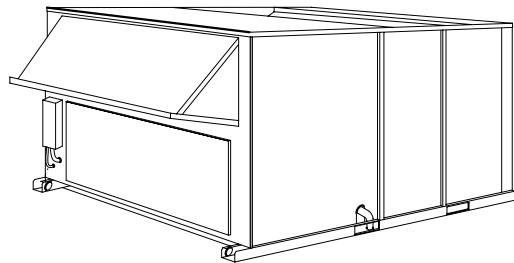


Installation Instructions

PGE Series – 3 Phase 15 to 25 Ton



PACKAGED ROOFTOP GAS HEATING/ELECTRIC COOLING UNITS

PRINTED IN MEXICO

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SAFETY CONSIDERATIONS

Installation and servicing of this equipment can be hazardous due to mechanical and electrical components. Only trained and qualified personnel should install, repair, or service this equipment.

Untrained personnel can perform basic maintenance functions such as cleaning and replacing air filters. All other operations must be performed by trained service personnel. When working on this equipment, observe precautions in the literature, on tags, and on labels attached to or shipped with the unit and other safety precautions that may apply.

Follow all safety codes. Installation must be in compliance with local and national building codes. Wear safety glasses, protective clothing, and work gloves. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit.

Recognize safety information. This is the safety-alert symbol  When you see this symbol in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTE**. These words are used with the safety-alert symbol. **DANGER** identifies the most serious hazards which **will** result in serious injury or death. **WARNING** signifies a hazard which **could** result in serious injury or death. **CAUTION** is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

These instructions cover minimum requirements and conform to existing national standards and safety codes. In some instances, these instructions exceed certain local codes and ordinances, especially those that may not have kept up with changing residential construction practices. We require these instructions as a minimum for a safe installation.



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death. Before installing or servicing system, always turn off power supply to unit and install lockout tag. There may be more than one disconnect switch. Turn off accessory heater power switch if applicable.



WARNING

FIRE, EXPLOSION, ELECTRICAL SHOCK HAZARD

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

1. Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury, or loss of life. Refer to the User's Information Manual provided with this unit for more details.
2. 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, or 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.



WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could cause death and/or property damage.

Disconnect gas piping from unit when leak testing at pressure greater than 0.5 psig. Pressures greater than 0.5 psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig, it *must* be replaced before use. When pressure testing field-supplied gas piping at pressures of 0.5 psig or less, a unit connected to such piping must be isolated by manually closing the gas valve(s).

INSTALLATION

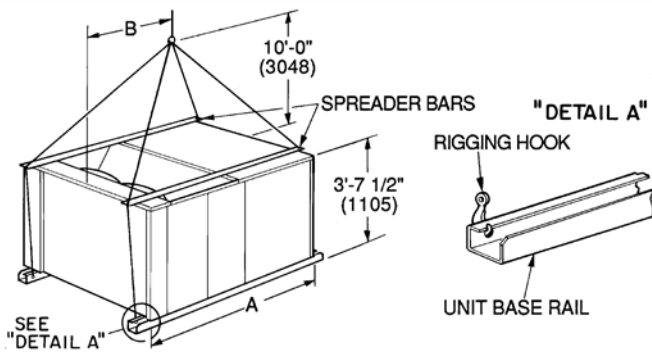
IMPORTANT: Units have high ambient operating limits. If limits are exceeded, the unit will automatically lock the compressor out of operation. Manual reset will be required to restart the compressor.

PROVIDE UNIT SUPPORT

Roofcurb

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

FIGURE 1 Rigging Details

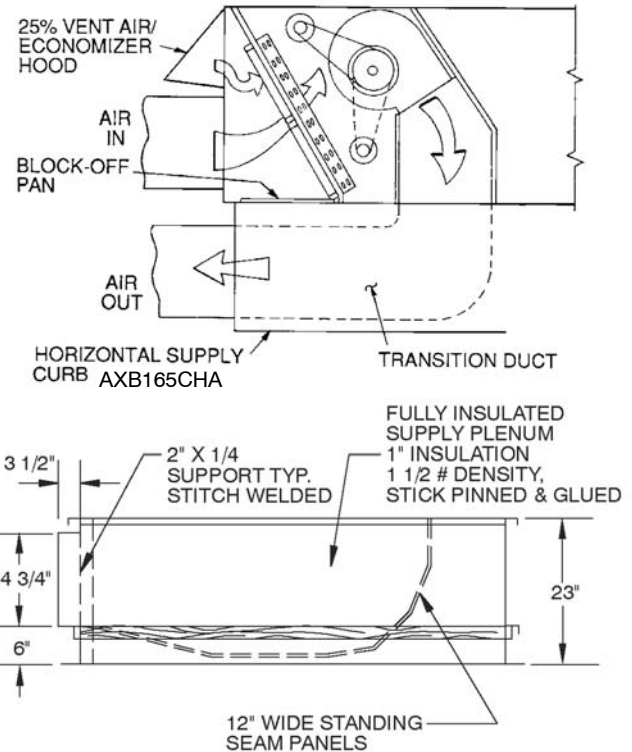
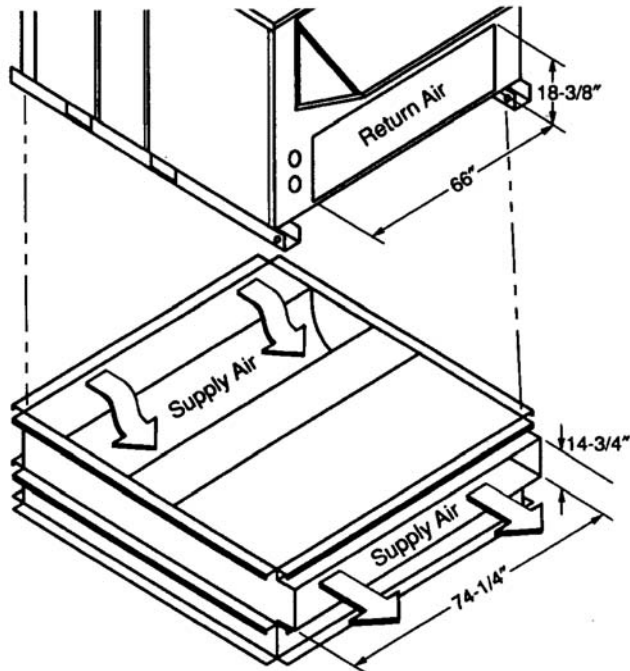


NOTES:

1. Dimensions in () are in millimeters.
2. Refer to Table 1 for unit operating weights.
3. Remove boards at ends of unit and runners prior to rigging.
4. Rig by inserting hooks into unit base rails as shown. Use corner post from packaging to protect coil from damage. Use bumper boards for spreader bars.
5. Weights do not include optional economizer. See Table 1 for economizer weight.
6. Weights given are for aluminum indoor coil plate fins and copper outdoor coil plate fins. Weights of other metal combinations are listed in Table 1.

UNIT PGE	MAXIMUM SHIPPING WEIGHT		DIMENSIONS			
	lb	kg	A		B	
			ft-in.	mm	ft-in.	mm
180	1875	850	6-11 ¹ / ₂	2121	4-0	1219
210	1925	873	6-11 ¹ / ₂	2121	3-2	964
240	2085	923	6-11 ¹ / ₂	2121	3-4	1016
300	2445	1109	6-11 ¹ / ₂	2121	3-4	1016

FIGURE 2 Horizontal Supply/ Return Adapter Installation -- PGE180-240



NOTE: AXB165CHA is a fully factory preassembled horizontal adapter and includes an insulated transition duct. The pressure drop through the adapter curb is negligible.
For horizontal return applications: The power exhaust and barometric relief dampers must be installed in the return air duct.

ACCESSORY PACKAGE NO.	CURB HEIGHT	DESCRIPTION
AXB165CHA	1'-11" (584)	Pre-Assembled, Horizontal Adapter Roof Curb

IMPORTANT: The gasketing of the unit to the roof curb is critical for watertight seal. Install gasket supplied with the roof curb. Improperly applied gasket can result in air leaks and poor unit performance.

Alternate Unit Support

When the curb cannot be used, support unit with sleepers using unit curb support area. If sleepers cannot be used, support long sides of unit with a minimum of 3 equally spaced 4-in. x 4-in. pads on each side.

RIG AND PLACE UNIT

Inspect unit for transportation damage. File any claim with transportation agency.

Do not drop unit; keep upright. Use spreader bars over unit to prevent sling or cable damage. Rollers may be used to move unit across a roof. Level by using unit frame as a reference; leveling tolerance is $\pm 1/16$ in. per linear ft in any direction. See Fig. 1 for additional information. Unit operating weight is shown in Table 1.

Four lifting holes are provided in ends of unit base rails as shown in Fig. 2. Refer to rigging instructions on unit.

NOTE: On PGE300 units, the lower forklift braces must be removed prior to setting unit on roof curb.

Positioning

Maintain clearance, per Fig. 3-5, around and above unit to provide minimum distance from combustible materials, proper airflow, and service access.

Do not install unit in an indoor location. Do not locate air inlets near exhaust vents or other sources of contaminated air. For proper unit operation, adequate combustion and ventilation air must be provided in accordance with Section 5.3 (Air for Combustion and Ventilation) of the National Fuel Gas Code, ANSI Z223.1 (American National Standards Institute).

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

Locate mechanical draft system flue assembly at least 4 ft from any opening through which combustion products could enter the building, and at least 4 ft from any adjacent building. When unit is located adjacent to public walkways, flue assembly must be at least 7 ft above grade.

Roof Mount

Check building codes for weight distribution requirements. Unit operating weight is shown in Table 1.

Base Unit Dimensions, PGE180, 210

UNIT	STD. UNIT WEIGHT	ECONOMIZER WEIGHT	CORNER A	CORNER B	CORNER C	CORNER D	DIM A	DIM B	DIM C
PGE180	1800 LB 816 KG	90 LB 41 KG	417 LB 185 KG	399 LB 181 KG	481 LB 218 KG	503 LB 228 KG	3'-2" (961)	3'-6" (1070)	1'-10" (3559)
PGE210	1850 LB 839 KG	90 LB 41 KG	409 LB 186 KG	393 LB 178 KG	421 LB 191 KG	496 LB 208 KG	3'-4" (1016)	3'-7" (1092)	1'-10" (3559)

NOTES:

1. Refer to print for roof curb accessory dimensions.
2. Dimensions in [] are in millimeters.
3. Center of gravity.
4. Direction of airflow.
5. Ductwork to be attached to accessory roof curb only.
6. 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 operation 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).
7. Control box side: 3'-0" (914) to ungrounded surfaces, non-combustible.
8. Control box side: 3'-6" (1067) to block or concrete walls, or other grounded surfaces.
9. Local codes or jurisdiction may prevail.
10. With the exception of clearance for the condenser coil and the damper/power exhaust as stated in Note #6, a removable fence or barricade requires no clearance.
11. Dimensions are from outside of corner post. Allow 0'-5 1/16" (8) on each side for top cover drip edge.

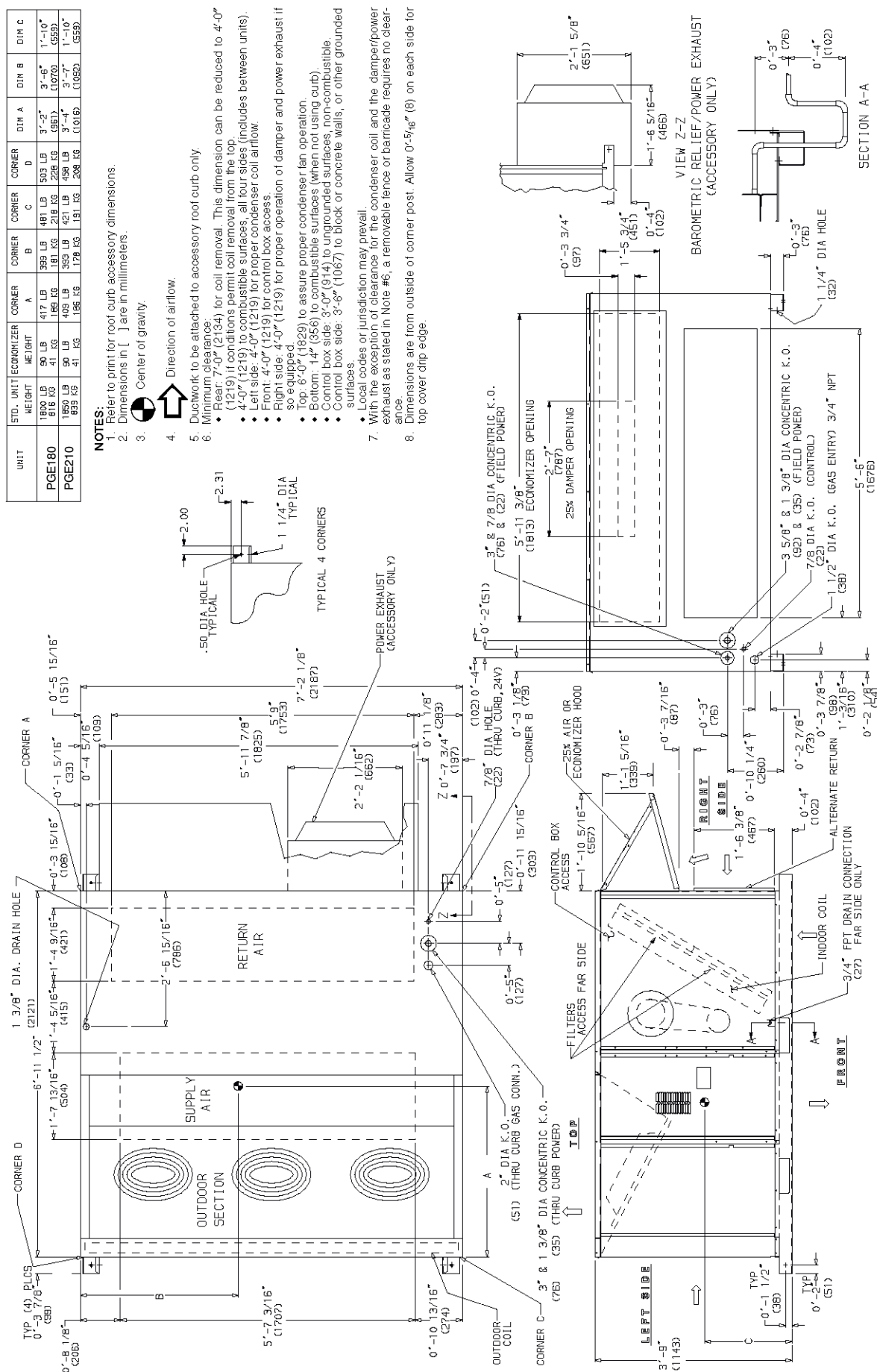


FIGURE 4

Base Unit Dimensions, PGE240

UNIT	STD. UNIT ECONOMIZER	CORNER A	CORNER B	CORNER C	CORNER D	DIM A	DIM B	DIM C
PGE240	1900 LB 862 KG	454 LB 206 KG	419 LB 190 KG	489 LB 222 KG	540 LB 245 KG	3'-3" (991)	3'-7" (1067)	1'-8" (508)

NOTES:

- Refer to print for roof curb accessory dimensions.
- Dimensions in [] are in millimeters.
- Center of gravity.
- Direction of airflow.
- Ductwork to be attached to accessory roof curb only.
- 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 operation 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.
- With the exception of clearance for the condenser coil and the damper/power exhaust as stated in Note #6, a removable fence or barricade requires no clearance.
- Dimensions are from outside of corner post. Allow 0'-5 1/8" (8) on each side for top cover drip edge.

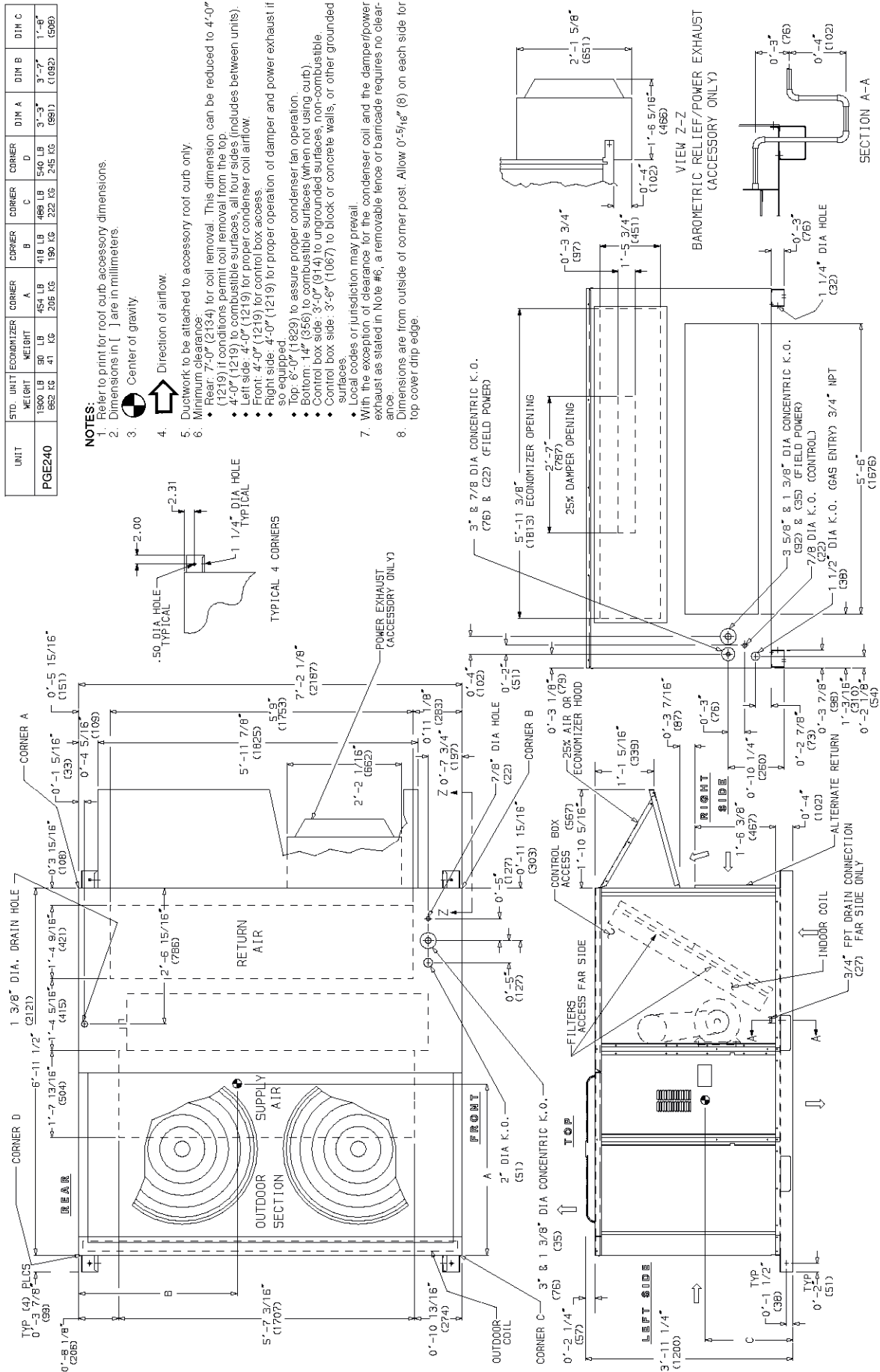


Table 1 – Physical Data – PGE180–300

UNIT PGE		180	210	240	300
NOMINAL CAPACITY (tons)		15	18	20	25
OPERATING WEIGHT		1800	1850	1900	2270
Economizer		90	90	90	90
COMPRESSOR/MANUFACTURER		Scroll, Copeland			
Quantity...Model (Ckt 1, Ckt 2)		1...ZR94KC, 1...ZR72KC	1...ZR108KC, 1...ZR94KC	1...ZR125KC, 1...ZR108KC	1...ZR140KC,* 1...ZR144KC
Capacity Stages (%)		60, 40	55, 45	55, 45	50, 50
Number of Refrigerant Circuits		2	2	2	2
Oil (oz) (Ckt 1, Ckt 2)		85, 60	106, 81	106,106	136, 106
REFRIGERANT TYPE		R-22			
Expansion Device		TXV			
Operating Charge (lb-oz) Circuit 1†		19-8	19-8	19-11	26-13
Circuit 2		13-8	19-2	13-14	25-10
CONDENSER COIL		Cross-Hatched ³ / ₈ -in. Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins			
Rows...Fins/in.		4...15	4...15	4...15	3...15 (2 coils)
Total Face Area (sq ft)		21.7	21.7	21.7	43.4
CONDENSER FAN		Propeller Type			
Nominal Cfm		10,500	10,500	14,200	21,000
Quantity...Diameter (in.)		3...22	3...22	2...30	6...22
Motor Hp...Rpm		¹ / ₂ ...1050	¹ / ₂ ...1050	1...1075	¹ / ₂ ...1050
Watts Input (Total)		1100	1100	3400	2200
EVAPORATOR COIL		Cross-Hatched ³ / ₈ -in. Copper Tubes, Aluminum Lanced or Copper Plate Fins, Face Split			
Rows...Fins/in.		4...15	4...15	4...15	4...15
Total Face Area (sq ft)		17.5	17.5	17.5	17.5
EVAPORATOR FAN		Centrifugal Type			
Quantity...Size (in.)		2...12 x 12	2...12 x 12	2...12 x 12	2...12 x 12
Type Drive		Belt	Belt	Belt	Belt
Nominal Cfm		6000	7200	8000	10,000
Motor Hp		5	5	7.5	10
Motor Nominal Rpm		1745	1745	1745	1740
Maximum Continuous Bhp		6.13	5.90	8.7 [208/230 v] 9.5 [460 v]	10.2 [208/230 v] 11.8 [460 v]
Motor Frame Size		184T	184T	213T	215T
Fan Rpm Range	Low-Medium Static	873-1021	910-1095	1002-1151	1066-1283
	High Static	1025-1200	1069-1287	1193-1369	1332-1550
Motor Bearing Type		Ball	Ball	Ball	Ball
Maximum Allowable Rpm		1550	1550	1550	1550
Motor Pulley Pitch Diameter	Low-Medium Static	4.9/5.9	4.9/5.9	5.4/6.6	4.9/5.9
	High Static	4.9/5.9	4.9/5.9	5.4/6.6	4.9/5.9
Min/Max (in.)		4.9/5.9	4.9/5.9	5.4/6.6	4.9/5.9
Nominal Motor Shaft Diameter (in.)		1 ¹ / ₈	1 ¹ / ₈	1 ³ / ₈	1 ³ / ₈
Fan Pulley Pitch Diameter (in.)	Low-Medium Static	9.4	9.4	9.4	8.0
	High Static	8.0	8.0	7.9	6.4
Nominal Fan Shaft Diameter (in.)		1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆
Belt, Quantity...Type...Length (in.)	Low-Medium Static	1...BX...50	1...BX...50	1...BX...53	2...BX...50
	High Static	1...BX...48	1...BX...48	1...BX...50	2...BX...47
Pulley Center Line Distance (in.)		13.3-14.8	13.3-14.8	14.6-15.4	14.6-15.4
Speed Change per Full Turn of Movable Pulley Flange (rpm)	Low-Medium Static	37	37	37	36
	High Static	44	34	44	45
Movable Pulley Maximum Full Turns From Closed Position		6**	6††	6**	6††
Factory Pulley Setting		3.5	3.5	3.5	3.5
Factory Speed Setting (rpm)	Low-Medium Static	965	1002	1120	1182
	High Static	1134	1178	1328	1470
Fan Shaft Diameter at Pulley (in.)		1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆	1 ⁷ / ₁₆

Table 1 – Physical Data – PGE180–300

UNIT PGE	180 (Low Heat/High Heat)	210 (Low Heat/High Heat)	240 (Low Heat/High Heat)	300 (Low Heat/High Heat)
FURNACE SECTION				
Rollout Switch Cutout Temp (F)***	190	190	190	190
Burner Orifice Diameter (in. ...drill size)				
Natural Gas Std	0.1285...30/0.136...29	0.1285...30/0.136...29	0.1285...30/0.136...29	0.1285...30/0.136...29
Thermostat Heat Anticipator Setting (amps)				
208/230 v Stage 1	0.98	0.98	0.98	0.98
Stage 2	0.44	0.44	0.44	0.44
460 v Stage 1	0.80	0.80	0.80	0.80
Stage 2	0.44	0.44	0.44	0.44
Gas Input Stage 1	206,000/270,000	206,000/270,000	206,000/270,000	206,000/270,000
Stage 2	275,000/360,000	275,000/360,000	275,000/360,000	275,000/360,000
Efficiency (Steady-State) (%)	81	81	81	81
Temperature Rise Range	15-45/20-50	15-45/20-50	15-45/20-50	15-45/20-50
Manifold Pressure (in. wg)				
Natural Gas Std	3.3	3.3	3.3	3.3
Liquid Propane††† Alt	3.3	3.3	3.3	3.3
Gas Valve Quantity	1	1	1	1
Gas Valve Pressure Range				
in. wg	5.5-13.5	5.5-13.5	5.5-13.5	5.5-13.5
psig	0.235-0.487	0.235-0.487	0.235-0.487	0.235-0.487
Field Gas Connection Size (in.-FPT)	3/4	3/4	3/4	3/4
HIGH-PRESSURE SWITCH (psig)				
Cutout	426			
Reset (Auto)				
LOW-PRESSURE SWITCH (psig)				
Cutout	27			
Reset (Auto)				
FREEZE PROTECTION THERMOSTAT (F)				
Opens	30 ± 5			
Closes				
OUTDOOR-AIR INLET SCREENS				
Quantity...Size (in.)	Cleanable 2...20 x 25 x 1 1...20 x 20 x 1			
RETURN-AIR FILTERS				
Quantity...Size (in.)	Throwaway†† 4...20 x 20 x 2 4...16 x 20 x 2			
POWER EXHAUST	1/2 Hp, 208/230-460 v Motor Direct Drive, Propeller-Fan (Factory-Wired for 460 v)			

LEGEND

Bhp — Brake Horsepower

TXV — Thermostatic Expansion Valve

*The ZRU140KC compressor is a tandem compressor, consisting of a ZR72KC (25% total capacity) and a ZR68KC (24% total capacity).

†Circuit 1 uses the lower portion of the condenser coil and lower portion of the evaporator coils; and Circuit 2 uses the upper portion of both coils.

**Pulley has 6 turns. Due to belt and pulley size, movable pulley cannot be set to 0 to 1 1/2 turns open.

††Pulley has 6 turns. Due to belt and pulley size, movable pulley cannot be set to 0 to 1 1/2 turns open.

***Rollout switch is manual reset.

†††A Liquid Propane kit is available as an accessory.

††The PGE300 unit requires 2-in. industrial-grade filters capable of handling face velocities up to 625 ft/min (such as American Air Filter no. 5700 or equivalent).

NOTE: The PGE units have a low-pressure switch (standard) located on the suction side.

FIELD FABRICATE DUCTWORK

Secure all ducts to building structure. Use flexible duct connectors between unit and ducts as required. 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.

MAKE UNIT DUCT CONNECTIONS

Unit is shipped for thru-the-bottom duct connections. Ductwork openings are shown in Figs. 3-5. Duct connections are shown in Fig. 6. Field-fabricated concentric ductwork may be connected as shown in Fig. 7 and 8. Attach all ductwork to roof curb and roof curb basepans.

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 Fig. 9. The wind baffle is then installed over the flue hood.

NOTE: When properly installed, flue hood will line up with combustion fan housing. See Fig. 10.

TRAP CONDENSATE DRAIN

See Fig. 11 for drain location. One 3/4-in. half coupling is provided inside unit evaporator section for condensate drain connection. An 8 1/2-in. x 3/4-in. diameter and 2-in. x 3/4-in. diameter pipe nipple, coupled to standard 3/4-in. diameter elbows, provide a straight path down through hole in unit base rails (see Fig. 12). A trap at least 4-in. deep must be used.

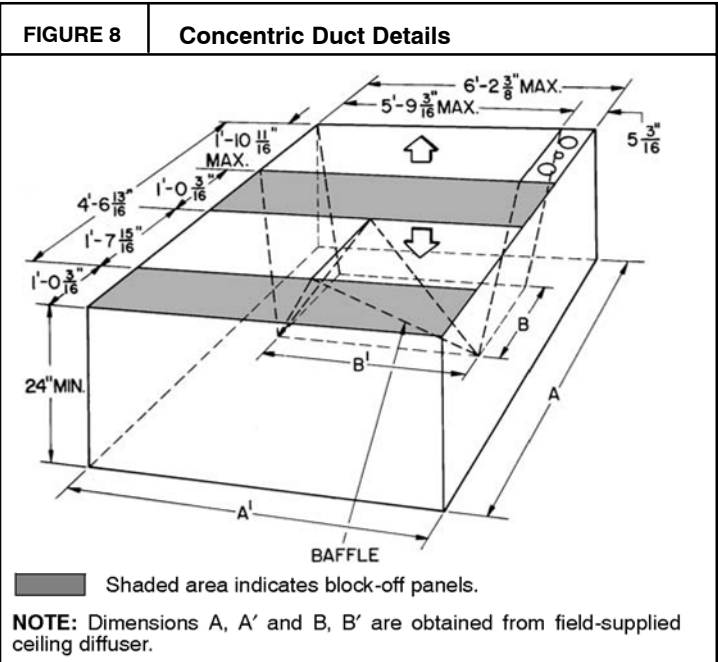
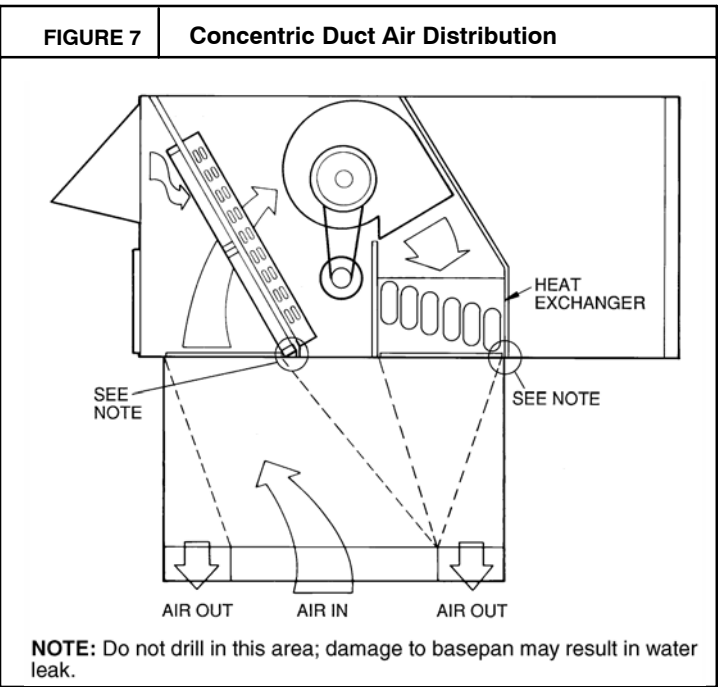
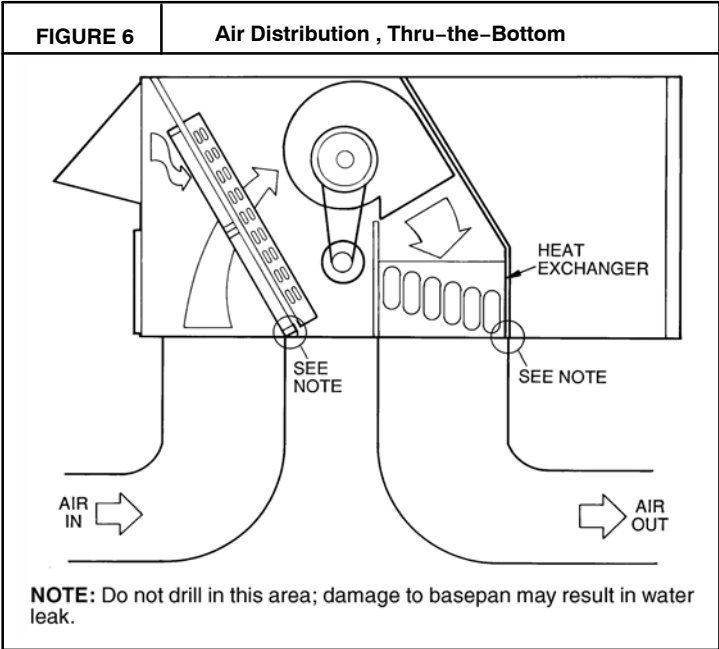


FIGURE 9 Flue Hood Location

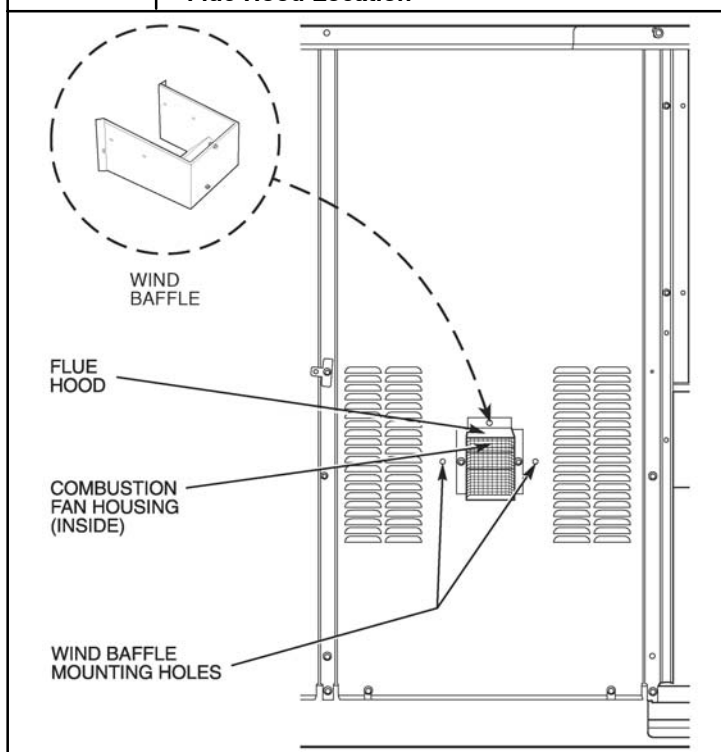


FIGURE 10 Combustion Fan Housing Location

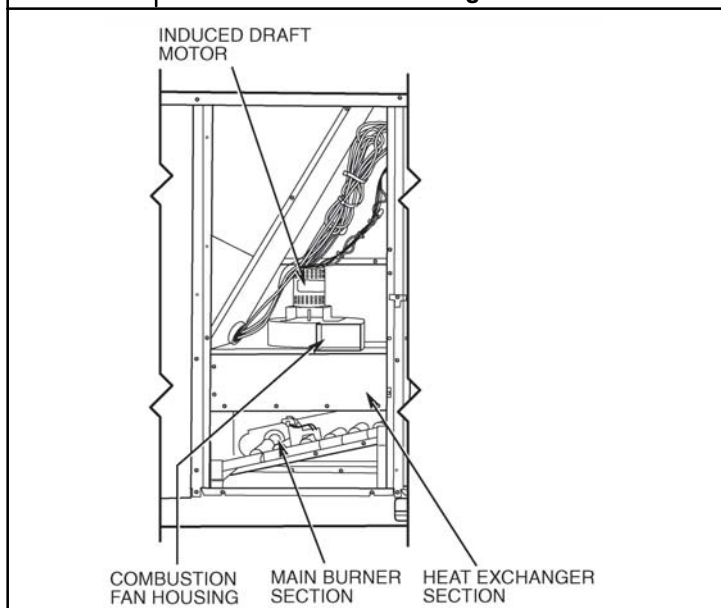


FIGURE 11 Condensate Drain Details

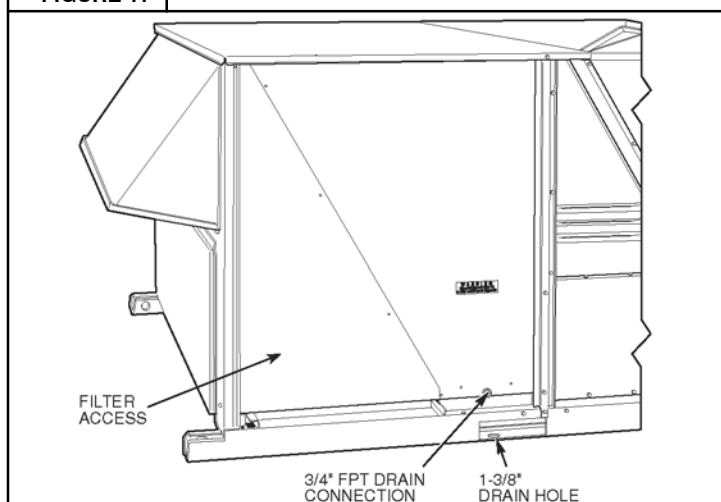
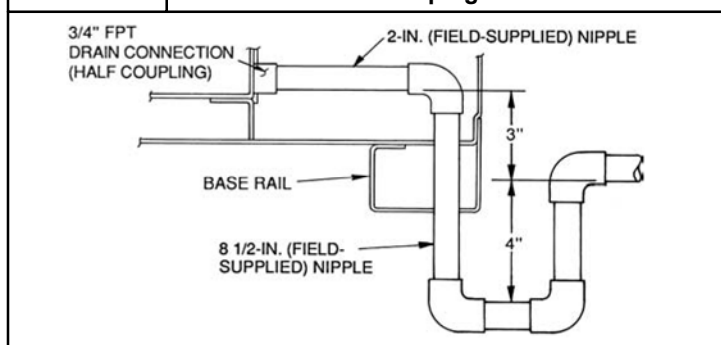


FIGURE 12 Condensate Drain Piping Details



ORIFICE CHANGE

This unit is factory assembled for heating operation using natural gas at an elevation from sea level to 2000 ft. This unit uses orifice type LH32RFnnn, where “nnn” indicates the orifice size based on drill size diameter in thousands of an inch.

High Elevation (Above 2000 ft)

Use accessory high altitude kit when installing this unit at an elevation of 2000 to 7000 ft. For elevations above 7000 ft, refer to Table 2 to identify the correct orifice size for the elevation. See Table 3 for the number of orifices required for each unit size. Purchase these orifices from your local dealer. Follow instructions in accessory Installation Instructions to install the correct orifices.

Table 2 — Altitude Compensation*

ELEVATION (ft)	NATURAL GAS ORIFICE†	
	Low Heat	High Heat
0-1,999	30	29
2,000	30	29
3,000	31	30
4,000	31	30
5,000	31	30
6,000	31	30
7,000	32	31
8,000	32	31
9,000	33	31
10,000	35	32

*As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes. Includes a 4% input reduction per each 1000 ft.

†Orifices available through your dealer.

Table 3 — Orifice Quantity

UNIT	ORIFICE QUANTITY
PGE180 Low Heat	5
PGE210 Low Heat, PGE240 Low Heat, PGE300 Low Heat, PGE180 High Heat	6
PGE210 High Heat, PGE240 High Heat, PGE300 High Heat	7

Conversion To LP (Liquid Propane) Gas

Use accessory LP gas conversion kit when converting this unit for use with LP fuel usage for elevations up to 7000 ft. For elevations above 7000 ft, refer to Table 4 to identify the correct orifice size for the elevation. See Table 3 for the number of orifices required for each unit size. Purchase these orifices from your local dealer. Follow instructions in accessory Installation Instructions to install the correct orifices.

Table 4 — LP Gas Conversion*

ELEVATION (ft)	LP GAS ORIFICE†
0-1,999	36
2,000	37
3,000	38
4,000	38
5,000	39
6,000	40
7,000	41
8,000	41
9,000	42
10,000	43

*As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes. Includes a 4% input reduction per each 1000 ft.

†Orifices available through your dealer.

INSTALL GAS PIPING

Unit is equipped for use with natural gas. Installation must conform with local building codes or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1.

Install field-supplied manual gas shutoff valve with a 1/8-in. NPT pressure tap for test gage connection at unit. Field gas piping must include sediment trap and union. See Fig. 13.

⚠ CAUTION

UNIT EQUIPMENT DAMAGE HAZARD

Failure to follow this caution can result in equipment damage.
Don not pressure test gas supply while connected to unit.
Always disconnect union before servicing.

IMPORTANT: Natural gas pressure at unit gas connection must not be less than 5.5 in. wg or greater than 13.5 in. wg.

Size gas-supply piping for 0.5-in. wg maximum pressure drop. Do not use supply pipe smaller than unit gas connection.

FIGURE 13 Field Gas Piping

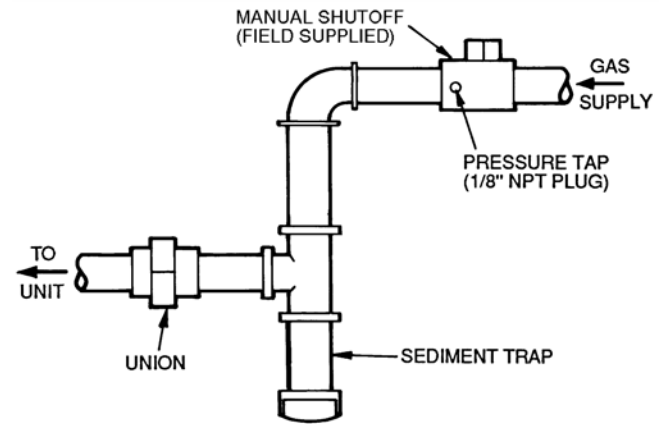
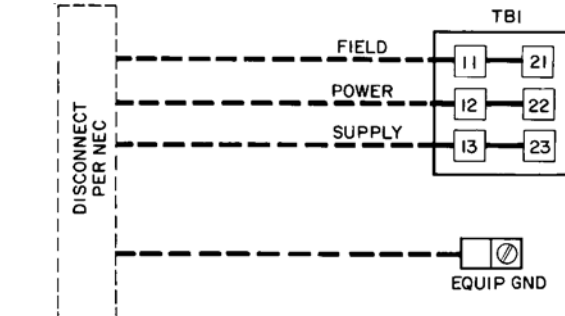


FIGURE 14 Field Power Wiring Connections



LEGEND

EQUIP GND — Equipment Ground
kcmil — Thousand Circular Mills
NEC — National Electrical
TB — Terminal Block

Make Electrical Connections

Field Power Supply

Unit is factory wired for voltage shown on nameplate.

When installing units, provide a disconnect of adequate size per NEC (National Electrical Code) requirements (Table 2).

All field wiring must comply with NEC and local requirements.

Route power lines through control box access panel or unit basepan (Fig. 3 to 5) to connections as shown on unit wiring diagram and Fig. 14.

Field wiring must conform to temperature limitations for type "T" wire. All field wiring must comply with NEC and local requirements.

Transformer no. 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% and the current must be balanced within 10%.

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 Control Wiring

Install an approved accessory thermostat assembly according to the installation instructions included with accessory. Locate thermostat assembly on a solid interior wall in the conditioned space to sense average temperature.

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 and in Fig. 15.

NOTE: For wire runs up to 50 ft, use no. 18 AWG (American Wire Gage) insulated wire (35 C minimum). For 50 to 75 ft, 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.

Set heat anticipator settings as follows:

VOLTAGE	W1	W2
208/230	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.

Optional Non-Fused Disconnect

On units with the optional non-fused disconnect, incoming power will be wired into the disconnect switch. Refer to Fig. 16 for wiring for 100 and 200 amp disconnect switches. Units with an MOCP (maximum overcurrent protection) under 100 will use the 100 amp disconnect switch. Units with an MOCP over 100 will use the 200 amp disconnect switch. Refer to the applicable disconnect wiring diagram.

To prevent breakage during shipping, the disconnect handle and shaft are shipped and packaged inside the unit control box. Install the disconnect handle before unit operation. To install the handle and shaft, perform the following procedure:

- 1. Open the control box door and remove the handle and shaft from shipping location.
- 2. Loosen the Allen bolt located on the disconnect switch. The bolt is located on the square hole and is used to hold the shaft in place. The shaft cannot be inserted until the Allen bolt is moved.
- 3. Insert the disconnect shaft into the square hole on the disconnect switch. The end of the shaft is specially cut and the shaft can only be inserted in the correct orientation.
- 4. Tighten the Allen bolt to lock the shaft into position.

- 5. Close the control box door.
- 6. Attach the handle to the external access door with the two screws provided. When the handle is in the ON position, the handle will be vertical. When the handle is in the OFF position, the handle will be horizontal.
- 7. Turn the handle to the OFF position and close the door. The handle should fit over the end of the shaft when the door is closed.
- 8. The handle must be in the OFF position to open the control box door.

Optional Convenience Outlet

On units with optional convenience outlet, a 115-v GFI (ground fault interrupt) convenience outlet receptacle is provided for field wiring. Field wiring should be run through the 7/8-in. knockout provided in the basepan near the return air opening.

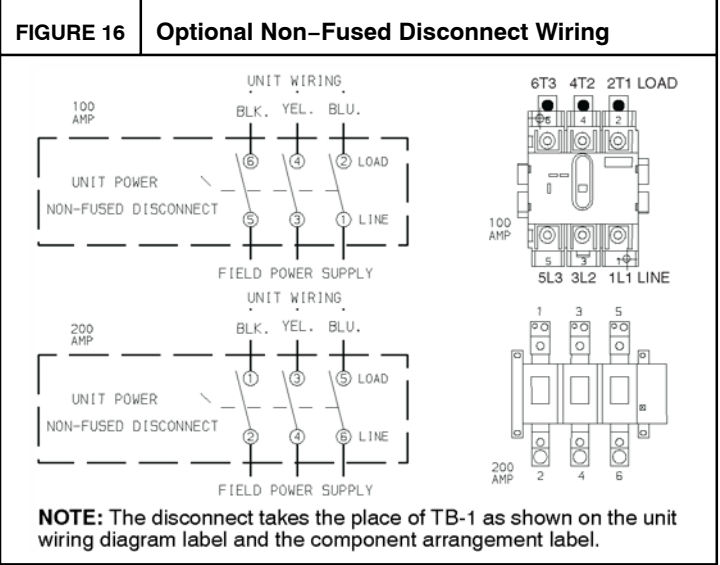
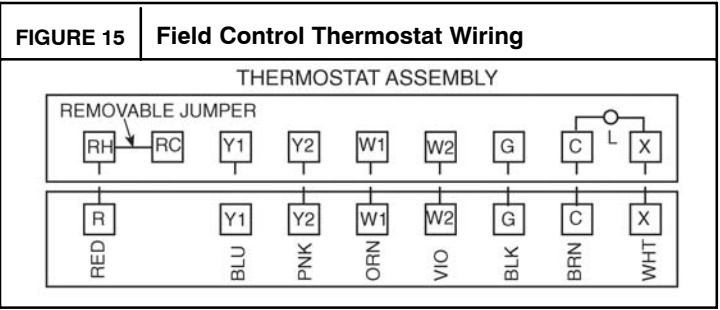


Table 5 — Electrical Data

Unit PGE	Voltage (3 Ph, 60 Hz)	Voltage Range		Compressor						OFM			IFM		Power Exhaust		Combustion Fan Motor	Power Supply	
				No. 1		No. 1A		No. 2											
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCP*
180	208/230	187	253	32.1	195	—	—	20.7	156	3	0.5	1.7	5.0	15.8/15.8	—	—	0.57	82/82	110/110
															4.6	18.8	0.57	86/86	110/110
	460	414	508	16.4	95	—	—	10	70	3	0.5	0.8	5.0	7.9	—	—	0.30	41	50
															2.3	6.0	0.30	43	50
210	208/230	187	253	30.1	225	—	—	28.8	195	3	0.5	1.7	5.0	15.8/15.8	—	—	0.57	87/87	110/110
															4.6	18.8	0.57	92/92	110/110
	460	414	508	15.5	114	—	—	14.7	95	3	0.5	0.8	5.0	7.9	—	—	0.30	44	50
															2.3	6.0	0.30	47	60
240	208/230	187	253	42	239	—	—	33.6	225	2	1	6.6	7.5	25.0/25.0	—	—	0.57	124/124	150/150
															4.6	18.8	0.57	129/129	150/150
	460	414	508	19.2	125	—	—	17.3	114	2	1	3.3	7.5	13.0	—	—	0.30	61	80
															2.3	6.0	0.30	63	80
300	208/230	187. 2	253	20.7	156	20.7	156	47.1	245	6	0.5	1.7	10.0	28.0/28.0	—	—	0.57	138/138	175/175
															4.6	18.8	0.57	143/143	150/175
	460	414	508	10	75	10	75	19.6	125	6	0.5	0.8	10.0	14.6	—	—	0.30	64	80
															2.3	6	0.30	66	80

LEGEND

FLA – Full Load Amps
HACR – Heating, Air Conditioning and Refrigeration
IFM – Indoor–Fan Motor
LRA – Locked Rotor Amps
MCA – Minimum Circuit Amps
MOCP – Maximum Overcurrent Protection
NEC – National Electrical Code
OFM – Outdoor–Fan Motor
RLA – Rated Load Amps

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent voltage imbalance.

MAKE OUTDOOR-AIR INLET ADJUSTMENTS

Manual Outdoor-Air Damper

All units (except those equipped with a factory-installed economizer) have a manual outdoor-air damper to provide ventilation air. Damper can be preset 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 (Fig. 17).

INSTALL OUTDOOR-AIR HOOD

The outdoor-air hood is common to 25% air ventilation and economizer. If economizer is factory installed, all electrical connections have been made and adjusted at the factory. Assemble and install hood in the field.

IMPORTANT: If the unit is equipped with the optional economizer component, move the outdoor-air temperature sensor prior to installing the outdoor-air hood. See the Optional economizer section for more information.

NOTE: The hood top panel, upper and lower filter retainers, hood drain pan, and filter support bracket are secured opposite the outdoor coil end of the unit. The screens, hood side panels, remaining section of filter support bracket, seal strip, and all other hardware are in a package located inside the return-air filter access panel (Fig. 18).

1. Attach seal strip to upper filter retainer. See Fig. 19.
2. Assemble hood top panel, side panels, upper filter retainer, and drain pan (see Fig. 20).
3. Secure lower filter retainer and support bracket to unit. See Fig. 20. Leave screws loose on size 300 units.

4. Slide baffle (size 300) 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 support bracket.
9. Attach remaining section of filter support bracket.

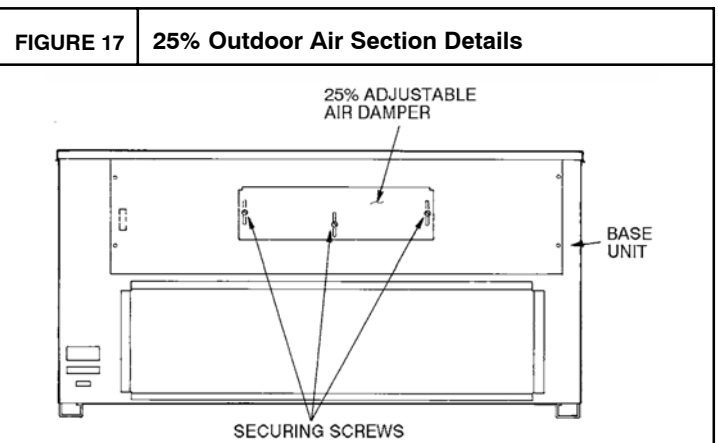


FIGURE 18 Outdoor Air Hood Component Location

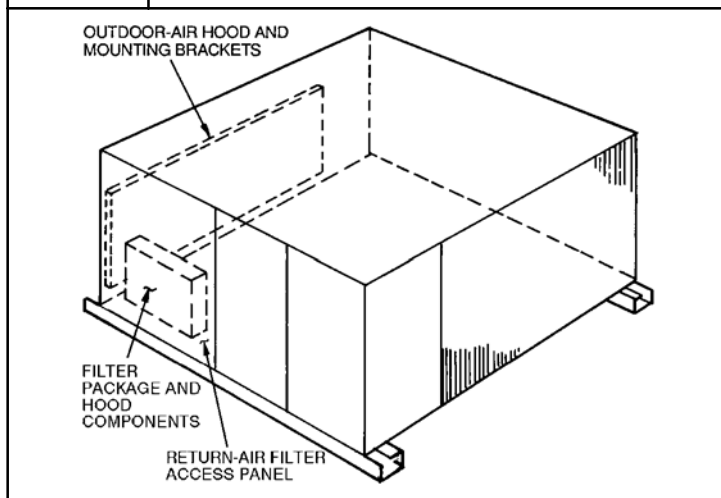
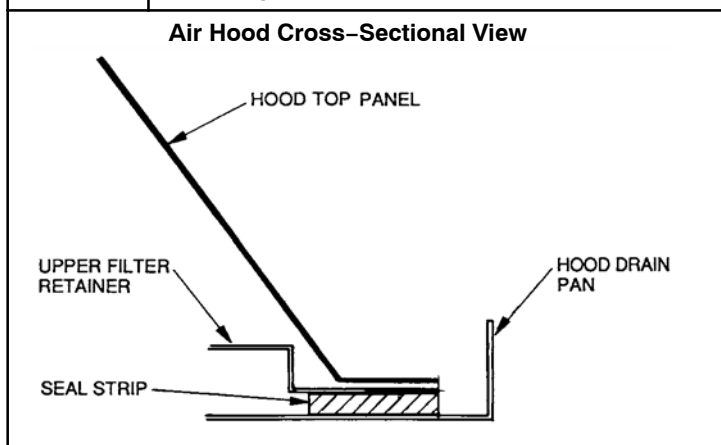


FIGURE 19 Seal Strip Location



INSTALL ALL ACCESSORIES

After all the factory-installed options have been adjusted, install all field-installed accessories. Refer to the accessory installation instructions included with each accessory.

Adjust Factory-Installed Options

Optional Economizer

See Figs. 21 and 22 for economizer component locations.

NOTE:These instructions are for installing the optional economizer only. Refer to the accessory economizer installation instructions when field installing an economizer accessory.

To complete installation of the optional economizer, perform the following procedure.

1. Remove the economizer hood. Refer to Step 8 — Install Outdoor-Air Hood on page 10 for information on removing and installing the outdoor-air hood.
2. Relocate outdoor air temperature sensor from shipping position to operation position on economizer. See Fig. 21.
3. Re-install economizer hood.
4. Install all economizer accessories. economizer wiring is shown in Fig. 23.

Outdoor air leakage is shown in Table 6. Return air pressure drop is shown in Table 7.

IMPORTANT:Failure to relocate the sensor will result in the economizer not operating properly.

FIGURE 20 Outdoor Air Hood Details

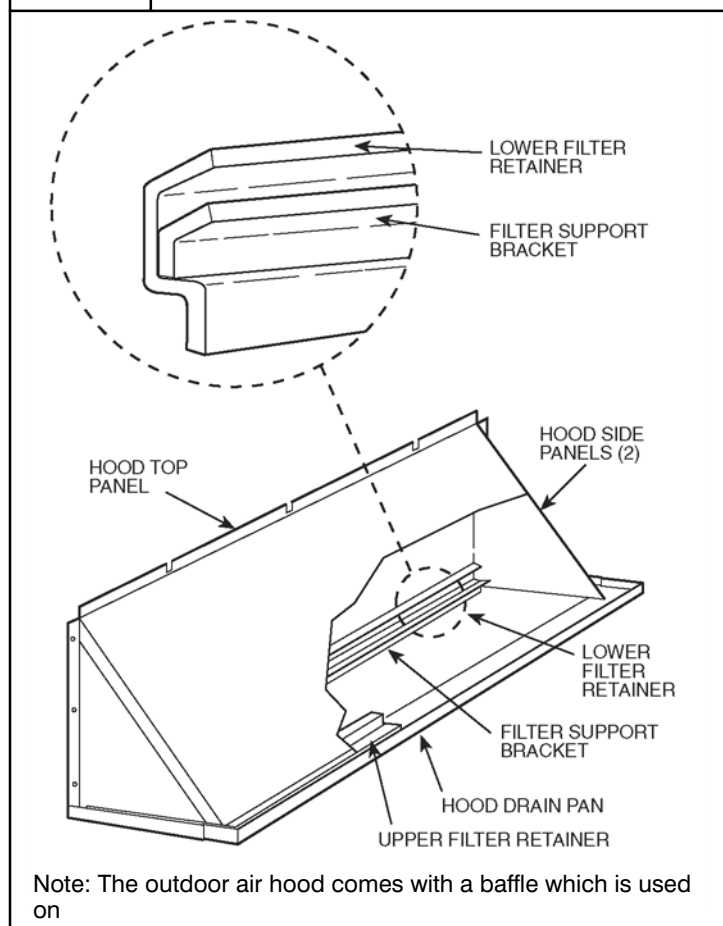


Table 6 – Outdoor Air Damper Leakage

	DAMPER STATIC PRESSURE (in. wg)					
	0.2	0.4	0.6	0.8	1.0	1.2
LEAKAGE (cfm)	35	53	65	75	90	102

Table 7 – Return Air Pressure Drop

CFM					
4500	5000	5400	6000	7200	7500
0.040	0.050	0.060	0.070	0.090	0.100

FIGURE 21 Economizer Component Locations (End View)

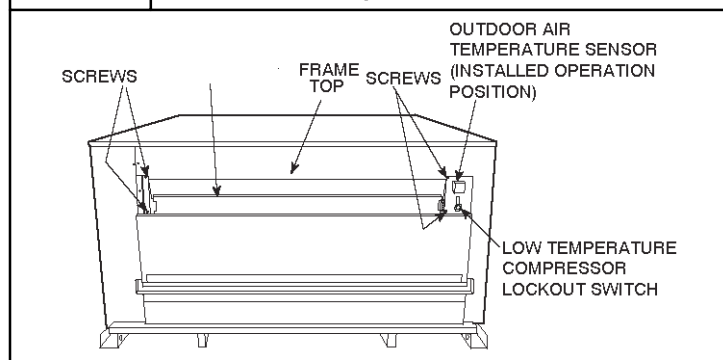
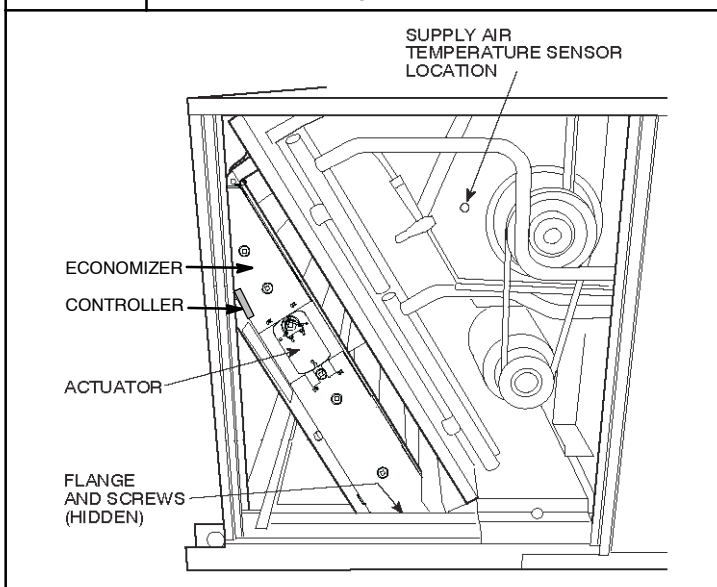


FIGURE 22 Economizer Component Locations (Side View)



Economizer Standard Sensors

Outdoor Air Temperature (OAT) Sensor

The outdoor air temperature sensor (HH57AC074) is a 10 to 20 mA device used to measure the outdoor-air temperature. The outdoor-air temperature is used to determine when the economizer can be used for free cooling. The sensor must be field-relocated. See Fig. 26. The operating range of temperature measurement is 40 to 100 F.

Supply Air Temperature (SAT) Sensor

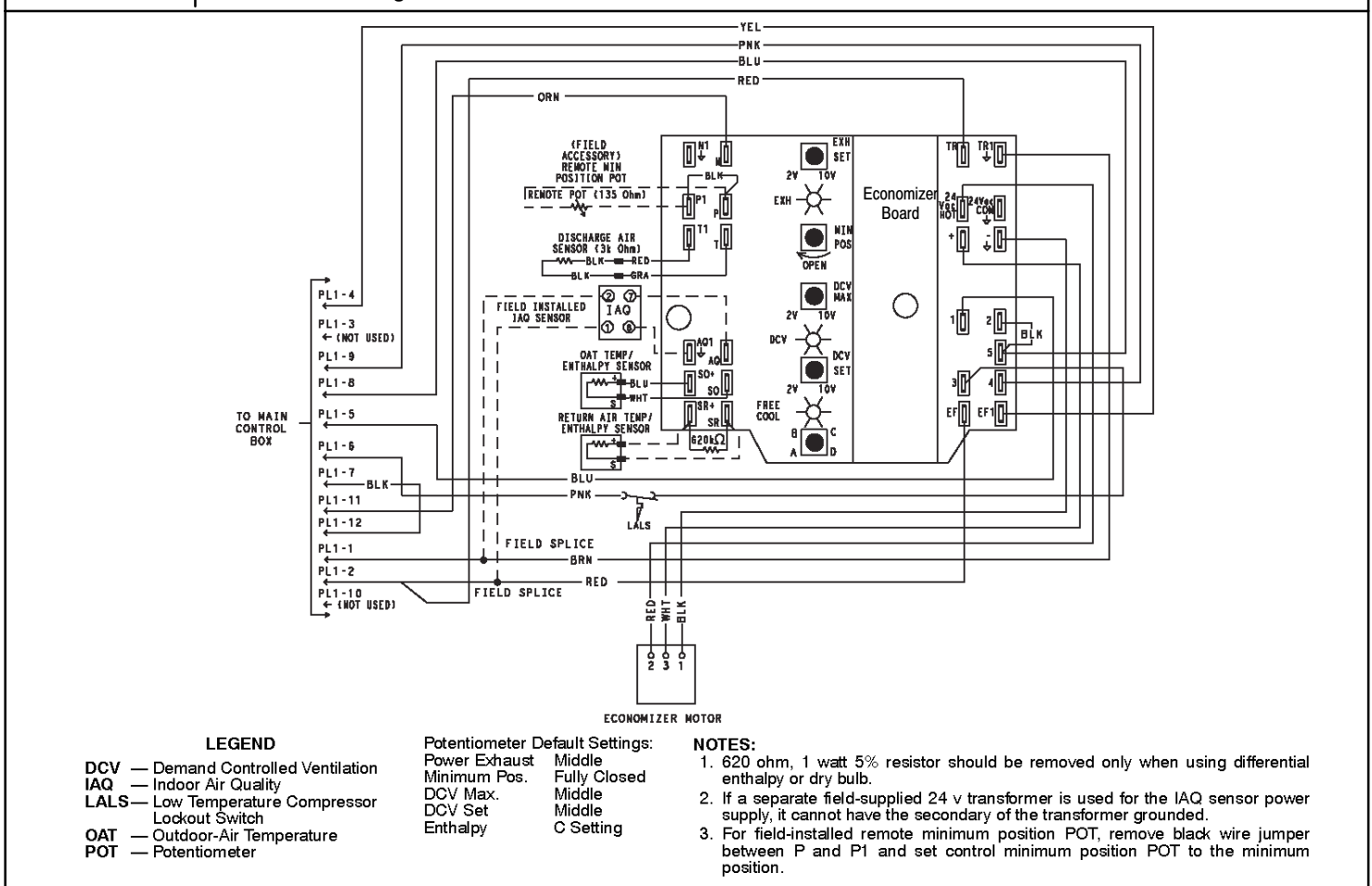
The supply air temperature sensor is a 3 K thermistor located at the inlet of the indoor fan. See Fig. 26. This sensor is factory installed. The operating range of temperature measurement is 0° to 158 F. See Table 10 for sensor temperature/resistance values.

The temperature sensor looks like an eyelet terminal with wires running to it. The sensor is located in the “crimp end” and is sealed from moisture.

Low Temperature Compressor Lockout Sensor

The economizer is equipped with an ambient temperature lockout switch located in the outdoor air stream which is used to lockout the compressors below a 42 F ambient temperature. See Fig. 26.

FIGURE 23 Economizer Wiring



**Table 8 – SUPPLY AIR SENSOR TEMPERATURE/
RESISTANCE VALUES**

TEMPERATURE (F)	RESISTANCE (ohms)
-58	200,250
-40	100,680
-22	53,010
-4	29,091
14	16,590
32	9,795
50	5,970
68	3,747
77	3,000
86	2,416
104	1,597
122	1,080
140	746
158	525
176	376
185	321
194	274
212	203
230	153
248	116
257	102
266	89
284	70
302	55

Economizer Control Modes

Determine the economizer control mode before set up of the control. Some modes of operation may require different sensors. Refer to Table 9. The economizer is supplied from the factory with a supply-air temperature sensor and an outdoor-air temperature sensor. This allows for operation of the economizer with outdoor air dry bulb changeover control. Additional accessories can be added to allow for different types of changeover control and operation of the economizer and unit.

Outdoor Dry Bulb Changeover

The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air and supply air temperature sensors are included as standard. For this control mode, the outdoor temperature is compared to an adjustable set point selected on the control. If the outdoor-air temperature is above the set point, the economizer will adjust the outdoor-air dampers to minimum position. If the outdoor-air temperature is below the set point, the position of the outdoor-air dampers will be controlled to provide free cooling using outdoor air. When in this mode, the LED next to the free cooling set point potentiometer will be on. The changeover temperature set point is controlled by the free cooling set point potentiometer located on the control. See Fig. 24. The scale on the potentiometer is A, B, C, and D. See Fig. 25 for the corresponding temperature changeover values.

Table 9 – ECONOMIZER SENSOR USAGE

APPLICATION	ECONOMIZER WITH OUTDOOR AIR DRY BULB SENSOR	ECONOMIZER WITH SINGLE ENTHALPY SENSOR
	Accessories Required	Accessories Required
Outdoor Air Dry Bulb	None. The outdoor air dry bulb sensor is factory installed.	DNTEMPSN002A00*
Differential Dry Bulb	DNTEMPSN002A00*	(2) DNTEMPSN002A00*
Single Enthalpy	HH57AC078	None. The single enthalpy sensor is factory installed.
Differential Enthalpy	HH57AC078 and DNENTDIF004A00*	DNENTDIF004A00*

*DNENTDIF004A00 and DNTEMPSN002A00 accessories are used on many different base units. As such, these kits may contain parts that will not be needed for installation.

†33ZCSENC02 is an accessory CO₂ sensor.

**33ZCASP02 is an accessory aspirator box required for duct-mounted applications.

Differential Dry Bulb Control

For differential dry bulb control the standard outdoor dry bulb sensor is used in conjunction with an additional accessory return air sensor (part number DNTEMPSN002A00). The accessory sensor must be mounted in the return airstream. See Fig. 26.

In this mode of operation, the outdoor-air temperature is compared to the return-air temperature and the lower temperature airstream is used for cooling. When using this

mode of changeover control, turn the free cooling/enthalpy set point potentiometer fully clockwise to the D setting. See Fig. 24.

Outdoor Enthalpy Changeover

For enthalpy control, accessory enthalpy sensor (part number HH57AC078) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 26. When the outdoor air enthalpy rises above the outdoor enthalpy changeover set point, the outdoor-air damper moves to its minimum position. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the economizer controller. The set points are A, B, C, and D. See Fig. 25. The factory-installed 620-ohm jumper must be in place across terminals SR and SR+ on the economizer controller. See Fig. 23.

FIGURE 24 Economizer Controller Potentiometer and LED Locations

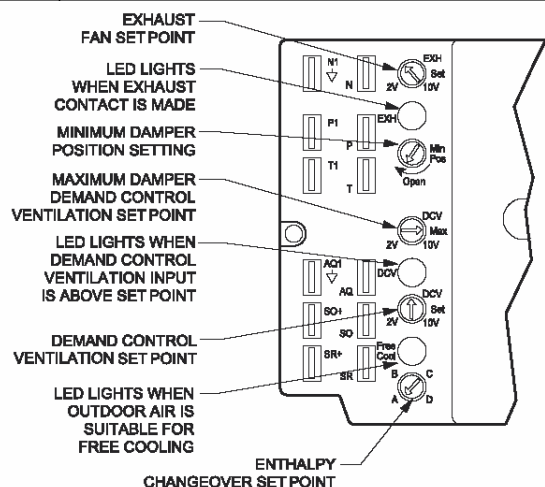


FIGURE 25 Outdoor Air Temperature Changeover Set Points

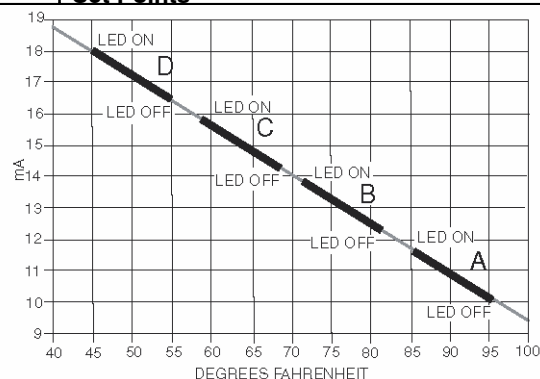
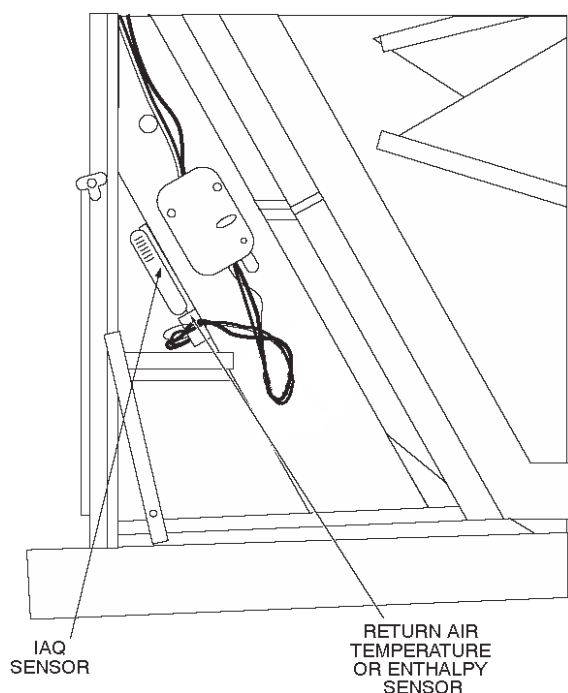


FIGURE 26 Return Air Temperature or Enthalpy Sensor Mounting Location



Differential Enthalpy Control

For differential enthalpy control, the economizer controller uses two enthalpy sensors (HH57AC078 and CRENTDIF004A00), one in the outside air and one in the return airstream on the economizer frame. The economizer controller compares the outdoor air enthalpy to the return air enthalpy to determine economizer use. The controller selects the lower enthalpy air (return or outdoor) for cooling. For example, when the outdoor air has a lower enthalpy than the return air and is below the set point, the economizer opens to bring in outdoor air for free cooling.

Replace the standard outside air dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 26. Mount the return air enthalpy sensor in the return airstream. See Fig. 26. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the economizer controller. When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting.

NOTE: Remove 620-ohm resistor if differential enthalpy sensor is installed.

Indoor Air Quality (IAQ) Sensor Input

The IAQ input can be used for demand control ventilation control based on the level of CO₂ measured in the space or return air duct.

Mount the accessory IAQ sensor according to manufacturer specifications. The IAQ sensor should be wired to the AQ and AQ1 terminals of the controller. Adjust the DCV potentiometers to correspond to the DCV voltage output of the indoor air quality sensor at the user-determined set point. See Fig. 25.

If a separate field-supplied transformer is used to power the IAQ sensor, the sensor must not be grounded or the economizer control board will be damaged.

Exhaust Set Point Adjustment

The exhaust set point will determine when the exhaust fan runs based on damper position (if accessory power exhaust is installed). The set point is modified with the Exhaust Fan Set Point (EXH SET) potentiometer. See Fig. 24. The set point represents the damper position above which the exhaust fan will be turned on. When there is a call for exhaust, the economizer controller provides a 45 ± 15 second delay before exhaust fan activation to allow the dampers to open. This delay allows the damper to reach the appropriate position to avoid unnecessary fan overload.

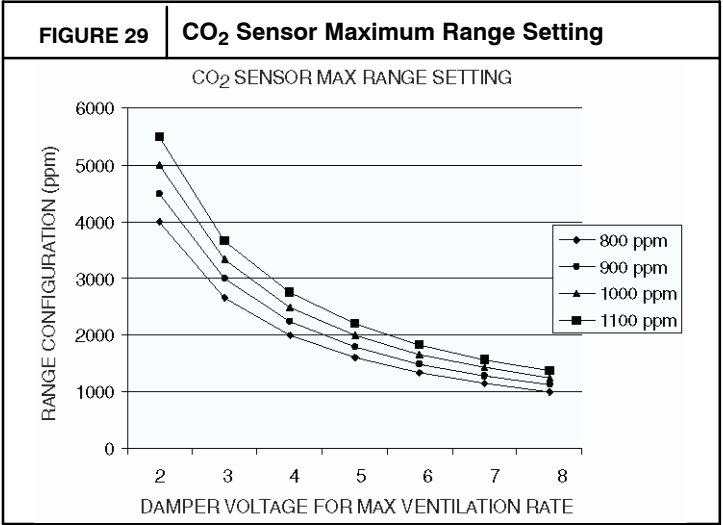
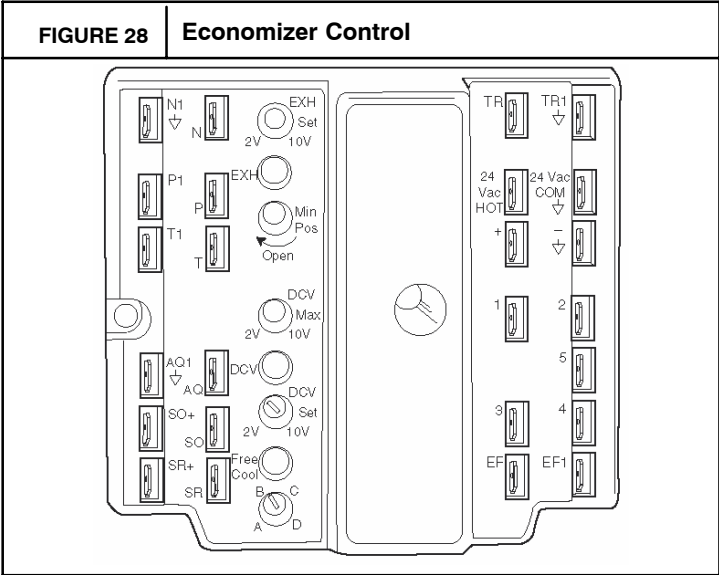
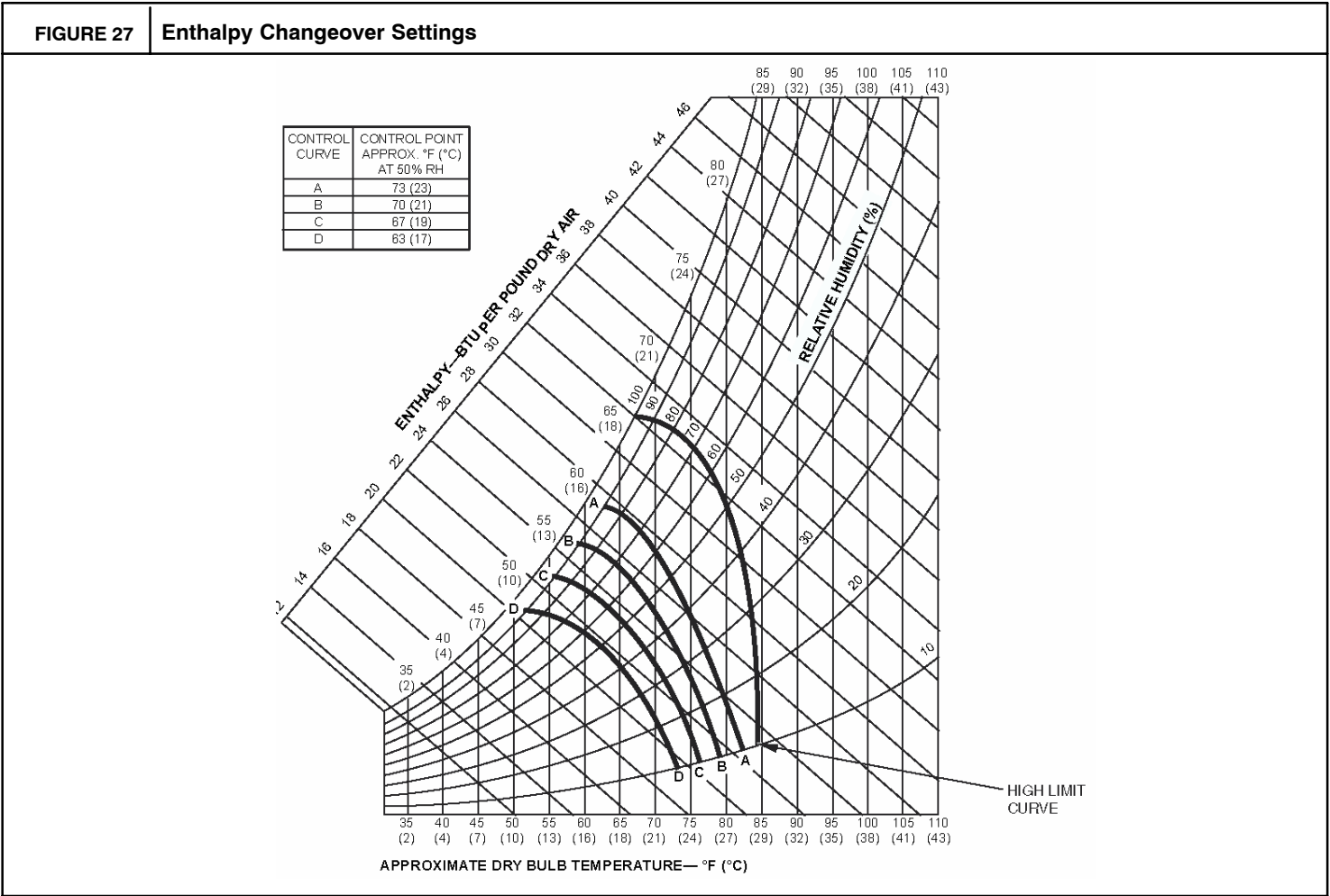
Minimum Position Control

There is a minimum damper position potentiometer on the economizer controller. See Fig. 28. The minimum damper position maintains the minimum airflow into the building during the occupied period.

When using demand ventilation, the minimum damper position represents the minimum ventilation position for VOC (volatile organic compound) ventilation requirements. The maximum demand ventilation position is used for fully occupied ventilation.

When demand ventilation control is not being used, the minimum position potentiometer should be used to set the occupied ventilation position. The maximum demand ventilation position should be turned fully clockwise.

Adjust the minimum position potentiometer to allow the minimum amount of outdoor air, as required by local codes, to enter the building. Make minimum position adjustments with at least 10° F temperature difference between the outdoor and return-air temperatures.



To determine the minimum position setting, perform the following procedure:

1. Calculate the appropriate mixed-air temperature using the following formula:

$$(T_O \times \frac{OA}{100}) + (T_R \times \frac{RA}{100}) = T_M$$

T_O = Outdoor-Air Temperature
 OA = Percent of Outdoor Air
 T_R = Return-Air Temperature
 RA = Percent of Return Air
 T_M = Mixed-Air Temperature

As an example, if local codes require 10% outdoor air during occupied conditions, outdoor-air temperature is 60 F, and return-air temperature is 75 F.

$$(60 \times .10) + (75 \times .90) = 73.5 \text{ F}$$

2. Disconnect the supply-air sensor from terminals T and T1.
3. Ensure that the factory-installed jumper is in place across terminals P and P1. If remote damper positioning is being used, make sure that the terminals are wired according to Fig. 23 and that the minimum position potentiometer is turned fully clockwise.
4. Connect 24 vac across terminals TR and TR1.
5. Carefully adjust the minimum position potentiometer until the measured mixed-air temperature matches the calculated value.
6. Reconnect the supply-air sensor to terminals T and T1.

Remote control of the economizer damper is desirable when requiring additional temporary ventilation. If a field-supplied remote potentiometer (Honeywell part number S963B1128) is wired to the economizer controller, the minimum position of the damper can be controlled from a remote location.

To control the minimum damper position remotely, remove the factory-installed jumper on the P and P1 terminals on the economizer controller. Wire the field-supplied potentiometer to the P and P1 terminals on the economizer controller. See Fig. 28.

Damper Movement

Damper movement from full open to full closed (or vice versa) takes 2½ minutes.

Thermostats

The economizer control works with conventional thermostats that have a Y1 (cool stage 1), Y2 (cool stage 2), W1 (heat stage 1), W2 (heat stage 2), and G (fan). The economizer control does not support space temperature sensors. Connections are made at the thermostat terminal connection board located in the main control box.

Occupancy Control

The factory default configuration for economizer control is occupied mode. This is implemented by the RED jumper at TB2-9 to TB2-10. When unoccupied mode is desired, remove the RED jumper and install a field-supplied timeclock function between TB2-9 and TB2-10. See Fig. 23. When the timeclock contacts are closed, the economizer control will be in occupied mode. When the timeclock contacts are open (removing the 24-v signal from terminal N), the economizer will be in unoccupied mode.

Demand Controlled Ventilation (DCV)

When using the economizer for demand controlled ventilation, there are some equipment selection criteria which should be considered. When selecting the heat capacity and

cool capacity of the equipment, the maximum ventilation rate must be evaluated for design conditions. The maximum damper position must be calculated to provide the desired fresh air.

Typically the maximum ventilation rate will be about 5 to 10% more than the typical cfm required per person, using normal outside air design criteria.

A proportional anticipatory strategy should be taken with the following conditions: a zone with a large area, varied occupancy, and equipment that cannot exceed the required ventilation rate at design conditions. Exceeding the required ventilation rate means the equipment can condition air at a maximum ventilation rate that is greater than the required ventilation rate for maximum occupancy. A proportional-anticipatory strategy will cause the fresh air supplied to increase as the room CO₂ level increases even though the CO₂ set point has not been reached. By the time the CO₂ level reaches the set point, the damper will be at maximum ventilation and should maintain the set point.

In order to have the CO₂ sensor control the economizer damper in this manner, first determine the damper voltage output for minimum or base ventilation. Base ventilation is the ventilation required to remove contaminants during unoccupied periods. The following equation may be used to determine the percent of outside-air entering the building for a given damper position. For best results there should be at least a 10 degree difference in outside and return-air temperatures.

$$(T_O \times \frac{OA}{100}) + (T_R \times \frac{RA}{100}) = T_M$$

T_O = Outdoor-Air Temperature
 OA = Percent of Outdoor Air
 T_R = Return-Air Temperature
 RA = Percent of Return Air
 T_M = Mixed-Air Temperature

Once base ventilation has been determined, set the minimum damper position potentiometer to the correct position.

The same equation can be used to determine the occupied or maximum ventilation rate to the building. For example, an output of 3.6 volts to the actuator provides a base ventilation rate of 5% and an output of 6.7 volts provides the maximum ventilation rate of 20% (or base plus 15 cfm per person). Use Fig. 29 to determine the maximum setting of the CO₂ sensor. For example, a 1100 ppm set point relates to a 15 cfm per person design. Use the 1100 ppm curve on Fig. 28 to find the point when the CO₂ sensor output will be 6.7 volts. Line up the point on the graph with the left side of the chart to determine that the range configuration for the CO₂ sensor should be 1800 ppm. The economizer controller will output the 6.7 volts from the CO₂ sensor to the actuator when the CO₂ concentration in the space is at 1100 ppm. The DCV set point may be left at 2 volts since the CO₂ sensor voltage will be ignored by the economizer controller until it rises above the 3.6 volt setting of the minimum position potentiometer.

Once the fully occupied damper position has been determined, set the maximum damper demand control ventilation potentiometer to this position. Do not set to the maximum position as this can result in over-ventilation to the space and potential high-humidity levels.

CO₂ Sensor Configuration

The CO₂ sensor has preset standard voltage settings that can be selected anytime after the sensor is powered up. See Table 10.

Use setting 1 or 2 for equipment. See Table 10.

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.
3. Use the Up/Down button to select the preset number. See Table 10.
4. Press Enter to lock in the selection.
5. Press Mode to exit and resume normal operation.

The custom settings of the CO₂ sensor can be changed anytime after the sensor is energized. Follow the steps below to change the non-standard settings:

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.

3. Use the Up/Down button to toggle to the NONSTD menu and press Enter.
4. Use the Up/Down button to toggle through each of the nine variables, starting with Altitude, until the desired setting is reached.
5. Press Mode to move through the variables.
6. Press Enter to lock in the selection, then press Mode to continue to the next variable.

Dehumidification of Fresh Air with DCV Control

Information from ASHRAE indicates that the largest humidity load on any zone is the fresh air introduced. For some applications, a field-supplied energy recovery unit can be added to reduce the moisture content of the fresh air being brought into the building when the enthalpy is high. In most cases, the normal heating and cooling processes are more than adequate to remove the humidity loads for most commercial applications.

If normal rooftop heating and cooling operation is not adequate for the outdoor humidity level, an energy recovery unit and/or a dehumidification option should be considered.

Table 10 – CO₂ Sensor Standard Settings

Setting	Equipment	Output	Ventilation Rate (cfm/Person)	Analog Output	CO ₂ Control Range (ppm)	Optional Relay Setpoint (ppm)	Relay Hysteresis (ppm)
1	Interface w/Standard Building Control System	Proportional	Any	0–10V 4–20 mA	0–2000	1000	50
2		Proportional	Any	2–10V 7–20 mA	0–2000	1000	50
3		Exponential	Any	0–10V 4–20 mA	0–2000	1100	50
4	Economizer	Proportional	15	0–10V 4–20 mA	0–1100	1100	50
5		Proportional	20	0–10V 4–20 mA	0–900	900	50
6		Exponential	15	0–10V 4–20 mA	0–1100	1100	50
7		Exponential	20	0–10V 4–20 mA	0–900	900	50
8	Health & Safety	Proportional	—	0–10V 4–20 mA	0–9999	5000	500
9	Parking/Air Intakes/Loading Docks	Proportional	—	0–10V 4–20 mA	0–2000	700	50

START-UP

Use the following information and Start-Up Checklist on last page to check out unit PRIOR to start-up.

UNIT PREPARATION

Check that unit has been installed in accordance with these installation instructions and all applicable codes.

COMPRESSOR MOUNTING

Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts.

GAS PIPING

Check gas piping for leaks.



WARNING

FIRE OR EXPLOSION HAZARD

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

Disconnect gas piping from unit when leak testing at pressure greater than 1/2 psig. Pressures greater than 1/2 psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 1/2 psig, it *must* be replaced before use. When pressure testing field-supplied gas piping at pressures of 1/2 psig or less, a unit connected to such piping must be isolated by manually closing the gas valve.

REFRIGERANT SERVICE PORTS

Each refrigerant system has a total of 3 Schrader-type service gage ports. One port is located on the suction line, one on the compressor discharge line, and one on the liquid line. In addition, Schrader-type valves are located underneath the low-pressure switches. Be sure that caps on the ports are tight.

COMPRESSOR ROTATION

It is important to be certain the compressors are rotating in the proper direction. To determine whether or not compressors are rotating in the proper direction:

1. Connect service gages to suction and discharge pressure fittings.
2. Energize the compressor.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

1. Note that the evaporator fan is probably also rotating in the wrong direction.
2. Turn off power to the unit.
3. Reverse any two of the incoming power leads.
4. Turn on power to the compressor.

The suction and discharge pressure levels should now move to their normal start-up levels.

NOTE: When compressors are rotating in the wrong direction, the unit will have increased noise levels and will not provide heating and cooling.

After a few minutes of reverse operation, the scroll compressor internal overload protection will open, which will activate the unit's lockout and requires a manual reset. Reset is accomplished by turning the thermostat on and off.

INTERNAL WIRING

Check all electrical connections in unit control boxes; tighten as required.

CRANKCASE HEATER

Crankcase heater(s) is energized as long as there is power to the unit and the compressor is not operating.

IMPORTANT: Unit power must be on for 24 hours prior to start-up. Otherwise, damage to compressor may result.

EVAPORATOR FAN

Fan belt and variable pulleys are factory-installed. See Tables 11-18 for fan performance data. Be sure that fans rotate in the proper direction. See Table 19 for air quantity limits. See Table 20 for static pressure information for accessories and options. See Table 21 for fan rpm at various motor pulley settings. See Tables 22 and 23 for evaporator fan motor data. To alter fan performance, see Evaporator Fan Performance Adjustment section on page 34.

NOTE: A 3¹/₂-in. 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.

CONDENSER-FANS AND MOTORS

Condenser fans and motors are factory set. Refer to Condenser-Fan Adjustment section on page 34 as required. Be sure that fans rotate in the proper direction.

RETURN-AIR FILTERS

Check that correct filters are installed in filter tracks (see Table 1). Do not operate unit without return-air filters.

OUTDOOR-AIR INLET SCREENS

Outdoor-air inlet screens must be in place before operating unit.

GAS HEAT

Verify gas pressures before turning on heat as follows:

1. Turn off manual gas stop.
2. Connect pressure gage to supply gas pressure tap (see Fig. 13).
3. Connect pressure gage to manifold pressure tap on gas valve.
4. Turn on manual gas stop and set thermostat to HEAT position. After the unit has run for several minutes, verify that incoming pressure is 5.5 in. wg or greater, and that the manifold pressure is 3.3 in. wg. If manifold pressure must be adjusted, refer to Gas Valve Adjustment section on page 35.
5. After unit has been in operation for 5 minutes, check temperature rise across the heat exchangers. See unit informative plate for correct rise limits of the heat supplied. Air quantities may need to be adjusted to bring the actual rise to within the allowable limits.

Use the following information and complete Start-Up Checklist on last page to check out unit PRIOR to start-up.

Table 11 — Fan Performance — PGE180*D (Low Heat Units)*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	753	1307	1.53	761	1330	1.56	840	1572	1.84	912	1822	2.14	980	2080	2.44
4800	747	1384	1.62	790	1515	1.78	866	1765	2.07	936	2023	2.37	1002	2289	2.68
5100	741	1465	1.72	820	1718	2.01	893	1977	2.32	961	2243	2.63	1025	2516	2.95
5700	810	1911	2.24	882	2182	2.56	950	2459	2.88	1014	2741	3.21	1075	3029	3.55
6000	844	2164	2.54	914	2444	2.87	980	2730	3.20	1042	3021	3.54	1100	3317	3.89
6300	879	2439	2.86	947	2729	3.20	1010	3023	3.55	1070	3322	3.90	1127	3626	4.25
6600	915	2737	3.21	980	3035	3.56	1041	3338	3.91	1099	3645	4.28	1155	3957	4.64
6900	950	3057	3.59	1013	3364	3.95	1072	3675	4.31	1129	3991	4.68	1183	4311	5.06
7200	986	3401	3.99	1047	3717	4.36	1104	4037	4.74	1159	4361	5.11	1211	4689	5.50
7500	1022	3770	4.42	1081	4095	4.80	1136	4423	5.19	1189	4755	5.58	1241	5091	5.97

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	1044	2345	2.75	1105	2619	3.07	1163	2899	3.40	1218	3187	3.74	1271	3481	4.08
4800	1065	2561	3.00	1124	2841	3.33	1180	3127	3.67	1235	3420	4.01	1287	3720	4.36
5100	1086	2795	3.28	1144	3082	3.61	1199	3375	3.96	1252	3674	4.31	1304	3979	4.67
5700	1132	3324	3.90	1187	3624	4.25	1240	3929	4.61	1291	4241	4.97	1341	4558	5.35
6000	1157	3619	4.24	1210	3925	4.60	1262	4239	4.97	1312	4557	5.34	1361	4880	5.72
6300	1182	3935	4.62	1234	4249	4.98	1285	4569	5.36	1334	4894	5.74	—	—	—
6600	1208	4274	5.01	1259	4595	5.39	1309	4922	5.77	—	—	—	—	—	—
6900	1235	4636	5.44	1285	4964	5.82	—	—	—	—	—	—	—	—	—
7200	1262	5021	5.89	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	2.2			2.4			2.6			2.8			3.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	1322	3781	4.43	1372	4088	4.79	1419	4400	5.16	1466	4719	5.53	1511	5042	5.91
4800	1337	4025	4.72	1386	4337	5.09	1433	4655	5.46	1479	4978	5.84	—	—	—
5100	1353	4290	5.03	1401	4607	5.40	1448	4930	5.78	—	—	—	—	—	—
5700	1388	4881	5.72	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

Watts — Input Watts to Motor

*Standard low-medium static drive range is 873 to 1021 rpm. Alternate high-static drive range is 1025 to 1200. Other rpms require a field-supplied drive.

Refer to page 30 for general Fan Performance Data notes.

NOTE: Maximum continuous bhp for the standard motor is 6.13. The maximum continuous watts is 5180. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm. See Table 24 for more information.

Table 12 — Fan Performance — PGE180°F (High Heat Units)**

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	753	1307	1.53	786	1404	1.65	861	1644	1.93	932	1893	2.22	997	2150	2.52
4800	747	1384	1.62	818	1603	1.88	890	1852	2.17	958	2108	2.47	1022	2373	2.78
5100	775	1571	1.84	850	1822	2.14	920	2079	2.44	986	2344	2.75	1048	2616	3.07
5700	849	2054	2.41	918	2323	2.73	982	2598	3.05	1044	2879	3.38	1102	3166	3.71
6000	886	2329	2.73	952	2607	3.06	1015	2891	3.39	1074	3180	3.73	1130	3474	4.08
6300	924	2628	3.08	987	2915	3.42	1047	3207	3.76	1105	3504	4.11	1160	3807	4.46
6600	962	2951	3.46	1023	3246	3.81	1081	3547	4.16	1136	3853	4.52	1190	4163	4.88
6900	1000	3298	3.87	1059	3603	4.23	1115	3912	4.59	1168	4225	4.96	1220	4543	5.33
7200	1038	3672	4.31	1095	3986	4.67	1149	4303	5.05	1201	4625	5.42	1251	4950	5.81
7500	1077	4072	4.78	1131	4394	5.15	1184	4720	5.54	1234	5050	5.92	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	1060	2414	2.83	1119	2685	3.15	1175	2964	3.48	1230	3250	3.81	1282	3542	4.15
4800	1082	2644	3.10	1140	2922	3.43	1195	3207	3.76	1248	3498	4.10	1299	3795	4.45
5100	1106	2894	3.39	1163	3178	3.73	1216	3470	4.07	1268	3767	4.42	1319	4071	4.77
5700	1157	3459	4.06	1211	3757	4.41	1262	4061	4.76	1312	4371	5.13	1360	4686	5.50
6000	1184	3774	4.43	1236	4080	4.79	1287	4391	5.15	1335	4707	5.52	1382	5029	5.90
6300	1212	4114	4.83	1263	4427	5.19	1312	4745	5.57	1359	5067	5.94	—	—	—
6600	1241	4478	5.25	1290	4798	5.63	1338	5122	6.01	—	—	—	—	—	—
6900	1270	4866	5.71	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	2.2			2.4			2.6			2.8			3.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	1332	3841	4.50	1381	4145	4.86	1428	4456	5.23	1473	4772	5.60	1518	5095	5.98
4800	1349	4100	4.81	1397	4409	5.17	1443	4725	5.54	1488	5046	5.92	—	—	—
5100	1367	4380	5.14	1414	4695	5.51	1460	5016	5.88	—	—	—	—	—	—
5700	1407	5007	5.87	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

Watts — Input Watts to Motor

**Standard low-medium static drive range is 873 to 1021 rpm. Alternate high-static drive range is 1025 to 1200. Other rpms require a field-supplied drive.

Refer to page 30 for general Fan Performance Data notes.

NOTE: Maximum continuous bhp for the standard motor is 6.13. The maximum continuous watts is 5180. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm. See Table 24 for more information.

Table 13 — Fan Performance — PGE210*D (Low Heat Units)*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
5,500	755	2.27	1908	831	2.58	2171	901	2.91	2443	968	3.24	2723	1031	3.58	3009	1091	3.93	3302
6,000	810	2.72	2287	881	3.04	2556	947	3.37	2833	1010	3.71	3116	1070	4.05	3406	1127	4.40	3702
6,500	866	3.22	2710	932	3.55	2985	994	3.88	3266	1054	4.23	3554	1111	4.57	3847	1166	4.93	4146
7,000	923	3.78	3177	985	4.11	3458	1044	4.45	3744	1100	4.80	4036	1155	5.15	4333	1207	5.51	4635
7,500	980	4.39	3690	1038	4.73	3976	1094	5.07	4267	1148	5.43	4564	1200	5.78	4864	1250	6.15	5170
8,000	1038	5.06	4251	1093	5.40	4542	1146	5.75	4838	1197	6.11	5138	1246	6.47	5443	1294	6.84	5752
8,500	1096	5.78	4859	1148	6.13	5156	1198	6.49	5456	1247	6.85	5761	1294	7.22	6070	1340	7.59	6382
9,000	1154	6.56	5517	1204	6.92	5818	1251	7.28	6123	1298	7.65	6432	1343	8.02	6745	1388	8.40	7062
9,500	1213	7.40	6224	1260	7.77	6531	1306	8.13	6840	1350	8.51	7154	1394	8.88	7471	1436	9.26	7791
10,000	1272	8.30	6983	1317	8.67	7294	1360	9.05	7608	1403	9.43	7926	1445	9.81	8247	1486	10.19	8570

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.4			1.6			1.8			1.9			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
5,500	1149	4.28	3602	1204	4.65	3907	1258	5.02	4217	1284	5.20	4375	1309	5.39	4533
6,000	1183	4.76	4003	1236	5.13	4310	1288	5.50	4622	1313	5.68	4780	1337	5.87	4939
6,500	1219	5.29	4450	1270	5.66	4759	1320	6.03	5073	1344	6.22	5232	1368	6.41	5391
7,000	1258	5.88	4942	1307	6.25	5253	1355	6.62	5569	1378	6.81	5729	1402	7.00	5890
7,500	1299	6.52	5480	1346	6.89	5794	1392	7.27	6113	1415	7.46	6273	1437	7.65	6435
8,000	1341	7.21	6065	1387	7.59	6383	1392	7.97	6704	1453	8.16	6866	1475	8.36	7028
8,500	1385	7.97	6699	1429	8.35	7019	1472	8.73	7343	1493	8.93	7506	1514	9.12	7670
9,000	1431	8.78	7382	1473	9.15	7705	1515	9.55	8032	1535	9.75	8196	—	—	—
9,500	1478	9.65	8114	1519	10.04	8441	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
Watts — Input Watts to Motor

*Standard low-medium static drive range is 910 to 1095 rpm. Alternate high-static drive range is 1069 to 1287. Other rpms require a field-supplied drive.
Refer to page 30 for general Fan Performance Data notes.

NOTE: Maximum continuous bhp is 5.90. The maximum continuous watts is 5180. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm. See Table 24 for more information.

Table 14 — Fan Performance — PGE210°F (High Heat Units)**

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																	
	0.2			0.4			0.6			0.8			1.0			1.2		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
5,500	795	2.43	2043	866	2.74	2306	934	3.07	2578	998	3.40	2856	1059	3.74	3142	1117	4.08	3434
6,000	854	2.92	2452	921	3.24	2722	984	3.57	3998	1044	3.90	3281	1102	4.25	3570	1158	4.60	3865
6,500	914	3.46	2909	977	3.79	3184	1036	4.12	3465	1093	4.46	3752	1148	4.81	4045	1201	5.16	4343
7,000	975	4.06	3414	1034	4.39	3695	1090	4.73	3981	1144	5.08	4272	1196	5.43	4569	1246	5.79	4870
7,500	1037	4.72	3969	1092	5.06	4255	1145	5.41	4546	1196	5.76	4842	1256	6.12	5142	1294	6.48	5447
8,000	1099	5.44	4575	1150	5.79	4866	1201	6.14	5162	1249	6.50	5462	1297	6.86	5766	1343	7.22	6075
8,500	1161	6.22	5232	1210	6.57	5529	1258	6.93	5829	1304	7.29	6134	1349	7.66	6443	1393	8.03	6755
9,000	1223	7.07	5943	1270	7.43	6245	1315	7.79	6550	1360	8.16	6869	1403	8.53	7171	1445	8.90	7487
9,500	1286	7.98	6708	1331	8.34	7014	1374	8.71	7324	1416	9.08	7638	1457	9.46	7954	1498	9.84	8274
10,000	1349	8.95	7528	1392	9.32	7839	1433	9.70	8154	1473	10.07	8471	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.4			1.6			1.8			1.9			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
5,500	1173	4.44	3732	1227	4.80	4036	1279	5.17	4345	1304	5.35	4502	1329	5.54	4629
6,000	1211	4.95	4165	1263	5.32	4471	1313	5.69	4782	1337	5.87	4939	1361	6.06	5097
6,500	1252	5.53	4646	1302	5.89	4954	1350	6.26	5267	1373	6.56	5425	1396	6.64	5584
7,000	1295	6.16	5176	1343	6.52	5487	1389	6.90	5802	1412	7.09	5961	1434	7.28	6121
7,500	1340	6.85	5756	1386	7.22	6070	1431	7.60	6387	1452	7.79	6547	1474	7.98	6709
8,000	1388	7.60	6388	1431	7.97	6704	1474	8.35	7024	1495	8.54	7186	1516	8.74	7348
8,500	1436	8.41	7071	1478	8.79	7390	1520	9.17	7713	1540	9.37	7876	—	—	—
9,000	1486	9.28	7807	1527	9.67	8130	—	—	—	—	—	—	—	—	—
9,500	1538	10.22	8597	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
Watts — Input Watts to Motor

**Standard low-medium static drive range is 910 to 1095 rpm. Alternate high-static drive range is 1069 to 1287. Other rpms require a field-supplied drive. Refer to page 30 for general Fan Performance Data notes.

NOTE: Maximum continuous bhp is 5.90. The maximum continuous watts is 5180. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm. See Table 24 for more information.

Table 15 — Fan Performance — PGE240*D (Low Heat Units)*

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	824	2607	3.09	894	2844	3.37	961	3085	3.66	1023	3330	3.95	1083	3578	4.24
6,500	881	3030	3.59	947	3266	3.88	1009	3507	4.16	1069	3751	4.45	1126	3998	4.74
7,000	939	3488	4.14	1001	3725	4.42	1060	3965	4.70	1116	4208	4.99	1170	4454	5.28
7,500	998	3982	4.72	1055	4218	5.00	1111	4458	5.29	1165	4701	5.58	1217	4946	5.87
8,000	1056	4512	5.35	1111	4748	5.63	1164	4988	5.92	1215	5230	6.20	1264	5474	6.49
8,500	1116	5077	6.02	1167	5314	6.30	1218	5553	6.59	1266	5795	6.87	1314	6039	7.16
9,000	1175	5678	6.74	1224	5915	7.02	1272	6154	7.30	1319	6395	7.59	1364	6639	7.88
9,500	1235	6315	7.49	1282	6552	7.77	1327	6791	8.06	1372	7033	8.34	1415	7276	8.63
10,000	1295	6988	8.29	1340	7225	8.57	1383	7465	8.86	1426	7706	9.14	1468	7949	9.43

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	1141	3829	4.54	1196	4082	4.84	1249	4337	5.15	1301	4596	5.45	1351	4856	5.76
6,500	1181	4247	5.04	1234	4499	5.34	1285	4753	5.64	1334	5009	5.94	1383	5267	6.25
7,000	1223	4702	5.58	1274	4953	5.88	1323	5205	6.18	1371	5460	6.48	1417	5716	6.78
7,500	1267	5194	6.16	1316	5443	6.46	1363	5694	6.76	1409	5947	7.06	1454	6202	7.36
8,000	1313	5721	6.79	1359	5970	7.08	1405	6220	7.38	1449	6472	7.68	1493	6726	7.98
8,500	1360	6285	7.46	1405	6533	7.75	1449	6783	8.05	1491	7034	8.34	1533	7286	8.64
9,000	1408	6885	8.17	1451	7132	8.46	1494	7381	8.76	1535	7631	9.05	—	—	—
9,500	1458	7521	8.92	1499	7768	9.22	1540	8016	9.51	—	—	—	—	—	—
10,000	1508	8193	9.72	1549	8440	10.01	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	2.2			2.4			2.6			2.8			3.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	1399	5118	6.07	1446	5381	6.38	1492	5647	6.70	1537	5914	7.02	—	—	—
6,500	1429	5527	6.56	1475	5789	6.87	1520	6052	7.18	—	—	—	—	—	—
7,000	1462	5974	7.09	1507	6234	7.40	1550	6495	7.71	—	—	—	—	—	—
7,500	1498	6459	7.66	1540	6717	7.97	—	—	—	—	—	—	—	—	—
8,000	1535	6981	8.28	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

Watts — Input Watts to Motor

*Standard low-medium static drive range is 1002 to 1151 rpm. Alternate high-static drive range is 1193 to 1369. Other rpms require a field-supplied drive.

Refer to page 30 for general Fan Performance Data notes.

NOTE: Maximum continuous bhp for the standard motor is 8.7 (for 208/230-v units) and 9.5 (for 460-v units). The maximum continuous watts is 7915 (for 208/230-v units) and 8640 (for 460-v units). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm. See Table 24 for additional information.

Table 16 — Fan Performance — PGE240°F (High Heat Units)**

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	868	2752	3.26	934	2987	3.54	997	3227	3.83	1058	3470	4.12	1115	3716	4.41
6,500	929	3201	3.80	991	3436	4.08	1051	3675	4.36	1108	3917	4.65	1162	4163	4.94
7,000	991	3687	4.37	1049	3923	4.65	1105	4161	4.94	1159	4403	5.22	1211	4647	5.51
7,500	1054	4211	5.00	1109	4447	5.28	1161	4686	5.56	1213	4926	5.84	1262	5170	6.13
8,000	1117	4773	5.66	1168	5009	5.94	1218	5247	6.22	1267	5488	6.51	1314	5731	6.80
8,500	1180	5373	6.37	1229	5609	6.65	1277	5847	6.94	1323	6088	7.22	1368	6331	7.51
9,000	1244	6011	7.13	1290	6247	7.41	1335	6485	7.69	1380	6726	7.98	1423	6968	8.27
9,500	1308	6687	7.93	1352	6924	8.21	1395	7162	8.50	1437	7402	8.78	1479	7644	9.07
10,000	1372	7401	8.78	1414	7638	9.06	1455	7876	9.34	1496	8117	9.63	1535	8358	9.92

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	1171	3965	4.70	1224	4216	5.00	1276	4469	5.30	1326	4726	5.61	1374	4983	5.91
6,500	1215	4410	5.23	1266	4659	5.53	1316	4911	5.83	1364	5165	6.13	1411	5421	6.43
7,000	1262	4894	5.81	1311	5142	6.10	1358	5392	6.40	1404	5645	6.70	1449	5899	7.00
7,500	1310	5415	6.42	1357	5663	6.72	1403	5912	7.01	1447	6164	7.31	1490	6416	7.61
8,000	1360	5976	7.09	1405	6222	7.38	1449	6471	7.68	1492	6721	7.97	1533	6973	8.27
8,500	1412	6575	7.80	1455	6821	8.09	1497	7068	8.39	1538	7318	8.68	—	—	—
9,000	1465	7212	8.56	1506	7457	8.85	1547	7705	9.14	—	—	—	—	—	—
9,500	1519	7888	9.36	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	2.2			2.4			2.6			2.8			3.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	1422	5243	6.22	1468	5505	6.53	1513	5768	6.84	—	—	—	—	—	—
6,500	1456	5679	6.74	1501	5938	7.04	1544	6199	7.35	—	—	—	—	—	—
7,000	1493	6155	7.30	1536	6412	7.61	—	—	—	—	—	—	—	—	—
7,500	1533	6670	7.91	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

Watts — Input Watts to Motor

**Standard low-medium static drive range is 1002 to 1151 rpm. Alternate high-static drive range is 1193 to 1369. Other rpms require a field-supplied drive.

Refer to page 30 for general Fan Performance Data notes.

NOTE: Maximum continuous bhp for the standard motor is 8.7 (for 208/230-v units) and 9.5 (for 460-v units). The maximum continuous watts is 7915 (for 208/230-v units) and 8640 (for 460-v units). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm. See Table 24 for more information.

Table 17 — Fan Performance — PGE300*D (Low Heat Units)**

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
7,000	941	3.35	2,769	1002	3.80	3,140	1061	4.27	3528	1117	4.76	3,934	1171	5.27	4,356
7,500	999	4.05	3,348	1057	4.53	3,742	1112	5.02	4152	1166	5.54	4,579	1218	6.07	5,020
8,000	1058	4.85	4,007	1113	5.35	4,424	1165	5.87	4856	1216	6.41	5,304	1266	6.97	5,766
8,500	1117	5.74	4,750	1169	6.28	5,190	1219	6.83	5645	1268	7.40	6,114	1315	7.98	6,597
9,000	1177	6.75	5,583	1226	7.31	6,047	1274	7.89	6524	1320	8.48	7,015	1365	9.09	7,520
9,500	1237	7.98	6,511	1284	8.46	6,999	1329	9.07	7499	1374	9.69	8,012	1417	10.33	8,538
10,000	1297	9.12	7,450	1342	9.74	8,051	1385	10.37	8574	1428	11.02	9,110	1469	11.68	9,657
10,500	1358	10.49	8,674	1400	11.14	9,209	1442	11.80	9755	1483	12.47	10,314	1523	13.16	10,883
11,000	1418	12.00	9,919	1459	12.67	10,478	—	—	—	—	—	—	—	—	—
11,250	1449	12.80	10,585	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)											
	1.2			1.4			1.6			1.8		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
7,000	1224	5.80	4,794	1274	6.35	5248	1323	6.92	5,718	1371	5.54	6204
7,500	1268	6.63	5,478	1316	7.20	6960	1364	7.79	6,437	1410	6.41	6939
8,000	1314	7.55	6,243	1360	8.14	6734	1406	8.76	7,239	1450	7.40	7759
8,500	1361	8.58	7,094	1406	9.20	7605	1449	9.83	8,129	1492	8.48	8666
9,000	1410	9.72	8,037	1453	10.36	8568	1495	11.02	9,111	1536	9.69	9667
9,500	1459	10.98	9,076	1501	11.64	9627	1541	12.32	10,190	—	—	—
10,000	1510	12.36	10,217	—	—	—	—	—	—	—	—	—
10,500	—	—	—	—	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—
11,250	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
Watts — Input Watts to Motor

*Standard low-medium static drive range is 1066 to 1283 rpm. Alternate high-static drive range is 1332 to 1550. Other rpms require a field-supplied drive.

Refer to page 30 for general Fan Performance Data notes.

NOTE: Maximum continuous bhp is 10.20 (208/230 v) or 11.80 (460 v) and the maximum continuous watts are 9510 (208/230 v) or 11,000 (460 v). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm. See Table 24 for more information.

Table 18 — Fan Performance — PGE300*F (High Heat Units)**

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
7,000	992	4.05	3,348	1051	4.44	3,668	1106	4.83	3995	1160	5.24	4331	1212	5.65	4675
7,500	1055	4.77	3,947	1110	5.17	4,277	1162	5.58	4615	1214	6.00	4960	1263	6.43	5312
8,000	1118	5.58	4,610	1170	5.99	4,950	1220	6.41	5298	1268	6.84	5653	1315	7.27	6014
8,500	1182	6.46	5,339	1231	6.88	5,690	1278	7.31	6047	1324	7.75	6411	1369	8.20	6782
9,000	1246	7.42	6,136	1292	7.86	6,498	1337	8.30	6865	1381	8.75	7239	1424	9.21	7618
9,500	1310	8.47	7,005	1354	8.92	7,377	1397	9.38	7754	1439	9.84	8137	1480	10.31	8525
10,000	1374	9.61	7,947	1416	10.07	8,329	1457	10.54	8715	1497	11.02	9107	1537	11.50	9504
10,500	1439	10.84	8,964	1479	11.32	9,356	1518	11.79	9752	—	—	—	—	—	—
11,000	1503	12.17	10,059	1542	12.65	10,460	—	—	—	—	—	—	—	—	—
11,250	1536	12.86	10,636	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)											
	1.2			1.4			1.6			1.8		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
7,000	1262	6.08	5026	1311	6.51	5385	1359	6.96	5751	1405	6.00	6124
7,500	1311	6.86	5672	1358	7.30	6039	1403	7.76	6412	1448	6.84	6792
8,000	1361	7.72	6382	1406	8.17	6767	1560	8.63	7137	1492	7.75	7524
8,500	1413	8.66	7158	1456	9.12	7541	1498	9.59	7929	1539	8.75	8323
9,000	1466	9.68	8003	1507	10.15	8393	1548	10.63	8790	—	—	—
9,500	1520	10.79	8918	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—
10,500	—	—	—	—	—	—	—	—	—	—	—	—
11,000	—	—	—	—	—	—	—	—	—	—	—	—
11,250	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

Watts — Input Watts to Motor

**Standard low-medium static drive range is 1066 to 1283 rpm. Alternate high-static drive range is 1332 to 1550. Other rpms require a field-supplied drive.

Refer to page 30 for general Fan Performance Data notes.

NOTE: Maximum continuous bhp is 10.20 (208/230 v) or 11.80 (460 v) and the maximum continuous watts are 9510 (208/230 v) or 11,000 (460 v). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm. See Table 24 for more information.

GENERAL NOTES FOR FAN PERFORMANCE DATA TABLES

1. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
2. Interpolation is permissible. Do not extrapolate.
3. Fan performance is based on wet coils, clean filters, and casing losses. See Table 22 for Accessory/FIOP Static Pressure information.
4. Extensive motor and drive testing on these units ensures that the full horsepower and watts range of the motor can be utilized with confidence. Using fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
5. Use of a field-supplied motor may affect wire size.

Table 19 — Air Quantity Limits

UNIT PGE	MINIMUM COOLING CFM	MINIMUM HEATING CFM		MAXIMUM CFM
		Low Heat	High Heat	
180	4500	3800	3800	7,500
210	5400	4750	5450	9,000
240	6000	4750	5450	10,000
300	7000	4750	5450	11,250

Table 20 — Accessory/FIOP Static Pressure (in. wg) — PGE180-300

COMPONENT	CFM								
	4500	5000	5400	6000	7200	7500	9000	10,000	11,250
Economizer	0.040	0.050	0.060	0.070	0.090	0.100	0.110	0.120	0.140

LEGEND

FIOP — Factory-Installed Option

NOTES: The static pressure must be added to external static pressure. The sum and the evaporator entering-air cfm should then be used in conjunction with the Fan Performance table to determine blower rpm, bhp, and watts.

Table 21 — Fan Rpm at Motor Pulley Settings*

UNIT PGE	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
180†	††	††	††	††	1021	1002	984	965	947	928	910	891	873
180**	††	††	††	††	1200	1178	1156	1134	1112	1091	1069	1047	1025
210†	††	††	1095	1077	1058	1040	1021	1002	984	965	947	928	910
210**	††	††	1287	1265	1243	1222	1200	1178	1156	1134	1112	1091	1069
240†	††	††	††	††	1151	1132	1114	1095	1077	1058	1040	1021	1002
240**	††	††	††	††	1369	1347	1325	1303	1281	1259	1237	1215	1193
300†	††	††	1283	1269	1247	1225	1203	1182	1160	1138	1116	1095	1066
300**	††	††	††	††	1551	1524	1497	1470	1443	1415	1388	1361	1332

*Approximate fan rpm shown

†Indicates standard drive package.

**Indicates alternate drive package.

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

Table 22 — Evaporator-Fan Motor Data

UNIT PGE	UNIT VOLTAGE	MAXIMUM ACCEPTABLE CONTINUOUS BHP	MAXIMUM ACCEPTABLE CONTINUOUS BkW*	MAXIMUM ACCEPTABLE OPERATING WATTS	MAXIMUM AMP DRAW
180	208/230	6.13	4.57	5,180	15.8
	460				7.9
210	208/230	5.90	4.40	5,180	15.8
	460				7.9
240	208/230	8.70	6.59	7,915	22.0
	460	9.50	7.08	8,640	13.0
300	208/230	10.20	7.61	9,510	28.0
	460	11.80	8.80	11,000	14.6

LEGEND

BHP — Brake Horsepower

BkW — Brake Kilowatts

*Extensive motor and electrical testing on these units ensures that the full horsepower (brake kilowatt) range of the motors can be utilized with confidence. Using your fan motors up to the horsepower (brake kilowatt) 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 (EPACT) effective October 24, 1997.

Table 23 — Evaporator-Fan Motor Efficiency

UNIT PGE	MOTOR EFFICIENCY (%)
5 Hp	87.5
7.5 Hp	88.5
10 Hp	89.5

OPERATING SEQUENCE

Cooling, Units With Economizer

When thermostat calls for cooling, terminals G and Y1 are energized. The indoor (evaporator) fan contactor (IFC), compressor contactor no. 1 (C1) and outdoor-fan contactor (OFC) are energized, and evaporator-fan motor, compressor no. 1, and both 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.

When the thermostat is satisfied, C1 and C2 are deenergized and the compressors and outdoor (condenser) fan motors (OFM) shut off. After a 30-second delay, the indoor (evaporator) fan motor (IFM) shuts off. If the thermostat fan selector switch is in the ON position, the evaporator-fan motor will run continuously.

Heating, Units Without Economizer

When the thermostat calls for heating, terminal W1 is energized. In order to prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor (IDM) is then energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 and W2 are deenergized, the IFM stops after a 45-second time-off delay.

Cooling, Units with Economizer

When free cooling is not available, the compressors will be controlled by the zone thermostat. When free cooling is available, the outdoor-air damper is modulated by the economizer control to provide a 50 to 55 F supply-air temperature into the zone. As the supply-air temperature fluctuates above 55 or below 50 F, the dampers will be modulated (open or close) to bring the supply-air temperature back within the set point limits.

For economizer operation, there must be a thermostat call for the fan (G). This will move the damper to its minimum position during the occupied mode.

Above 50 F supply-air temperature, the dampers will modulate from 100% open to the minimum open position. From 50 F to 45 F supply-air temperature, the dampers will maintain at the minimum open position. Below 45 F the dampers will be completely shut. As the supply-air temperature rises, the dampers will come back open to the minimum open position once the supply-air temperature rises to 48 F.

If optional power exhaust is installed, as the outdoor-air damper opens and closes, the power exhaust fan will be energized and deenergized.

If field-installed accessory CO₂ sensors are connected to the economizer control, a demand controlled ventilation strategy will begin to operate. As the CO₂ level in the zone increases above the CO₂ set point, the minimum position of the damper

will be increased proportionally. As the CO₂ level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed. Damper position will follow the higher demand condition from DCV mode or free cooling mode.

Damper movement from full closed to full open (or vice versa) will take between 1½ and 2½ minutes.

If free cooling can be used as determined from the appropriate changeover command (switch, dry bulb, enthalpy curve, differential dry bulb, or differential enthalpy), a call for cooling (Y1 closes at the thermostat) will cause the control to modulate the dampers open to maintain the supply air temperature set point at 50 to 55 F.

As the supply-air temperature drops below the set point range of 50 to 55 F, the control will modulate the outdoor-air dampers closed to maintain the proper supply-air temperature.

Heating, Units With Economizer

When the room thermostat calls for heat, the heating controls are energized as described in the Heating, Units Without Economizer section. When the indoor fan is running, the economizer damper moves to the minimum position. When the indoor fan is off, the economizer damper is fully closed.

SERVICE



WARNING

ELECTRICAL SHOCK HAZARD

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

Before installing or servicing system, always turn off power supply to unit and install lockout tag. There may be more than one disconnect switch. Turn off accessory heater power switch if applicable.

CLEANING

Inspect unit interior at beginning of each heating and cooling season and as operating conditions require. Remove unit top panel and/or side panels for access to unit interior.

Main Burner

At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames.

Flue Gas Passageways

The flue collector box and heat exchanger cells may be inspected by removing heat exchanger access panel (Fig. 3-4), flue box cover, and main burner assembly (Fig. 9 and 10). Refer to Main Burners section on page 36 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 Fig. 30.

Combustion-Air Blower

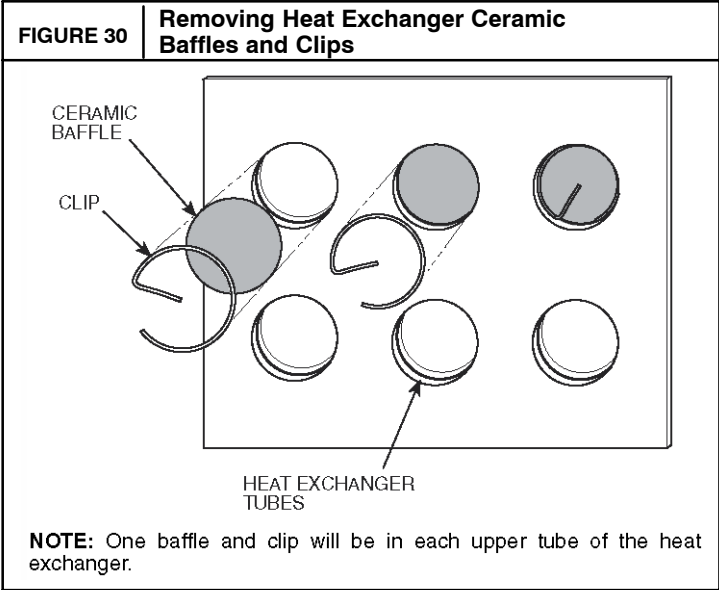
Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically

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.

Evaporator Coil

Clean as required with commercial coil cleaner.



Condenser Coil

Clean condenser coil annually and as required by location and outdoor-air conditions. Inspect coil monthly — clean as required.

Condensate Drain

Check and clean each year at start of cooling season. In winter, keep drains and traps dry.

Filters

Clean or replace at start of each heating and cooling season, or more often if operating conditions require. Refer to Table 1 for type and size.

The PGE300 unit requires industrial grade throwaway filters capable of withstanding face velocities up to 625 fpm. Ensure that replacement filters for the PGE300 units are rated for 625 fpm.

Outdoor-Air Inlet Screens

Clean screens with steam or hot water and a mild detergent. Do not use throwaway filters in place of screens.

LUBRICATION

Compressors

Each compressor is charged with the correct amount of oil at the factory. Conventional white oil (Sontex 200LT) is used.

White oil is compatible with 3GS oil, and 3GS oil may be used if the addition of oil is required. See compressor nameplate for original oil charge. A complete recharge should be four ounces less than the original oil charge. When a compressor is exchanged in the field it is possible that a major portion of the oil from the replaced compressor may still be in the system. While this will not affect the reliability of the replacement compressor, the extra oil will add rotor drag and increase power usage. To remove this excess oil, an access valve may be added to the lower portion of the suction line at the inlet of the compressor. The compressor should then be run for 10 minutes, shut down and the access valve opened until no oil flows. This should be repeated twice to make sure the proper oil level has been achieved.

Fan Shaft Bearings

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

MANUFACTURER	LUBRICANT
Texaco	Regal AFB-2*
Mobil	Mobilplex EP No. 1
Sunoco	Prestige 42
Texaco	Multifak 2

*Preferred lubricant because it contains rust and oxidation inhibitors.

Condenser and Evaporator-Fan Motor Bearings

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

EVAPORATOR FAN PERFORMANCE ADJUSTMENT (Fig. 31 and 32)

Fan motor pulleys are factory set for speed shown in Table 1.

To change fan speeds:

1. Shut off unit power supply.
2. 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.
3. Loosen movable-pulley flange setscrew (see Fig. 31).
4. 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 Table 1.
See Table 19 for air quantity limits.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 1 for speed change for each full turn of pulley flange.)
6. Replace and tighten belts. See Belt Tension Adjustment section below.

To align fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft.

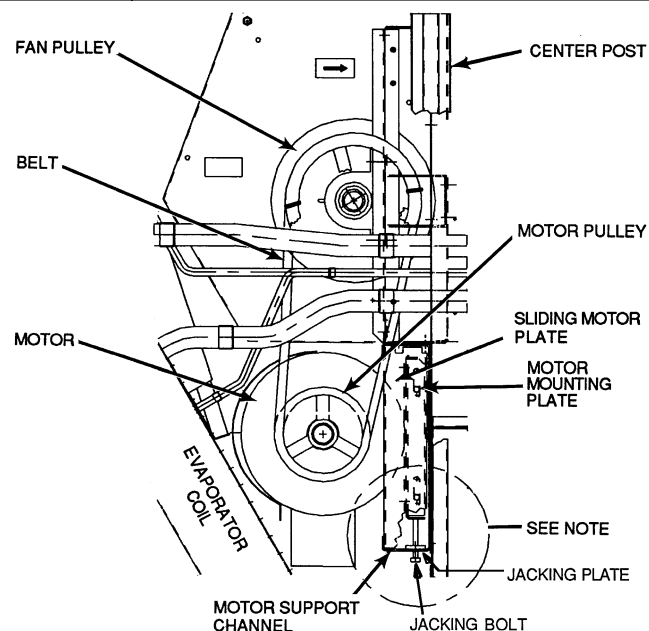
3. Make angular alignment by loosening motor from mounting plate.

EVAPORATOR FAN SERVICE AND REPLACEMENT

The PGE units use a fan motor mounting system that features a slide-out motor mounting plate. See Fig. 32. To replace or service the motor, slide out the bracket.

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 2 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 this 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.

FIGURE 32 PGE180–300 Evaporator Fan Motor Section



NOTE: A 3 1/2-in. bolt and threaded plate are included in the installer's packet. They should be added to the motor support channel below the motor mounting plate to aid in raising the motor. The plate part number is 50DP503842. The adjustment bolt is 3/8-16 x 1 3/4-in. LG.

11. Remove the motor.
12. To install the new motor, reverse Steps 1-11.

BELT TENSION ADJUSTMENT

To adjust belt tension:

1. Loosen fan motor bolts.
2. Turn motor jacking bolt to move motor mounting plate up or down for proper belt tension ($\frac{3}{8}$ in. deflection at midspan with one finger [9 lb force]).
3. Tighten nuts.
4. Adjust bolts and nut on mounting plate to secure motor in fixed position.

CONDENSER-FAN ADJUSTMENT

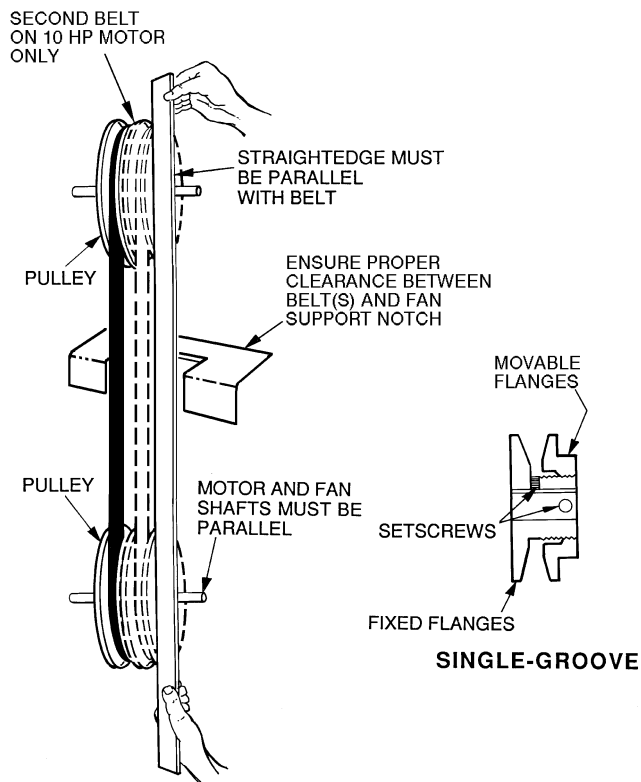
PGE180, 210, 300 UNITS (Fig. 33)

1. Shut off unit power supply.
2. Remove access panel(s) closest to the fan to be adjusted.
3. Loosen fan hub setscrews.
4. Adjust fan height on shaft using a straightedge placed across the fan orifice.
5. Tighten setscrews and replace panel(s).
6. Turn on unit power.

PGE240 Units (Fig. 34)

1. Shut off unit power supply.
2. Remove fan top-grille assembly and loosen fan hub screws.
3. Adjust fan height on unit, using a straightedge placed across the fan orifice.

FIGURE 31 Evaporator Fan Pulley Adjustment



4. Tighten setscrews and replace rubber hubcap to prevent hub from rusting to motor shaft.
5. Fill hub recess with permagum if rubber hubcap is missing.

POWER FAILURE

Dampers have a spring return. In event of power failure, dampers will return to fully closed position until power is restored. *Do not manually operate economizer motor.*

REFRIGERANT CHARGE

Amount of refrigerant charge is listed on unit nameplate and in Table 1. Refer to GTAC II; Module 5; Charging, Recovery, Recycling, and Reclamation section for charging methods and procedures. Unit panels must be in place when unit is operating during charging procedure.

NOTE: Do not use recycled refrigerant as it may contain contaminants.

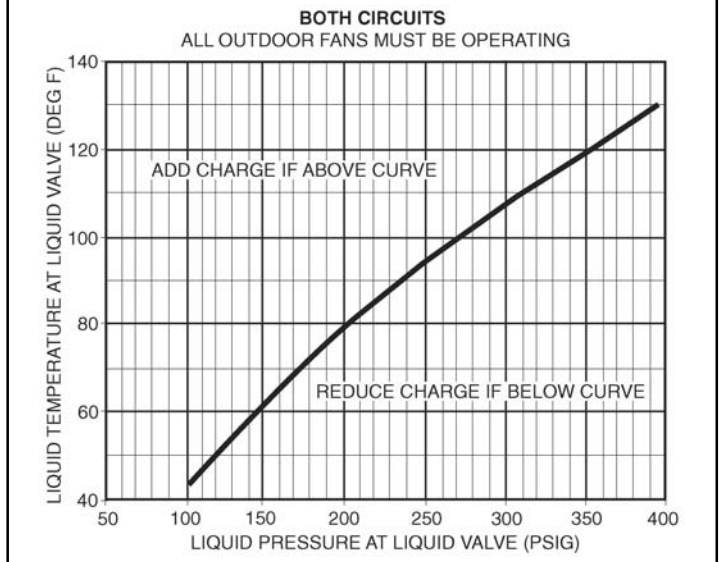
No Charge

Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant (refer to Table 1).

Low Charge Cooling

Using cooling charging chart (see Fig. 35), add or remove refrigerant until conditions of the chart are met. Note that charging chart is different from those normally used. An accurate pressure gage and temperature-sensing device is required. Charging is accomplished by ensuring the proper amount of liquid subcooling. Measure liquid line pressure at the liquid line service valve using pressure gage. Connect temperature sensing device to the liquid line near the liquid line service valve and insulate it so that outdoor ambient temperature does not affect reading.

FIGURE 35 Cooling Charging Chart



To Use the Cooling Charging Chart

Use the above temperature and pressure readings, and find the intersection point on the cooling charging chart. If intersection point on chart is above line, add refrigerant. If intersection point on chart is below line, carefully recover some of the charge. Recheck suction pressure as charge is adjusted.

NOTE: Indoor-air cfm must be within normal operating range of unit. All outdoor fans must be operating.

The TXV (thermostatic expansion valve) is set to maintain between 15 and 20 degrees of superheat at the compressors. The valves are factory set and should not require re-adjustment.

GAS VALVE ADJUSTMENT

Natural Gas

The gas valve opens and closes in response to the thermostat or limit control.

When power is supplied to valve terminals D1 and C2, the main valve opens to its preset position.

The regular factory setting is stamped on the valve body (3.3 in. wg).

To adjust regulator:

1. Set thermostat at setting for no call for heat.
2. Turn main gas valve to OFF position.
3. Remove $\frac{1}{8}$ -in. pipe plug from manifold or gas valve pressure tap connection. Install a suitable pressure-measuring device.
4. Set main gas valve to ON position.
5. Set thermostat at setting to call for heat.
6. Remove screw cap covering regulator adjustment screw (see Fig. 36).
7. Turn adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure.

FIGURE 33 Outdoor Fan Adjustment – PGE180, 210, 300

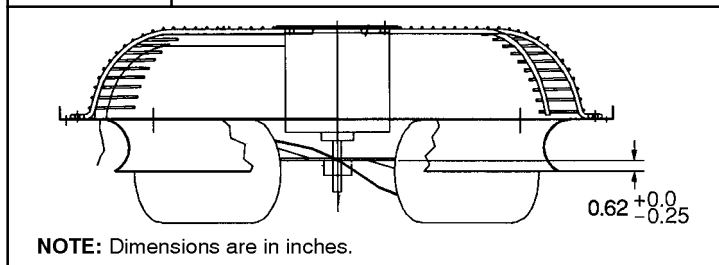
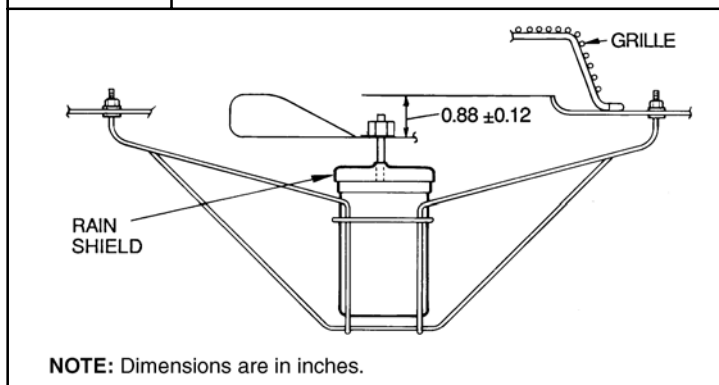


FIGURE 34 Outdoor Fan Adjustment – PGE240



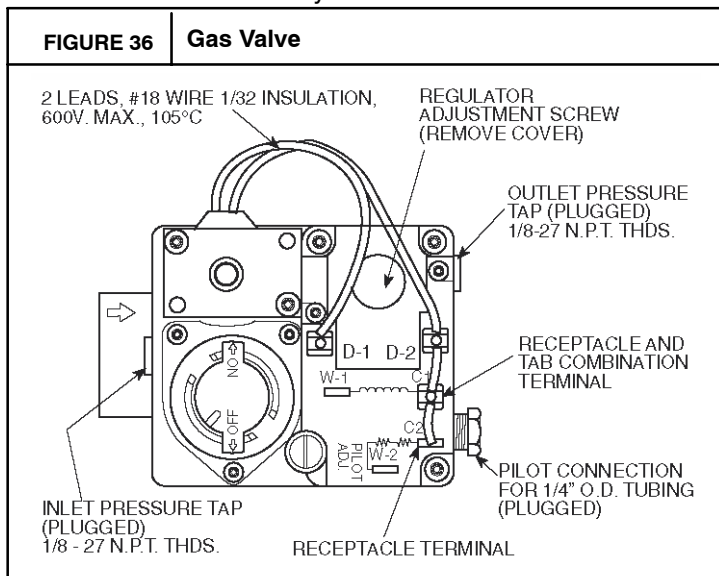
- Once desired pressure is established, set thermostat setting for no call for heat, turn off main gas valve, remove pressure-measuring device, and replace 1/8-in. pipe plug and screw cap.

MAIN BURNERS

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

Main Burner Removal

- Shut off (field-supplied) manual main gas valve.
- Shut off power to unit.
- Remove unit control box access panel, burner section access panel, and center post (Fig. 3-4).
- Disconnect gas piping from gas valve inlet.
- Remove wires from gas valve.
- Remove wires from rollout switch.
- Remove sensor wire and ignitor cable from IGC board.
- Remove 2 screws securing manifold bracket to basepan.
- Remove 2 screws that hold the burner support plate flange to the vestibule plate.
- Lift burner assembly out of unit.



Cleaning and Adjustment

- Remove burner rack from unit as described in Main Burner Removal section on page 36.
- Inspect burners, and if dirty, remove burners from rack.
- Using a soft brush, clean burners and crossover port as required.
- Adjust spark gap. See Fig. 37.
- Reinstall burners on rack.
- Reinstall burner rack as described above.

FILTER DRIER

Replace whenever refrigerant system is exposed to atmosphere.

PROTECTIVE DEVICES

Compressor Protection – Overcurrent

Each compressor has internal line break motor protection.

Crankcase Heater

All units are equipped with a 70-watt crankcase heater to prevent absorption of liquid refrigerant by oil in the crankcase when the compressor is idle. The crankcase heater is energized whenever there is main power to the unit and the compressor is not energized.

IMPORTANT: After prolonged shutdown or servicing, energize the crankcase heaters for 24 hours before starting the compressors.

Compressor Lockout

If any of the safeties (high-pressure, low-pressure, freeze protection thermostat, compressor internal thermostat) trip, or if there is loss of power to the compressors, the cooling lockout (CLO) will lock the compressors off. To reset, manually move the thermostat setting.

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.

Condenser-Fan Motor Protection

Each condenser-fan motor is internally protected against overtemperature.

High and Low-Pressure Switches

If either switch trips, or if the compressor overtemperature switch activates, that refrigerant circuit will be automatically locked out by the CLO. To reset, manually move the thermostat setting.

Freeze Protection Thermostat (FPT)

An FPT is located on the top and bottom of the evaporator coil. They detect frost build-up and turn off the compressor, allowing the coil to clear. Once the frost has melted, the compressor can be reenergized by resetting the compressor lockout.

RELIEF DEVICES

All units have relief devices to protect against damage from excessive pressures (i.e., fire). These devices protect the high and low side.

CONTROL CIRCUIT, 24-V

This control circuit is protected against overcurrent by a 3.2 amp circuit breaker. Breaker can be reset. If it trips, determine cause of trouble before resetting. See Fig. 38 for typical wiring diagram.

REPLACEMENT PARTS

A complete list of replacement parts may be obtained from your distributor upon request.

XVI. DIAGNOSTIC IGC CONTROL LEDs

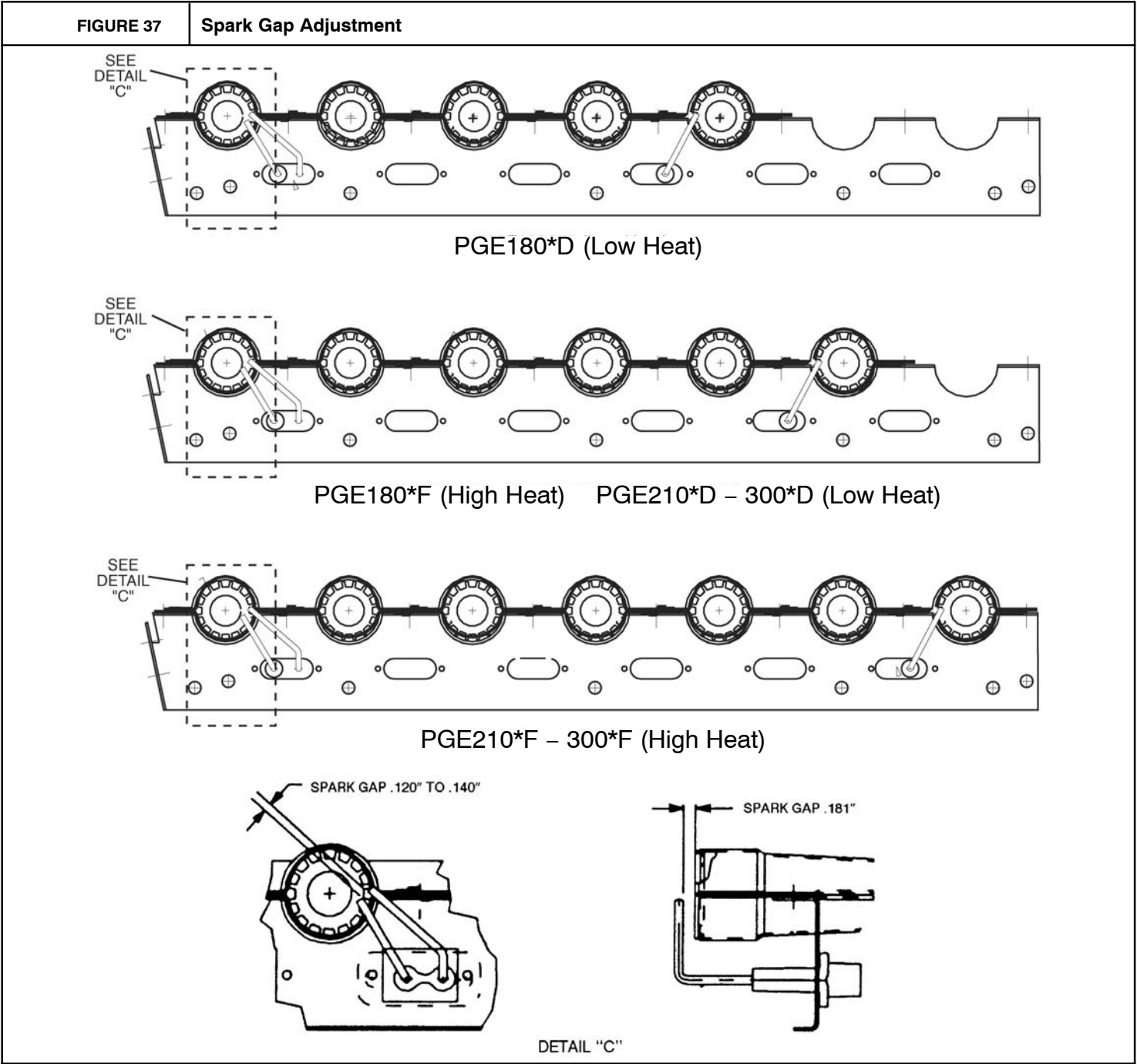
The unit control boards have LEDs for diagnostic purposes. Refer to Troubleshooting section on page 43.

XVII. OPTIONAL HINGED ACCESS DOORS

When the optional hinged access doors option is ordered, the unit will be provided with external and internal hinged access doors to facilitate service.

Four external hinged access doors are provided on size 180-240 units. Two external hinged doors are provided on size 300 units. All external doors are provided with 2 large 1/4 turn latches with folding bail-type handles. (Compressor access doors have one latch.) A single door is provided for filter and drive access. One door is provided for control box access. The control box access door is interlocked with the non-fused disconnect which must be in the OFF position to open the door. Two doors are provided on PGE180-240 units for access to the compressor compartment.

Two internal access doors are provided inside the filter/drive access door. The filter access door (on the left) is secured by 2 small 1/4 turn latches with folding bail-type handles. This door must be opened prior to opening the drive access door. The drive access door is shipped with 2 sheet metal screws holding the door closed. Upon initial opening of the door, these screws may be removed and discarded. The door is then held shut by the filter access door, which closes over it.



Typical Wiring Schematic, PGE240 – 208/230v Shown

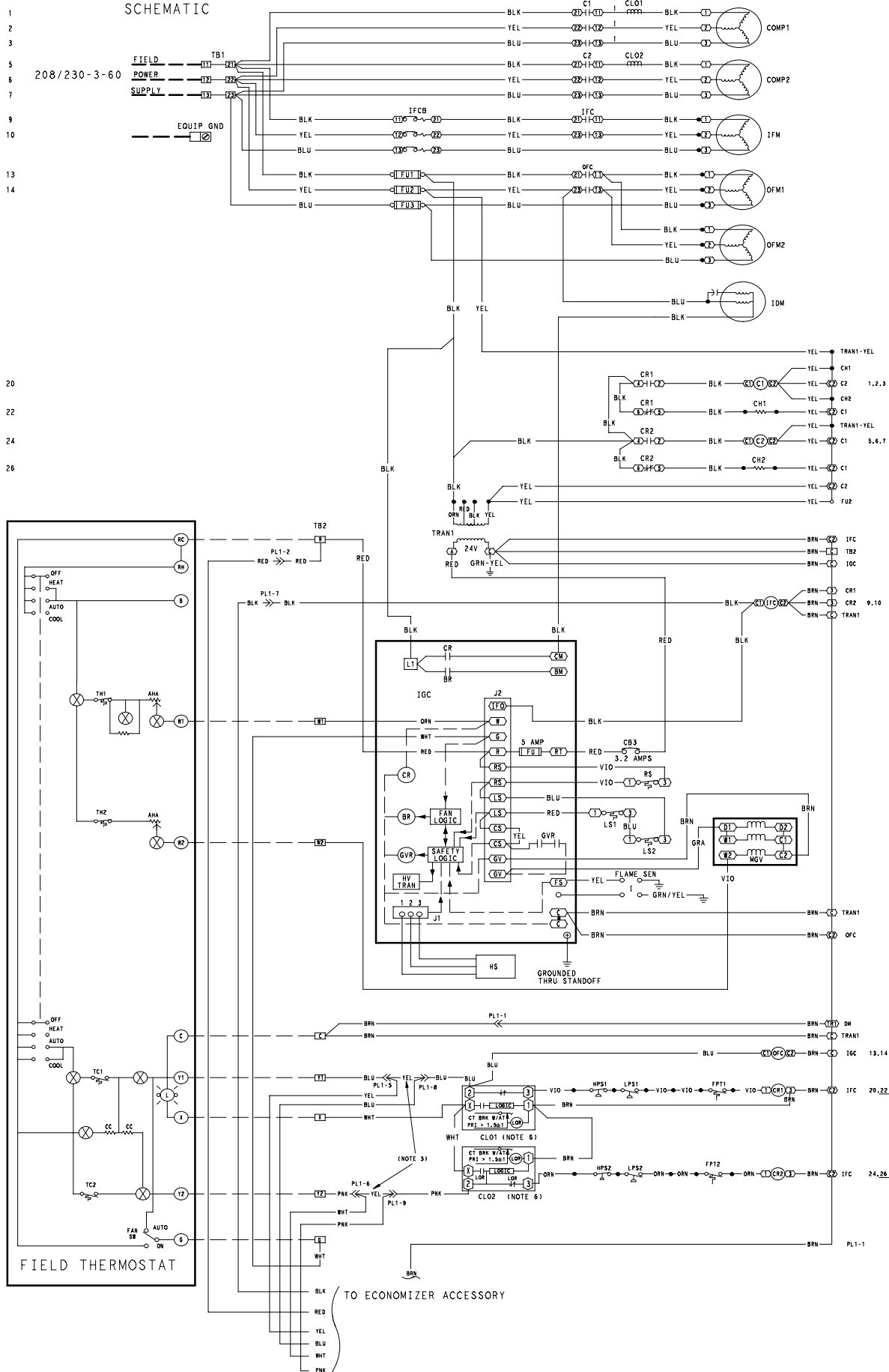
















FIGURE 39



- | | | | |
|-------|---------------------------------|------|----------------------------|
| AHA | ADJUSTABLE HEAT ANTICIPATOR | IFCB | INDOOR FAN CIRCUIT BREAKER |
| C | CONTRACTOR, COMPRESSOR | IFM | INDOOR FAN MOTOR |
| CA | CAPACITOR | L | LIGHT |
| CB | CIRCUIT BREAKER | LLSV | LIQUID LINE SOLENOID VALVE |
| CC | COOLING COMPENSATOR | LOR | LOCKOUT RELAY |
| CL | COMPRESSOR LOCKOUT | LPS | LOW PRESSURE SWITCH |
| CLO | COMPRESSOR LOCKOUT SWITCH | LTS | LIMIT SWITCH |
| COMP | COMPRESSOR MOTOR | MAT | MIXED AIR THERMOSTAT |
| CR | CONTROL RELAY | MGV | MAIN GAS VALVE |
| DAT | DISCHARGE AIR THERMISTOR | OAT | OUTDOOR AIR THERMOSTAT |
| DAM | DAMP MOTOR | OFC | OUTDOOR FAN CIRCUIT |
| DU | DUMMY TERMINAL | OFM | OUTDOOR FAN MOTOR |
| EC | ENTHALPY CONTROL | PL | PLUG ASSEMBLY |
| EQUIP | EQUIPMENT | PRI | PRIMARY |
| FU | FUSE | R | RELAY |
| FPT | FREEZE PROTECTION THERMOSTAT | RS | ROLLOUT SWITCH |
| GND | GROUND | SN | SENSOR |
| HPS | HIGH PRESSURE SWITCH | SR | SOLENOID RELAY |
| HS | HALL EFFECT SENSOR | SW | SWITCH |
| HV | HIGH VOLTAGE | TB | TERMINAL BLOCK |
| I | IGNITOR | TC | THERMOSTAT COOLING |
| IDM | INDUCED DRAFT MOTOR | TDR | TIME DELAY RELAY |
| IGC | INTERGRATED GAS UNIT CONTROLLER | TH | THERMOSTAT HEATING |
| IFC | INDOOR FAN CONTACTOR | TRAN | TRANSFORMER |

LEGENDS AND NOTES FOR FIGS. 38 and 39.

LEGEND

AHA	— Adjustable, Heat Anticipator	OFC	— Outdoor Fan Contactor
BRK W/AT	— Breaks with Amp Turns	OFM	— Outdoor Fan Motor
C	— Contactor, Compressor	OP	— Overcurrent Protector
CAP	— Capacitor	PL	— Plug Assembly
CB	— Circuit Breaker	QT	— Quadruple Terminal
CC	— Cooling Compensator	RVR	— Reversing Valve Relay
CH	— Crankcase Heater	RVS	— Reversing Valve Solenoid
CLO	— Compressor Lockout	TB	— Terminal Block
COMP	— Compressor Motor	TC	— Thermostat Cooling
CTD	— Compressor Time Delay	TH	— Thermostat Heating
DB	— Defrost Board	TRAN	— Transformer
DFT	— Defrost Thermostat		Terminal (Marked)
DM	— Damper Motor		Terminal (Unmarked)
DR	— Defrost Relay		Terminal Block
DU	— Dummy Terminal		Splice
EQUIP	— Equipment		Factory Wiring
FL	— Fuse Link		Field Wiring
FPT	— Freeze Protection Thermostat		Option/Accessory Wiring
FU	— Fuse		To indicate common potential only; not to represent wiring.
GND	— Ground		Economizer Motor
HC	— Heater Contactor		Remote POT Field Accessory
HPS	— High-Pressure Switch		OAT Sensor
HR	— Heat Relay		Disch Air Sensor
HTR	— Heater		RAT Accessory Sensor
IAQ	— Indoor Air Quality Sensor		Low Ambient Lockout Switch
IFC	— Indoor-Fan Contactor		
IFCB	— Indoor-Fan Circuit Breaker		
IFM	— Indoor-Fan Motor		
IP	— Internal Protector		
L	— Light		
LALS	— Low Temperature Compressor Lockout Switch		
LPS	— Low-Pressure Switch		
LS	— Limit Switch		
NEC	— National Electric Code		
OAT	— Outdoor Air Temperature Sensor		
OCCUP	— Occupancy Sensor		

NOTES:

1. Compressor and/or fan motor(s) thermally protected three-phase motors protected against primary single phasing conditions.
2. If any of the original wire furnished must be replaced, it must be replaced with Type 90° C or its equivalent.
3. TRAN1 is wired for 230-v operation. If unit is 208-v, disconnect the black wires from the ORN TRAN wire and reconnect to the RED TRAN wire, apply wirenuts to wires.
4. CB1,2 must trip amps are equal to or less than 156% FLA, IFCB 140%.
5. The CLO locks out the compressor to prevent short cycling on compressor overload and safety devices; before replacing CLO, check these devices.
6. Jumpers are omitted when unit is equipped with economizer.
7. Number(s) indicates the line location of used contacts. A bracket over (2) numbers signifies a single pole, double throw contact. An underlined number signifies a normally closed contact. Plain (no line) number signifies a normally open contact.
8. Remove jumper between RC & RN.
9. 620 Ohm, 1 watt, 5% resistor should be removed only when using differential enthalpy or dry bulb.
10. If a separate field-supplied 24-v transformer is used for the IAQ sensor power supply, it cannot have the secondary of the transformer grounded.
11. OAT sensor is shipped inside unit and must be relocated in the field for proper operation.
12. For field-installed remote minimum position POT, remove black wire jumper between P and P1 and set control minimum position POT to the minimum position.

TROUBLESHOOTING

Unit Troubleshooting

Refer to Table 24–25 and figs. 40 for unit troubleshooting information.

Economizer Troubleshooting

See Table 26 for economizer logic.

A functional view of the economizer is shown in Fig. 46. Typical settings, sensor ranges, and jumper positions are also shown.

Preparation

This procedure is used to prepare the economizer for troubleshooting. No troubleshooting or testing is done by performing the following procedure.

NOTE:This procedure requires a 9-v battery, 1.2 kilo-ohm resistor, and a 5.6 kilo-ohm resistor which are not supplied with the economizer.

IMPORTANT:Be sure to record the positions of all potentiometers before starting troubleshooting.

1. Disconnect power at TR and TR1. All LEDs should be off. Exhaust fan contacts should be open.
2. Disconnect device at P and P1.
3. Jumper P to P1.
4. Disconnect wires at T and T1. Place 5.6 kilo-ohm resistor across T and T1.
5. Jumper TR to 1.
6. Jumper TR to N.
7. If connected, remove sensor from terminals S_O and +. Connect 1.2 kilo-ohm 4074EJM checkout resistor across terminals S_O and +.
8. Put 620-ohm resistor across terminals S_R and +.
9. Set minimum position, DCV set point, and exhaust potentiometers fully CCW (counterclockwise).
10. Set DCV maximum position potentiometer fully CW (clockwise).
11. Set enthalpy potentiometer to D.
12. Apply power (24 vac) to terminals TR and TR1.

Differential Enthalpy

To check differential enthalpy:

1. Make sure economizer preparation procedure has been performed.
2. Set the enthalpy potentiometer to A (fully CCW). The Free Cool LED should be lit.
3. Set the enthalpy potentiometer to D (fully CW). The Free Cool LED should turn off.
4. Remove 620-ohm resistor across S_O and +. The Free Cool LED should turn off.
5. Return economizer settings and wiring to normal after completing troubleshooting.

Single Enthalpy

To check single enthalpy:

1. Make sure economizer preparation procedure has been performed.
2. Set the enthalpy potentiometer to A (fully CCW). The Free Cool LED should be lit.
3. Set the enthalpy potentiometer to D (fully CW). The Free Cool LED should turn off.

4. Return economizer settings and wiring to normal after completing troubleshooting.

DCV (Demand Controlled Ventilation) and Power Exhaust

To check DCV and Power Exhaust:

1. Make sure economizer preparation procedure has been performed.
2. Ensure terminals AQ and AQ1 are open. The LED for both DCV and Exhaust should be off. The actuator should be fully closed.
3. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The LED for both DCV and Exhaust should turn on. The actuator should drive to between 90 and 95% open.
4. Turn the Exhaust potentiometer CW until the Exhaust LED turns off. The LED should turn off when the potentiometer is approximately 90%. The actuator should remain in position.
5. Turn the DCV set point potentiometer CW until the DCV LED turns off. The DCV LED should turn off when the potentiometer is approximately 9 v. The actuator should drive fully closed.
6. Turn the DCV and Exhaust potentiometers CCW until the Exhaust LED turns on. The exhaust contacts will close 30 to 120 seconds after the Exhaust LED turns on.
7. Return economizer settings and wiring to normal after completing troubleshooting.

DCV Minimum and Maximum Position

To check the DCV minimum and maximum position:

1. Make sure economizer preparation procedure has been performed.
2. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The DCV LED should turn on. The actuator should drive to between 90 and 95% open.
3. Turn the DCV Maximum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
4. Turn the DCV Maximum Position potentiometer to fully CCW. The actuator should drive fully closed.
5. Turn the Minimum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
6. Turn the Minimum Position Potentiometer fully CW. The actuator should drive fully open.
7. Remove the jumper from TR and N. The actuator should drive fully closed.
8. Return economizer settings and wiring to normal after completing troubleshooting.

Supply-air Input

To check supply-air input:

1. Make sure economizer preparation procedure has been performed.
2. Set the Enthalpy potentiometer to A. The Free Cool LED turns on. The actuator should drive to between 20 and 80% open.
3. Remove the 5.6 kilo-ohm resistor and jumper T to T1. The actuator should drive fully open.
4. Remove the jumper across T and T1. The actuator should drive fully closed.
5. Return economizer settings and wiring to normal after completing troubleshooting.

Economizer Troubleshooting Completion

This procedure is used to return the economizer to operation. No troubleshooting or testing is done by performing the following procedure.

1. Disconnect power at TR and TR1.
2. Set enthalpy potentiometer to previous setting.
3. Set DCV maximum position potentiometer to previous setting.
4. Set minimum position, DCV set point, and exhaust potentiometers to previous settings.
5. Remove 620-ohm resistor from terminals S_R and +.
6. Remove 1.2 kilo-ohm checkout resistor from terminals S_O and +. If used, reconnect sensor from terminals S_O and +.
7. Remove jumper from TR to N.
8. Remove jumper from TR to 1.
9. Remove 5.6 kilo-ohm resistor from T and T1. Reconnect wires at T and T1.
10. Remove jumper from P to P1. Reconnect device at P and P1.
11. Apply power (24 vac) to terminals TR and TR1.

Table 24 — Heating Service Analysis

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. Check 24-v circuit breaker; reset if necessary.
	Miswired or loose connections.	Check all wiring and wire nut 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 or replace filter as necessary.
	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.	Install alternate motor, if applicable, or adjust pulley to increase fan speed.
	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.

Table 25 — Cooling Service Analysis

PROBLEM	CAUSE	REMEDY
Compressor and Condenser Fan 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 Fan Runs.	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.
	Compressor locked out	Determine cause for safety trip and reset lockout.
	One leg of 3-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
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.
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.	Recover 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.

LEGEND

TXV — Thermostatic Expansion Valve

FIGURE 40

IGC Control (Heating and Cooling)

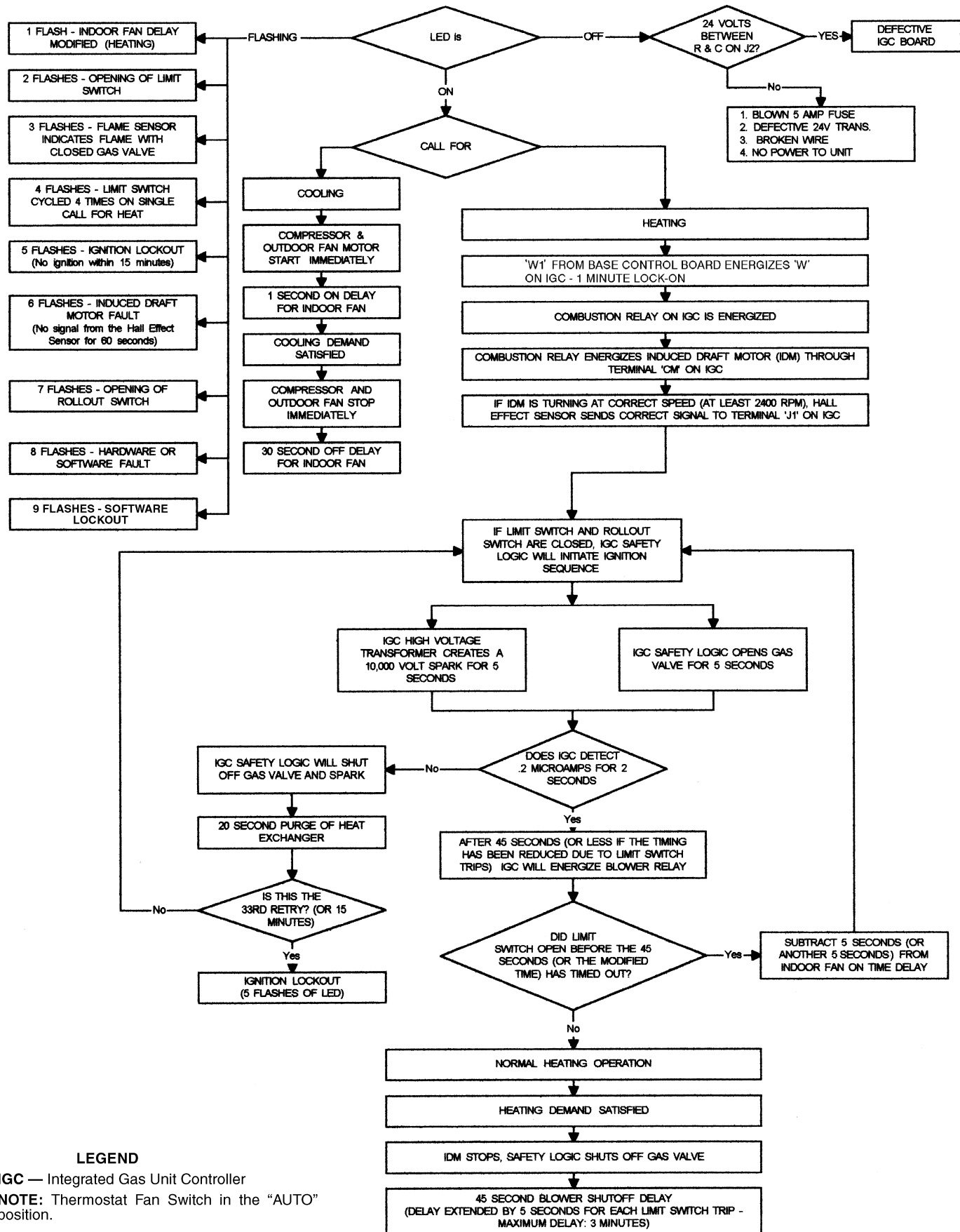


TABLE 26 — ECONOMIZER INPUT/OUTPUT LOGIC

INPUTS					OUTPUTS			
Demand Control Ventilation (DCV)	Enthalpy*		Y1	Y2	Compressor		N Terminal†	
	Outdoor	Return			Stage	Stage	Occupied	Unoccupied
					1	2	Damper	
Below set (DCV LED Off)	High (Free Cooling LED Off)	Low	On	On	On	On	Minimum position	Closed
			On	Off	On	Off		
			Off	Off	Off	Off		
	Low (Free Cooling LED On)	High	On	On	On	Off	Modulating** (between min. position and full-open)	Modulating** (between closed and full-open)
			On	Off	Off	Off		
			Off	Off	Off	Off		
Above set (DCV LED On)	High (Free Cooling LED Off)	Low	On	On	On	On	Modulating†† (between min. position and DCV maximum)	Modulating†† (between closed and DCV maximum)
			On	Off	On	Off		
			Off	Off	Off	Off		
	Low (Free Cooling LED On)	High	On	On	On	Off	Modulating***	Modulating†††
			On	Off	Off	Off		
			Off	Off	Off	Off		

*For single enthalpy control, the module compares outdoor enthalpy to the ABCD set point.

† Power at N terminal determines Occupied/Unoccupied setting: 24 vac (Occupied), no power (Unoccupied).

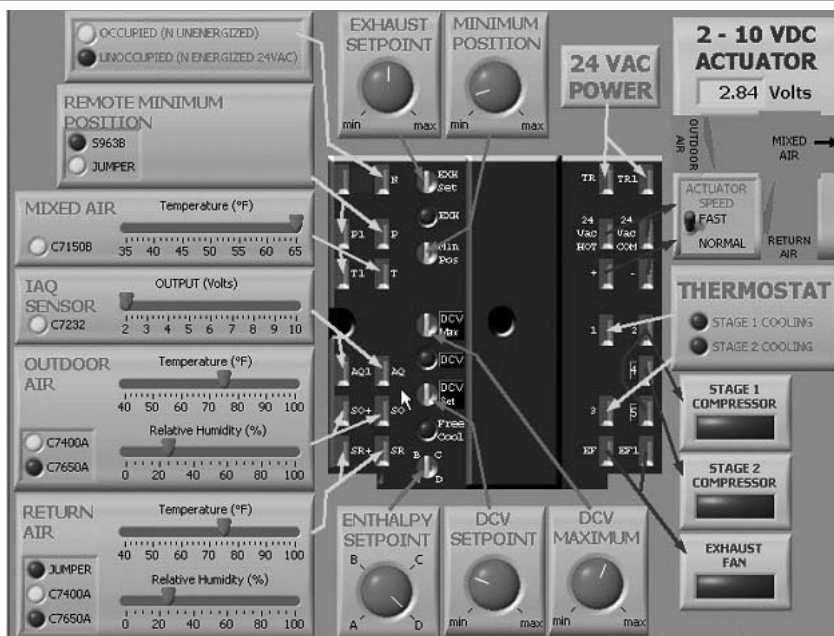
** Modulation is based on the supply-air sensor signal.

†† Modulation is based on the DCV signal.

*** Modulation is based on the greater of DCV and supply-air sensor signals, between minimum position and either maximum position (DCV) or fully open (supply-air signal).

††† Modulation is based on the greater of DCV and mixed air sensor signals, between closed and either maximum position (DCV) or fully open (supply-air signal).

FIGURE 41 Economizer Functional View



START-UP CHECKLIST
(Remove and Store in Job File)

MODEL NO.: _____

DATE: _____

SERIAL NO.: _____

TECHNICIAN: _____

I. PRE-START-UP

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ VERIFY PROPER ADJUSTMENT OF INDOOR FAN MOTOR ADJUSTMENT BOLT
- ☐ VERIFY INSTALLATION OF OUTDOOR-AIR HOOD
- ☐ VERIFY INSTALLATION OF FLUE HOOD AND WIND BAFFLE
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS
- ☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
- ☐ CHECK GAS PIPING FOR LEAKS
- ☐ CHECK THAT AIR INLET FILTERS ARE CLEAN AND IN PLACE
- ☐ VERIFY THAT UNIT IS LEVEL
- ☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE, AND VERIFY SET SCREW IS TIGHT
- ☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED
- ☐ VERIFY THAT SCROLL COMPRESSOR IS ROTATING IN THE CORRECT DIRECTION
- ☐ VERIFY THAT CRANKCASE HEATERS HAVE BEEN ENERGIZED FOR AT LEAST 24 HOURS

II. START-UP

ELECTRICAL

SUPPLY VOLTAGE	L1-L2	_____	L2-L3	_____	L3-L1	_____
COMPRESSOR AMPS -	COMPRESSOR NO. 1		L1	_____	L2	_____
INDOOR-FAN AMPS -	COMPRESSOR NO. 2		L1	_____	L2	_____
					L3	_____
SUPPLY FAN AMPS	_____		EXHAUST FAN AMPS	_____		

TEMPERATURES

OUTDOOR-AIR TEMPERATURE	_____	F DB (Dry-Bulb)
RETURN-AIR TEMPERATURE	_____	F DB _____ F WB (Wet-Bulb)
COOLING SUPPLY AIR	_____	F
GAS HEAT SUPPLY AIR	_____	F

PRESSURES (COOLING MODE)

GAS INLET PRESSURE	_____	IN. WG
GAS MANIFOLD PRESSURE	STAGE NO. 1 _____	IN. WG
	STAGE NO. 2 _____	IN. WG
REFRIGERANT SUCTION	CIRCUIT NO. 1 _____	PSIG
	CIRCUIT NO. 2 (180 ONLY) _____	PSIG
REFRIGERANT DISCHARGE	CIRCUIT NO. 1 _____	PSIG
	CIRCUIT NO. 2 (180 ONLY) _____	PSIG

- ☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS

GENERAL

- ☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS