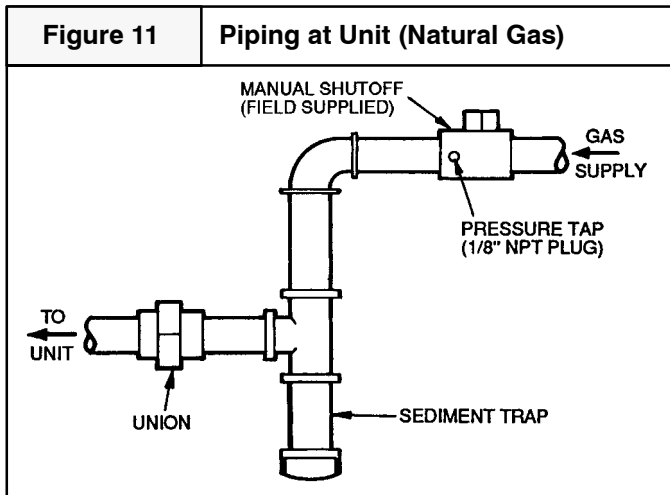
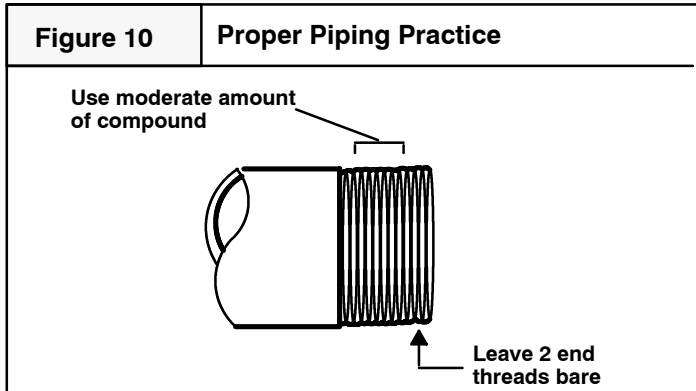
Piping At Unit

Connecting the Gas Piping

Refer to **Figure 11** for the general layout of the unit. It shows the basic fittings needed.

The following rules apply:

1. Use black iron pipe and fittings for natural gas.
2. Use pipe joint compound on male threads only. Pipe joint compound **MUST** be resistant to the action of LP gases. Do **NOT** use Teflon tape or similar materials. See **Figure 10**.



3. Use ground joint unions.

⚠ WARNING

FIRE AND/OR EXPLOSION HAZARD.

Failure to do so could result in property damage, bodily injury, and/or death.

Gas connector **MUST** be properly installed and can **NOT** be used inside the furnace.

4. Install a drip leg to trap dirt and moisture before it can enter the gas valve. Drip leg **MUST** be a minimum of 3" (76mm) long.
5. Install a manual shut off valve.

6. Provide a 1/8" NPT test gauge connection immediately upstream of the gas supply connection to the unit.
7. If installation is for LP gas:
 - a. Have a licensed LP gas dealer make all connections from storage tank to unit.
 - b. **TWO-STAGE REGULATION** is required.
 - c. If copper tubing is used, usage **MUST** comply with limitations set forth in National Fuel Gas Code NFPA 54/ANSI Z223.1 (latest edition) or in Canada the National Standard CAN/CGA 1-B149.1 (latest edition).
8. Hold a flat-jawed wrench on the squared end of the gas valve when tightening the supply pipe going into the gas valve. This will prevent turning or damaging the gas valve and wiring and/or misaligning the burners.

NOTE:

Overtightening assembly may cause damage to the gas valve and/or wiring and may misalign the burners.

9. Tighten all joints securely.

Leak Checks

1. Gas pressure **MUST NOT** exceed 1/2 PSIG (3450 Pa). If gas piping is to be checked with pressures above 1/2 PSIG (3450 Pa), the gas valve and the manual shut off valve **MUST** be disconnected from the line during testing.
2. Before pressure checking the gas piping to the unit, shut **OFF** the manual shut off valve for the unit.

⚠ WARNING

FIRE AND/OR EXPLOSION HAZARD.

Failure to follow this warning could result in property damage, personal injury, and/or death.

Never exceed specified pressures. Higher pressures may damage the gas valve. Such damage may result in overfiring and possible heat exchanger failure.

3. Test all pipes for leaks.
4. Apply soap suds or a liquid detergent to each joint. A leak is indicated when bubbles form.

⚠ WARNING

FIRE AND/OR EXPLOSION HAZARD.

An open flame or spark could result in property damage, bodily injury, and/or death.

Do **NOT** use a match or open flame to test for leaks.

5. Be sure to check burner orifices for leaks.
6. Correct even the smallest leak at once.

Electrical Wiring

⚠ WARNING
ELECTRICAL SHOCK HAZARD.

Failure to follow this warning could result in personal injury and/or death.

Shut off electric power at unit disconnect or service panel before making any electrical connections.

Unit **MUST** be grounded to electrical service panel.

NOTE: All electrical work **MUST** conform with the requirements of local codes and ordinances and in the United States the National Electrical Code ANSI/NFPA70 (current edition) and in Canada CSA C.22.1 - Canadian Electrical Code Part 1 (current edition). Provide line voltage power supply from a separate protected circuit with a disconnect switch (when required) located within sight of the unit. Supply voltage, amperage, wire, fuse and disconnect switch sizes **MUST** conform with specifications on the unit rating plate.

Wiring **MUST** be protected from possible mechanical damage and **MUST NOT** interfere with removal of access panels, filters, etc.

All exposed wiring or connections **MUST** be made with weatherproof cable or wire unless installed in conduit.

Field Power Supply - Unit is factory wired for voltage shown on nameplate.

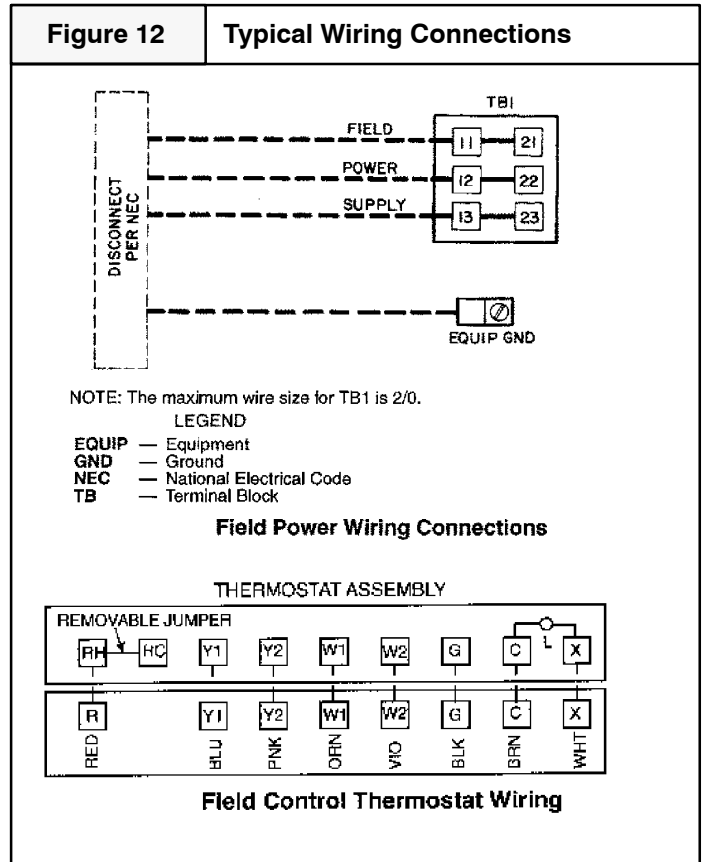
When installing units, provide a disconnect per NEC (National Electrical code) of adequate size.

For access to high and low voltage connections, remove the control box access panel. (see **Figure 1 & 12**).

Line Voltage Wiring

Route power ground lines through control box end panel or unit basepan and to connections as shown on unit wiring diagram.

Do **NOT** complete line voltage connections until unit is permanently grounded. All line voltage connections and the ground connection **MUST** be made with copper wire.



⚠ CAUTION

RISK OF REDUCED COMPONENT LIFE

Failure to follow these Caution may result in premature component failure.

The correct power phasing is critical in the operation of the scroll compressors. An incorrect phasing will cause the compressor to rotate in the wrong direction This may lead to premature compressor failure.

Converting 230V Units to 208V

Field wiring must confirm to temperature limitations for type 'T' wire. All field wiring must comply with NEC and local requirements.

Transformer # 1 is wired for 230-v unit. IF 208/230-v unit is to be run with 208-v power supply, the transformer must be rewired as follows:

1. Remove cap from red (208 v) wire.
2. Remove cap from orange (230 v) spliced wire.
3. Replace orange wire with red wire.
4. Recap both wires.

IMPORTANT: BE CERTAIN UNUSED WIRES ARE CAPPED. Failure to do so may damage the transformers.

Operating voltage to compressor must be within voltage range indicated on unit nameplate. On 3 phase units, voltages between phases must be balanced within 2%.

Unit failure as a result of operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components.

Field Installed Equipment

All wiring done in the field between the unit and other devices, or between separate devices that are field installed and located, **MUST** not exceed the temperature limitations for type T wire and **MUST** be installed according to the manufacturer's instructions for the devices.

Low Voltage Wiring

Route thermostat cable or equivalent single leads of colored wire from subbase terminals through conduit in unit to low-voltage connections as shown on unit label wiring diagram.

NOTE: For wire runs up to 50 ft, use no. 18 AWG (American Wire Gage) insulated wire (35 C minimum), for 50-75 ft. runs, use no. 16 AWG insulated wire (35 C minimum), for over 75 ft, use no. 14 AWG insulated wire (35 C minimum). All wire larger than no. 18 AWG cannot be directly connected at the thermostat and will require a junction box and splice at the thermostat.

Low Voltage Wiring With Economizer Option

The economizer electrical harness taps into **Y1** and **Y2** on the low voltage terminal board. Low voltage wires from the thermostat are connected to **Y1** and **Y2** with or without an economizer.

Thermostat

NOTE: Do NOT attempt to use a thermostat designed for electric heat or heat pump use. Such thermostats will NOT control the unit properly.

The thermostat **MUST** be a field supplied 2 stage cooling, 2 stage gas heating thermostat.

The location of the thermostat has an important effect on the operation of the unit. **FOLLOW THE INSTRUCTIONS INCLUDED WITH THE THERMOSTAT FOR CORRECT LOCATION, MOUNTING AND WIRING.**

Heat Anticipator

Voltage	W1	W2
208/230, 575	0.98	0.44
460	0.80	0.44

Settings may be changed slightly to provide a greater degree of comfort for a particular installation.

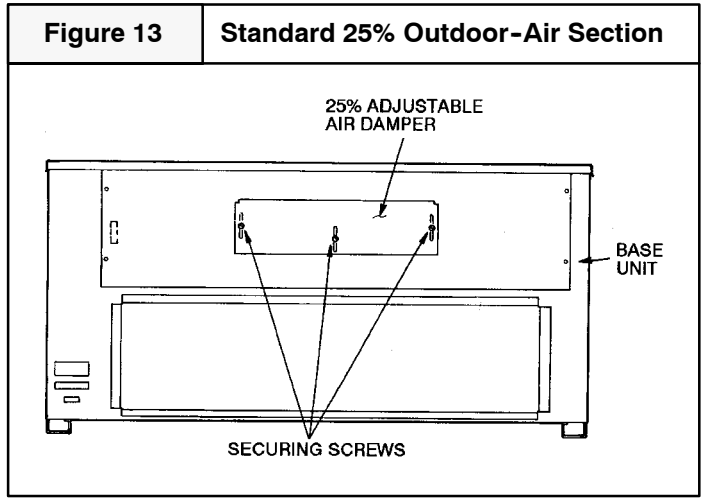
Final Check

Make a final wiring check to be sure system is correctly wired. Inspect field installed wiring and the routing to ensure that rubbing or chafing due to vibration will not occur.

Make Outdoor-Air Inlet Adjustments

All units have a manual outdoor-air damper to provide ventilation air.

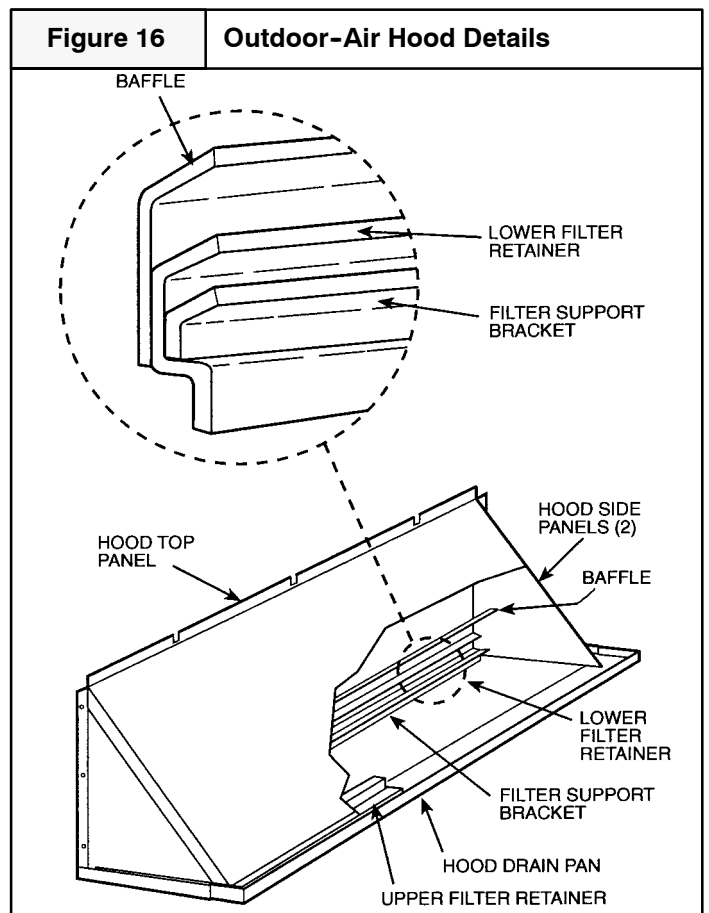
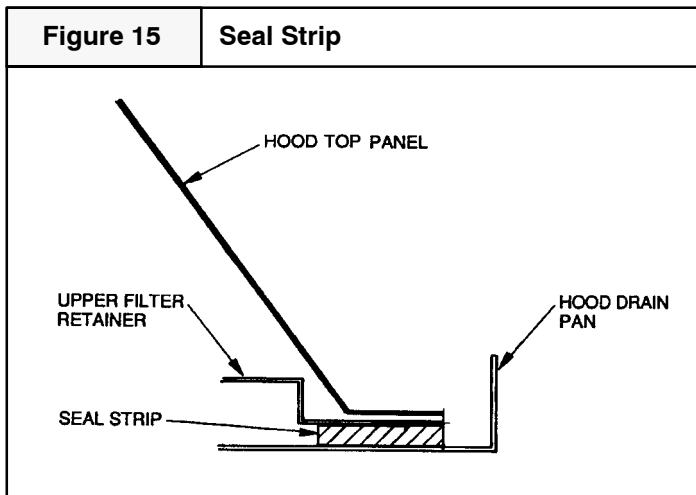
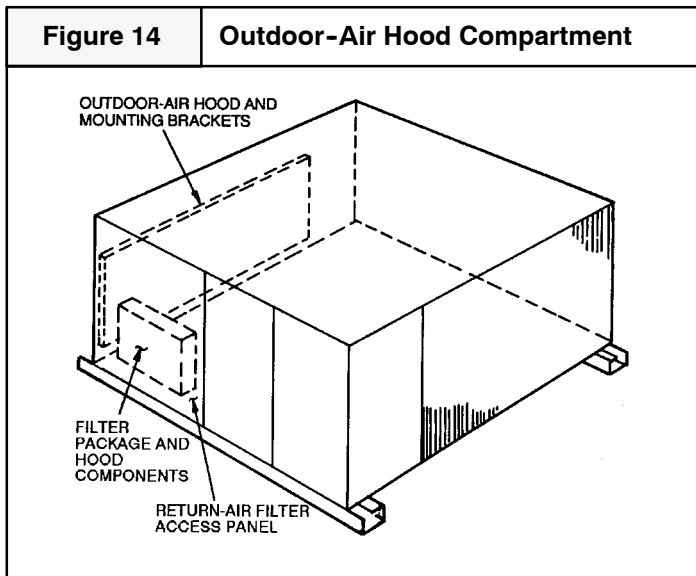
Damper can be reset to admit up to 25% outdoor air into return-air compartment. To adjust, loosen securing screws and move damper to desired setting, then retighten screws to secure damper. **See Figure 13.**



Install Outdoor-Air Hood

NOTE: The hood top panel, upper and lower filter retainers, hood drain pan, baffle and filter support bracket are secured opposite the condenser end of the unit. The screens, hood side panels, remaining section of filter support bracket, seal strip, and hardware are in a package located inside the return-air filter access panel. **See Figure 14.**

1. Attach seal strip to upper filter retainer. **See Figure 15.**
2. Assemble hood top panel, side panels, upper filter retainer, and drain pan. **See Figure 16.**



3. Secure lower filter retainer and support bracket to unit. **See Figure 16.** Leave screws loose.
4. Slide baffle behind lower filter retainer and tighten screws.
5. Loosen sheet metal screws for top panel of base unit located above outdoor-air inlet opening, and remove screws for hood side panels located on the sides of the outdoor-air inlet opening.
6. Match notches in hood top panel to unit top panel screws. Insert hood flange between top panel flange and unit. Tighten screws.
7. Hold hood side panel flanges flat against unit, and install screws removed in Step 5.
8. Insert outdoor-air inlet screens and spacer in channel created by lower filter retainer and filter support bracket.
9. Attach remaining section of filter support bracket.

Air Distribution System

Ductwork

NOTE: The total heat loss from the structure as expressed in total Btu/hr **MUST** be calculated by manufacturer's method or in accordance with "A.S.H.R.A.E. Guide" or "Manual N - Load Calculations" published by the Air Conditioning Contractors of America or in Canada H.R.A.I. "Manual N". The total heat loss calculated should be equal to or less than the heating capacity. Output based on D.O.E. test procedures, steady state efficiency times input.

Ductwork, supply registers, and return air grilles **MUST** be designed and sized to handle the greater of the units heating or cooling air volume requirements. If the unit is connected to an existing system, the ductwork **MUST** be checked to make sure it is adequate. Extra runs or larger duct sizes may have to be installed. **Use only non-combustible type insulation on supply plenum or supply ductwork within 6 feet of unit.**

Maximum recommended velocity in trunk ducts is 1000 feet per minute (5.08 m/s). Velocity in branches should not exceed 800 feet per minute (4.06 m/s).

Ductwork installed outdoors should have a minimum of 2" (50.8mm) of fiberglass insulation and a weatherproof vapor barrier. It should also be protected against damage. Caulk and flashing, or other means adequate to provide a permanent weather seal should be used.

Ductwork installed in attics or other areas exposed to outside temperatures should be installed with a minimum of 2" (50.8mm) fiberglass insulation and have an indoor type vapor barrier.

Ductwork Connections

The use of flexible, **non-combustible** connectors between main trunk ducts and supply and return air plenums is recommended to minimize vibration transmission. Attach all ductwork to roof curb and roof curb basepans.

Field Fabricate Ductwork

Secure all ducts to roof curb and building structure on vertical units. Do not connect ductwork to unit. For horizontal applications, field supplied flanges should be attached to horizontal discharge openings and all ductwork secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes.

A minimum clearance is not required around ductwork. Cabinet return-air static shall not exceed -.45 in. wg without an economizer.

The units are designed for a minimum heating operation continuous return-air temperature of 50 F (dry bulb), or an

intermittent operation down to 45 F (dry bulb), such as when used with a night set-back thermostat.

Filters

NOTE:

Do NOT operate the unit without all filters in place.

All air **MUST** pass through a filter before entering the unit. Electronic air cleaner, optional filter racks, or other accessible filter arrangements **MUST** be installed in the return air ductwork.

NOTE: If the unit has an economizer or any other type of outdoor air damper, disposable filters **MUST** be used in the internal filter racks.

For replacement filter sizes and instructions, see specification sheet.

Circulating Blower

Determining Blower Speed

1. From the system design, determine the external static pressure (ESP) for the supply ducts, return ducts and registers, diffusers, grilles, dampers, heaters and special filters (if any).
2. If unit is to be set up in cooling mode, add .08" W.C. (20 Pa) for wet coil operation to the total ESP determined in Step 1.
3. For static additions due to installation of an economizer or manual air dampers, add .05 inches to ESP.
4. From the system design, determine the desired airflow in CFM (L/s). See **Figure 17** for CFM to L/s conversion table.
5. To determine the blower speed necessary to obtain the desired CFM (L/s), see the Circulating Blower Performance Data for the unit located on the pages that immediately follow.
6. Determine the blower RPM's needed to obtain the desired CFM (L/s).
7. Compare required RPM to unit's factory setting for blower RPM (see Blower Performance Tables). If different from the RPM your installation requires, the blower speed will need to be changed.
8. Following the circulating Blower Performance Data table is a table that shows how many turns open the adjustable blower motor pulley needs to be to obtain the required RPM.
9. To change the blower speed, see pages 20 and 21 .

Figure 17

**Metric Conversions: Cubic Feet per Minute (CFM) to Liters per Second (L/s);
Inches of Water Column (In. W.C.) to Pascals (Pa)**

CFM	L/s	CFM	L/s	CFM	L/s	In. W.C.	Pa	In. W.C.	Pa	In. W.C.	Pa	In. W.C.	Pa	In. W.C.	Pa
6000	2831	8050	3799	10100	4767	0.01	2	0.51	127	1.01	251	1.51	376	2.01	501
6050	2855	8100	3823	10150	4790	0.02	5	0.52	130	1.02	254	1.52	379	2.02	503
6100	2879	8150	3846	10200	4814	0.03	7	0.53	132	1.03	257	1.53	381	2.03	506
6150	2902	8200	3870	10250	4837	0.04	10	0.54	135	1.04	259	1.54	384	2.04	508
6200	2926	8250	3894	10300	4861	0.05	12	0.55	137	1.05	262	1.55	386	2.05	511
6250	2949	8300	3917	10350	4885	0.06	15	0.56	139	1.06	264	1.56	389	2.06	513
6300	2973	8350	3941	10400	4908	0.07	17	0.57	142	1.07	267	1.57	391	2.07	516
6350	2997	8400	3964	10450	4932	0.08	20	0.58	144	1.08	269	1.58	394	2.08	518
6400	3020	8450	3988	10500	4955	0.09	22	0.59	147	1.09	271	1.59	396	2.09	521
6450	3044	8500	4012	10550	4979	0.10	25	0.60	149	1.10	274	1.60	399	2.10	523
6500	3067	8550	4035	10600	5003	0.11	27	0.61	152	1.11	276	1.61	401	2.11	526
6550	3091	8600	4059	10650	5026	0.12	30	0.62	154	1.12	279	1.62	404	2.12	528
6600	3115	8650	4082	10700	5049	0.13	32	0.63	157	1.13	281	1.63	406	2.13	531
6650	3138	8700	4106	10750	5073	0.14	35	0.64	159	1.14	284	1.64	408	2.14	533
6700	3162	8750	4130	10800	5097	0.15	37	0.65	162	1.15	286	1.65	411	2.15	536
6750	3185	8800	4153	10850	5121	0.16	40	0.66	164	1.16	289	1.66	413	2.16	538
6800	3209	8850	4177	10900	5144	0.17	42	0.67	167	1.17	291	1.67	416	2.17	541
6850	3233	8900	4200	10950	5168	0.18	45	0.68	169	1.18	294	1.68	418	2.18	543
6900	3256	8950	4224	11000	5191	0.19	47	0.69	172	1.19	296	1.69	421	2.19	545
6950	3280	9000	4248	11050	5215	0.20	50	0.70	174	1.20	299	1.70	423	2.20	548
7000	3303	9050	4271	11100	5239	0.21	52	0.71	177	1.21	301	1.71	426	2.21	550
7050	3327	9100	4281	11150	5262	0.22	55	0.72	179	1.22	304	1.72	428	2.22	553
7100	3350	9150	4318	11200	5286	0.23	57	0.73	182	1.23	306	1.73	431	2.23	555
7150	3374	9200	4342	11250	5309	0.24	60	0.74	184	1.24	309	1.74	433	2.24	558
7200	3398	9250	4366	11300	5333	0.25	62	0.75	187	1.25	311	1.75	436	2.25	560
7250	3421	9300	4389	11350	5357	0.26	65	0.76	189	1.26	314	1.76	438	2.26	563
7300	3445	9350	4413	11400	5380	0.27	67	0.77	192	1.27	316	1.77	441	2.27	565
7350	3468	9400	4436	11450	5404	0.28	70	0.78	194	1.28	319	1.78	443	2.28	568
7400	3492	9450	4460	11500	5427	0.29	72	0.79	197	1.29	321	1.79	446	2.29	570
7450	3516	9500	4484	11550	5451	0.30	75	0.80	199	1.30	324	1.80	448	2.30	573
7500	3539	9550	4507	11600	5475	0.31	77	0.81	202	1.31	326	1.81	451	2.31	575
7550	3563	9600	4531	11650	5498	0.32	80	0.82	204	1.32	329	1.82	453	2.32	578
7600	3587	9650	4554	11700	5521	0.33	82	0.83	207	1.33	331	1.83	456	2.33	580
7650	3610	9700	4578	11750	5545	0.34	85	0.84	209	1.34	334	1.84	458	2.34	583
7700	3634	9750	4601	11800	5569	0.35	87	0.85	212	1.35	336	1.85	461	2.35	585
7750	3658	9800	4625	11850	5596	0.36	90	0.86	214	1.36	339	1.86	463	2.36	588
7800	3681	9850	4649	11900	5616	0.37	92	0.87	217	1.37	341	1.87	466	2.37	590
7850	3705	9900	4672	11950	5640	0.38	95	0.88	219	1.38	344	1.88	468	2.38	593
7900	3728	9950	4696	12000	5663	0.39	97	0.89	222	1.39	346	1.89	471	2.39	595
7950	3752	10000	4719	12050	5687	0.40	100	0.90	224	1.40	349	1.90	473	2.40	598
8000	3776	10050	4743	12100	5711	0.41	102	0.91	227	1.41	351	1.91	476	2.41	600
						0.42	105	0.92	229	1.42	354	1.92	478	2.42	603
						0.43	107	0.93	232	1.43	356	1.93	481	2.43	605
						0.44	110	0.94	234	1.44	359	1.94	483	2.44	608
						0.45	112	0.95	237	1.45	361	1.95	486	2.45	610
						0.46	115	0.96	239	1.46	364	1.96	488	2.46	613
						0.47	117	0.97	242	1.47	366	1.97	491	2.47	615
						0.48	120	0.98	244	1.48	369	1.98	493	2.48	618
						0.49	122	0.99	247	1.49	371	1.99	496	2.49	620
						0.50	125	1.00	249	1.50	374	2.00	498	2.50	623

Performance Data

CIRCULATING BLOWER PERFORMANCE - PGS/E300 (Low Heat Units)																		
CFM	External Static Pressure in Inces Water Column - Dry coil With Filter																	
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
7000	941	2769	1002	3140	1061	3528	1117	3934	1171	4356	1224	4794	1274	5248	1323	5718	1371	6204
7500	999	3348	1057	3742	1112	4152	1166	4579	1218	5020	1268	5478	1316	6960	1364	6437	1410	6939
8000	1058	4007	1113	4424	1165	4856	1216	5304	1266	5766	1314	6243	1360	6734	1406	7239	1450	7759
8500	1117	4750	1169	5190	1219	5645	1268	6114	1315	6597	1361	7094	1406	7605	1449	8129	1492	8666
9000	1177	5583	1226	6047	1274	6524	1320	7015	1365	7520	1410	8037	1453	8568	1495	9111	1536	9667
9500	1237	6511	1284	6999	1329	7499	1374	8012	1417	8538	1459	9076	1501	9627	1541	10190	-	-
10000	1297	7450	1342	8051	1385	8574	1428	9110	1469	9657	1510	10217	-	-	-	-	-	-
10500	1358	8674	1400	9209	1442	9755	1483	10314	1523	10883	-	-	-	-	-	-	-	-
11000	1418	9919	1459	10478	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11250	1449	10585	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CIRCULATING BLOWER PERFORMANCE - PGS/E300 (High Heat Units)																		
CFM	External Static Pressure in Inces Water Column - Dry coil With Filter																	
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
7000	922	3348	1051	3668	1106	3995	1160	4331	1212	4675	1262	5026	1311	5385	1359	5751	1405	6124
7500	1055	3947	1110	4277	1162	4615	1214	4960	1263	5312	1311	5672	1358	6039	1403	6412	1448	6792
8000	1118	4610	1170	4950	1220	5298	1268	5653	1315	6014	1361	6382	1406	6767	1560	7137	1492	7524
8500	1182	5339	1231	5690	1278	6047	1324	6411	1369	6782	1413	7158	1456	7541	1498	7929	1539	8323
9000	1246	6136	1292	6498	1337	6865	1381	7239	1424	7618	1466	8003	1507	8393	1548	8790	-	-
9500	1310	7005	1354	7377	1397	7754	1439	8137	1480	8525	1520	8918	-	-	-	-	-	-
10000	1374	7947	1416	8329	1457	8715	1497	9107	1537	9504	-	-	-	-	-	-	-	-
10500	1439	8964	1479	9356	1518	9752	-	-	-	-	-	-	-	-	-	-	-	-
11000	1503	10059	1542	10460	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11250	1536	10636	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTES:

1. Maximum total motor watts is 9,510 208/230 volt and 11,000 for 460 volt.
2. Maximum blower wheel speed is 1550 rpm.
3. Motor drive ranges is 1066 -1283 rpm.
4. Airflow data based on dry coil with filters. Deduct 0.08 inches for wet coil performance.

AIR QUANTITY UNITS		
Unit Size	Minimum CFM	Maximum CFM
PGS/E300	7,000	11,250

EVAPORATOR MOTOR EFFICIENCY	
Unit Size	Motor Efficiency (%)
PGS/E300 -10 HP	89.5

OUTDOOR SOUND POWER										
UNIT	SOUND RATING (60Hz)	A - Weighted (db)	OCTAVE BANDS							
			63	125	250	500	1000	2000	4000	8000
PGS/E300	9.4 Bels	94.1	98.7	92.3	93.8	90.9	89.6	85.9	80.3	74.3

Bels - Sound Levels (1 bel = 10 decibels).

FAN RPM AT MOTOR PULLEY SETTINGS *													
UNIT	MOTOR PULLEY TURNS OPEN												
	0	1/2	1	1-1/2	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6
PGS/E300	**	**	1283	1269	1247	1225	1203	1182	1160	1138	1116	1095	1066

* Approximate fan rpm shown.

** Due to belt and pulley size, pulley cannot be set to this number of turns open.

EVAPORATOR FAN MOTOR PERFORMANCE					
UNIT	Unit Voltage	Maximum Acceptable Continuous BHP*	Maximum Acceptable Continuous BkW*	Maximum Acceptable Operating Watts	Maximum Amp Draw
PGS/E300	208/230	10.20	7.61	9510	28.0
	460	11.80	8.80	11000	14.6

Bhp - Brake Horsepower.

* Extensive motor and electrical testing on these units ensures that the full horsepower range of the motors can be utilized with confidence. Using your fan motors up to the horsepower ratings shown in this table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Note: All indoor fan motors 5 hp and larger meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPA) effective October 24, 1997.

Adjustable Belt Drive Blower

⚠ **WARNING**

PERSONAL INJURY HAZARD.

Failure to do so could result in personal injury. Use extreme care during the following procedures and obey Safety Information.

The following safety rules **MUST** always be followed when working near belt drive.

Always Turn The Power Off

Turn electric power to the unit **OFF** before you begin working on it.

Always Wear Protective Clothing

NEVER wear loose or bulky clothes, such as neckties, exposed shirttails, loose sleeves, or lab coats around belt drives. Wear gloves while inspecting sheaves to avoid nicks, burrs, or sharply worn pulley edges.

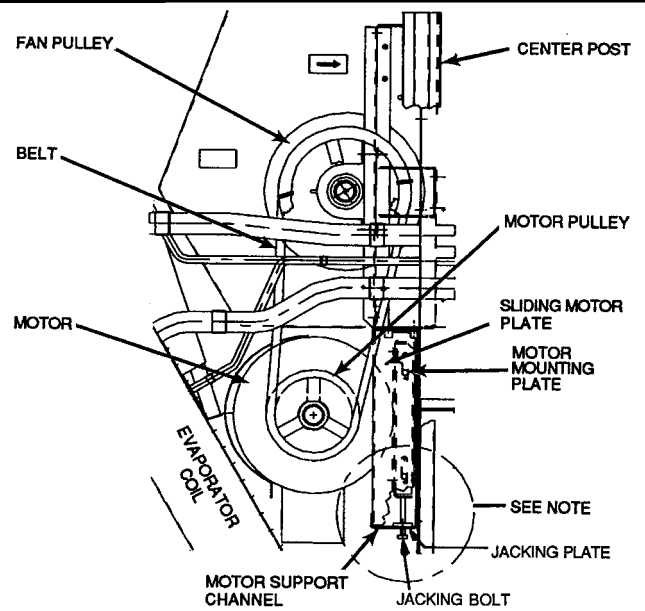
The blower speed is changed by adjusting the variable speed pulley mounted on the blower motor.

NOTE: A 3-1/2" bolt and threaded plate are included in the installer's packet. They can be added to the motor support channel below the motor mounting plate to aid in raising the fan motor.

If the blower speed needed is different than the speed of the blower as shipped, follow the steps below to change the blower speed. Before changing the blower speed, read the above safety rules first.

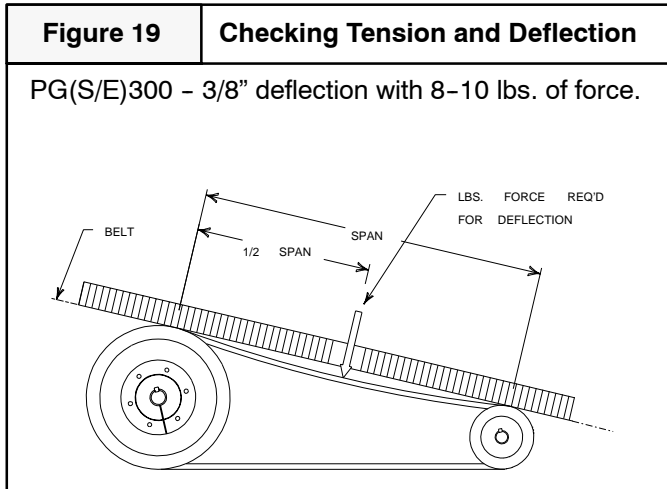
1. Turn electric power **OFF**.
2. Remove the side blower access panel (see **Figure 1**).
3. Loosen nuts on the 2 carriage bolts in the motor mounting base. Install jacking bolt and plate under motor base (bolt and plate are shipped in installer's packet). Using bolt and plate, raise motor to top of slide and remove belt. Secure motor in this position by tightening the nuts on the carriage bolts. See **Figure 18**.
4. Loosen movable-pulley flange setscrew. See page 19 for air quantity limits.
5. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in the performance data listed in this instruction.
6. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table on page 19 for speed change for each full turn of pulley flange.)
7. Replace and tighten belts. See Belt Tension Adjustment section on page 21.

Figure 18 Evaporator Fan Motor Adjustment



NOTE: A 3-1/2" jacking bolt (1171103) and threaded jacking plate (1171400) are included in the unit's base pan. They should be added to the motor support channel below the motor mounting plate to aid in raising the motor.

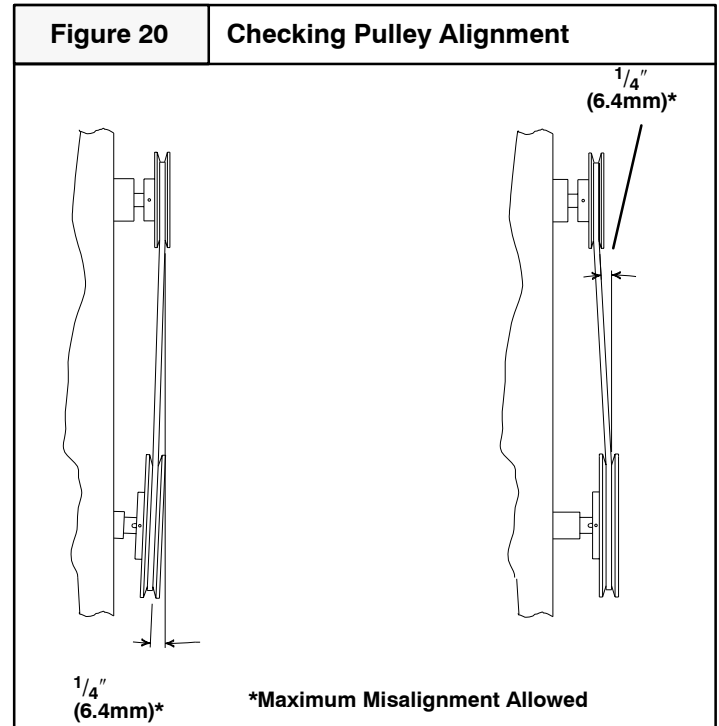
Belt Tension Adjustment



1. Turn motor adjustment bolt clockwise until the belt has enough tension at the proper deflection. Use one of the commercially available belt tension gauges to set the correct tension at the proper deflection (see **Figure 19 & 20**).
2. Use a straight-edge (angle iron, straight piece of board or anything with a good straight surface or edge) to check the alignment of the blower pulley with blower motor pulley (see **Figure 20**).

It may be necessary to back the tension off the belt temporarily and tighten one of the motor mount bolts before it is possible to adjust the angle of the blower motor.
3. Tighten all blower motor mount bolts.
4. Ensure that all bolts, nuts and screws are tightened and ensure that all tools, gloves, etc. are removed from unit.

5. Replace side blower access panel before Start-up.
6. During Start-up, listen for any unusual noises or vibrations.
7. Shut down the unit after it runs for a while and check the bearings and motor. If they feel hot, the belt tension may be too tight, bearings may be misaligned or not lubricated correctly, etc.
8. It is a good idea to retension a new belt after a run-in period of about 24 hours. A run-in period of overnight or during a lunch break is better than no run-in period at all.



Start-up Procedure

⚠ WARNING
ELECTRICAL SHOCK, FIRE AND/OR EXPLOSION HAZARD.

Failure to follow this warning could result in property damage, personal injury, and/or death.

Use extreme care during all of the following checks and procedures.

Make sure Electric Power and/or Gas supply is turned OFF as instructed in appropriate steps.

Check the unit's operation as outlined in the following instructions.

Blower and Phasing Check

1. Shut **OFF** electric power at unit disconnect.
2. Shut **OFF** gas valve and manual shut off valve (see **Figure 22**).
3. Check to see that clean, properly sized air filters are installed.

4. Check to see that everything inside the unit is clear and ready to operate safely. Ensure that there are no objects in, on or around the motor, belt or blower wheel.
5. Set thermostat Heat-Cool selector to **OFF**.
6. Set thermostat fan switch to **AUTO**.

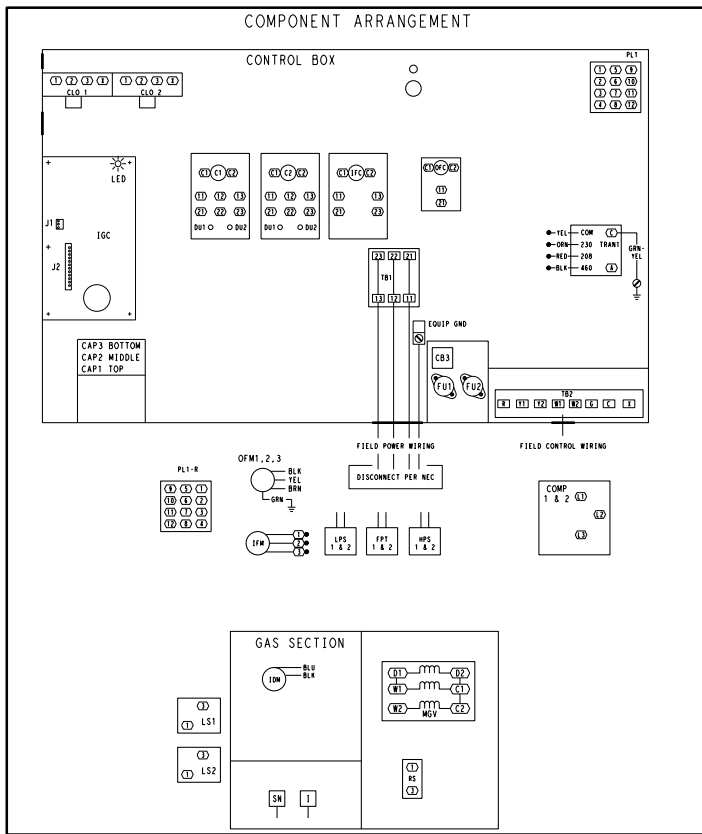
⚠ WARNING
MOVING PARTS HAZARD.

Failure to follow this warning could result in property damage, personal injury, and/or death.

Do NOT put hands or any other object in, on or around the motor, belt or blower wheel. Ensure that there are no objects in, on or around the motor, belt or blower wheel before turning electric power on.

7. Turn **ON** electric power. Nothing should start running. If any unusual arcing, odors or noises are encountered, shut **OFF** electric power immediately and check for wiring errors.

NOTE: It is necessary to check for improper phasing. The following steps must be performed to verify correct electrical phasing.



NOTE:

Do NOT operate the unit with the compressor(s) running until proper blower rotation has been confirmed by running the following test.

8. Set thermostat fan switch to **ON**. The circulating air blower should come **ON**.
9. Shut **OFF** electric power at unit disconnect and visually observe the direction of the blower rotation as it slows down. Do **NOT** put hands or any other object in, on or around the belt, motor or blower wheel.

⚠ CAUTION

RISK OF REDUCED EQUIPMENT LIFE

Failure to follow this Caution may result in premature equipment failure.

If blower rotation is incorrect, shut electric power **OFF** at unit disconnect and reverse any two supply wires at field connections **ONLY**. Do **NOT** reverse the blower and/or compressor leads or rewire any internal wiring. After rewiring is done, repeat blower rotation check to ensure that blower rotation is now correct.

10. If blower rotation is correct, reset thermostat fan switch to **AUTO**. The circulating air blower should go **OFF**. Nothing should be running.
11. Shut **OFF** electric power at unit disconnect.

⚠ WARNING

FIRE AND/OR EXPLOSION HAZARD.

Failure to follow this warning could result in property damage, personal injury, and/or death.

Never exceed specified pressures. Higher pressures may damage the gas valve. Such damage may result in overfiring and possible heat exchanger failure.

High Heat Checks

1. Be sure that gas valve and manual shut off valve are **OFF**.
2. Be sure that electric power is **OFF**.
3. Remove inlet plug from gas valve (see **Figure 22**). Insert 1/8" NPT barbed fitting into inlet for use as supply line pressure tap.
4. Connect U-Tube manometer to barbed fitting. Use a manometer with a 0-12" (0-3 Pa) range.
5. Remove outlet plug from gas valve. Insert 1/8" NPT barbed fitting into outlet for use as manifold pressure tap.
6. Connect U-Tube manometer to barbed fitting.
7. To check the supply gas pressure at high heat, place a jumper between the **R** and **W1** and **W2** terminals on the low voltage terminal board.
8. Turn **ON** electric power. The combustion blower should come **ON**.
9. Turn **ON** gas valve (see **Figure 22**).
10. Turn **ON** the manual shut off valve. The unit will fire at high heat.

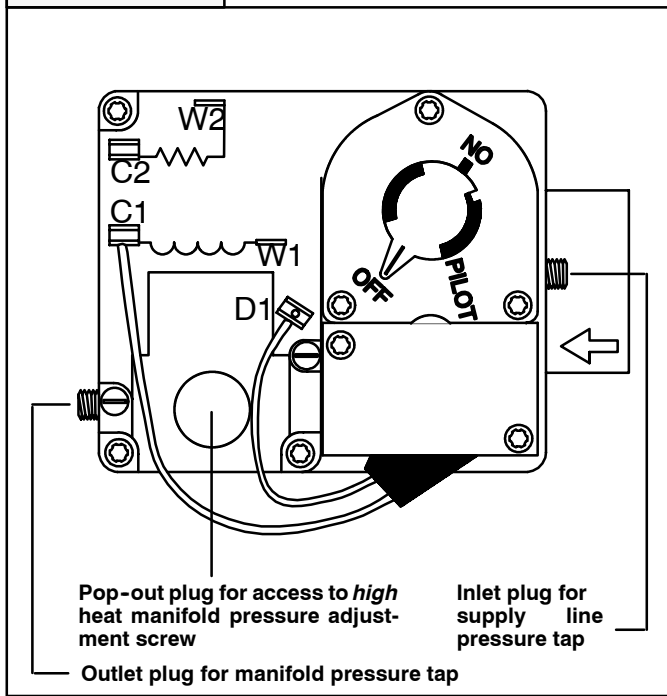
NOTE: Supply line pressures **MUST** be checked with main burners operating and all other gas appliances on same gas line fired at high heat.

11. Manometer reading **MUST** be within the minimum and maximum supply gas pressure values listed in **Figure 21**.
If supply gas pressure is not within the minimum and maximum values, turn manual shut off valve **OFF** and contact gas supplier.
12. The induced draft motors will start, purging heat exchangers.
13. After a call for heating, the main burners should light within 5 seconds. If the burners do not light, then there is a 22-second delay before another 5-second ignition try. If the burners still do not light, the time delay is repeated. If the burners do not light with 15 minutes, there is a lockout. To reset the control, break the 24v power to W1.
14. The evaporator-fan motor will turn on 45 seconds after the burners are ignited.
15. The evaporator-fan motor will turn off 45 seconds after the thermostat temperature is satisfied.

Figure 21	Supply Gas Pressures	
	Natural Gas	LP Gas
Minimum	4.5" W.C. (1120 Pa)	11" W.C. (2740 Pa)
Recommended	7" W.C. (1740 Pa)	11" W.C. (2740 Pa)
Maximum	13" W.C. (3230 Pa)	13" W.C. (3230 Pa)

Figure 22

Typical White Rogers Gas Valve



16. Inspect main burner flames. Flames should be stable and blue.

⚠ WARNING

FIRE AND/OR EXPLOSION HAZARD.

Failure to properly set input pressure could result in property damage, personal injury, and/or death.

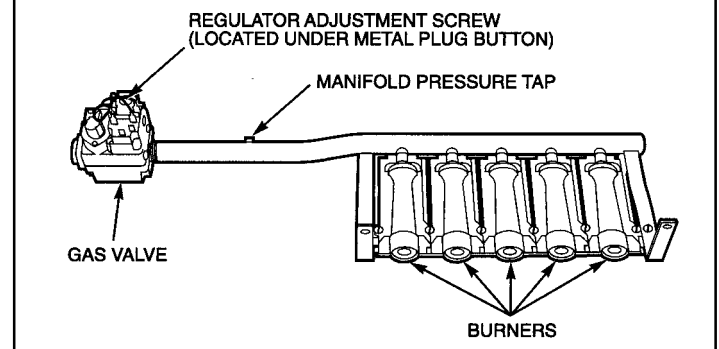
Manifold pressure **MUST** be set correctly to obtain rated input.

NOTE: Manifold pressures **MUST** be checked with main burners operating.

17. Check manifold pressure on manometer. Manometer reading **MUST** be within range for high values listed in **figure 24**.
- If the manometer reading is not within the range for high heat listed in **Figure 21**, an adjustment **MUST** be made. To adjust the high heat manifold pressure:
 - Remove the pop-out plug from the top of the gas valve (see **Figure 22**) to access the high heat manifold pressure adjustment screw.
 - To increase the manifold pressure, turn the adjustment screw clockwise. To decrease the manifold pressure, turn the adjustment screw counterclockwise.
 - When the manifold pressure is correct, replace pop-out plug.

Figure 23

Burner Tray



- Inspect main burner flames. Flames should be stable and blue.
- Shut manual shut off valve OFF.
- Shut gas valve OFF. Allow circulating blower to run before turning electric power off.
- Shut electric power OFF at unit disconnect.
- Remove barbed fitting from inlet and replace outlet plug.
- Remove barbed fitting from outlet and replace outlet plug.
- Remove jumpers from low voltage terminal board.

Figure 24

Manifold Gas Pressures

	Natural Gas	LP Gas
High Heat	3.5" W.C. \pm 0.3 (870 Pa \pm 75)	3.5" W.C. \pm 0.3 (2490 Pa \pm 75)

Heating Operation/Temperature Rise Check

- Open **ALL** registers and duct dampers.
- Set thermostat Heat-Cool selector to **HEAT**.
- Set the thermostat as high as it will go.
- Turn **ON** electric power.
- Turn **ON** manual shut off valve.
- Turn gas valve **ON**. Unit should come on at high heat.
- Operate unit **AT LEAST** 15 minutes, then check temperature rise.
- To check the temperature rise through the space, place thermometers in the supply and return air ducts as close to the unit as possible.
Keep the economizer dampers (if equipped) completely closed while checking the temperature rise.

NOTE: Temperature rise is the difference between the supply and return air temperatures. If the air distribution system is designed properly, the correct temperature rise is usually obtained when the unit is operating at rated input with the recommended blower speed .

NOTE: The temperature rise must be within the specifications marked on the unit rating plate.

NOTE: It may be necessary to change the blower speed if the correct temperature rise is not obtained. A faster blower speed will decrease the temperature rise. A slower blower speed will increase the temperature rise. To change the blower speed, see Air Distribution system and blower chart.

9. After the correct temperature rise has been obtained, check the limit control function by blocking the return air grille(s).

After several minutes the main burners should go **OFF**. The circulating air blower should continue to run.

Remove air restrictions. Main burners should relight after a cool down period of a few minutes.

10. Adjust the thermostat setting below room temperature. Main burners, and combustion air blower should go **OFF**.

The circulation air blower should continue to run for approximately 45 seconds.

Cooling Checks



CAUTION

RISK OF REDUCED EQUIPMENT LIFE

Failure to follow this Caution may result in premature equipment failure.

Do **NOT** operate the unit with the compressor(s) running until proper blower rotation has been confirmed during the Blower and Phasing Check in the previous section. If the phasing is incorrect, the scroll compressor(s) (if equipped) will run backwards and they will be damaged.

1. Be sure that electric power is **OFF**.
2. To check cooling Stage 1, place jumper wires across low voltage terminal board terminals **R** to **G**, **R** to **Y1**.
3. Turn electric power **ON**. Check to see that the following occurs:
 - a. Compressor 1 - **ON**
 - b. Condenser fan motor(s) - **ON**
 - c. Circulation air blower - **ON** with correct rotation and adequate airflow from ductwork.
4. Shut **OFF** electric power at unit disconnect.
5. To check cooling Stage 2, remove jumper wires from **Y1** and place it on **Y2**.

NOTE: Allow 5 minutes between Steps 4 and 6.

6. Turn **ON** electric power. Check to see that the following occurs:
 - a. Compressors 1 & 2 - **ON**
 - b. Condenser fan motor(s) - **ON**
 - c. Circulation air blower - **ON**
7. Shut **OFF** electric power at unit disconnect.
8. Remove jumpers from low voltage terminal board.

9. Replace all service access panels.

Turning Off the Unit

Heating

1. Set thermostat selector to **OFF** and fan switch to **AUTO**.
2. To shut the furnace down completely, shut **OFF** the manual shut off valve. If furnace is running at time of shut-down, wait 2.5 minutes then shut **OFF** electric power supply at disconnect switch or service panel. (No wait is necessary if furnace was not running within 2.5 minutes prior to shut-down.)

Cooling

1. Set thermostat selector to **OFF** and fan switch to **AUTO**.
2. To shut the unit down completely, shut **OFF** electric power supply at disconnect switch or service panel.

Operation And Maintenance Instructions

⚠ WARNING
ELECTRICAL SHOCK HAZARD.

Failure to follow this warning could result in personal injury, and/or death.

Turn off electric power supply at disconnect switch or service panel before removing any access or service panel from unit.

Starting the Unit After Shutdown

⚠ WARNING
CARBON MONOXIDE, FIRE, AND/OR EXPLOSION HAZARD.

Failure to follow this warning could result in property damage, personal injury, and/or death.

Do not operate the unit on heating (except during service checks) unless all access panels are securely fastened in place. Abnormal and possibly hazardous burner operation could result.

Heating

1. Set the thermostat to **OFF**.
2. Remove the burner access panel. Shut **OFF** gas valve. Wait 5 minutes.
3. Turn **ON** gas valve (White Rogers valve knobs must be pressed down before turning). Replace burner access panel. Turn **ON** manual shut off valve.
4. Turn **ON** electric power.
5. Set thermostat to desired temperature and set selector to **HEAT**. Unit will come on and operate automatically under control of the thermostat.

When the thermostat calls for heating, power is sent to W on the IGC (integrated gas unit controller) board. An LED (light-emitting diode) on the IGC board will be on during normal operation. A check is made to ensure that the rollout switch and limit switch are closed and the induced-draft motor is running. The induced-draft motor is then energized, and when speed is proven with the hall effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds.

If the burners do not light, there is a 22 second delay before another 5 second attempt. If the burners still do not light, this sequence is repeated for 15 minutes. After the 15 minutes have elapsed, if the burners still have not lighted, heating is locked out. To reset the control, break 24v power to the thermostat.

When ignition occurs the IGC board will continue to monitor the condition of the rollout and limit switches, the hall effect sensor, as well as the flame sensor. If the unit is controlled through a room thermostat set for fan auto., 45 seconds after ignition occurs, the indoor-fan motor will be energized. If for

some reason the overtemperature limit opens prior to the start of the indoor fan blower, on the next attempt, the 45-second delay will be shortened to 5 seconds less than the time from initiation of heat to when the limit ripped. Gas will not be interrupted to the burners and heating will continue. Once modified, the fan on delay will not change back to 45 seconds unless power is reset to the control.

When additional heat is required, W2 closes and initiates power to the second stage of the main gas valve. When the thermostat is satisfied, W1 and W2 open and the gas valve closes, interrupting the flow of gas to the main burners. If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto., the indoor fan motor will continue to operate for an additional 45 seconds then stop. If the overtemperature limit opens after the indoor motor is stopped within 10 minutes of W1 becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. once modified, the fan off delay will not change back to 45 seconds unless power is reset to the control.

Table 1 - LED Error Code Description

LED Indication	Error Code Description
ON	Normal Operation
OFF	Hardware Failure
1 Flash	Fan On/Off Delay Modified
2 Flashes	Limit Switch Fault
3 Flashes	Flame Sense Fault
4 Flashes	5 Consecutive Limit Switch Faults
5 Flashes	Ignition Lockout Fault
6 Flashes	Inducer Switch Fault
7 Flashes	Rollout Switch Fault
8 Flashes	Internal Switch Fault
9 Flashes	Software Lockout

LEGEND
IGC - Integrated Gas unit Controller
LED - Light-Emitting Diode
1. A 3 second pause exists between LED error code flashes.
2. If more than one error code exists, all applicable codes will be displayed in numerical sequence.
3. Error codes on the IGC will be lost if power to the unit is interrupted.

Cooling

⚠ CAUTION
RISK OF REDUCED EQUIPMENT LIFE

Failure to follow this Caution may result in premature component failure.

To prevent possible damage to the compressor(s), do NOT operate on cooling when outdoor temperature is below 35°F (2°C).

NOTE: An optional low ambient kit is available that allows the unit to operate at temperatures down to 0°F (-18°C).

When thermostat calls for cooling, terminals G and Y1 are energized. The indoor (evaporator) fan contactor (IFC) and compressor contactor no. 1 (C1) are energized and evaporator fan motor (IFM), compressor no. 1, and condenser fans start. The condenser fan motors run continuously while

unit is cooling. If the thermostat calls for a second stage of cooling by energizing Y2, compressor contactor no. 2 (C2) is energized and compressor no. 2 starts.

Close all doors and windows. The unit may run continuously for several hours or longer on the initial run because of residual heat and moisture in the building. This is normal for any air conditioning system.

Thermostat Fan Switch Operation

The circulating air blower will run continuously with the fan selector switch in the **ON** position. When the fan selector switch is in the **AUTO** position, the blower will run during each heating or cooling cycle.

Monthly Maintenance and Inspection Checks

Vent Assembly

⚠ WARNING

BURN HAZARD.
Failure to follow this warning could result in personal injury and/or death.
Flue cover may be hot! Allow adequate time for flue cover to cool.

Inspect the inside of the vent hood and burner compartment using a light and mirror as necessary. Look for soot and severe rust or corrosion and any obstructions due to leaves, spider webs, etc. Clean as required.

Air Filters (Factory Installed)

NOTE:

Do NOT operate unit without all air filters installed in the unit.

Dirty filters are the most common cause of compressor failures and inadequate heating and cooling performance. Inspect filters at least monthly and replace or clean as required.

Install filters so that the arrows on the side point in the direction of air flow.

Filter racks are accessible through the filter access panel.

Disposable Replacement Filters

For all units: 4 filters 20" x 20" x 2"
4 filters 16" x 20" x 2"

Condenser Coil

Keep the condenser inlet and outlet area clean and free of leaves, grass clippings and other debris. Grass should be kept short in front of the condenser inlet. Shrubbery **MUST** be trimmed back so it is no closer than 30 inches (762 mm) to condenser coil.

Condensate Drain

Check for condensate drainage. Clean as required.

Annual Maintenance and Inspection

⚠ WARNING

ELECTRICAL SHOCK, FIRE AND EXPLOSION HAZARDS.

Failure to follow this warning could result in property damage, personal injury, and/or death.

Turn off electric power supply at disconnect switch or service panel and gas supply at manual shutoff valve before removing any access or service panel from unit.

The annual inspection should include cleaning as required to ensure efficient operation of the unit.

The condenser and evaporator fan motors have permanently sealed bearings, so no field lubrication is necessary.

Lubricate bearings at least every 6 months with suitable bearing grease. Extended grease line is provided for far side fan bearing (opposite drive side).

Evaporator-fan motor protection – A manual reset, calibrated trip, magnetic circuit breaker protects against overcurrent. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

Circulating Air Blower

Visually inspect the blower wheel for accumulations of dirt or lint. Clean the compartment and the blower wheel. If accumulation is excessive on blower wheel or does not remove easily, it will be necessary to remove the blower assembly.

Evaporator Fan Service and Replacements

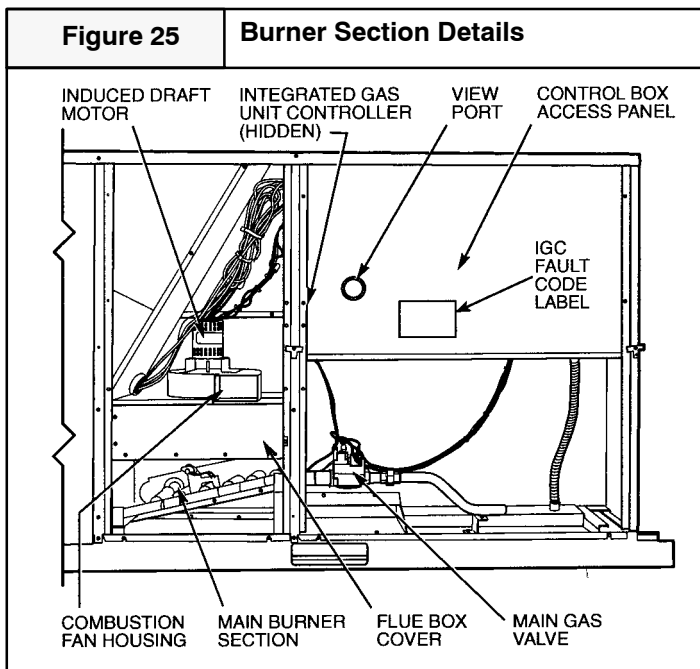
These units use a fan motor mounting system that features a slide-out motor mounting plate. To replace or service the motor, slide out the bracket. **See Figure 18.**

1. Remove the evaporator-fan access panel and the heating control access panel.
2. Remove the center post (located between the evaporator fan and heating control access panels) and all screws securing it.
3. Loosen nuts on the two carriage bolts in the motor mounting base.
4. Using jacking bolt under motor base, raise motor to top of slide and remove belt. Secure motor in the position by tightening the nuts on the carriage bolts.
5. Remove the belt drive.
6. Remove jacking bolt and tapped jacking bolt plate.
7. Remove the 2 screws that secure the motor mounting plate to the motor support channel.
8. Remove the 3 screws from the end of the motor support channel that interfere with the motor slide path.
9. Slide out the motor and motor mounting plate.
10. Disconnect wiring connections and remove the 4 mounting bolts.
11. Remove the motor.
12. To install the new motor, reverse steps 1 - 11.

Inspection And Cleaning Of Burner Assembly Heat Exchangers/Flue Gas Passages

For Qualified Service Technicians Only

See **Figure 25** for identification of parts.



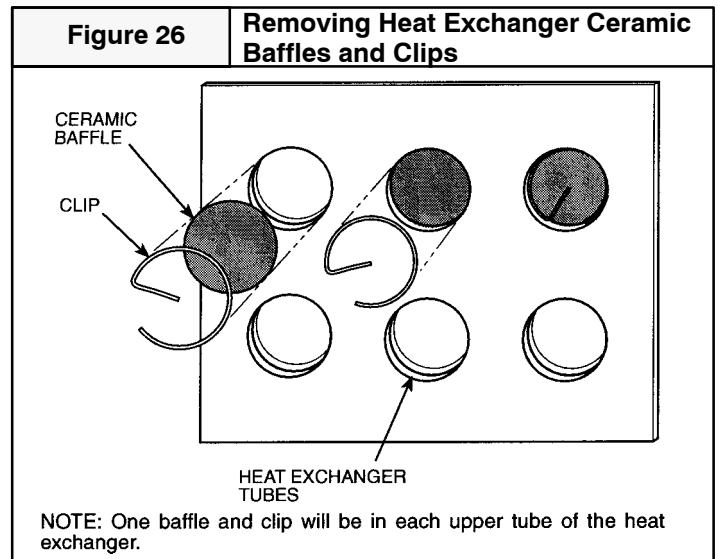
Main Burners

At the beginning of each heating season, inspect for deterioration, blockage due to corrosion or other causes. Observe the main burner flames and replace burners, if necessary. Refer to main burner section on this page.

Flue Gas Passageways

The flue collector box and heat exchanger cells may be inspected by removing heat exchanger access panel, flue box cover, and main burner assembly. **See Figure 25.** Refer to main burners section (below) for burner removal sequence. If cleaning is required, remove heat exchanger baffles and clean tubes with a wire brush.

Use caution with ceramic heat exchanger baffles. When installing retaining clip, be sure the center leg of the clip extends inward toward baffle. **See figure 26.**



Combustion-Air Blower

Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bi-monthly to determine proper cleaning frequency.

To inspect blower wheel, remove heat exchanger access panel. Shine a flashlight into opening to inspect wheel. If cleaning is required, remove motor and wheel assembly by removing screws holding motor mounting plate to top of combustion fan housing. The motor and wheel assembly will slide up and out of the fan housing. Remove the blower wheel from the motor shaft and clean with a detergent or solvent. Replace motor and wheel assembly.

Main Burner Section

For all applications, main burners are factory set and should require no adjustment.

Main Burner Removal

1. Shut **OFF** (field supplied) manual gas valve.
2. Shut **OFF** power to unit and install lockout tag.
3. Remove unit control box access panel, burner section access panel, and center post. **See Figure 1 & 25.**
4. Disconnect gas piping at unit gas valve.

5. Remove wires connected to gas valve. Mark each wire.
 6. Remove wires from gas valve.
 7. Remove wires from rollout switch.
 8. Remove sensor wire and ignitor cable from IGC board.
 9. Remove 2 screws securing manifold bracket to base-pan.
 10. Remove 2 screws that hold the burner support plate flange to the vestibule plate.
 11. Lift burner assembly out of unit.
4. Adjust spark gap. **See figure 27.**
 5. Reinstall burners on rack.
 6. Reinstall burner rack as described above.

CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described in Main Burner Removal section above.
2. Inspect burners, and if dirty, remove burners from rack.
3. Using a soft brush, clean burners and crossover port as required.

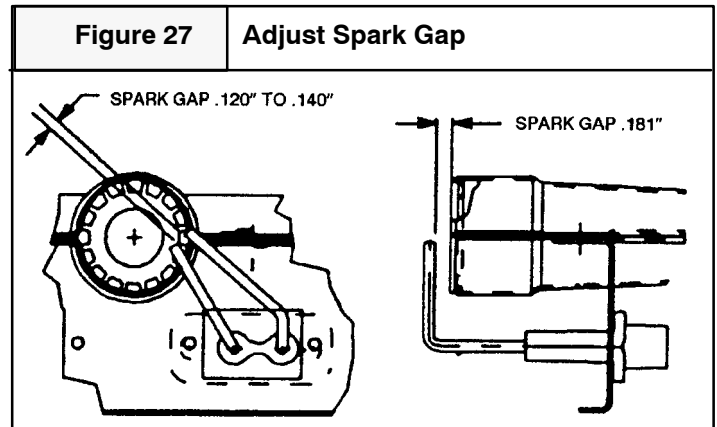


Table 1- TROUBLESHOOTING, LED Troubleshooting Error Code

SYMPTOM	CAUSE	REMEDY
Hardware Failure OFF	Loss of power to control module (IGC).	Check 5 amp fuse on IGC, power to unit, 24-v circuit breaker, and transformer, Units without a 24-v circuit breaker have an internal overload in the 24-v transformer. If the overload trips, allow 10 minutes to auto reset.
On/Off Delay Modified 1 Flash	High limit switch opens during heat exchanger warm-up period before fan-on delay expires. Limit switch opens within three minutes after blower-off delay timing in Heating mode.	Ensure unit is fired on rate and temperature rise is correct. Ensure unit's external static pressure is within application guidelines.
Limit Switch Fault 2 Flashes	High temperature limit switch is open.	Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is in accordance with the range on the unit nameplate.
Flame Sense Fault 3 Flashes	The IGC sensed flame that should not be present.	Reset unit. If problem persists, replace control board.
4 Consecutive Limit Switch Faults 4 Flashes	Inadequate airflow to unit.	Check operation of indoor (evaporator) fan motor and that supply-air temperature rise agrees with range on unit nameplate.
Ignition Lockout Fault 5 Flashes	Unit unsuccessfully attempted ignition for 15 minutes.	Check ignitor and flame sensor electrode spacing, gaps, etc. Ensure that flame sense and ignition wires are properly terminated. Verify that unit is obtaining proper amount of gas.
Induced-Draft Motor Fault 6 Flashes	IGC does not sense that induced-draft motor is operating.	Check for proper voltage. If motor is operating, check the speed sensor plug/IGC Terminal J2 connection. Proper connection: PIN 1 - White, PIN 2 - Red, PIN 3 - Black.
Rollout Switch Fault 7 Flashes	Rollout switch has opened.	Rollout switch will automatically reset, but IGC will continue to lock out unit. Check gas valve operation. Ensure that induced draft blower wheel is properly secured to motor shaft. Reset unit at unit disconnect.
Internal Switch Fault 8 Flashes	Microprocessor has sensed an error in the software or hardware.	If error code is not cleared by resetting unit power, replace the IGC.
CAUTION: If the IGC must be replaced, be sure to ground yourself to dissipate any electrical charge that may be present before handling new control board. The IGC is sensitive to static electricity and may be damaged if the necessary precautions are not taken.		IMPORTANT: Refer to Heating troubleshooting chart for additional troubleshooting analysis. LEGEND: IGC - Integrated Gas Controller. LED - Light emitting diode.

TROUBLESHOOTING - Cooling Service

PROBLEM	CAUSE	REMEDY
Compressor and condenser fans will not start.	Power failure	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay.	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
	Thermostat setting too high.	Lower thermostat setting below room temperature.
Compressor will not start but condenser fans run.	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor.
	Defective overload.	Determine cause and replace.
	One leg of 3-phase power dead.	Replace fuse or reset circuit breaker.
Compressor cycles (other than normally satisfying thermostat).	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor	Replace and determine cause.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective overload.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
(PGS240, PGE180/240 Only) Compressor makes excessive noise (Scroll only)	Compressor rotating in wrong direction	Reverse the 3-phase power leads as described in Start-Up section
Compressor operates continuously.	Dirty air filter	Replace filter.
	Unit undersized for load	Decrease load or increase unit size
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge.	Locate leak, repair, and recharge.
	Air in system	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive head pressure.	Dirty air filter	Replace filter.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharged.	Remove excess refrigerant.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling.	Determine cause and correct.
Head pressure too low.	Low refrigerant charge	Check for leaks, repair, and recharge.
	Restriction in liquid tube.	Remove restriction.
Excessive suction pressure.	High heat load.	Check for source and eliminate.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction pressure too low.	Dirty air filter.	Replace filter.
	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Faulty TXV.	1. Check TXV bulb mounting and secure tightly to suction line. 2. Replace TXV if stuck open or closed.
	Insufficient evaporator airflow	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Field-installed filter drier restricted.	Replace.
Compressor no. 2 will not run.	Unit in economizer mode.	Proper operation; no remedy necessary.

TROUBLESHOOTING - Heating Service

PROBLEM	CAUSE	REMEDY
Burners will not ignite.	Misaligned spark electrodes.	Check flame ignition and sensor electrode positioning. Adjust as needed.
	No gas at main burners	Check gas line for air purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to relight unit. Check gas valve.
	Water in gas line	Drain water and install drip leg to trap water.
	No power to furnace.	Check power supply, fuses, wiring, and circuit breaker.
	No 24 v power supply to control circuit.	Check transformer. Transformers with internal overcurrent protection require a cool down period before resetting.
	Miswired or loose connections.	Check all wiring and wirenut connections.
	Burned-out heat anticipator in thermostat.	Replace thermostat.
	Broken thermostat wires.	Run continuity check. Replace wires, if necessary.
Inadequate Heating.	Dirty air filter	Clean all wiring and wirenut connections.
	Gas input to unit too low.	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure, or replace with correct orifices.
	Unit undersized for application.	Replace with proper unit or add additional unit.
	Restricted airflow.	Clean filter, replace filter, or remove any restrictions.
	Blower speed too low.	Use high speed tap, increase fan speed, or install optional blower as suitable for individual units.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
	Too much outdoor air.	Adjust minimum position. Check economizer operation.
Poor flame characteristics.	Incomplete combustion (lack of combustion air) results in: Aldehyde odors, CO, sooting flame, or floating flame.	Check all screws around flue outlets and burner compartment. Tighten as necessary.
		Cracked heat exchanger.
		Overfired unit - reduce input, change orifices, or adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary.
		Check orifice to burner alignment.
Burners will not turn off.	Unit is locked into Heating mode for a one minute minimum.	Wait until mandatory one minute time period has elapsed or power to unit.

I. START-UP CHECKLIST (Remove and store in job file)

Model No:	Serial No:
Date:	Technician:
Unit No:	Job Location:
	Job Name:

II. PRE-START-UP (Insert Checkmark in box as each item is completed)

<input type="checkbox"/>	Verify that all packing materials have been removed from unit.
<input type="checkbox"/>	Verify installation of indoor fan motor adjustment bolt and plate. (20 ton only)
<input type="checkbox"/>	Verify installation of flue hood and wind baffle.
<input type="checkbox"/>	Verify that condensate connection is installed per installation instructions.
<input type="checkbox"/>	Check all electrical connections and terminals for tightness.
<input type="checkbox"/>	Check gas piping for leaks.
<input type="checkbox"/>	Check that indoor-air filters are clean and in place.
<input type="checkbox"/>	Verify that unit installation is level.
<input type="checkbox"/>	Check fan wheels and propellers for location in housing/orifice and setscrew tightness.
<input type="checkbox"/>	Ensure belt tension is correct and blower pulleys are properly aligned.

III. START-UP

ELECTRICAL

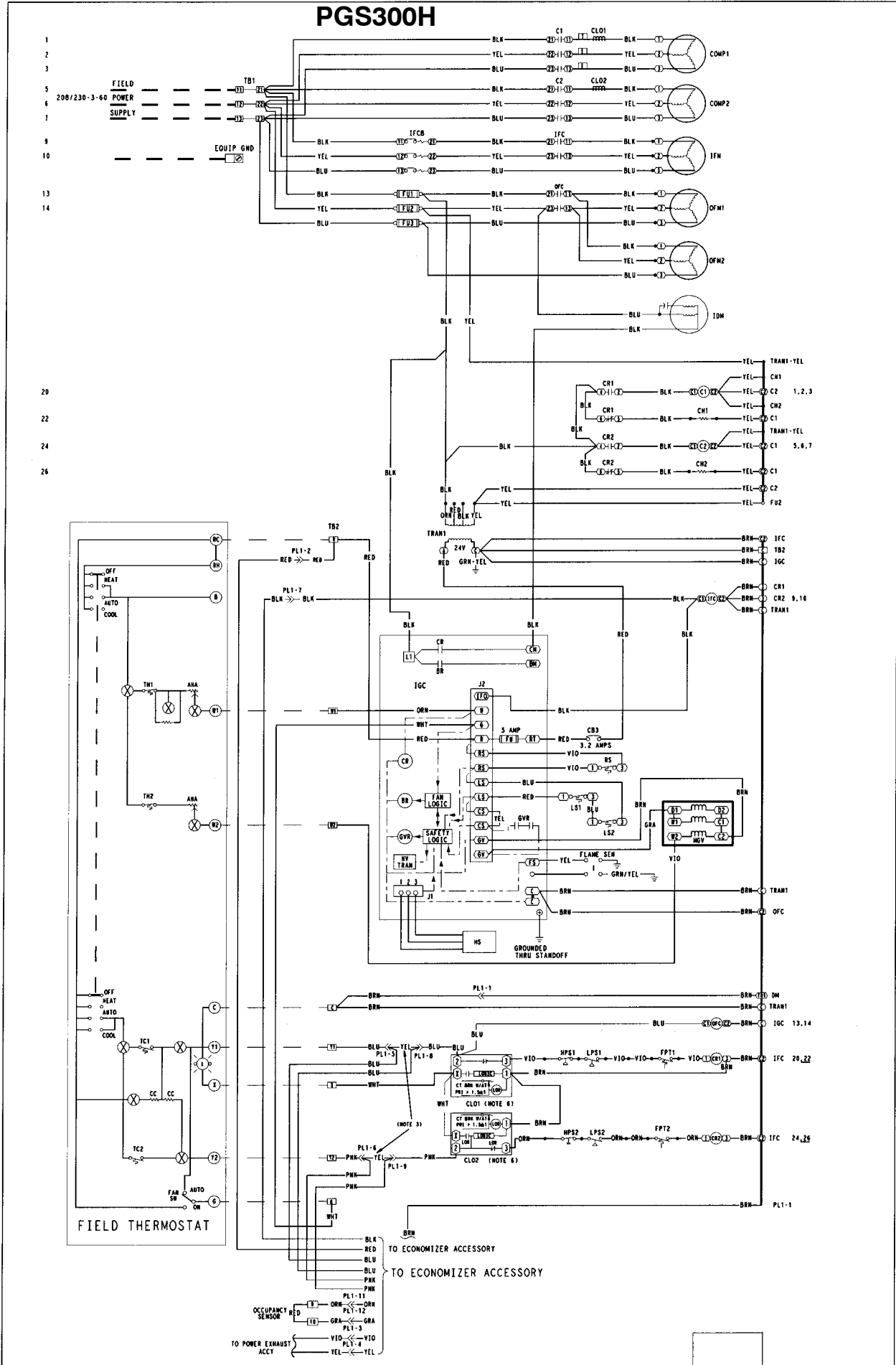
Supply Voltage	L1-L2	L2-L3	L3-L1
Compressor AMPS	L1	L2	L3
Compressor AMPS	L1	L2	L3
Indoor-Fan AMPS	L1	L2	L3

TEMPERATURES and PRESSURES

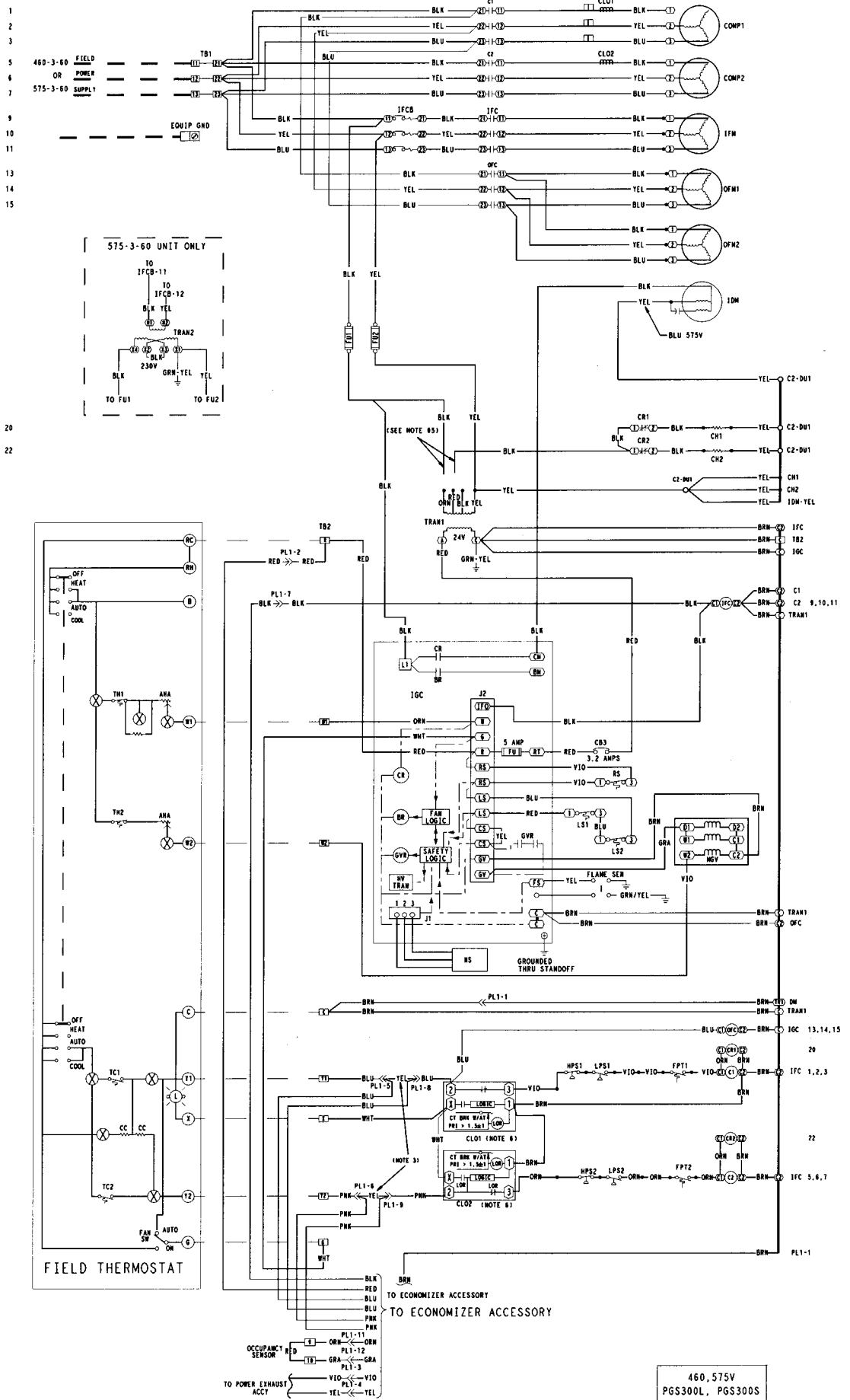
Outdoor-Air Temperature	°DB	
Return-Air Temperature	°DB	°WB
Cooling Supply air	°DB	°WB
Gas Heat Supply air	°DB	
Gas Inlet Pressure	In. wg	
Gas Manifold Pressure	In. wg (High Fire)	In. wg (Lo Fire)
Refrigerant Suction Pressure	PSIG-Circuit # 1	PSIG-Circuit # 2
Refrigerant Temp. (Suction) Pressure	Circuit # 1	Circuit # 2
Refrigerant Discharge	PSIG-Circuit # 1	PSIG-Circuit # 2
Discharge Temperature	°F/C-Circuit # 1	°F/C-Circuit # 2

<input type="checkbox"/>	Verify that 3-phase scroll compressor rotating in correct direction on select models.
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PGS300H



PGS300L,S

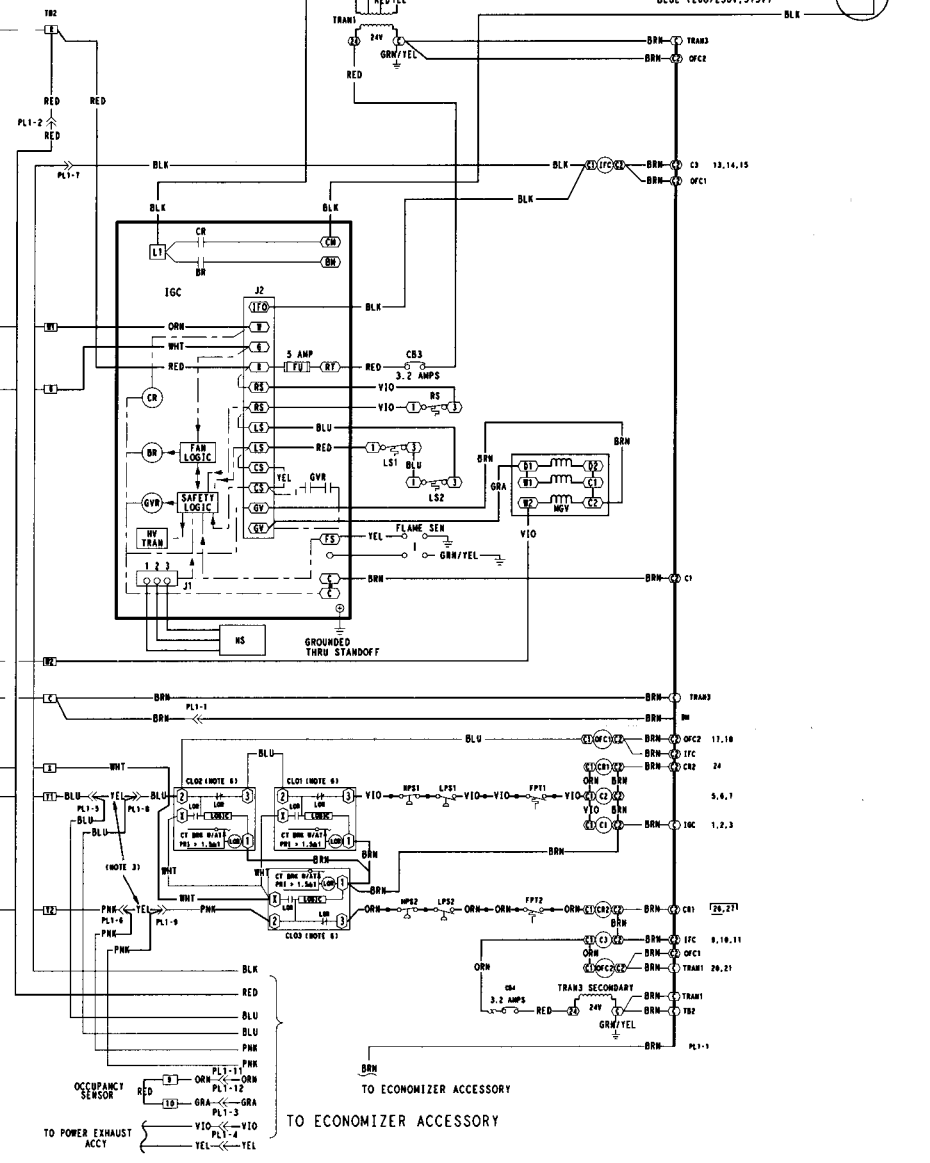
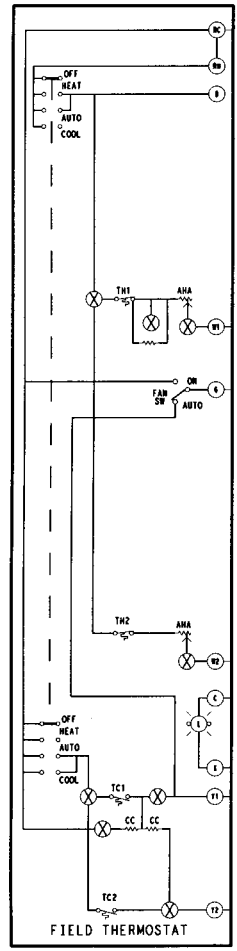
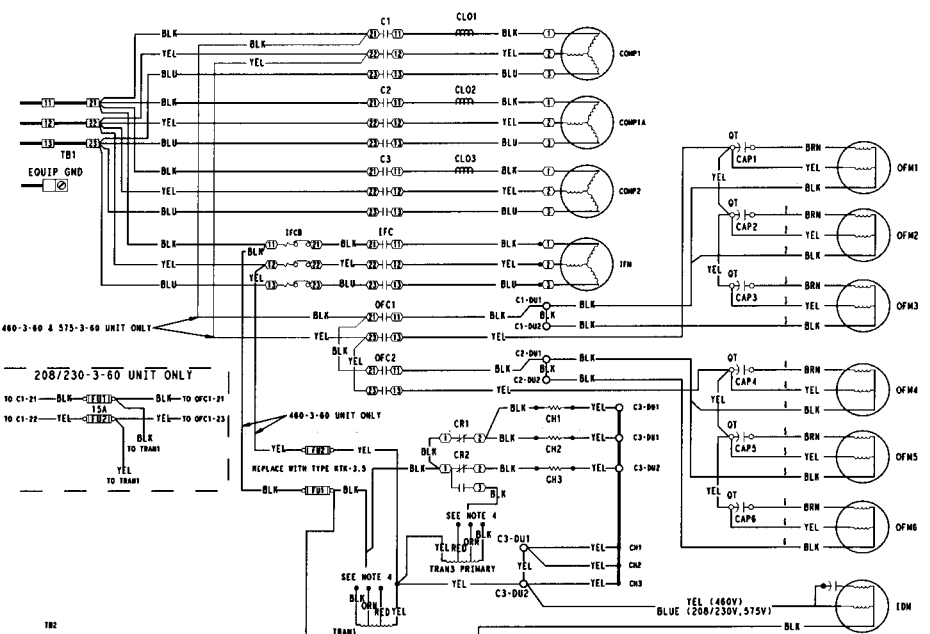
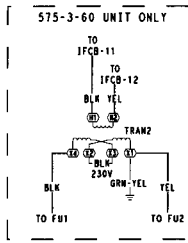


460, 575V
PGS300L, PGS300S

PGE300H, L, S

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208/230-3-60 FIELD
460-3-60 POWER
575-3-60 SUPPLY



208/230V, 460V, 575V
PGE300H, L, S