Installation Instructions

PGE Series – 3 Phase
3 to 6 Ton

PACKAGED GAS HEATING / ELECTRIC COOLING UNITS

International Comfort Products, LLC
Lewisburg, TN. 37091

521 01 1001 01 01-15-08

Printed in U.S.A.
Code: PGE

IMPORTANT - READ BEFORE INSTALLING

1. Read and become familiar with these installation instructions before installing this unit (Fig. 1A and1B).
2. Be sure the installation conforms to all applicable local and national codes.
3. These instructions contain important information for the proper maintenance and repair of this equipment. Retain these instructions for future use.

CONTENTS

SAFE INSTALLATION REQUIREMENTS

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.

⚠ CAUTION

PROPERTY DAMAGE HAZARD

Failure to follow this caution can cause damage to the unit.

Ensure voltage listed on unit data plate agrees with electrical supply provided for the unit.

INSTALLATION

The unit is shipped in the vertical discharge configuration. To convert to horizontal configuration, remove the horizontal duct opening covers. Using the same screws, install the covers on the duct openings in the basepan of the unit with the insulation-side down. Seals around duct openings must be tight.

Step 1—PROVIDE UNIT SUPPORT

Roofcurb

Assemble and install accessory roof curb in accordance with instructions shipped with curb. Ductwork must be attached to curb, not to the unit. The accessory thru-the-bottom power and gas connection package must be installed before the unit is set on the roof curb. If fieldinstalled (thru-the-roof curb) gas connections are desired, use factory-supplied 3/4-in. pipe coupling and gas plate assembly to mount the thru-the-roof curb connection to the roof curb. Gas connections and power connections to the unit must be field installed after the unit is installed on the roof curb.

If electric and control wiring is to be routed through the basepan, attach the accessory thru-the-bottom service connections to the basepan in accordance with the accessory installation instructions.

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

Curb should be level. This is necessary for the unit drain to function properly. Unit leveling tolerances are shown in Fig.2. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

UNIT	STD. UNIT WEIGHT LB	STD. UNIT WEIGHT KG	Economizer WEIGHT LB	Economizer WEIGHT KG	VERT. ECON W/P.E. WEIGHT LB	VERT. ECON W/P.E. WEIGHT KG	(A) CORNER WEIGHT LB	(A) CORNER WEIGHT KG	(B) CORNER WEIGHT LB	(B) CORNER WEIGHT KG	(C) CORNER WEIGHT LB	(C) CORNER WEIGHT KG	(D) CORNER WEIGHT LB	(D) CORNER WEIGHT KG	"A" PANEL LENGTH
PGE036	460	209	50	22.7	90	40.9	140	63.5	105	47.6	159	72.1	56	25.4	1'-10 3/8" [568.0]
PGE048	470	213	↓	↓	↓	↓	142	64.4	106	48.1	162	73.5	60	27.2	1'-10 3/8" [568.0]
PGE060	490	222	↓	↓	↓	↓	150	68.0	115	52.2	160	72.6	65	29.5	1'-0 3/8" [315.0]

BOTTOM POWER CHART:
THESE HOLES REQ'D FOR USE WITH ACCESSORY PACKAGE
DNRBTMPWR001A01

THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)
1/2"	ACC.	7/8" [22.2]
1/2"	24V	7/8" [22.2]
3/4" 001	POWER*	1 1/8" [28.4]

* - SELECT EITHER 3/4" OR 1 1/4" FOR POWER, DEPENDING ON WIRE SIZE.

	CONNECTION SIZES
A	1 3/8" DIA. [35] FIELD POWER SUPPLY HOLE
B	2" DIA. [51] POWER SUPPLY KNOCK-OUT
C	2 1/2" DIA. [64] POWER SUPPLY KNOCK-OUT
D	7/8" DIA. [22] FIELD CONTROL WIRING HOLE
E	3/4"-14 NPT CONDENSATE DRAIN
F	1/2"-14 NPT GAS CONNECTION

NOTES:
1. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. ⊕ CENTER OF GRAVITY.
3. ⇨ DIRECTION OF AIR FLOW.
4. ON VERTICAL DISCHARGE UNITS, DUCTWORK TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. FOR HORIZONTAL DISCHARGE UNITS FIELD SUPPLIED FLANGES SHOULD BE ATTACHED TO HORIZONTAL DISCHARGE OPENINGS, AND ALL DUCTWORK SHOULD BE ATTACHED TO THE FLANGES.
5. MINIMUM CLEARANCE (LOCAL CODES OR JURISDICTION MAY PREVAIL):
   a. BETWEEN UNIT, FLUE SIDE AND COMBUSTIBLE SURFACES, 36 IN.,18 IN. WHEN USING ACCESSORY FLUE DISCHARGE DEFLECTOR.
   b. BOTTOM OF UNIT TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 1 INCH. BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 0 INCHES.
   c. CONDENSER COIL, FOR PROPER AIR FLOW, 36 INCHES ONE SIDE, 12 INCHES THE OTHER. THE SIDE GETTING THE GREATER CLEARANCE IS OPTIONAL.
   d. OVERHEAD, 60 INCHES TO ASSURE PROPER CONDENSER FAN OPERATION.
   e. BETWEEN UNITS, CONTROL BOX SIDE, 42 IN. PER NEC.
   f. BETWEEN UNIT AND UNGROUNDED SURFACES, CONTROL BOX SIDE, 36 IN. PER NEC.
   g. BETWEEN UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, CONTROL BOX SIDE, 42 IN. PER NEC.
   h. HORIZONTAL SUPPLY AND RETURN END, 0 INCHES WHEN USED ALTERNATE CONDENSATE DRAIN IS USED.
6. WITH THE EXCEPTION OF THE CLEARANCE FOR THE CONDENSER COIL AND COMBUSTION SIDE AS STATED IN NOTE #5a, b, AND c, A REMOVABLE FENCE OR BARRICADE REQUIRES NO CLEARANCE.
7. UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM WOOD OR CLASS A, B, OR C ROOF COVERING MATERIAL IF SET ON BASERAIL.
8. THE VERTICAL CENTER OF GRAVITY IS 1'-6"[457] UP FROM THE BOTTOM OF THE BASE RAIL.

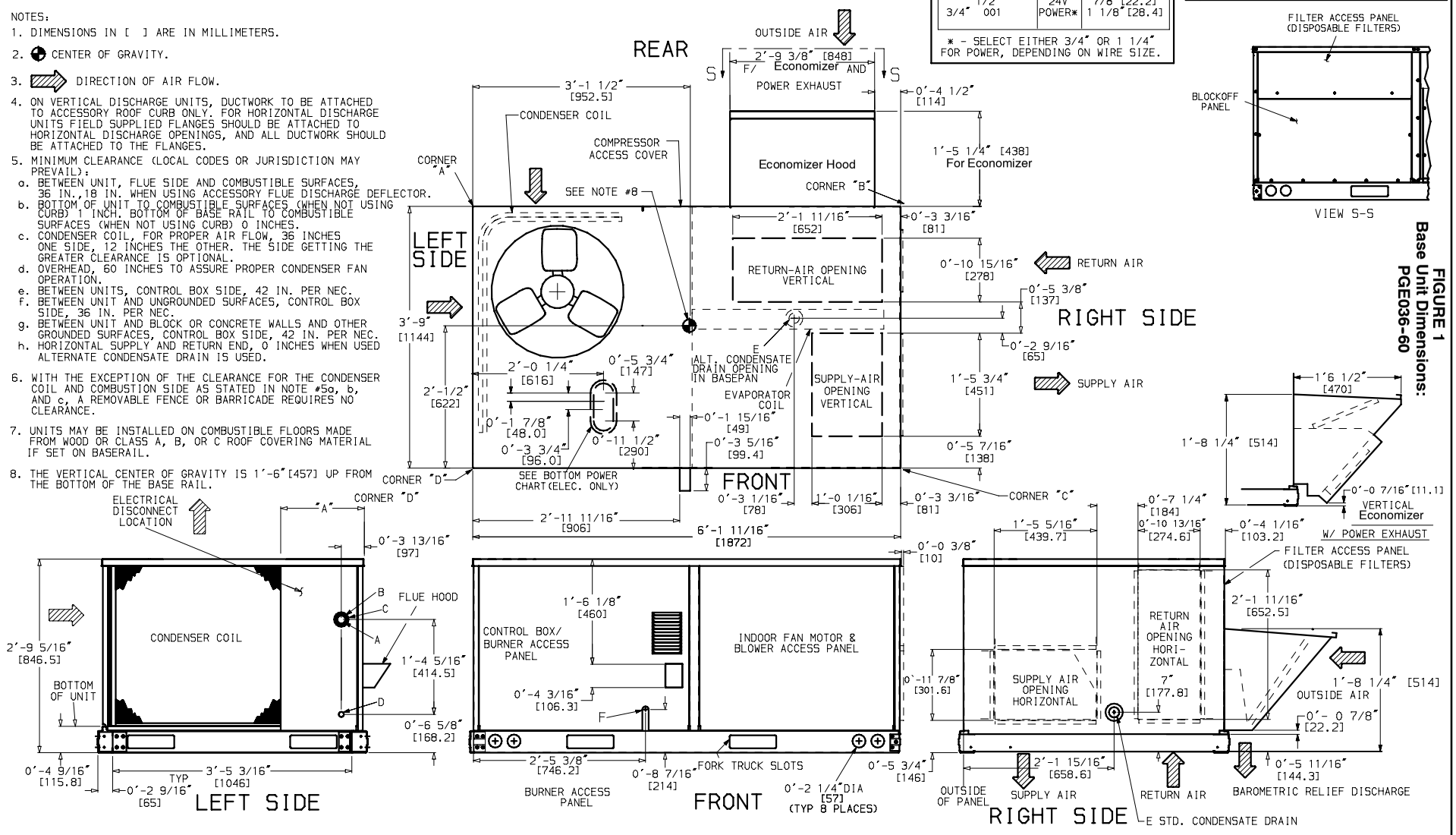

FIGURE 1
Base Unit Dimensions: PGE036-60

UNIT	STD. UNIT WEIGHT LB	STD. UNIT WEIGHT KG	Economizer WEIGHT LB	Economizer WEIGHT KG	VERT. ECON W/P.E. WEIGHT LB	VERT. ECON W/P.E. WEIGHT KG	(A) CORNER WEIGHT LB	(A) CORNER WEIGHT KG	(B) CORNER WEIGHT LB	(B) CORNER WEIGHT KG	(C) CORNER WEIGHT LB	(C) CORNER WEIGHT KG	(D) CORNER WEIGHT LB	(D) CORNER WEIGHT KG	"J" FT -IN.	"J" MM
PGE072	615	279	50	22.7	90	40.9	147	66.7	142	64.4	160	72.6	166	75.3	2'-9 5/16"	846.5

BOTTOM POWER CHART:
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Threaded CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)
1/2"	ACC.	7/8" [22.2]
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B	2" DIA. [51] POWER SUPPLY KNOCK-OUT
C	1 3/4" DIA. [44] CHARGING PORT HOLE
D	7/8" DIA. [22] FIELD CONTROL WIRING HOLE
E	3/4"-14 NPT CONDENSATE DRAIN
F	1/2"-14 NPT GAS CONNECTION
G	2 1/2" DIA. [64] POWER SUPPLY KNOCK-OUT

NOTES:
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   b. BOTTOM OF UNIT TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 1 INCH. BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 0 INCHES.
   c. CONDENSER COIL, FOR PROPER AIR FLOW, 36 INCHES ONE SIDE, 12 INCHES THE OTHER. THE SIDE GETTING THE GREATER CLEARANCE IS OPTIONAL.
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   e. BETWEEN UNITS, CONTROL BOX SIDE, 42 IN. PER NEC.
   f. BETWEEN UNIT AND UNGROUNDED SURFACES, CONTROL BOX SIDE, 36 IN. PER NEC.
   g. BETWEEN UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, CONTROL BOX SIDE, 42 IN. PER NEC.
   h. HORIZONTAL SUPPLY AND RETURN END, 0 INCHES WHEN THE ALTERNATE CONDENSATE DRAIN IS USED.
6. WITH THE EXCEPTION OF THE CLEARANCE FOR THE CONDENSER COIL AND COMBUSTION SIDE AS STATED IN NOTE #5a, b, AND c, A REMOVABLE FENCE OR BARRICADE REQUIRES NO CLEARANCE.
7. UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM WOOD OR CLASS A, B, OR C ROOF COVERING MATERIAL IF SET ON BASE RAIL.
8. THE VERTICAL CENTER OF GRAVITY IS 1'-6" [457] UP FROM FROM THE BOTTOM OF THE BASE RAIL.

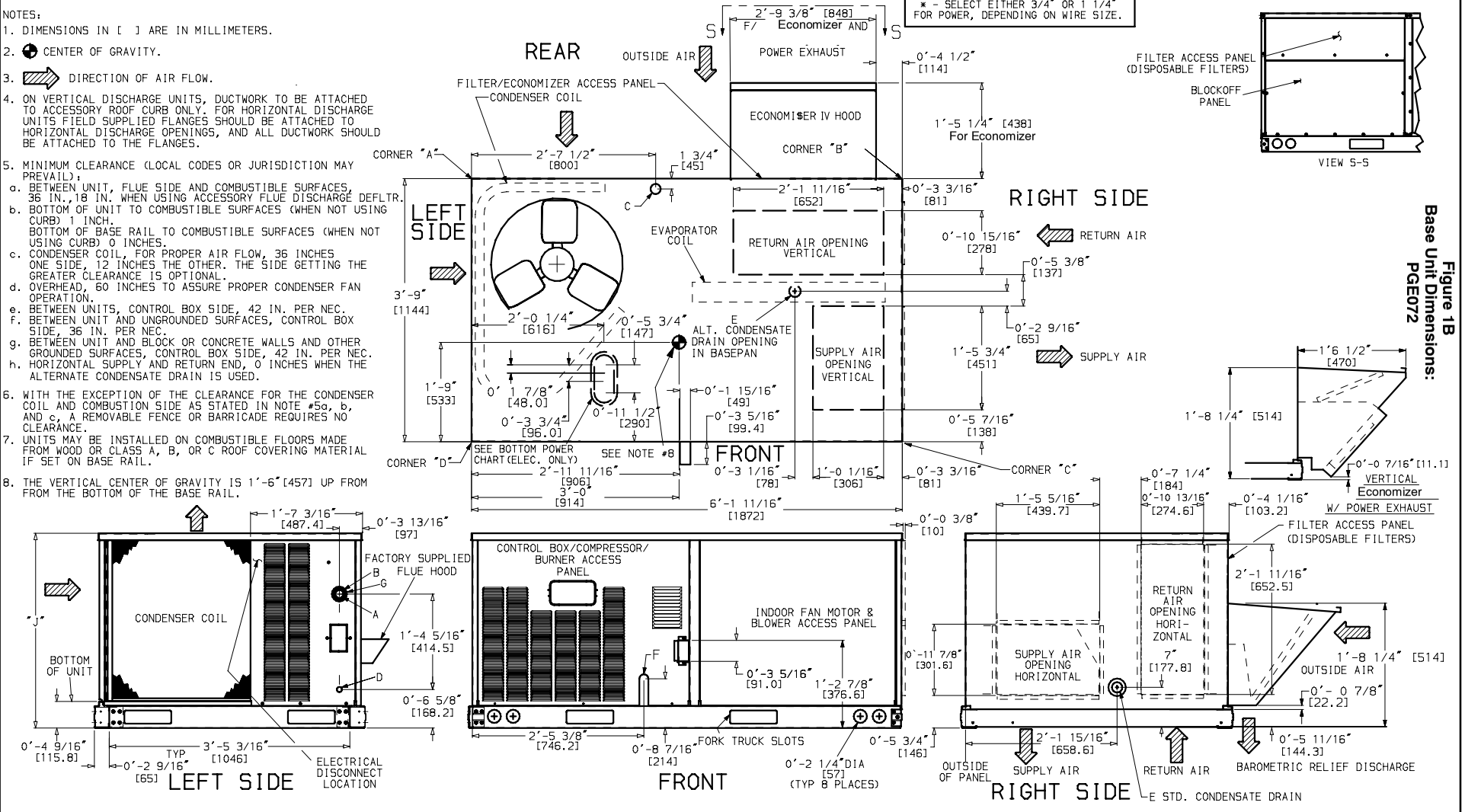
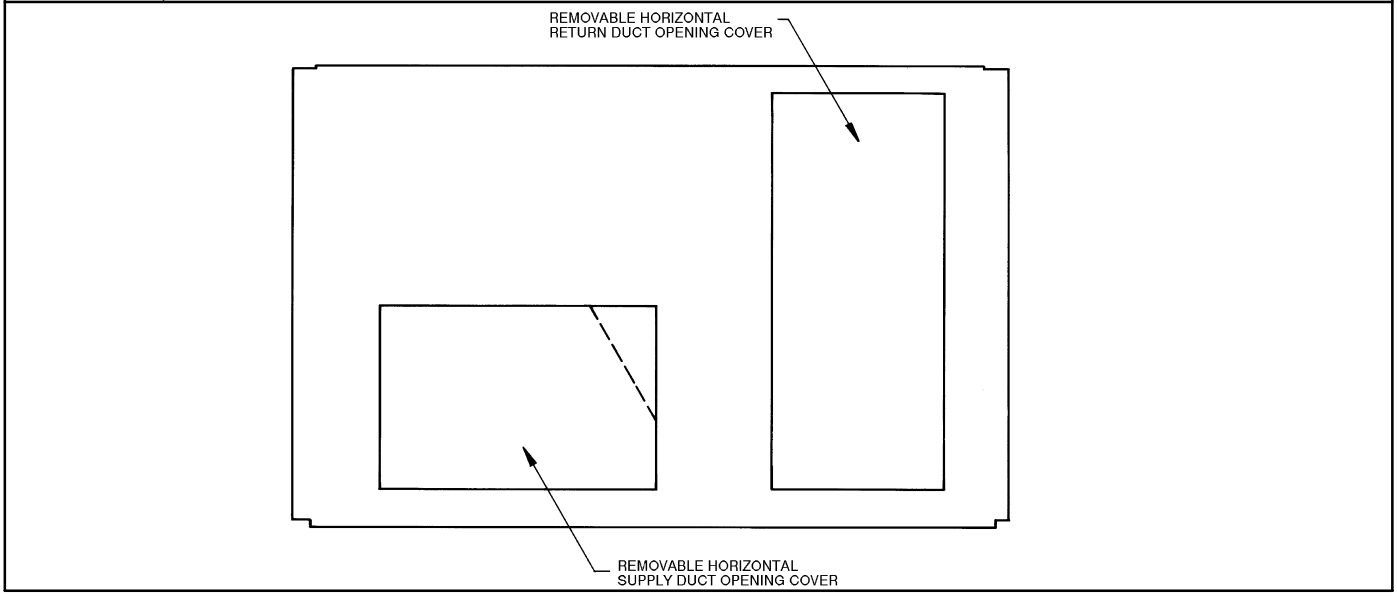


Figure 1B
Base Unit Dimensions: PGE072

FIGURE 2 **HORIZONTAL CONVERSION PANELS**



Slab Mount (Horizontal Units Only)

Provide a level concrete slab that extends a minimum of 6 in. beyond the unit cabinet. Install a gravel apron in front of the condenser coil air inlet to prevent grass and foliage from obstructing airflow.

NOTE: Horizontal units may be installed on the roof curb if required.

Alternate Unit Support

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

Step 2—FIELD FABRICATE DUCTWORK

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

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

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

A minimum clearance is not required around ductwork. Cabinet return air static pressure (a negative condition) should not exceed 0.35 in. wg with economizer or 0.45 in. wg without economizer.

These units are designed for a minimum continuous heating return-air temperature of 50 F (dry bulb), or an intermittent operation down to 45 F (dry bulb), such as when used with a night set-back thermostat.

To operate at lower return-air temperatures, a field-supplied outdoor air temperature control must be used to initiate both stages of heat when the temperature is below 45 F. Indoor comfort may be compromised when these lower air temperatures are used with insufficient heating temperature rise.

Step 3—INSTALL EXTERNAL TRAP FOR CONSENSATE DRAIN

The unit's 3/4-in. condensate drain connections are located on the bottom and side of the unit. Unit discharge connections do not determine the use of drain connections; either drain connection can be used with vertical or horizontal applications.

When using the standard side drain connection, make sure the plug (Red) in the alternate bottom connection is tight before installing the unit.

To use the bottom drain connection for a roof curb installation, relocate the factory-installed plug (Red) from the bottom connection to the side connection. The center drain plug looks like a star connection, however it can be removed with a 1/2-in. socket drive. See Fig. 4A. The piping for the condensate drain and external trap can be completed after the unit is in place.

All units must have an external trap for condensate drainage. Install a trap at least 4-in. deep and protect against freeze-up. If drain line is installed downstream from the external trap, pitch the line away from the unit at 1 in. per 10 ft of run. Do not use a pipe size smaller than the unit connection (3/4 in.). See Fig. 4B.

Step 4—RIG AND PLACE UNIT

Inspect unit for transportation damage. Spreader bars are not required if top crating is left on unit. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 1 and Fig. 5 for additional information.

Lifting holes are provided in base rails as shown in Fig. 1A and 1B. Refer to rigging instructions on unit.

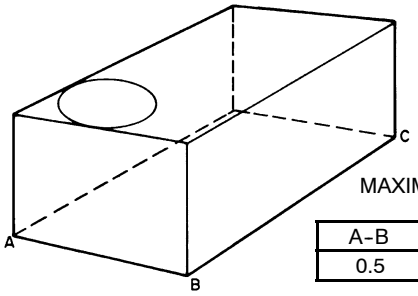
⚠ CAUTION

PROPERTY DAMAGE HAZARD

Failure to follow this caution may result in property damage.

All panels must be in place when rigging and lifting.

FIGURE 3 Unit Leveling Tolerances



MAXIMUM ALLOWABLE

A-B	B-C	A-C
0.5	1.0	1.0

FIGURE 4A Condensate Drain Connection

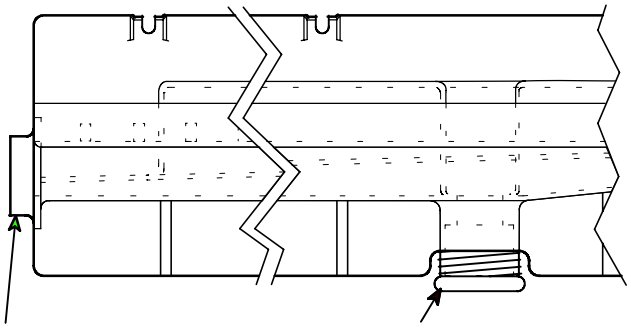
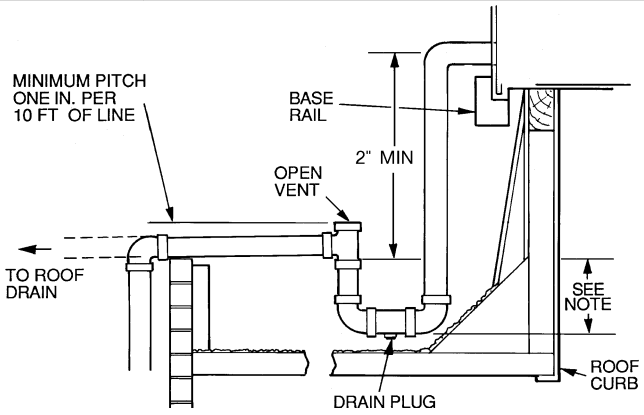


FIGURE 4B Condensate Drain Piping Details



NOTE: Trap should be deep enough to offset maximum unit static difference.
A 4-in. trap is recommended.

Positioning

Maintain clearance around and above unit to provide minimum distance from combustible materials, proper airflow, and service access. See Fig. 1A and 1B. A properly positioned unit will have the following clearances between unit and roof curb: 1/4-in. clearance between roof curb and base rails on each side and duct end of unit; 1/4-in. clearance between roof curb and condenser coil end of unit.

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

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

Unit may be installed directly on wood flooring or on Class A, B, or C roof-covering material when roof curb is used.

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

Flue vent discharge must have a minimum horizontal clearance of 4 ft from electric and gas meters, gas regulators, and gas relief equipment.

Minimum distance between unit and other electrically live parts is 48 inches.

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

Adequate combustion-air space must be provided for proper operation of this equipment. Be sure that installation complies with all local codes and Section 5.3, Air for Combustion and Ventilation, NFGC (National Fuel Gas Code), and ANSI (American National Standards Institute) Z223.1, and NFPA (National Fire Protection Association) 54 TIA-54-84-1. In Canada, installation must be in accordance with the CAN1-B149 installation codes for gas burning appliances.

After unit is in position, remove rigging skids and shipping materials.

Step 5—INSTALL FLUE HOOD

Flue hood is shipped screwed to the basepan beside the burner compartment access panel. Remove from shipping location and using screws provided, install flue hood and screen in location shown in Fig. 6.

Step 6—INSTALL GAS PIPING

Unit is equipped for use with type of gas shown on nameplate. Refer to local building codes, or in the absence of local codes, to ANSI Z223.1 entitled National Fuel Gas Code. In Canada, installation must be in accordance with the CAN1.B149.1 and CAN1.B149.2 installation codes for gas burning appliances.

For natural gas applications, gas pressure at unit gas connection must not be less than 4 in. wg or greater than 13.0 in. wg while unit is operating. On PGE048, 060, 072 high heat units, the gas pressure at unit gas connection must not be less than 5 in. wg or greater than 13 in. wg while the unit is operating. For propane applications, the gas pressure must not be less than 5 in. wg or greater than 13 in. wg at the unit connection.

Size gas supply piping for 0.5 in. wg maximum pressure drop. Do not use supply pipe smaller than unit gas connection. Support gas piping as shown in the table in Fig. 7. For example, a 3/4-in. gas pipe must have one field-fabricated support beam every 8 ft. Therefore, an 18-ft long gas pipe would have a minimum of 2 support beams, a 48-ft long pipe would have a minimum of 6 support beams.

See Fig. 7 for typical pipe guide and locations of external manual main shutoff valve.

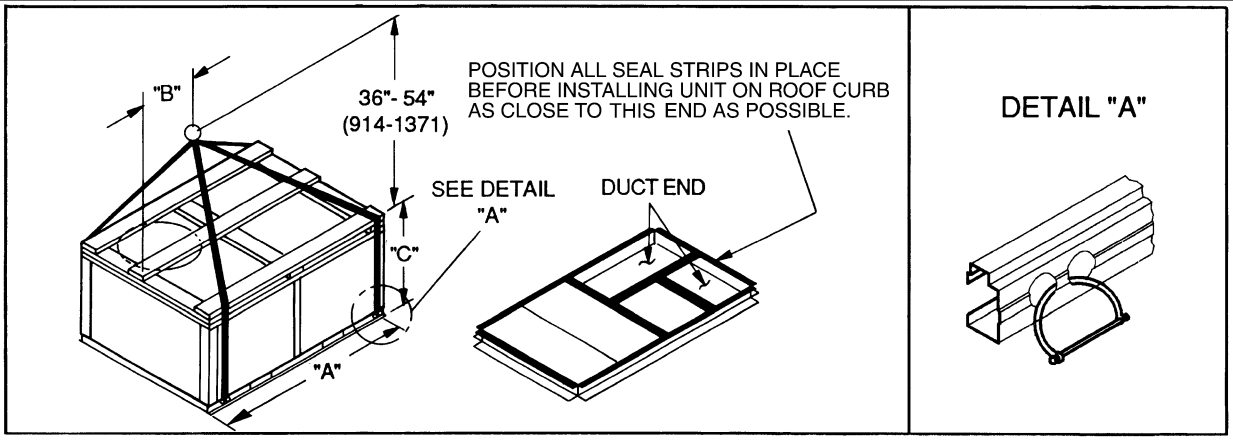
⚠ CAUTION

UNIT EQUIPMENT DAMAGE HAZARD

Failure to follow this caution can result in equipment damage.

When connecting the gas line to the unit gas valve, the installer MUST use a backup wrench to prevent valve damage.

FIGURE 5 | **Rigging Details**



NOTES:

1. Dimensions in ( ) are in millimeters.
2. Hook rigging shackles through holes in base rail, as shown in detail "A." Holes in base rails are centered around the unit center of gravity. Use wooden top skid when rigging to prevent rigging straps from damaging unit.
3. Unit weights do not include economizer. See Table 1 for economizer weights.

PGE UNIT SIZE	MAX. WEIGHT		A		B		C	
	lb.	kg	In.	mm	In.	mm	In.	mm
036	510	231	73.69	1872	37.50	953	33.35	845
048	520	236						
060	540	245						
072	665	302						

Table 1—Physical Data - PGE036-72

PGE UNIT SIZE		036	048	060	072
NOMINAL CAPACITY (tons)		3	4	5	6
OPERATING WEIGHT (lb) Unit					
Al/Al*		460	470	490	615
Cu/Cu*		468	482	505	—
Economizer		50	50	50	50
Roof Curb†		115	115	115	115
COMPRESSOR		Reciprocating			Scroll
Quantity		1	1	1	1
No. Cylinders (per Circuit)		2	2	2	2
Oil (oz)		50	50	50	60
REFRIGERANT TYPE		R-22			
Expansion Device		Fixed Orifice Metering Device			
Operating Charge (lb-oz)					
Circuit 1		4-4	6-6	6-14	11-0
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins			
Rows...Fins/in.		1...17	2...17	2...17	2...17
Total Face Area (sq ft)		8.36	8.36	10.42	16.5
CONDENSER FAN		Propeller Type			
Nominal Cfm		3500	4000	4000	4100
Quantity...Diameter (in.)		1...22.0	1...22.0	1...22.0	1...22.0
Motor Hp...Rpm		1/4...1100	1/4...1100	1/4...1100	1/4...1100
Watts Input (Total)		325	325	325	320
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins			
Rows...Fins/in.		2...15	2...15	3...15	4...15
Total Face Area (sq ft)		4.17	5.5	5.5	5.5
EVAPORATOR FAN		Centrifugal Type			
Quantity...Size (in.)	Std	1...10 x 10	1...10 x 10	1...11 x 10	1...10 x 10
	Alt	1...10 x 10	1...10 x 10	1...10 x 10	—
	High-Static	1...10 x 10	1...10 x 10	1...11 x 10	1...10 x 10
Type Drive	Std	Direct	Direct	Direct	Belt
	Alt	Belt	Belt	Belt	—
	High-Static	Belt	Belt	Belt	Belt
Nominal Cfm		1200	1600	2000	2100
Maximum Continuous Bhp	Std	.34	.75	1.20	2.40
	Alt	1.20	1.20	1.30/2.40**	—
	High-Static	2.40	2.40	2.90	2.90
Motor Frame Size	Std	48	48	48	56
	Alt	48	48	56	—
	High-Static	56	56	56	56
Nominal Rpm High/Low (Direct Drive)	Std	860/800	1075/970	1075/970	—
Fan Rpm Range	Std	—	—	—	1070-1460
	Alt	685-1045	770-1175	878-1192	—
	High-Static	1075-1455	1075-1455	1300-1685	1300-1685
Motor Bearing Type		Ball	Ball	Ball	Ball
Maximum Allowable Rpm		2100	2100	2100	2100
Motor Pulley Pitch Diameter Min/Max (in.)	Std	—	—	—	2.8/3.8
	Alt	1.9/2.9	1.9/2.9	2.4/3.4	—
	High-Static	2.8/3.8	2.8/3.8	3.4/4.4	3.4/4.4
Nominal Motor Shaft Diameter (in.)	Std	1/2	1/2	1/2	5/8
	Alt	1/2	1/2	5/8	—
	High-Static	5/8	5/8	5/8	7/8
Fan Pulley Pitch Diameter (in.)	Std	—	—	—	4.5
	Alt	4.5	4.0	4.5	—
	High-Static	4.5	4.5	4.5	4.5
Belt, Quantity...Type...Length (in.)	Std	—	—	—	1...A...40
	Alt	1...A...34	1...A...34	1...A...39	—
	High-Static	1...A...39	1...A...39	1...A...40	1...A...40
Pulley Center Line Distance (in.)	Std	—	—	—	14.7-15.5
	Alt	10.0-12.4	10.0-12.4	14.7-15.5	—
	High-Static	10.0-12.4	10.0-12.4	14.7-15.5	14.7-15.5
Speed Change per Full Turn of	Std	—	—	—	80
Movable Pulley Flange (rpm)	Alt	48	70	80	—
	High-Static	65	65	60	60
Movable Pulley Maximum Full Turns	Std	—	—	—	5
From Closed Position	Alt	5	5	6	—
	High-Static	6	6	5	5

Table 1—Physical Data - PGE036-72 (Cont.)

PGE UNIT SIZE			036	048	060	072
Factory Setting		Std	—	—	—	3
		Alt	3	3	3	—
		High-Static	$3^1/_2$	$3^1/_2$	$3^1/_2$	$3^1/_2$
Factory Speed Setting (rpm)		Std	—	—	—	1226
		Alt	829	932	1035	—
		High-Static	1233	1233	1416	1416
Fan Shaft Diameter at Pulley (in.)			$^5/_8$	$^5/_8$	$^5/_8$	$^5/_8$
FURNACE SECTION						
Rollout Switch CutoutTemp (F)††			195	195	195	195
Burner Orifice Diameter (in. ...drill size)						
Natural Gas	Std	074	.113...33	.113...33	.113...33	.113...33
		114/115	.113...33	.113...33	.113...33	.113...33
		149/150	—	.129...30	.129...30	.129...30
		060N	.102...38	.102...38	.102...38	—
		090N	.102...38	.102...38	.102...38	—
		120N	—	.116...32	.116...32	—
Liquid Propane	Alt	074	.089...43	.089...43	.089...43	.089...43
		114/115	.089...43	.089...43	.089...43	.089...43
		149/150	—	.104...37	.104...37	.104...37
		060N	.082...45	.082...45	.082...45	—
		090N	.082...45	.082...45	.082...45	—
		120N	—	.094...42	.094...42	—
Thermostat Heat Anticipator Setting (amps)						
208/230 v and 575	Stage 1		.14	.14	.14	.14
	Stage 2		.14	.14	.14	.14
460 v	Stage 1		.14	.14	.14	.14
	Stage 2		.14	.14	.14	.14
Gas Input (Btuh)CA High Output 3-Phase Units		114‖	115,000	—	—	—
		149‖	—	150,000	150,000	—
Standard Units		074	74,000/—	74,000/—	74,000/—	74,000/—
(Stage 2/ Stage 1)		115***	115,000/82,000	115,000/—	115,000/—	115,000/—
		150***	—	150,000/120,000	150,000/120,000	150,000/120,000
Low NOx Units		060N†††	60,000	60,000	60,000	—
		090N†††	90,000	90,000	90,000	—
		120N†††	—	120,000	120,000	—
Efficiency (Steady State) (%)			80	80	80	80
Temperature Rise Range		074	25-55	25-55	25-55	25-55
		114/115	55-85	35-65	35-65	35-65
		149/150	—	50-80	50-80	50-80
		060N	20-50	20-50	20-50	—
		090N	30-60	30-60	30-60	—
		120N	—	40-70	40-70	—
Manifold Pressure (in. wg) Natural Gas	Std		3.5	3.5	3.5	3.5
Liquid Propane	Alt		3.5	3.5	3.5	3.5
Gas Valve Quantity			1	1	1	1
Gas Valve Pressure Range Psig			0.180-0.487	0.180-0.487	0.180-0.487	0.180-0.487
in. wg			5.0-13.5	5.0-13.5	5.0-13.5	5.0-13.5
Field Gas Connection Size (in.)			$^1/_2$	$^1/_2$	$^1/_2$	$^1/_2$
High Pressure Switch (psig)				450 ± 50		500 ± 50
Internal Relief (Differential) Cutout				428		428
Reset (Auto.)				320		320
Low Pressure Switch (psig) Cutout				7 ± 3		
Reset (Auto.)				22 ± 7		
Freeze Protection Thermostat (F) Opens				30 ± 5		
Closes				45 ± 5		
OUTDOOR-AIR INLET SCREENS			Cleanable. Screen size and quantity varies with option selected.			
RETURN-AIR FILTERS			Throwaway			
Quantity...Size (in.)			2...16 x 25 x 2			

LEGEND
Al - Aluminum
Bhp - Brake Horsepower
Cu - Copper
*Evaporator coil fin material/condenser coil fin material.
†Weight of 14-in. roof curb.

††Rollout switch lockout is manually reset by interrupting power to unit or resetting thermostat.
‖California rated three-phase high heat models.
***Three phase standard high-heat models have heating input values as shown.
†††California SCAQMD compliant Low NOx models have combustion products that are controlled to 40 nanograms per joule or less.

Step 7—MAKE ELECTRICAL CONNECTIONS

All units except 208/230–v units are factory wired for the voltage shown on the nameplate. If the 208/230–v unit is to be connected to a 208–v power supply, the transformer must be rewired by moving the black wire with the 1/4–in. female space connector from the 230–volt connection and moving to the 208–volt 1/4–in. male terminal on the primary side of the transformer.

Refer to unit label diagram for additional information. Pigtails are provided for field wire connections. Use factorysupplied splices or UL (Underwriters Laboratories) approved copper/aluminum connector.

When installing units, provide a disconnect per the NEC.

All field wiring must comply with NEC and local requirements.

Install field wiring as follows:

1. Install conduit through side panel openings. Install conduit between disconnect and control box.
2. Install power lines to terminal connections as shown in Fig. 8.

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate (see Tables 2A and 2B). On 3–phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown in the legend for Tables 2A and 2B, Note 2 to determine the percent of voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable warranty.

Field Power Supply

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

Route thermostat cable or equivalent single leads of colored wire from subbase terminals through connector on unit to low–voltage connections (shown in Fig. 9).

NOTE: For wire runs up 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 to the thermostat and will require a junction box and splice at the thermostat.

Pass the control wires through the hole provided in the corner post; then feed wires through the raceway built into the corner post to the 24–v barrier located on the left side of the control box. See Fig. 10. The raceway provides the UL required clearance between high–voltage and low–voltage wiring.

Heat Anticipator

Set heat anticipator settings at 0.14 amp for the first stage and 0.14 amp for second–stage heating, when available.

FIGURE 6 Flue Hood Details

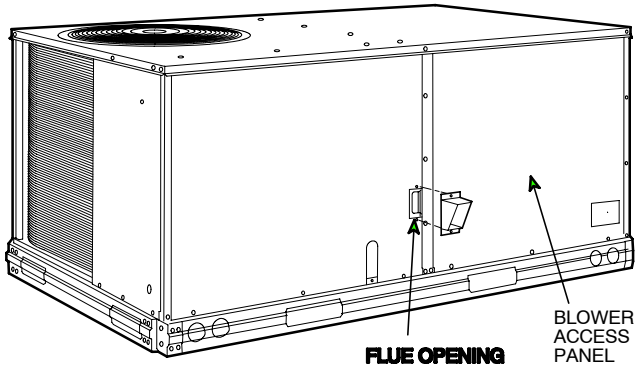
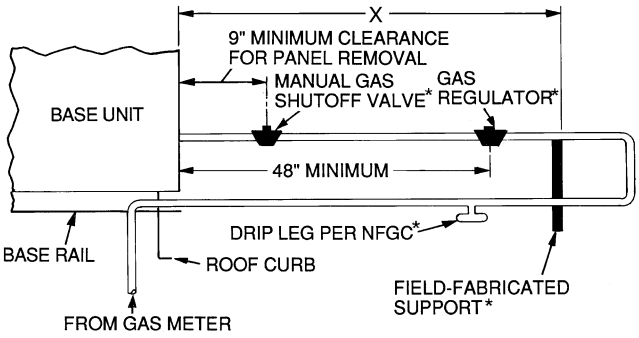


FIGURE 7 Gas Piping Guide (With Accessory Thru–the–Curb Service Connections



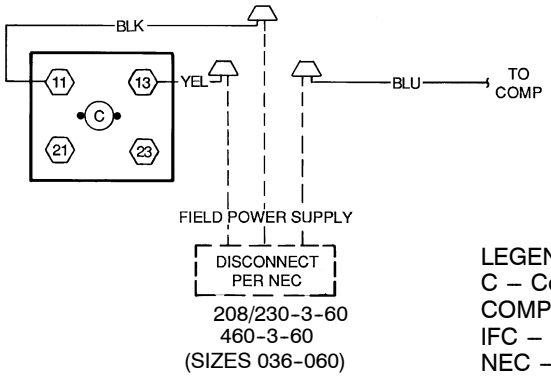
LEGEND
NFGC – National Fuel Gas Code
*** Field Supplied**

NOTE: Follow all local codes.

SPACING OF SUPPORTS

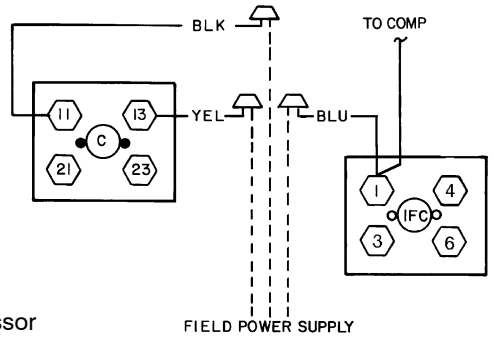
Steel Pipe Nominal Diameter (in.)	X Dimension (feet)
1/2	6
3/4 or 1	8
1 1/4 or larger	10

FIGURE 8 **POWER WIRING CONNECTIONS**



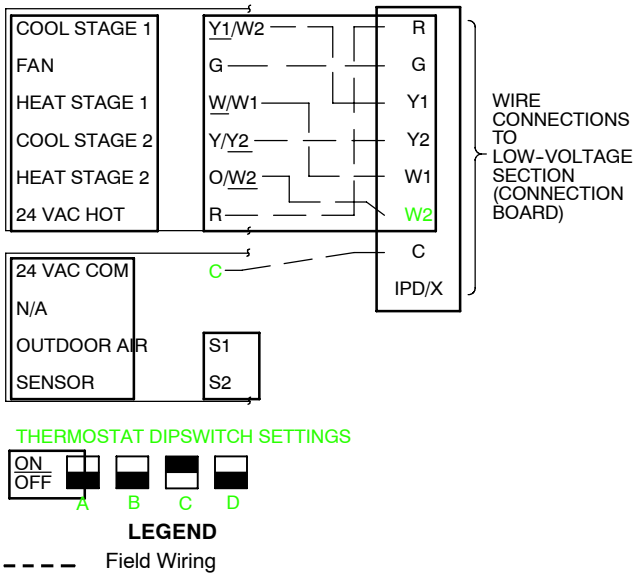
208/230-3-60
460-3-60
(SIZES 036-060)

LEGEND
C – Contactor
COMP – Compressor
IFC – Indoor–Fan Contactor
NEC – National Electric Code
TB – Terminal Block



208/230-3-60
460-3-60
(SIZE 072)

FIGURE 9 **LOW VOLTAGE CONNECTIONS**



THERMOSTAT DIPSWITCH SETTINGS

LEGEND

– – – – Field Wiring

NOTE: Underlined letter indicates active thermostat output when configured for A/C operation.

FIGURE 10 **FIELD CONTROL WIRING RACEWAY**

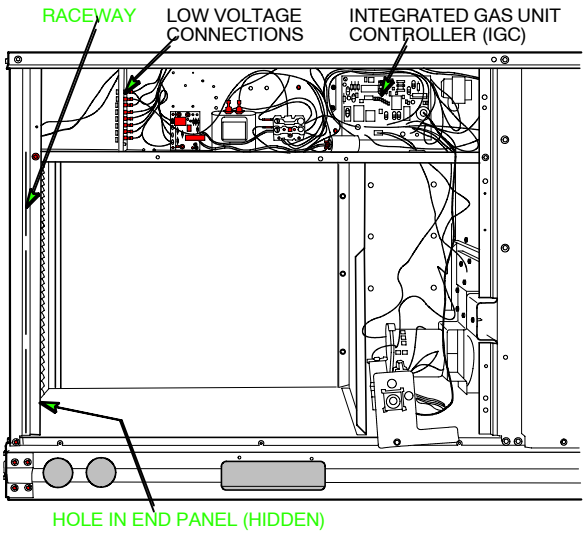


Table 2A - Electrical Data (Without Convenience Outlet)

PGE Unit Size	Voltage	IFM Type	Voltage Range		Compressor (ea)		OFM (ea)		IFM	Combustion Fan Motor	Power Supply		Disconnect Size*	
			Min	Max	RLA	LRA	Hp	FLA	FLA	FLA	MCA	MOCP†	FLA	LRA
036	208/230-3-60	Std	187	254	10.2	75.0	1/4	1.4	3.5	.6	17.7/17.7	25/25	17/17	85/ 85
		Alt							4.9		19.1/19.1	25/25	19/19	90/ 90
		High							5.2		19.4/19.4	25/25	19/19	109/109
	460-3-60	Std	414	508	4.4	40.0	1/4	0.8	1.3	.3	7.6	15	7	44
		Alt							2.1		8.4	15	8	48
		High							2.6		8.9	15	9	57
048	208/230-3-60	Std	187	254	15.4	90.0	1/4	1.4	3.5	.6	24.2/24.2	30/30	23/23	101/101
		Alt							4.9		25.6/25.6	30/30	25/25	105/105
		High							5.2		25.9/25.9	30/30	25/25	124/124
	460-3-60	Std	414	508	8.3	45.0	1/4	0.8	1.8	.3	13.0	20	13	51
		Alt							2.1		13.3	20	13	53
		High							2.6		13.8	20	13	62
060	208/230-3-60	Std	187	254	16.0	114.0	1/4	1.4	5.9	.6	27.3/27.3	35/35	27/27	128/128
		Alt							5.2		26.6/26.6	35/35	26/26	148/148
		High							7.5		28.9/28.9	35/35	29/29	174/174
	460-3-60	Std	414	508	7.4	64.0	1/4	0.8	3.1	.3	13.2	20	13	71
		Alt							2.6		13.5	20	13	81
		High							3.4		13.5	20	13	93
0732	208/230-3-60	Std	187	254	20.6	146.0	1/4	1.4	5.2	.6	32.4/32.4	40/40	31/31	180/180
		High							7.5		34.7/34.7	40/40	34/34	205/205
	460-3-60	Std	414	508	9.5	73.0	1/4	0.9	2.6	.3	15.4	20	15	90
		High							3.4		16.2	20	16	103

LEGENDS AND NOTES

Legend

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps
***Used to determine minimum disconnect per NEC.**
†Fuse or HACR circuit breaker.

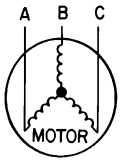
NOTES

: 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 of

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

EXAMPLE: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3} = \frac{1371}{3} = 457$$

Determine maximum deviation from average voltage.
(AB) 457 - 452 = 5 V
(BC) 464 - 457 = 7 V
(AB) 457 - 455 = 2 V
Maximum deviation is 7 v.

Determine percent voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457} = 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately .

3. power exhaust MCA and MOCP. Check MCA and MOCP when power exhaust is powered through the unit (must be in accordance with NEC and/or local codes). Determine the new MCA including the power exhaust using the following formula:
MCA New = MCA unit only + MCA of Power Exhaust

POWER EXHAUST PART NO.	MCA (230 v)	MCA (460 v)	MCA (575 v)	MOCP (for separate power source)
DNPWREXH021A01	N/A	0.9	N/A	15

Table 2B – Electrical Data (With Convenience Outlet)

PGE Unit Size	Voltage	IFM Type	Voltage Range		Compressor (ea)		OFM (ea)		IFM	Combustion Fan Motor FLA	Power Supply		Disconnect Size*	
			Min	Max	RLA	LRA	Hp	FLA	FLA		MCA	MOCP†	FLA	LRA
036	208/230-3-60	Std	187	254	10.2	75.0	1/4	1.4	3.5	.6	22.5/22.5	25/25	23/23	90/ 90
		Alt							4.9		23.9/23.9	30/30	25/25	95/ 95
		High							5.2		24.2/24.2	30/30	25/25	114/114
	460-3-60	Std	414	508	4.4	40.0	1/4	0.8	1.3	.3	9.8	15	10	47
		Alt							2.1		10.6	15	11	50
		High							2.6		11.1	15	11	59
048	208/230-3-60	Std	187	254	15.4	90.0	1/4	1.4	3.5	.6	29.0/29.0	35/35	29/29	106/106
		Alt							4.9		30.4/30.4	35/35	30/30	110/110
		High							5.2		30.7/30.7	35/35	31/31	129/129
	460-3-60	Std	414	508	8.3	45.0	1/4	0.8	1.8	.3	15.2	20	15	53
		Alt							2.1		15.5	20	15	55
		High							2.6		16.0	20	16	64
060	208/230-3-60	Std	187	254	16.0	114.0	1/4	1.4	5.9	.6	32.1/32.1	40/40	32/32	133/133
		Alt							5.2		31.4/31.4	40/40	32/32	153/153
		High							7.5		33.7/33.7	40/40	34/34	179/179
	460-3-60	Std	414	508	7.4	64.0	1/4	0.8	3.1	.3	15.3	20	15	74
		Alt							2.6		15.6	20	15	83
		High							3.4		15.6	20	16	96
072	208/230-3-60	Std	187	254	20.6	146.0	1/4	1.4	5.2	.6	37.2/37.2	45/45	37/37	184/184
		High							7.5		39.5/39.5	45/45	39/39	210/210
	460-3-60	Std	414	508	9.5	73.0	1/4	0.6	2.6	.3	17.6	20	17	92
		High							3.4		18.4	25	18	105

LEGENDS AND NOTES

Legend

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps
***Used to determine minimum disconnect per NEC.**
†Fuse or HACR circuit breaker.

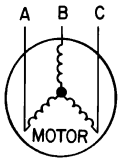
NOTES

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 of

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

EXAMPLE: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3} = \frac{1371}{3} = 457$$

Determine maximum deviation from average voltage.
(AB) 457 - 452 = 5 V
(BC) 464 - 457 = 7 V
(AB) 457 - 455 = 2 V
Maximum deviation is 7 v.

Determine percent voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457} = 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately .

3. Power exhaust MCA and MOCP. Check MCA and MOCP when power exhaust is powered through the unit (must be in accordance with NEC and/or local codes). Determine the new MCA including the power exhaust using the following formula:
MCA New = MCA unit only + MCA of Power Exhaust

POWER EXHAUST PART NO.	MCA (230 v)	MCA (460 v)	MCA (575 v)	MOCP (for separate power source)
DNPWREXH021A01	N/A	0.9	N/A	15

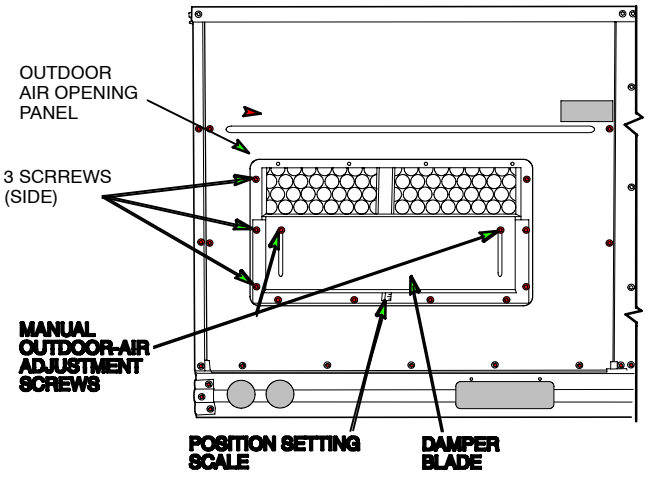
Step 8—ADJUST FACTORY INSTALLED OPTIONS

Manual Outdoor-Air Damper

Assembly:

1. Determine quantity of ventilation required for building. Record amount for use in Step 8.
2. Remove and save outdoor air opening panel and screws. See Fig. 11.
3. Separate hood and screen from basepan by removing the 4 screws securing them. Save all screws.
4. Replace evaporator coil access panel.
5. Place hood on front of outdoor air opening panel. See Fig. 12 for hood details. Secure top of hood with the 4 screws removed in Step 3. See Fig. 13.
6. Remove and save 6 screws (3 on each side) from sides of the manual outdoor-air damper.
7. Align screw holes on hood with screw holes on side of manual outdoor-air damper. See Fig. 12 and 13. Secure hood with 6 screws from Step 6.
8. Adjust minimum position setting of the damper blade by adjusting the manual outdoor-air adjustment screws on the front of the damper blade. See Fig. 11. Slide blade vertically until it is in the appropriate position determined by Fig. 15. Tighten screws.
9. Remove and save screws currently on sides of hood. Insert screen. Secure screen to hood using the screws. See Fig. 13.

FIGURE 11 Damper Panel with Manual Outdoor-Air Damper Installed



Optional Economizer

See Figure 15 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.

1. To remove the existing unit filter access panel, raise the panel and swing the bottom outward. The panel is now disengaged from the track and can be removed. See Fig. 16.

FIGURE 12 Outdoor Air Hood Details

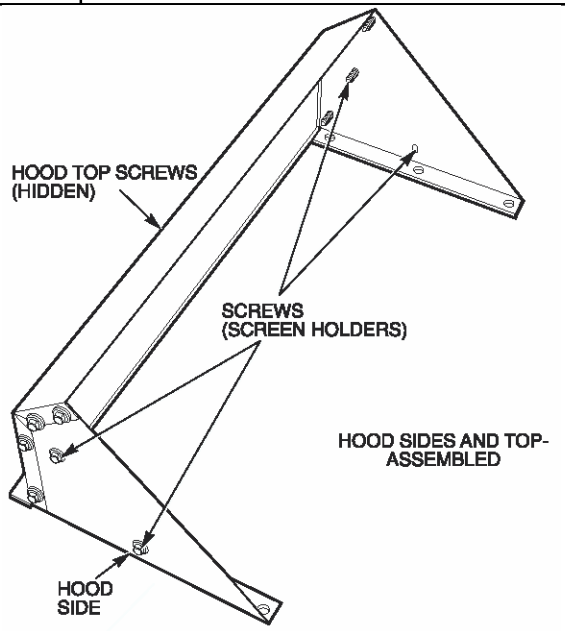


FIGURE 13 Outdoor Air Damper with Hood Attached

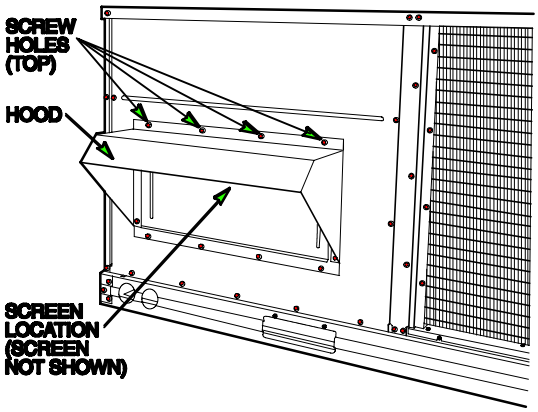
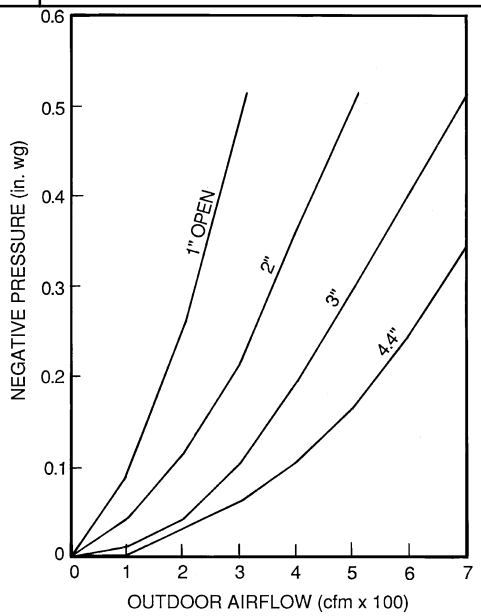


FIGURE 14 Outdoor Air Damper Position Sitting



2. The box with the economizer hood components is shipped in the compartment behind the economizer. The economizer controller is mounted on top of the economizer in the position shown in Fig. 15. The optional economizer with 4 to 20 mA actuator signal control does not include the economizer controller. To remove the component box from its shipping position, remove the screw holding the hood box bracket to the top of the economizer. Slide the hood box out of the unit. See Fig. 17.

IMPORTANT: If the power exhaust accessory is to be installed on the unit, the hood shipped with the unit will not be used and must be discarded. **Save the aluminum filter for use in the power exhaust hood assembly.**

3. The indoor coil access panel will be used as the top of the hood. Remove the screws along the sides and bottom of the indoor coil access panel. See Fig. 18.
4. Swing out indoor oil access panel and insert the hood sides under the panel (hood top). Use the screws provided to attach the hood sides to the hood top.
5. Remove the shipping tape holding the economizer barometric relief damper in place.
6. Insert the hood divider between the hood sides. See Fig. 19 and 20. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.
7. Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 20.
8. Caulk the ends of the joint between the unit top panel and the hood top. See Fig. 18.
9. Replace the filter access panel.
10. Install all economizer accessories. Economizer wiring is shown in Fig. 21.

Barometric flow capacity is shown in Fig. 22. Outdoor air leakage is shown in Fig. 23. Return air pressure drop is shown in Fig. 24.

FIGURE 15 Economizer Component Locations

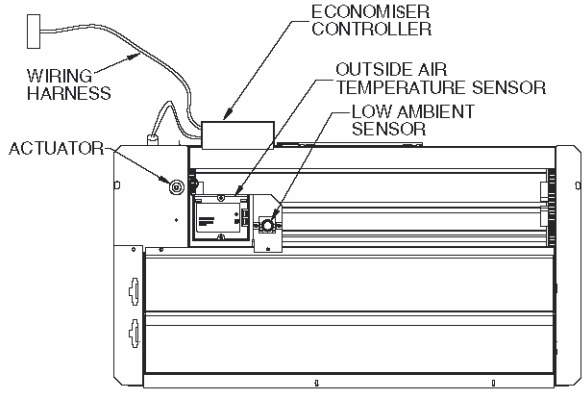


FIGURE 16 Typical Access Panel Locations

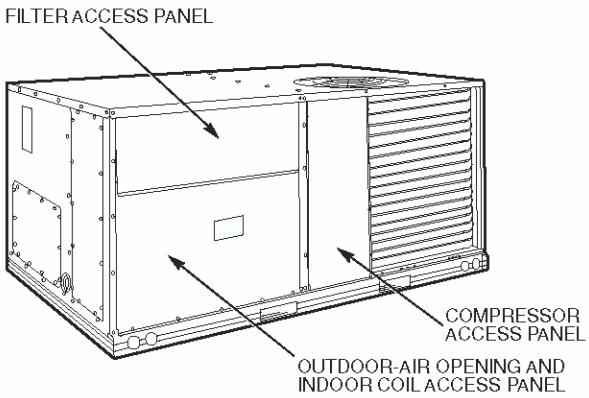


FIGURE 17 Hood Box Removal

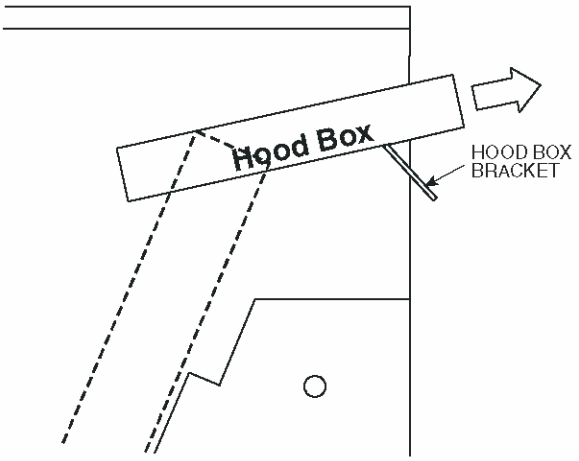


FIGURE 18 Indoor Coil Access Panel Relocation

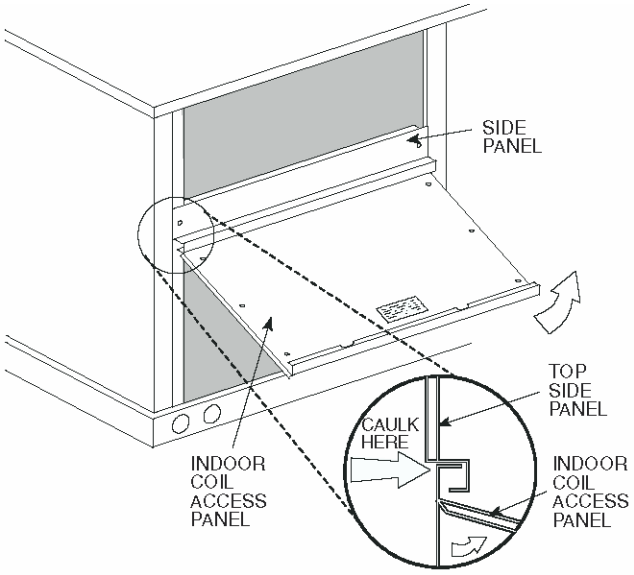


FIGURE 19 Outdoor Air Hood Construction

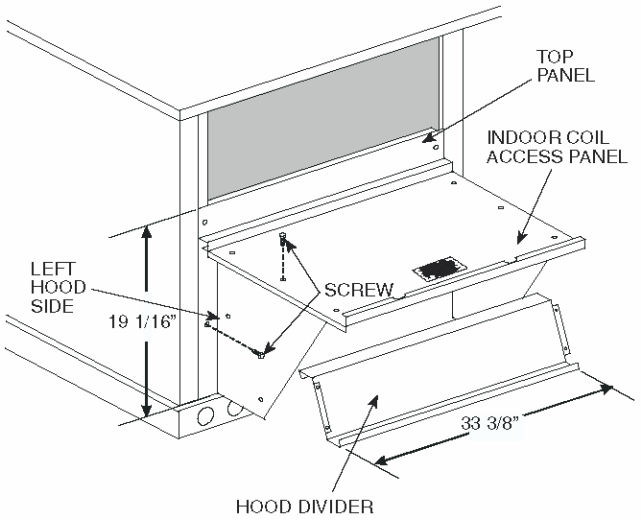


FIGURE 20 Filter Installation

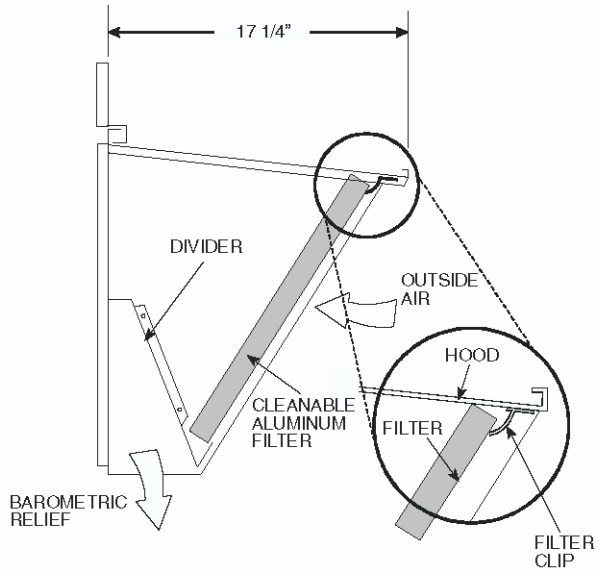
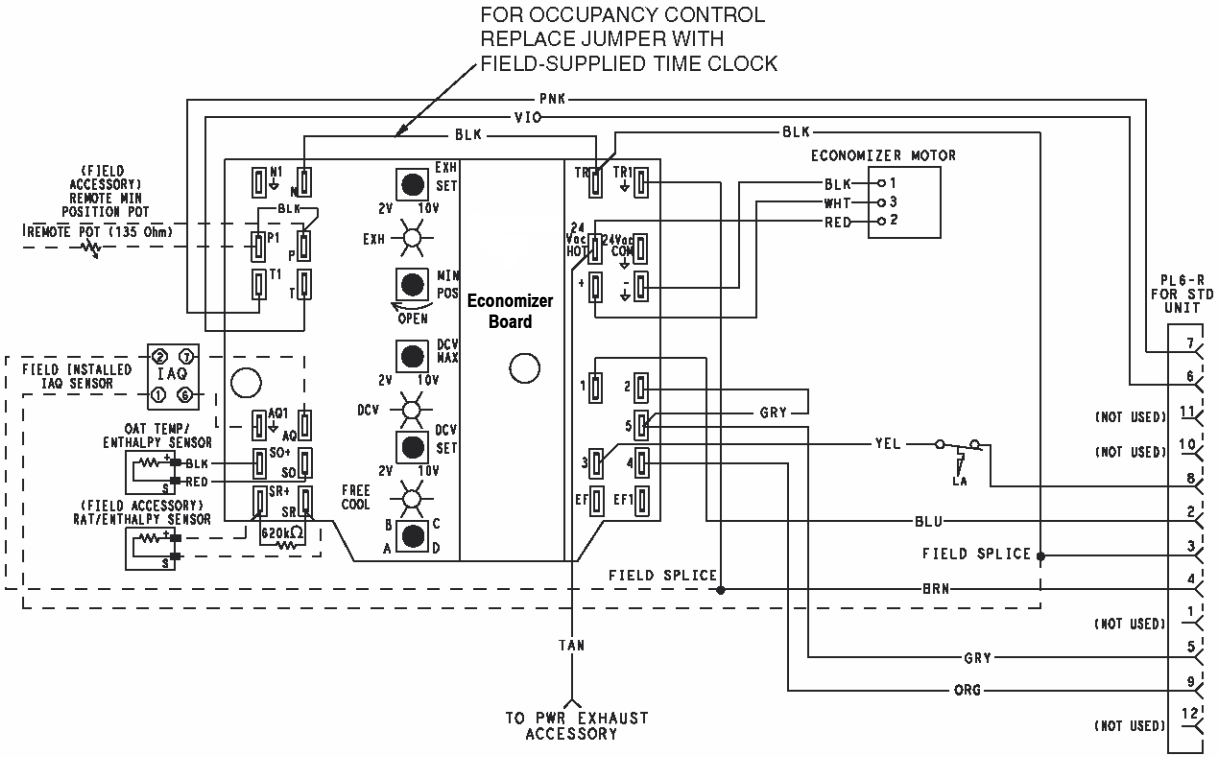


FIGURE 21 Economizer Wiring



LEGEND

DCV — Demand Controlled Ventilation
IAQ — Indoor Air Quality
LA — Low Ambient Lockout Device
OAT — Outdoor-Air Temperature
POT — Potentiometer
RAT — Return-Air Temperature

Potentiometer Defaults Settings:

Power Exhaust	Middle
Minimum Pos.	Fully Closed
DCV Max.	Middle
DCV Set	Middle
Enthalpy	C Setting

NOTES:

1. 620 ohm, 1 watt 5% resistor should be removed only when using differential enthalpy or dry bulb.
2. 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.
3. 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.

FIGURE 22 **Barametric Flow Capacity**

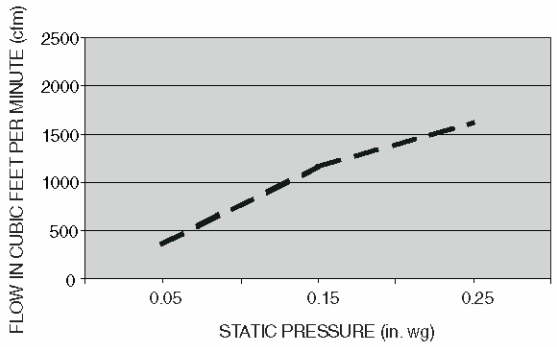


FIGURE 23 **Outdoor Air Damper Leakage**

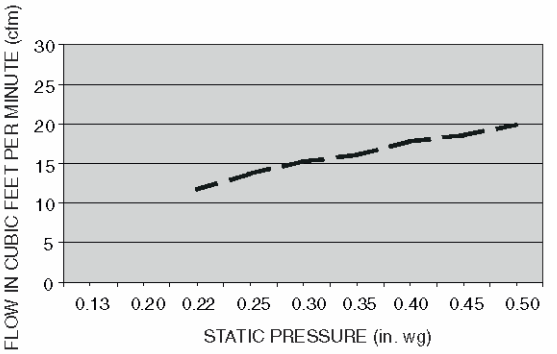
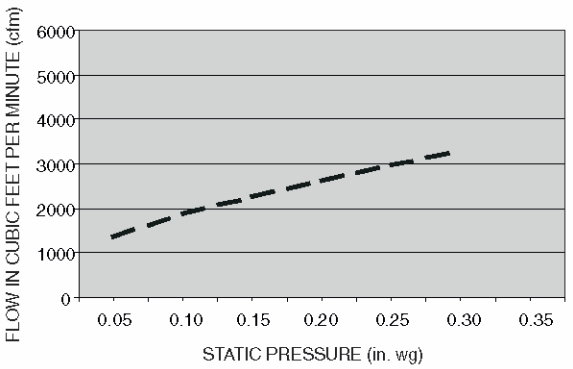


FIGURE 24 **Return Air Pressure Drop**



Economizer Stardard 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 is factory–installed on the economizer in the outdoor airstream. See Fig. 15. 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. 25. This sensor is factory installed. The operating range of temperature measurement is 0 to 158 F. See Table 3 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.

Outdoor Air 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. 15.

Table 3 – 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 4. 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. 26. The scale on the potentiometer is A, B, C, and D. See Fig. 27 for the corresponding temperature changeover values.

Differential Dry Bulb Control

For differential dry bulb control the standard outdoor dry bulb sensor is used in conjunction with an additional accessory dry bulb sensor (part number DNTEMPSN002A00). The accessory sensor must be mounted in the return airstream. See Fig. 28. Wiring is provided in the economizer wiring harness. See Fig. 21.

In this mode of operation, the outdoor air temperature is compared to the return air temperature and the lower temperature air stream is used for cooling. When using this mode of changeover control, turn the enthalpy setpoint potentiometer fully clockwise to the D setting. See Fig. 27.

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. 15. 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. 27. The factory−installed 620−ohm jumper must be in place across terminals SR and SR+ on the economizer controller. See Fig. 15 and 30.

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 air duct. 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, the economizer opens to bring in outdoor air for free cooling.

FIGURE 25 **Supply Air Sensor Location**

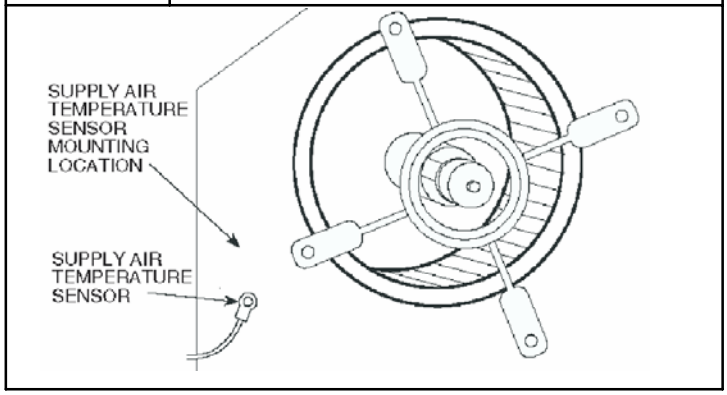


FIGURE 26 **Economizer Controller Potentiometer and LED Locations**

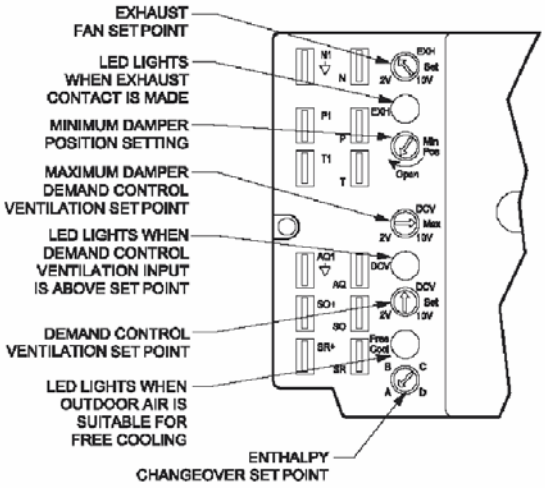


FIGURE 27 **Outdoor Air Temperature Changeover Set Points**

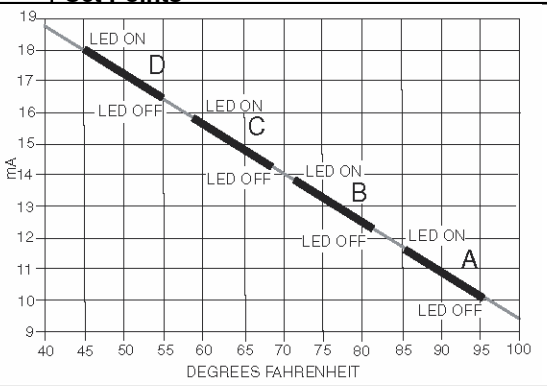
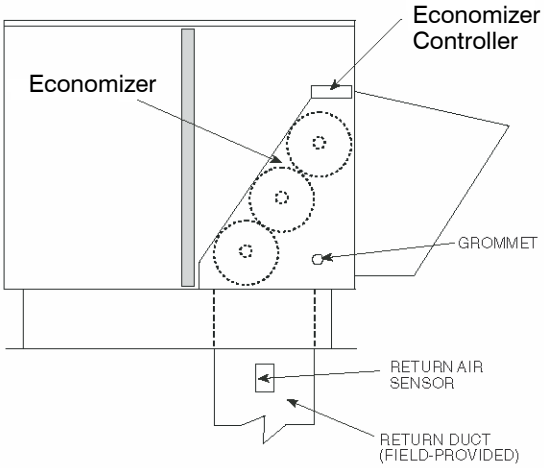


FIGURE 28 **Return Air Temperature or Enthalpy Sensor Mounting Location**



Replace the standard outside air dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 16. Mount the return air enthalpy sensor in the return air duct. See Fig. 28. Wiring is provided in the economizer wiring harness. See Fig. 21. 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.

Table 4 - Economizer Sensor Usage

Application	Economiser with Outdoor Air Dry Bulb Sensor		
	Accessories Required		
Outdoor Air Dry Bulb	None. The outdoor air dry bulb sensor is factory installed.		
Differential Dry Bulb	DNTEMPSN002A00*		
Single Enthalpy	HH57AC078		
Differential Enthalpy	HH57AC078 and DNENTDIF004A00*		
CO_2 for DCV Control using a Wall-Mounted CO_2 Sensor	33ZCSENCO2		
CO_2 for DCV Control using a Duct-Mounted CO_2 Sensor	33ZCSENCO2† and 33ZCASPCO2**	or	DNCBDIOX005A00††

*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.

†33ZCSENCO2 is an accessory CO_2 sensor.

**33ZCASPCO2 is an accessory aspirator box required for duct-mounted applications.

††DNCBDIOX005A00 is an accessory that contains both 33ZCSENCO2 and 33ZCASPCO2.

FIGURE 29 | **Enthalpy Changeover Settings**

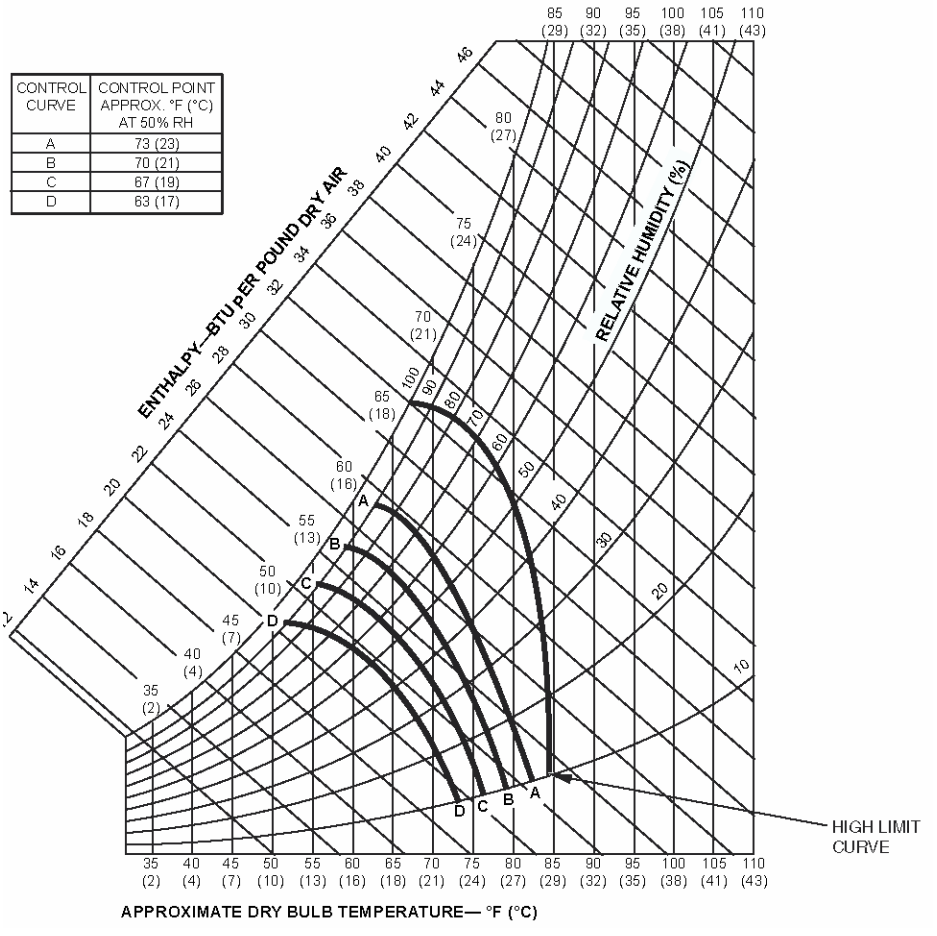
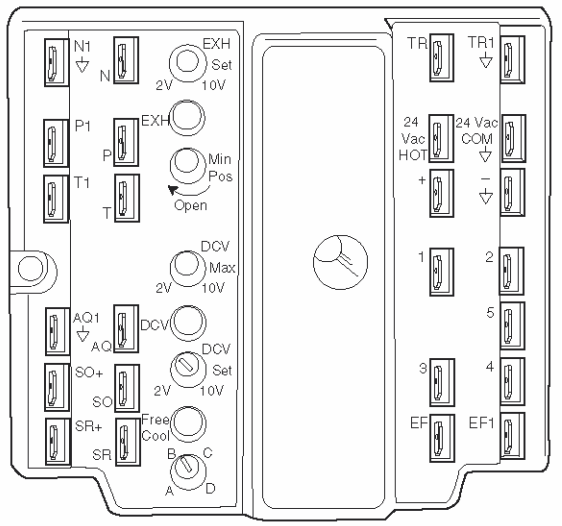


FIGURE 30 | **Economizer Control**



Indoor Air Quality (IAQ) Sensor

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. 31.

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 Eet 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. 26. The set point represents the damper position above which the exhaust fans 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

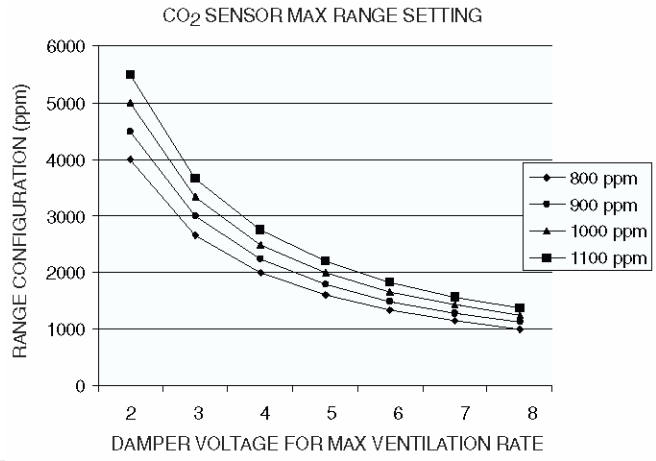
There is a minimum damper position potentiometer on the economizer controller. See Fig. 26. The minimum damper position maintains the minimum airflow into the building during the occupied period.

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.

FIGURE 31 | **CO_2 Sensor Maximum Range Setting**



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 x .10) + (75 x .90) = 73.5 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. 21 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. 30.

Damper Movement

Damper movement from full open to full closed (or vice versa) takes $2^1/2$ 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 the economizer control is occupied mode. Occupied status is provided by the black jumper from terminal TR to terminal N. When unoccupied mode is desired, install a field-supplied timeclock function in place of the jumper between TR and N. See Fig. 21. 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 CO_2 level increases even though the CO_2 set point has not been reached. By the time the CO_2 level reaches the set point, the damper will be at maximum ventilation and should maintain the set point.

In order to have the CO_2 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. 31 to determine the maximum setting of the CO_2 sensor. For example, a 1100 ppm set point relates to a 15 cfm per person design. Use the 1100 ppm curve on Fig. 31 to find the point when the CO_2 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 CO_2 sensor should be 1800 ppm. The economizer controller will output the 6.7 volts from the CO_2 sensor to the actuator when the CO_2 concentration in the space is at 1100 ppm. The DCV set point may be left at 2 volts since the CO_2 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.

CO_2 Sensor Configuration

The CO_2 sensor has preset standard voltage settings that can be selected anytime after the sensor is powered up. See Table 5.

Use setting 1 or 2. See Table 5.

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 5.
4. Press Enter to lock in the selection.
5. Press Mode to exit and resume normal operation.

The custom settings of the CO_2 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, an energy recovery unit is 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 5 - CO_2 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

Step 9—ADJUST EVAPORATOR FAN SPEED

Adjust evaporator–fan speed to meet jobsite requirements. Table 6 shows fan rpm at motor pulley settings. Table 7 shows motor performance. Table 8 provides accessory static pressure drop information. Refer to Tables 6–30 to determine fan speed settings.

Direct–Drive Motors

The evaporator–fan motor factory speed setting is shown on label diagram affixed to base unit. If other than factory setting is desired, refer to label diagram for motor reconnection. See Fig. 32 for direct drive motor location.

Belt–Drive Motors

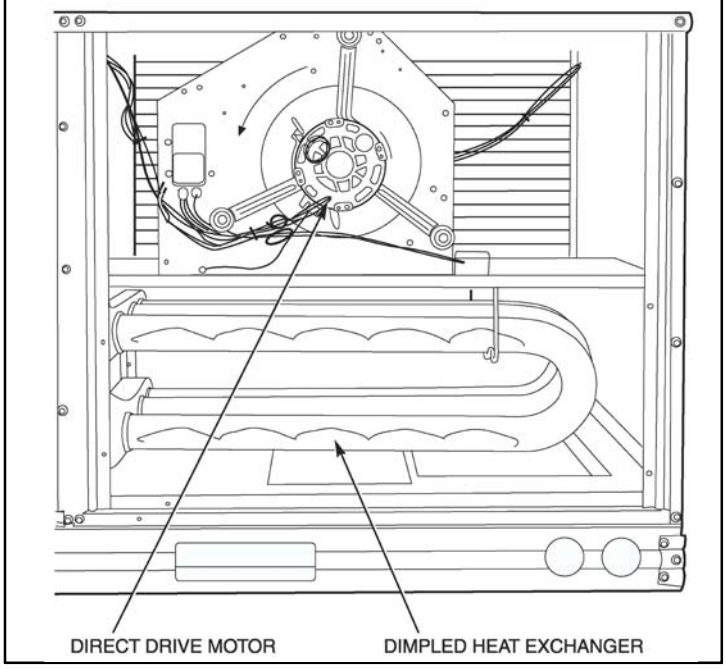
Fan motor pulleys are factory set for speed shown in Table 1. See Fig. 33 for belt drive motor location.

NOTE: Before adjusting fan speed, make sure the new fan speed will provide an air temperature rise range as shown in Table 1.

To change fan speed:

1. Shut off unit power supply and tag disconnect.
2. Loosen belt by loosening fan motor mounting nuts. See Fig. 33.
3. Loosen movable pulley flange setscrew (see Fig. 34).
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.
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.)

FIGURE 32 | **Direct Drive Motor Mounting**



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.

To adjust belt tension:

1. Loosen fan motor mounting nuts.
2. Slide motor mounting plate away from fan scroll for proper belt tension (1/2–in. deflection with 8 to 10 lb of force).
3. Tighten motor mounting nuts.
4. Adjust bolt and tighten nut to secure motor in fixed position.

FIGURE 33 Belt Drive Motor Mounting

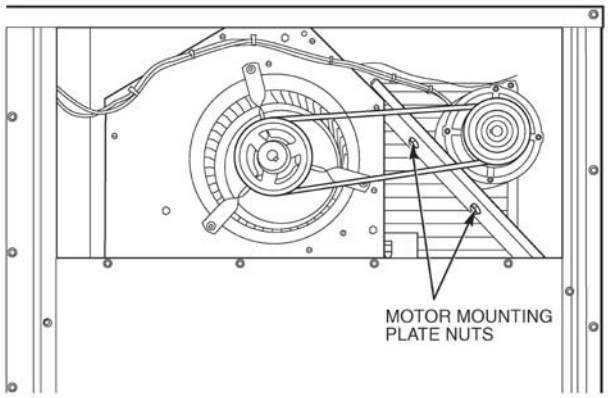


FIGURE 34 Evaporator Fan Pulley Adjustment

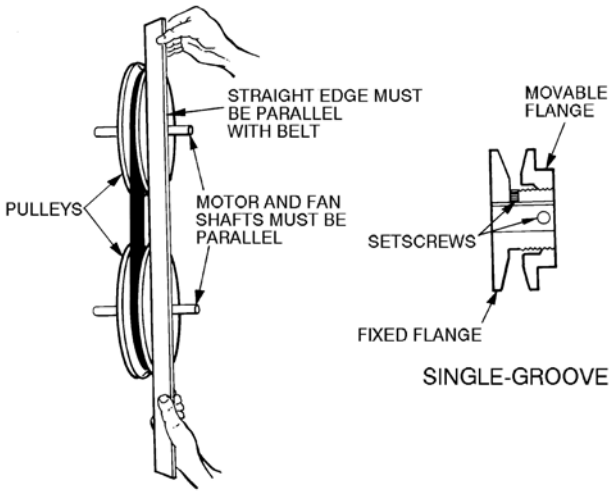


Table 6 - Fan Rpm at Motor Pulley Settings*

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
036†	1045	1009	973	937	901	865	829	793	757	721	685	—	—
036**	1455	1423	1392	1360	1328	1297	1265	1233	1202	1170	1138	1107	1075
048†	1175	1135	1094	1054	1013	973	932	892	851	811	770	—	—
048**	1455	1423	1392	1360	1328	1297	1265	1233	1202	1170	1138	1107	1075
060†	1192	1166	1140	1114	1087	1061	1035	1009	983	957	930	904	878
060**	1685	1647	1608	1570	1531	1493	1454	1416	1377	1339	1300	—	—
072††	1460	1421	1382	1343	1304	1265	1226	1187	1148	1109	1070	—	—
072**	1685	1647	1608	1570	1531	1493	1454	1416	1377	1339	1300	—	—

*Approximate fan rpm shown.
†Indicates alternate motor and drive package.
**Indicates high-static motor and drive package.
††Indicates standard motor and drive package.

Table 7 - Motor Data

Unit PGE	Evaporator Fan Motor	Unit Voltage	Maximum Acceptable Continuous BHP*	Maximum Acceptable Operating Watts	Maximum Amp Draw
036	Standard	208/230	0.34	440	2.8
		460			1.3
	Alternate	208/230	1.20	1000	4.9
		460			2.1
	High Static	208/230	2.40	2120	6.0
		460			3.0
048	Standard	208/230	0.75	850	3.5
		460			1.8
	Alternate	208/230	1.20	1000	4.9
		460			2.1
	High Static	208/230	2.40	2120	6.0
		460			3.0
060	Standard	208/230	1.20	1340	5.9
		460			3.2
	Alternate	208/230	1.30/2.40†	2120	10.1/6.7†
		460			3.0
	High Static	208/230	2.90	2562	8.6
		460			3.9
072	Standard	208/230	2.40	2120	6.7
		460			3.0
	High Static	208/230	2.90	2562	8.6
		460			3.9

LEGEND
BHP — Brake Horsepower
*Extensive motor and electrical testing on these units ensures that the full horsepower range of the motors can be utilized with confidence. Using fan motors up to the horsepower ratings shown in this table will not result in nuisance tripping or premature motor failure.
1. 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.
2. High-static motor not available on single-phase units. Unit warranty will not be affected.

Table 8 - Accessory/FIOP Static Pressure* (in.wg.)

COMPONENT	CFM						
	2250	2500	3000	3500	4000	4500	5000
Vertical Economizer	0.06	0.075	0.115	0.15	0.195	0.25	0.325
Horizontal Economizer	—	0.10	0.15	0.21	0.275	0.34	—

LEGEND

FIOP — Factory Installed Option

*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 tables to determine blower rpm and watts.

Table 9 - Fan Performance PGE036 — Vertical Discharge Units, Standard Motor

STANDARD MOTOR (DIRECT DRIVE)												
Airflow (Cfm)	Low Speed						High Speed					
	208 V			230, 460 V			208 V			230, 460 V		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
900	0.49	0.21	253	0.50	0.23	277	0.51	0.26	307	0.55	0.31	363
1000	0.42	0.23	270	0.43	0.25	292	0.43	0.27	321	0.51	0.32	374
1100	0.37	0.24	287	0.38	0.26	307	0.39	0.28	335	0.46	0.33	385
1200	0.33	0.26	304	0.33	0.27	323	0.34	0.29	349	0.40	0.34	397
1300	0.27	0.27	321	0.28	0.29	338	0.28	0.31	364	0.34	0.34	408
1400	0.20	0.29	338	0.23	0.30	354	0.25	0.32	378	—	—	—
1500	0.16	0.30	355	0.18	0.31	369	0.20	0.33	392	—	—	—

LEGEND

BHP — Brake Horsepower

ESP - External Static Pressure (in. wg)

Table 10 - Fan Performance PGE036 — Vertical Discharge Units, Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	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
900	**643**	**0.15**	**152**	768	0.22	222	870	0.30	296	958	0.37	373	1037	0.46	454
1000	**683**	**0.19**	**191**	804	0.27	268	904	0.35	348	991	0.43	430	**1069**	**0.52**	**517**
1100	725	0.24	237	842	0.32	321	939	0.41	407	1025	0.50	496	**1102**	**0.59**	**588**
1200	767	0.29	291	880	0.38	382	976	0.48	474	**1060**	**0.57**	**570**	**1136**	**0.67**	**668**
1300	811	0.35	352	920	0.45	451	1013	0.55	550	**1095**	**0.66**	**652**	**1170**	**0.76**	**756**
1400	855	0.43	423	960	0.53	529	**1051**	**0.64**	**636**	**1132**	**0.75**	**744**	**1205**	**0.86**	**855**
1500	900	0.51	504	1002	0.62	617	**1090**	**0.74**	**731**	**1169**	**0.85**	**846**	**1242**	**0.97**	**963**
AIRFLOW (Cfm)	**EXTERNAL STATIC PRESSURE (in. wg)**														
	1.2			**1.4**			**1.6**			**1.8**			**2.0**		
	Rpm	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**
900	**1110**	**0.54**	**538**	**1177**	**0.63**	**627**	**1239**	**0.72**	**718**	**1298**	**0.82**	**813**	**1355**	**0.92**	**911**
1000	**1141**	**0.61**	**607**	**1207**	**0.70**	**700**	**1269**	**0.80**	**796**	**1328**	**0.90**	**895**	**1384**	**1.00**	**998**
1100	**1173**	**0.69**	**683**	**1238**	**0.79**	**781**	**1300**	**0.89**	**883**	**1358**	**0.99**	**987**	**1414**	**1.10**	**1094**
1200	**1205**	**0.77**	**768**	**1270**	**0.88**	**872**	**1332**	**0.98**	**979**	**1389**	**1.09**	**1088**	—	—	—
1300	**1239**	**0.87**	**863**	**1303**	**0.98**	**972**	**1364**	**1.09**	**1084**	—	—	—	—	—	—
1400	**1273**	**0.97**	**967**	**1337**	**1.09**	**1082**	—	—	—	—	—	—	—	—	—
1500	**1309**	**1.09**	**1082**	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS - Input watts to motor.

***** Motor drive range: 685 tp 1045 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 1.20.

Table 11 - Fan Performance PGE036 — Vertical Discharge Units, High Static Motor (Belt Drive)*

AIRFLOW (Cfm)	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
900	**643**	**0.15**	**152**	**768**	**0.22**	**222**	**870**	**0.30**	**296**	**958**	**0.37**	**373**	**1037**	**0.46**	**454**
1000	**683**	**0.19**	**191**	**804**	**0.27**	**268**	**904**	**0.35**	**348**	**991**	**0.43**	**430**	**1069**	**0.52**	**517**
1100	**725**	**0.24**	**237**	**842**	**0.32**	**321**	**939**	**0.41**	**407**	**1025**	**0.50**	**496**	1102	0.59	588
1200	**767**	**0.29**	**291**	**880**	**0.38**	**382**	**976**	**0.48**	**474**	**1060**	**0.57**	**570**	1136	0.67	668
1300	**811**	**0.35**	**352**	**920**	**0.45**	**451**	**1013**	**0.55**	**550**	1095	0.66	652	1170	0.76	756
1400	**855**	**0.43**	**423**	**960**	**0.53**	**529**	**1051**	**0.64**	**636**	1132	0.75	744	1205	0.86	855
1500	**900**	**0.51**	**504**	**1002**	**0.62**	**617**	1090	0.74	731	1169	0.85	846	1242	0.97	963
AIRFLOW (Cfm)	**EXTERNAL STATIC PRESSURE (in. wg)**														
	1.2			**1.4**			**1.6**			**1.8**			**2.0**		
	Rpm	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**
900	1110	0.54	538	1177	0.63	627	1239	0.72	718	1298	0.82	813	1355	0.92	911
1000	1141	0.61	607	1207	0.70	700	1269	0.80	796	1328	0.90	895	1384	1.00	998
1100	1173	0.69	683	1238	0.79	781	1300	0.89	883	1358	0.99	987	1414	1.10	1094
1200	1205	0.77	768	1270	0.88	872	1332	0.98	979	1389	1.09	1088	1444	1.21	1200
1300	1239	0.87	863	1303	0.98	972	1364	1.09	1084	1421	1.21	1199	**1475**	**1.32**	**1316**
1400	1273	0.97	967	1337	1.09	1082	1397	1.21	1200	1453	1.33	1320	**1507**	**1.45**	**1443**
1500	1309	1.09	1082	1371	1.21	1204	1430	1.33	1327	**1486**	**1.46**	**1453**	**1540**	**1.59**	**1581**

LEGEND

BHP — Brake Horsepower

WATTS - Input watts to motor.

***** Motor drive range: 1075 tp 1445 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.

Table 12 - Fan Performance PGE048 — Vertical Discharge Units, Standard Motor

STANDARD MOTOR (DIRECT DRIVE)												
	Low Speed						High Speed					
	208 V			230, 460			208 V			230, 460		
Airflow (Cfm)	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
1200	0.68	0.41	458	0.74	0.45	506	0.74	0.51	572	0.85	0.56	632
1300	0.61	0.42	471	0.67	0.46	521	0.66	0.52	589	0.78	0.58	651
1400	0.53	0.45	503	0.59	0.49	556	0.59	0.54	616	0.70	0.60	681
1500	0.45	0.47	536	0.51	0.52	593	0.52	0.56	631	0.63	0.62	698
1600	0.36	0.49	557	0.42	0.54	616	0.45	0.58	654	0.56	0.64	723
1700	0.26	0.52	584	0.32	0.57	646	0.37	0.60	678	0.48	0.66	750
1800	0.15	0.54	610	0.22	0.60	674	0.30	0.62	698	0.41	0.68	772
1900	0.04	0.56	629	0.11	0.62	696	0.23	0.64	720	0.34	0.70	796
2000	—	—	—	—	—	—	0.16	0.66	744	0.26	0.73	823

LEGEND

BHP — Brake Horsepower

ESP - External Static Pressure (in. wg)

Table 13 - Fan Performance PGE036 — Vertical Discharge Units, Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1200	**666**	**0.26**	**257**	778	0.37	367	871	0.47	471	952	0.57	572	1025	0.67	670
1300	**701**	**0.31**	**306**	810	0.43	426	901	0.54	540	981	0.65	651	1053	0.76	760
1400	**737**	**0.36**	**361**	842	0.49	491	931	0.62	616	1010	0.74	738	1081	0.86	856
1500	773	0.42	422	875	0.57	564	963	0.70	699	1040	0.84	831	1110	0.96	960
1600	810	0.49	491	909	0.65	643	994	0.79	790	1070	0.94	932	1140	1.08	1070
1700	847	0.57	567	943	0.73	730	1027	0.89	888	1101	1.05	1040	1170	1.20	1189
1800	885	0.66	652	978	0.83	826	1060	1.00	994	1133	1.16	1157	—	—	—
1900	923	0.75	745	1014	0.94	930	1093	1.11	1109	—	—	—	—	—	—
2000	962	0.85	847	1049	1.05	1043	—	—	—	—	—	—	—	—	—
AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
1200	1093	0.77	767	1155	0.87	861	**1213**	**0.96**	**955**	**1268**	**1.05**	**1047**	**1321**	**1.14**	**1137**
1300	1119	0.87	866	**1181**	**0.98**	**970**	**1239**	**1.08**	**1073**	**1294**	**1.18**	**1175**	—	—	—
1400	1147	0.98	972	**1208**	**1.09**	**1086**	—	—	—	—	—	—	—	—	—
1500	1175	1.09	1086	—	—	—	—	—	—	—	—	—	—	—	—
1600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS - Input watts to motor.

***** Motor drive range: 770 tp 1175 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 1.20.

Table 14 - Fan Performance PGE048 — Vertical Discharge Units, High Static Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1200	**666**	**0.26**	**257**	**778**	**0.37**	**367**	**871**	**0.47**	**471**	**952**	**0.57**	**572**	**1025**	**0.67**	**670**
1300	**701**	**0.31**	**306**	**810**	**0.43**	**426**	**901**	**0.54**	**540**	**981**	**0.65**	**651**	**1053**	**0.76**	**760**
1400	**737**	**0.36**	**361**	**842**	**0.49**	**491**	**931**	**0.62**	**616**	**1010**	**0.74**	**738**	1081	0.86	856
1500	**773**	**0.42**	**422**	**875**	**0.57**	**564**	**963**	**0.70**	**699**	**1040**	**0.84**	**831**	1110	0.96	960
1600	**810**	**0.49**	**491**	**909**	**0.65**	**643**	**994**	**0.79**	**790**	**1070**	**0.94**	**932**	1140	1.08	1070
1700	**847**	**0.57**	**567**	**943**	**0.73**	**730**	**1027**	**0.89**	**888**	1101	1.05	1040	1170	1.20	1189
1800	**885**	**0.66**	**652**	**978**	**0.83**	**826**	**1060**	**1.00**	**994**	1133	1.16	1157	1200	1.32	1316
1900	**923**	**0.75**	**745**	**1014**	**0.94**	**930**	1093	1.11	1109	1165	1.29	1283	1231	1.46	1453
2000	**962**	**0.85**	**847**	**1049**	**1.05**	**1043**	1127	1.24	1233	1198	1.42	1417	1263	1.61	1598
AIRFLOW (Cfm)	**EXTERNAL STATIC PRESSURE (in. wg)**														
	1.2			**1.4**			**1.6**			**1.8**			**2.0**		
	Rpm	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**
1200	1093	0.77	767	1155	0.87	861	1213	0.96	955	1268	1.05	1047	1321	1.14	1137
1300	1119	0.87	866	1181	0.98	970	1239	1.08	1073	1294	1.18	1175	1346	1.28	1275
1400	1147	0.98	972	1208	1.09	1086	1265	1.21	1199	1320	1.32	1310	1371	1.43	1419
1500	1175	1.09	1086	1235	1.22	1209	1292	1.34	1332	1346	1.46	1452	1397	1.58	1572
1600	1204	1.21	1207	1263	1.35	1340	1320	1.48	1472	1373	1.61	1603	1424	1.74	1732
1700	1233	1.34	1336	1292	1.49	1480	1348	1.63	1622	1401	1.77	1762	1451	1.91	1901
1800	1262	1.48	1473	1321	1.64	1627	1376	1.79	1779	1428	1.94	1930	**1479**	**2.09**	**2078**
1900	1293	1.63	1620	1350	1.79	1784	1405	1.96	1946	**1457**	**2.12**	**2106**	**1506**	**2.28**	**2265**
2000	1323	1.79	1776	1380	1.96	1950	1434	2.13	2123	**1486**	**2.31**	**2293**	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS - Input watts to motor.

* Motor drive range: 1075 tp 1455 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.

Table 15 - Fan Performance PGE060 — Vertical Discharge Units, Standard Motor

STANDARD MOTOR (DIRECT DRIVE)																		
Air-flow (Cfm)	Low Speed						Medium Speed						High Speed					
	208 V			230,460 V			208 V			230,460V			208 V			230,460 V		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
1500	0.69	0.67	750	1.01	0.71	791	1.00	0.70	782	1.20	0.76	845	1.22	0.79	875	1.28	0.85	949
1600	0.49	0.70	780	0.85	0.74	824	0.85	0.74	821	1.06	0.79	883	1.09	0.82	913	1.17	0.89	988
1700	0.29	0.73	810	0.70	0.77	857	0.70	0.77	861	0.93	0.83	921	0.97	0.85	950	1.06	0.92	1027
1800	0.09	0.75	839	0.54	0.80	891	0.55	0.81	900	0.80	0.86	959	0.84	0.89	988	0.95	0.96	1066
1900	—	—	—	0.39	0.83	924	0.40	0.84	940	0.67	0.90	997	0.72	0.92	1025	0.84	0.99	1105
2000	—	—	—	0.23	0.86	957	0.25	0.88	979	0.54	0.93	1035	0.59	0.95	1063	0.73	1.03	1144
2100	—	—	—	0.08	0.89	990	0.10	0.91	1018	0.41	0.96	1073	0.46	0.99	1101	0.62	1.06	1183
2200	—	—	—	—	—	—	—	—	—	0.28	1.00	1111	0.34	1.02	1138	0.51	1.10	1222
2300	—	—	—	—	—	—	—	—	—	0.15	1.03	1149	0.21	1.06	1176	0.40	1.13	1261
2400	—	—	—	—	—	—	—	—	—	0.02	1.07	1187	0.09	1.09	1213	0.29	1.17	1300
2500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.18	1.20	1340

LEGEND

BHP — Brake Horsepower

ESP - External Static Pressure (in. wg)

Table 16 - Fan Performance PGE060 — Vertical Discharge Units, Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1500	**802**	**0.42**	**370**	912	0.55	489	1006	0.70	624	1088	0.87	773	1163	1.05	935
1600	**840**	**0.49**	**432**	947	0.63	557	1038	0.78	696	1119	0.95	848	**1193**	**1.14**	**1013**
1700	878	0.57	502	982	0.71	632	1071	0.87	776	1151	1.05	932	**1224**	**1.24**	**1100**
1800	917	0.65	581	1017	0.81	716	1105	0.97	864	1183	1.15	1024	**1255**	**1.35**	**1197**
1900	956	0.75	668	1053	0.91	808	1139	1.08	961	**1216**	**1.27**	**1126**	**1287**	**1.47**	**1302**
2000	995	0.86	764	1090	1.02	910	1173	1.20	1067	**1249**	**1.39**	**1236**	**1319**	**1.59**	**1416**
2100	1035	0.98	869	1127	1.15	1021	1209	1.33	1183	**1283**	**1.53**	**1357**	**1351**	**1.74**	**1541**
2200	1075	1.11	984	1164	1.29	1141	1244	1.47	1309	**1317**	**1.68**	**1488**	**1385**	**1.89**	**1676**
2300	1115	1.25	1110	1202	1.43	**1273**	**1280**	**1.63**	**1446**	**1352**	**1.83**	**1629**	**1418**	**2.05**	**1822**
2400	1155	1.40	**1246**	**1240**	**1.59**	**1415**	**1316**	**1.79**	**1594**	**1387**	**2.01**	**1782**	**1452**	**2.23**	**1980**
2500	1196	1.57	**1394**	**1278**	**1.77**	**1569**	**1353**	**1.97**	**1753**	**1422**	**2.19**	**1946**	—	—	—
AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
1500	**1232**	**1.25**	**1109**	**1297**	**1.46**	**1295**	**1357**	**1.68**	**1492**	**1415**	**1.91**	**1700**	**1469**	**2.16**	**1917**
1600	**1262**	**1.34**	**1190**	**1325**	**1.55**	**1379**	**1385**	**1.78**	**1579**	**1442**	**2.01**	**1788**	**1496**	**2.26**	**2009**
1700	**1291**	**1.44**	**1281**	**1354**	**1.66**	**1472**	**1414**	**1.89**	**1674**	**1470**	**2.12**	**1887**	**1524**	**2.37**	**2109**
1800	**1322**	**1.55**	**1380**	**1384**	**1.77**	**1575**	**1443**	**2.00**	**1779**	**1499**	**2.25**	**1994**	—	—	—
1900	**1352**	**1.68**	**1489**	**1414**	**1.90**	**1687**	**1472**	**2.13**	**1894**	**1528**	**2.38**	**2112**	—	—	—
2000	**1384**	**1.81**	**1607**	**1445**	**2.04**	**1808**	**1502**	**2.27**	**2019**	—	—	—	—	—	—
2100	**1415**	**1.95**	**1736**	**1476**	**2.18**	**1940**	—	—	—	—	—	—	—	—	—
2200	**1448**	**2.11**	**1875**	**1507**	**2.35**	**2083**	—	—	—	—	—	—	—	—	—
2300	**1480**	**2.28**	**2025**	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS - Input watts to motor.

***** Motor drive range: 878 tp 1192 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.

Table 17 - Fan Performance PGE060 — Vertical Discharge Units, High Static Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1500	**802**	**0.42**	**370**	**912**	**0.55**	**489**	**1006**	**0.70**	**624**	**1088**	**0.87**	**773**	**1163**	**1.05**	**935**
1600	**840**	**0.49**	**432**	**947**	**0.63**	**557**	**1038**	**0.78**	**696**	**1119**	**0.95**	**848**	**1193**	**1.14**	**1013**
1700	**878**	**0.57**	**502**	**982**	**0.71**	**632**	**1071**	**0.87**	**776**	**1151**	**1.05**	**932**	**1224**	**1.24**	**1100**
1800	**917**	**0.65**	**581**	**1017**	**0.81**	**716**	**1105**	**0.97**	**864**	**1183**	**1.15**	**1024**	**1255**	**1.35**	**1197**
1900	**956**	**0.75**	**668**	**1053**	**0.91**	**808**	**1139**	**1.08**	**961**	**1216**	**1.27**	**1126**	**1287**	**1.47**	**1302**
2000	**995**	**0.86**	**764**	**1090**	**1.02**	**910**	**1173**	**1.20**	**1067**	**1249**	**1.39**	**1236**	1319	1.59	1416
2100	**1035**	**0.98**	**869**	**1127**	**1.15**	**1021**	**1209**	**1.33**	**1183**	**1283**	**1.53**	**1357**	1351	1.74	1541
2200	**1075**	**1.11**	**984**	**1164**	**1.29**	**1141**	**1244**	**1.47**	**1309**	1317	1.68	1488	1385	1.89	1676
2300	**1115**	**1.25**	**1110**	**1202**	**1.43**	**1273**	**1280**	**1.63**	**1446**	1352	1.83	1629	1418	2.05	1822
2400	**1155**	**1.40**	**1246**	**1240**	**1.59**	**1415**	1316	1.79	1594	1387	2.01	1782	1452	2.23	1980
2500	**1196**	**1.57**	**1394**	**1278**	**1.77**	**1569**	1353	1.97	1753	1422	2.19	1946	1486	2.42	2149
AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
1500	**1232**	**1.25**	**1109**	**1297**	**1.46**	**1295**	1357	1.68	1492	1415	1.91	1700	1469	2.16	1917
1600	**1262**	**1.34**	**1190**	1325	1.55	1379	1385	1.78	1579	1442	2.01	1788	1496	2.26	2009
1700	**1291**	**1.44**	**1281**	1354	1.66	1472	1414	1.89	1674	1470	2.12	1887	1524	2.37	2109
1800	1322	1.55	1380	1384	1.77	1575	1443	2.00	1779	1499	2.25	1994	1552	2.50	2219
1900	1352	1.68	1489	1414	1.90	1687	1472	2.13	1894	1528	2.38	2112	1580	2.63	2339
2000	1384	1.81	1607	1445	2.04	1808	1502	2.27	2019	1557	2.52	2240	1609	2.78	2470
2100	1415	1.95	1736	1476	2.18	1940	1533	2.43	2155	1587	2.68	2378	—	—	—
2200	1448	2.11	1875	1507	2.35	2083	1563	2.59	2301	1617	2.85	2528	—	—	—
2300	1480	2.28	2025	1539	2.52	2237	1595	2.77	2459	—	—	—	—	—	—
2400	1513	2.46	2187	1571	2.71	2403	—	—	—	—	—	—	—	—	—
2500	1547	2.66	2360	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS - Input watts to motor.

*****Motor drive range: 1300 tp 1685 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.90.

Table 18 - Fan Performance PGE072 — Vertical Discharge Units, Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1800	**967**	**0.65**	**579**	1077	0.81	718	1172	0.96	856	1257	1.12	993	1334	1.27	1130
1900	**1007**	**0.75**	**663**	1115	0.91	811	1208	1.08	957	1291	1.24	1101	1368	1.40	1246
2000	**1048**	**0.85**	**757**	1153	1.03	913	1244	1.20	1066	1326	1.37	1219	1401	1.54	1371
2100	1090	0.97	859	1191	1.15	1023	1281	1.33	1185	1361	1.51	1345	1435	1.69	1505
2200	1131	1.09	970	1230	1.29	1143	1318	1.48	1313	1397	1.67	1481	**1470**	**1.86**	**1649**
2300	1173	1.23	1091	1269	1.43	1273	1355	1.63	1451	1433	1.83	1627	**1505**	**2.03**	**1803**
2400	1215	1.38	1223	1309	1.59	1413	1393	1.80	1600	**1470**	**2.01**	**1784**	**1540**	**2.21**	**1967**
2500	1258	1.54	1365	1349	1.76	1564	1431	1.98	1759	**1506**	**2.20**	**1951**	—	—	—
2600	1300	1.71	1518	1389	1.94	1726	**1470**	**2.17**	**1929**	**1544**	**2.40**	**2130**	—	—	—
2700	1343	1.90	1683	1430	2.14	1899	**1509**	**2.38**	**2111**	—	—	—	—	—	—
2800	1386	2.09	1860	**1471**	**2.35**	**2085**	—	—	—	—	—	—	—	—	—
2900	1429	2.31	2050	—	—	—	—	—	—	—	—	—	—	—	—
AIRFLOW (Cfm)	**EXTERNAL STATIC PRESSURE (in. wg)**														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
1800	1406	1.43	1268	**1473**	**1.58**	**1407**	**1535**	**1.74**	**1548**	**1595**	**1.90**	**1690**	**1652**	**2.06**	**1833**
1900	1438	1.57	1391	**1504**	**1.73**	**1537**	**1567**	**1.90**	**1685**	**1626**	**2.06**	**1833**	**1682**	**2.23**	**1983**
2000	**1471**	**1.72**	**1523**	**1536**	**1.89**	**1677**	**1598**	**2.06**	**1831**	**1657**	**2.24**	**1986**	—	—	—
2100	**1504**	**1.87**	**1665**	**1569**	**2.06**	**1825**	**1630**	**2.24**	**1986**	—	—	—	—	—	—
2200	**1538**	**2.04**	**1816**	**1602**	**2.23**	**1984**	—	—	—	—	—	—	—	—	—
2300	**1572**	**2.23**	**1978**	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS - Input watts to motor.

***Motor drive range: 1070 tp 1460 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.

Table 19 - Fan Performance PGE073 — Vertical Discharge Units, High Static Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1800	**967**	**0.65**	**579**	**1077**	**0.81**	**718**	**1172**	**0.96**	**856**	**1257**	**1.12**	**993**	1334	1.27	1130
1900	**1007**	**0.75**	**663**	**1115**	**0.91**	**811**	**1208**	**1.08**	**957**	**1291**	**1.24**	**1101**	1368	1.40	1246
2000	**1048**	**0.85**	**757**	**1153**	**1.03**	**913**	**1244**	**1.20**	**1066**	1326	1.37	1219	1401	1.54	1371
2100	**1090**	**0.97**	**859**	**1191**	**1.15**	**1023**	**1281**	**1.33**	**1185**	1361	1.51	1345	1435	1.69	1505
2200	**1131**	**1.09**	**970**	**1230**	**1.29**	**1143**	1318	1.48	1313	1397	1.67	1481	1470	1.86	1649
2300	**1173**	**1.23**	**1091**	**1269**	**1.43**	**1273**	1355	1.63	1451	1433	1.83	1627	1505	2.03	1803
2400	**1215**	**1.38**	**1223**	1309	1.59	1413	1393	1.80	1600	1470	2.01	1784	1540	2.21	1967
2500	**1258**	**1.54**	**1365**	1349	1.76	1564	1431	1.98	1759	1506	2.20	1951	1576	2.41	2142
2600	1300	1.71	1518	1389	1.94	1726	1470	2.17	1929	1544	2.40	2130	1613	2.62	2329
2700	1343	1.90	1683	1430	2.14	1899	1509	2.38	2111	1581	2.61	2320	1649	2.85	2527
2800	1386	2.09	1860	1471	2.35	2085	1548	2.60	2305	1619	2.84	2522	—	—	—
2900	1429	2.31	2050	1512	2.57	2283	1588	2.83	2512	—	—	—	—	—	—
3000	1473	2.54	2252	1553	2.81	2494	—	—	—	—	—	—	—	—	—
AIRFLOW (Cfm)	**EXTERNAL STATIC PRESSURE (in. wg)**														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
1800	1406	1.43	1268	1473	1.58	1407	1535	1.74	1548	1595	1.90	1690	1652	2.06	1833
1900	1438	1.57	1391	1504	1.73	1537	1567	1.90	1685	1626	2.06	1833	1682	2.23	1983
2000	1471	1.72	1523	1536	1.89	1677	1598	2.06	1831	1657	2.24	1986	**1713**	**2.41**	**2142**
2100	1504	1.87	1665	1569	2.06	1825	1630	2.24	1986	**1688**	**2.42**	**2149**	**1744**	**2.60**	**2312**
2200	1538	2.04	1816	1602	2.23	1984	1663	2.42	2152	**1720**	**2.61**	**2321**	**1775**	**2.81**	**2491**
2300	1572	2.23	1978	1635	2.42	2153	**1695**	**2.62**	**2328**	**1753**	**2.82**	**2504**	—	—	—
2400	1607	2.42	2150	1669	2.63	2332	**1729**	**2.83**	**2515**	—	—	—	—	—	—
2500	1642	2.63	2333	**1704**	**2.84**	**2523**	—	—	—	—	—	—	—	—	—
2600	1677	2.85	2527	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS - Input watts to motor.

***Motor drive range: 1300 tp 1685 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.90.

Table 20 – Fan Performance PGE036 — Horizontal Discharge Units, Standard Motor

STANDARD MOTOR (DIRECT DRIVE)												
Airflow (Cfm)	Low Speed						High Speed					
	208 V			230, 460 V			208 V			230, 460 V		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
900	0.54	0.21	253	0.57	0.23	277	0.55	0.26	307	0.60	0.31	363
1000	0.49	0.23	270	0.51	0.25	292	0.52	0.27	321	0.53	0.32	374
1100	0.43	0.24	287	0.45	0.26	307	0.46	0.28	335	0.49	0.33	385
1200	0.39	0.26	304	0.40	0.27	323	0.38	0.29	349	0.43	0.34	397
1300	0.33	0.27	321	0.35	0.29	338	0.35	0.31	364	0.36	0.34	408
1400	0.26	0.29	338	0.28	0.30	354	0.29	0.32	378	—	—	—
1500	0.21	0.30	355	0.23	0.31	369	0.24	0.33	392	—	—	—

LEGEND
BHP — Brake Horsepower
ESP – External Static Pressure (in. wg)

Table 21 – Fan Performance PGE036 — Horizontal Discharge Units, Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	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
900	**607**	**0.14**	**142**	745	0.22	221	856	0.31	304	952	0.39	393	1037	0.49	485
1000	**640**	**0.18**	**174**	775	0.26	261	884	0.35	351	978	0.45	446	**1062**	**0.55**	**545**
1100	**674**	**0.21**	**212**	805	0.31	307	912	0.41	404	1005	0.51	506	**1089**	**0.61**	**611**
1200	708	0.26	256	836	0.36	359	941	0.47	464	1033	0.57	572	**1116**	**0.69**	**683**
1300	743	0.31	307	868	0.42	417	971	0.53	530	**1062**	**0.65**	**645**	**1143**	**0.77**	**764**
1400	780	0.37	364	900	0.49	483	1002	0.61	603	**1091**	**0.73**	**726**	**1172**	**0.86**	**851**
1500	816	0.43	428	934	0.56	556	1033	0.69	685	**1121**	**0.82**	**815**	**1201**	**0.95**	**947**
AIRFLOW (Cfm)	**EXTERNAL STATIC PRESSURE (in. wg)**														
	1.2			**1.4**			**1.6**			**1.8**			**2.0**		
	Rpm	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**
900	**1114**	**0.59**	**582**	**1186**	**0.69**	**684**	**1253**	**0.79**	**789**	**1316**	**0.90**	**898**	**1375**	**1.02**	**1010**
1000	**1139**	**0.65**	**648**	**1210**	**0.76**	**754**	**1277**	**0.87**	**865**	**1340**	**0.98**	**979**	**1399**	**1.10**	**1097**
1100	**1165**	**0.72**	**720**	**1236**	**0.84**	**832**	**1302**	**0.95**	**948**	**1364**	**1.07**	**1068**	**1423**	**1.20**	**1191**
1200	**1191**	**0.80**	**799**	**1261**	**0.92**	**917**	**1327**	**1.04**	**1039**	**1389**	**1.17**	**1165**	—	—	—
1300	**1218**	**0.89**	**885**	**1288**	**1.02**	**1010**	**1353**	**1.14**	**1138**	—	—	—	—	—	—
1400	**1246**	**0.99**	**980**	**1315**	**1.12**	**1111**	—	—	—	—	—	—	—	—	—
1500	**1274**	**1.09**	**1083**	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND
BHP — Brake Horsepower
WATTS – Input watts to motor.
***Motor drive range: 685 tp 1045 rpm. All other rpms require a field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 1.20.

Table 22 – Fan Performance PGE036 — Horizontal Discharge Units, High Static Motor (Belt Drive)*

AIRFLOW (Cfm)	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
900	**607**	**0.14**	**142**	**745**	**0.22**	**221**	**856**	**0.31**	**304**	**952**	**0.39**	**393**	**1037**	**0.49**	**485**
1000	**640**	**0.18**	**174**	**775**	**0.26**	**261**	**884**	**0.35**	**351**	**978**	**0.45**	**446**	**1062**	**0.55**	**545**
1100	**674**	**0.21**	**212**	**805**	**0.31**	**307**	**912**	**0.41**	**404**	**1005**	**0.51**	**506**	1089	0.61	611
1200	**708**	**0.26**	**256**	**836**	**0.36**	**359**	**941**	**0.47**	**464**	**1033**	**0.57**	**572**	1116	0.69	683
1300	**743**	**0.31**	**307**	**868**	**0.42**	**417**	**971**	**0.53**	**530**	**1062**	**0.65**	**645**	1143	0.77	764
AIRFLOW (Cfm)	**EXTERNAL STATIC PRESSURE (in. wg)**														
	1.2			**1.4**			**1.6**			**1.8**			**2.0**		
	Rpm	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**
900	1114	0.59	582	1186	0.69	684	1253	0.79	789	1316	0.90	898	1375	1.02	1010
1000	1139	0.65	648	1210	0.76	754	1277	0.87	865	1340	0.98	979	1399	1.10	1097
1100	1165	0.72	720	1236	0.84	832	1302	0.95	948	1364	1.07	1068	1423	1.20	1191
1200	1191	0.80	799	1261	0.92	917	1327	1.04	1039	1389	1.17	1165	1448	1.30	1293
1300	1218	0.89	885	1288	1.02	1010	1353	1.14	1138	1414	1.28	1270	**1473**	**1.41**	**1404**
1400	1246	0.99	980	1315	1.12	1111	1379	1.25	1246	1440	1.39	1383	**1499**	**1.53**	**1523**
1500	1274	1.09	1083	1342	1.23	1221	1406	1.37	1362	**1467**	**1.51**	**1505**	**1525**	**1.66**	**1652**
1400	**780**	**0.37**	**364**	**900**	**0.49**	**483**	**1002**	**0.61**	**603**	1091	0.73	726	1172	0.86	851
1500	**816**	**0.43**	**428**	**934**	**0.56**	**556**	**1033**	**0.69**	**685**	1121	0.82	815	1201	0.95	947

LEGEND
BHP — Brake Horsepower
WATTS – Input watts to motor.
***Motor drive range:1075 tp 1045 rpm. All other rpms require a field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.

Table 23 – Fan Performance PGE048 — Horizontal Discharge Units, Standard Motor

STANDARD MOTOR (DIRECT DRIVE)												
Airflow (Cfm)	Low Speed						High Speed					
	208 V			230, 460 V			208 V			230, 460 V		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
1200	0.75	0.41	458	0.81	0.45	506	0.87	0.51	572	0.92	0.56	632
1300	0.68	0.42	471	0.74	0.46	521	0.79	0.52	589	0.85	0.58	651
1400	0.60	0.45	503	0.66	0.49	556	0.71	0.54	616	0.77	0.60	681
1500	0.51	0.47	536	0.58	0.52	593	0.64	0.56	631	0.70	0.62	698
1600	0.42	0.49	557	0.49	0.54	616	0.56	0.58	654	0.63	0.64	723
1700	0.32	0.52	584	0.39	0.57	646	0.48	0.60	678	0.55	0.66	750
1800	0.21	0.54	610	0.29	0.60	674	0.41	0.62	698	0.48	0.68	772
1900	0.09	0.56	629	0.18	0.62	696	0.33	0.64	720	0.41	0.70	796
2000	—	—	—	0.06	0.65	731	0.26	0.66	744	0.33	0.73	823

LEGEND

BHP — Brake Horsepower

ESP – External Static Pressure (in. wg)

Table 24 – Fan Performance PGE048 — Horizontal Discharge Units, Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1200	**643**	**0.23**	**234**	**762**	**0.34**	**343**	859	0.46	458	944	0.58	579	1020	0.71	705
1300	**675**	**0.28**	**277**	790	0.40	394	886	0.52	517	969	0.65	644	1044	0.78	777
1400	**707**	**0.33**	**326**	819	0.45	452	913	0.58	581	996	0.72	716	1070	0.86	855
1500	**740**	**0.38**	**382**	849	0.52	515	941	0.66	653	1023	0.80	795	1096	0.95	941
1600	773	0.45	444	879	0.59	586	970	0.73	731	1050	0.88	880	1123	1.04	1034
1700	807	0.52	513	910	0.67	663	999	0.82	817	1078	0.98	973	1150	1.14	1134
1800	841	0.59	589	942	0.75	749	1029	0.91	910	1106	1.08	1074	—	—	—
1900	875	0.68	674	974	0.85	842	1059	1.02	1012	1135	1.19	1184	—	—	—
2000	910	0.77	767	1006	0.95	944	1090	1.13	1122	—	—	—	—	—	—
AIRFLOW (Cfm)	**EXTERNAL STATIC PRESSURE (in. wg)**														
	1.2			**1.4**			**1.6**			**1.8**			**2.0**		
	Rpm	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**
1200	1089	0.84	837	1153	0.98	974	**1213**	**1.12**	**1115**	—	—	—	—	—	—
1300	1113	0.92	915	**1177**	**1.06**	**1058**	—	—	—	—	—	—	—	—	—
1400	1138	1.01	1000	**1201**	**1.15**	**1149**	—	—	—	—	—	—	—	—	—
1500	1163	1.10	1092	—	—	—	—	—	—	—	—	—	—	—	—
1600	**1189**	**1.20**	**1191**	—	—	—	—	—	—	—	—	—	—	—	—
1700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS – Input watts to motor.

***Motor drive range: 770 tp 1175 rpm. All other rpms require a field–supplied drive.

NOTES:

1. **Boldface** indicates field–supplied drive is required.
2. Maximum continuous bhp is 1.20.

Table 25 – Fan Performance PGE048 — Horizontal Discharge Units, High Static Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1200	**643**	**0.23**	**234**	**762**	**0.34**	**343**	**859**	**0.46**	**458**	**944**	**0.58**	**579**	**1020**	**0.71**	**705**
1300	**675**	**0.28**	**277**	**790**	**0.40**	**394**	**886**	**0.52**	**517**	**969**	**0.65**	**644**	**1044**	**0.78**	**777**
1400	**707**	**0.33**	**326**	**819**	**0.45**	**452**	**913**	**0.58**	**581**	**996**	**0.72**	**716**	**1070**	**0.86**	**855**
1500	**740**	**0.38**	**382**	**849**	**0.52**	**515**	**941**	**0.66**	**653**	**1023**	**0.80**	**795**	1096	0.95	941
1600	**773**	**0.45**	**444**	**879**	**0.59**	**586**	**970**	**0.73**	**731**	**1050**	**0.88**	**880**	1123	1.04	1034
1700	**807**	**0.52**	**513**	**910**	**0.67**	**663**	**999**	**0.82**	**817**	1078	0.98	973	1150	1.14	1134
1800	**841**	**0.59**	**589**	**942**	**0.75**	**749**	**1029**	**0.91**	**910**	1106	1.08	1074	1177	1.25	1242
1900	**875**	**0.68**	**674**	**974**	**0.85**	**842**	**1059**	**1.02**	**1012**	1135	1.19	1184	1205	1.37	1360
2000	**910**	**0.77**	**767**	**1006**	**0.95**	**944**	1090	1.13	1122	1165	1.31	1302	1234	1.49	1485
AIRFLOW (Cfm)	**EXTERNAL STATIC PRESSURE (in. wg)**														
	1.2			**1.4**			**1.6**			**1.8**			**2.0**		
	Rpm	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**
1200	1089	0.84	837	1153	0.98	974	1213	1.12	1115	1270	1.27	1262	1324	1.42	1413
1300	1113	0.92	915	1177	1.06	1058	1237	1.21	1205	1293	1.36	1358	1347	1.52	1514
1400	1138	1.01	1000	1201	1.15	1149	1261	1.31	1303	1317	1.47	1461	1370	1.63	1623
1500	1163	1.10	1092	1226	1.25	1247	1285	1.41	1407	1341	1.58	1571	1394	1.75	1740
1600	1189	1.20	1191	1252	1.36	1353	1310	1.53	1520	1365	1.70	1690	1418	1.87	1865
1700	1216	1.31	1299	1277	1.48	1468	1335	1.65	1640	1390	1.83	1817	1442	2.01	1998
1800	1242	1.42	1414	1303	1.60	1590	1361	1.78	1770	1415	1.96	1953	**1467**	**2.15**	**2140**
1900	1270	1.55	1538	1330	1.73	1721	1387	1.92	1908	1441	2.11	2098	**1493**	**2.30**	**2292**
2000	1297	1.68	1672	1357	1.87	1862	1414	2.07	2055	**1467**	**2.26**	**2252**	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS – Input watts to motor.

*Motor drive range: 1075 tp 1455 rpm. All other rpms require a field–supplied drive.

NOTES:

1. **Boldface** indicates field–supplied drive is required.
2. Maximum continuous bhp is 2.40.

Table 26 – Fan Performance PGE060 — Horizontal Discharge Units, Standard Motor

Air-flow (Cfm)	STANDARD MOTOR (DIRECT DRIVE)																	
	Low Speed						Medium Speed						High Speed					
	208V			230, 460 V			208 V			230, 460 V			208 V			230, 460 V		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
1500	0.74	0.67	750	1.06	0.71	791	1.07	0.70	782	1.27	0.76	845	1.26	0.79	875	1.33	0.85	949
1600	0.54	0.70	780	0.90	0.74	824	0.92	0.74	821	1.13	0.79	883	1.14	0.82	913	1.22	0.89	988
1700	0.34	0.73	810	0.75	0.77	857	0.77	0.77	861	1.00	0.83	921	1.01	0.85	950	1.11	0.92	1027
1800	0.14	0.75	839	0.59	0.80	891	0.62	0.81	900	0.87	0.86	959	0.89	0.88	988	1.00	0.96	1066
1900	—	—	—	0.44	0.83	924	0.47	0.84	940	0.74	0.90	997	0.77	0.92	1025	0.89	0.99	1105
2000	—	—	—	0.28	0.86	957	0.32	0.88	979	0.61	0.93	1035	0.64	0.95	1063	0.78	1.03	1144
2100	—	—	—	0.13	0.89	990	0.17	0.91	1018	0.48	0.96	1073	0.51	0.99	1101	0.67	1.06	1183
2200	—	—	—	—	—	—	0.02	0.95	1058	0.35	1.00	1111	0.39	1.02	1138	0.56	1.10	1222
2300	—	—	—	—	—	—	—	—	—	0.22	1.03	1149	0.26	1.06	1176	0.45	1.13	1261
2400	—	—	—	—	—	—	—	—	—	0.09	1.07	1187	0.14	1.09	1213	0.34	1.17	1300
2500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.23	1.20	1340

LEGEND

BHP — Brake Horsepower

ESP – External Static Pressure (in. wg)

Table 27 – Fan Performance PGE060 — Horizontal Discharge Units, Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1500	**790**	**0.40**	**353**	896	0.53	470	990	0.67	599	1074	0.83	738	1151	1.00	886
1600	**828**	**0.46**	**413**	930	0.60	535	1021	0.75	669	1103	0.91	812	1179	1.09	965
1700	**866**	**0.54**	**479**	964	0.68	607	1053	0.84	746	1133	1.01	894	**1207**	**1.18**	**1051**
1800	905	0.62	553	1000	0.77	687	1085	0.94	831	1164	1.11	984	**1236**	**1.29**	**1146**
1900	944	0.71	635	1036	0.87	775	1119	1.04	924	**1195**	**1.22**	**1082**	**1266**	**1.41**	**1248**
2000	984	0.82	725	1072	0.98	871	1153	1.15	1025	**1227**	**1.34**	**1189**	**1297**	**1.53**	**1360**
2100	1024	0.93	824	1109	1.10	976	1188	1.28	1136	**1260**	**1.47**	**1305**	**1328**	**1.67**	**1481**
2200	1064	1.05	932	1147	1.23	1090	**1223**	**1.41**	**1256**	**1294**	**1.61**	**1430**	**1360**	**1.81**	**1612**
2300	1105	1.18	1050	1185	1.37	1215	**1259**	**1.56**	**1386**	**1328**	**1.76**	**1566**	**1393**	**1.97**	**1752**
2400	1146	1.33	1179	**1223**	**1.52**	**1349**	**1295**	**1.72**	**1527**	**1362**	**1.93**	**1711**	**1426**	**2.14**	**1903**
2500	1187	1.48	1317	**1262**	**1.68**	**1494**	**1332**	**1.89**	**1677**	**1398**	**2.10**	**1868**	**1460**	**2.33**	**2065**
AIRFLOW (Cfm)	**EXTERNAL STATIC PRESSURE (in. wg)**														
	1.2			**1.4**			**1.6**			**1.8**			**2.0**		
	Rpm	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**
1500	**1223**	**1.18**	**1045**	**1291**	**1.36**	**1212**	**1355**	**1.56**	**1388**	**1415**	**1.77**	**1573**	**1473**	**1.99**	**1765**
1600	**1249**	**1.27**	**1127**	**1316**	**1.46**	**1298**	**1379**	**1.66**	**1478**	**1439**	**1.87**	**1665**	**1496**	**2.09**	**1860**
1700	**1277**	**1.37**	**1217**	**1342**	**1.57**	**1392**	**1404**	**1.77**	**1575**	**1463**	**1.99**	**1766**	**1520**	**2.21**	**1965**
1800	**1305**	**1.48**	**1316**	**1369**	**1.68**	**1495**	**1430**	**1.89**	**1681**	**1489**	**2.11**	**1876**	**1545**	**2.34**	**2078**
1900	**1333**	**1.60**	**1423**	**1397**	**1.81**	**1606**	**1457**	**2.02**	**1797**	**1514**	**2.25**	**1995**	—	—	—
2000	**1363**	**1.73**	**1540**	**1425**	**1.94**	**1727**	**1484**	**2.16**	**1922**	**1541**	**2.39**	**2124**	—	—	—
2100	**1393**	**1.87**	**1665**	**1454**	**2.09**	**1857**	**1512**	**2.31**	**2056**	—	—	—	—	—	—
2200	**1424**	**2.03**	**1801**	**1484**	**2.25**	**1997**	—	—	—	—	—	—	—	—	—
2300	**1455**	**2.19**	**1946**	—	—	—	—	—	—	—	—	—	—	—	—
2400	**1487**	**2.37**	**2103**	—	—	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS – Input watts to motor.

***Motor drive range: 1075 tp 1455 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.

Table 28 – Fan Performance PGE060 — Horizontal Discharge Units, High Static Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1500	**790**	**0.40**	**353**	**896**	**0.53**	**470**	**990**	**0.67**	**599**	**1074**	**0.83**	**738**	**1151**	**1.00**	**886**
1600	**828**	**0.46**	**413**	**930**	**0.60**	**535**	**1021**	**0.75**	**669**	**1103**	**0.91**	**812**	**1179**	**1.09**	**965**
1700	**866**	**0.54**	**479**	**964**	**0.68**	**607**	**1053**	**0.84**	**746**	**1133**	**1.01**	**894**	**1207**	**1.18**	**1051**
1800	**905**	**0.62**	**553**	**1000**	**0.77**	**687**	**1085**	**0.94**	**831**	**1164**	**1.11**	**984**	**1236**	**1.29**	**1146**
1900	**944**	**0.71**	**635**	**1036**	**0.87**	**775**	**1119**	**1.04**	**924**	**1195**	**1.22**	**1082**	**1266**	**1.41**	**1248**
2000	**984**	**0.82**	**725**	**1072**	**0.98**	**871**	**1153**	**1.15**	**1025**	**1227**	**1.34**	**1189**	**1297**	**1.53**	**1360**
2100	**1024**	**0.93**	**824**	**1109**	**1.10**	**976**	**1188**	**1.28**	**1136**	**1260**	**1.47**	**1305**	1328	1.67	1481
2200	**1064**	**1.05**	**932**	**1147**	**1.23**	**1090**	**1223**	**1.41**	**1256**	**1294**	**1.61**	**1430**	1360	1.81	1612
2300	**1105**	**1.18**	**1050**	**1185**	**1.37**	**1215**	**1259**	**1.56**	**1386**	1328	1.76	1566	1393	1.97	1752
2400	**1146**	**1.33**	**1179**	**1223**	**1.52**	**1349**	**1295**	**1.72**	**1527**	1362	1.93	1711	1426	2.14	1903
2500	**1187**	**1.48**	**1317**	**1262**	**1.68**	**1494**	1332	1.89	1677	1398	2.10	1868	1460	2.33	2065
AIRFLOW (Cfm)	**EXTERNAL STATIC PRESSURE (in. wg)**														
	1.2			**1.4**			**1.6**			**1.8**			**2.0**		
	Rpm	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**	**Rpm**	**Bhp**	**Watts**
1500	**1223**	**1.18**	**1045**	**1291**	**1.36**	**1212**	1355	1.56	1388	1415	1.77	1573	1473	1.99	1765
1600	**1249**	**1.27**	**1127**	1316	1.46	1298	1379	1.66	1478	1439	1.87	1665	1496	2.09	1860
1700	**1277**	**1.37**	**1217**	1342	1.57	1392	1404	1.77	1575	1463	1.99	1766	1520	2.21	1965
1800	1305	1.48	1316	1369	1.68	1495	1430	1.89	1681	1489	2.11	1876	1545	2.34	2078
1900	1333	1.60	1423	1397	1.81	1606	1457	2.02	1797	1514	2.25	1995	1570	2.48	2200
2000	1363	1.73	1540	1425	1.94	1727	1484	2.16	1922	1541	2.39	2124	1596	2.63	2333
2100	1393	1.87	1665	1454	2.09	1857	1512	2.31	2056	1568	2.55	2262	1622	2.79	2475
2200	1424	2.03	1801	1484	2.25	1997	1541	2.48	2200	1596	2.71	2411	—	—	—
2300	1455	2.19	1946	1514	2.42	2147	1571	2.65	2355	1625	2.89	2570	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS – Input watts to motor.

***Motor drive range: 1300 tp 1685 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.90.

Table 29 – Fan Performance PGE072 — Horizontal Discharge Units, Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1800	**919**	**0.63**	**561**	**1010**	**0.75**	**663**	1095	0.87	771	1174	1.00	886	1250	1.14	1008
1900	**960**	**0.73**	**648**	**1047**	**0.85**	**754**	1129	0.98	867	1206	1.11	986	1279	1.25	1111
2000	**1001**	**0.84**	**744**	1085	0.96	855	1163	1.09	972	1238	1.23	1095	1309	1.38	1224
2100	**1043**	**0.96**	**850**	1123	1.09	965	1199	1.22	1086	1271	1.37	1213	1340	1.52	1346
2200	1085	1.09	966	1162	1.22	1086	1235	1.36	1211	1305	1.51	1342	1372	1.67	1479
2300	1127	1.23	1092	1201	1.37	1217	1272	1.52	1347	1340	1.67	1482	1405	1.83	1623
2400	1169	1.38	1229	1241	1.53	1359	1310	1.68	1493	1375	1.84	1633	1439	2.00	1778
2500	1212	1.55	1378	1281	1.70	1513	1348	1.86	1652	1412	2.02	1796	**1473**	**2.19**	**1945**
2600	1255	1.73	1539	1322	1.89	1678	1386	2.05	1822	1448	2.22	1970	**1508**	**2.39**	**2124**
2700	1298	1.93	1713	1363	2.09	1857	1425	2.26	2005	—	—	—	—	—	—
2800	1341	2.14	1899	1404	2.31	2048	—	—	—	—	—	—	—	—	—
2900	1384	2.36	2099	—	—	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
1800	1321	1.28	1137	1390	1.43	1273	1455	1.59	1415	**1518**	**1.76**	**1563**	**1579**	**1.93**	**1718**
1900	1348	1.40	1243	1415	1.56	1381	**1479**	**1.72**	**1526**	**1541**	**1.89**	**1677**	**1601**	**2.06**	**1834**
2000	1377	1.53	1359	1442	1.69	1500	**1505**	**1.86**	**1648**	**1565**	**2.03**	**1801**	**1624**	**2.21**	**1961**
2100	1406	1.67	1485	**1470**	**1.83**	**1629**	**1531**	**2.00**	**1780**	**1591**	**2.18**	**1936**	**1648**	**2.36**	**2098**
2200	1437	1.83	1621	**1499**	**1.99**	**1769**	**1559**	**2.16**	**1923**	**1617**	**2.34**	**2082**	—	—	—
2300	**1468**	**1.99**	**1769**	**1529**	**2.16**	**1920**	**1587**	**2.34**	**2077**	—	—	—	—	—	—
2400	**1500**	**2.17**	**1928**	**1559**	**2.35**	**2083**	—	—	—	—	—	—	—	—	—
2500	**1533**	**2.36**	**2098**	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS – Input watts to motor.

***Motor drive range: 1070 tp 1460 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.

Table 30 – Fan Performance PGE072 — Horizontal Discharge Units, High Static Motor (Belt Drive)*

AIRFLOW (Cfm)	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
1800	**919**	**0.63**	**561**	**1010**	**0.75**	**663**	**1095**	**0.87**	**771**	**1174**	**1.00**	**886**	**1250**	**1.14**	**1008**
1900	**960**	**0.73**	**648**	**1047**	**0.85**	**754**	**1129**	**0.98**	**867**	**1206**	**1.11**	**986**	**1279**	**1.25**	**1111**
2000	**1001**	**0.84**	**744**	**1085**	**0.96**	**855**	**1163**	**1.09**	**972**	**1238**	**1.23**	**1095**	1309	1.38	1224
2100	**1043**	**0.96**	**850**	**1123**	**1.09**	**965**	**1199**	**1.22**	**1086**	**1271**	**1.37**	**1213**	1340	1.52	1346
2200	**1085**	**1.09**	**966**	**1162**	**1.22**	**1086**	**1235**	**1.36**	**1211**	1305	1.51	1342	1372	1.67	1479
2300	**1127**	**1.23**	**1092**	**1201**	**1.37**	**1217**	**1272**	**1.52**	**1347**	1340	1.67	1482	1405	1.83	1623
2400	**1169**	**1.38**	**1229**	**1241**	**1.53**	**1359**	1310	1.68	1493	1375	1.84	1633	1439	2.00	1778
2500	**1212**	**1.55**	**1378**	**1281**	**1.70**	**1513**	1348	1.86	1652	1412	2.02	1796	1473	2.19	1945
2600	**1255**	**1.73**	**1539**	1322	1.89	1678	1386	2.05	1822	1448	2.22	1970	1508	2.39	2124
2700	**1298**	**1.93**	**1713**	1363	2.09	1857	1425	2.26	2005	1485	2.43	2158	1544	2.61	2315
2800	1341	2.14	1899	1404	2.31	2048	1464	2.48	2201	1523	2.66	2358	1580	2.84	2520
2900	1384	2.36	2099	1445	2.54	2253	1504	2.71	2410	1561	2.90	2572	—	—	—
3000	1428	2.60	2313	1487	2.78	2471	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
1800	1321	1.28	1137	1390	1.43	1273	1455	1.59	1415	1518	1.76	1563	1579	1.93	1718
1900	1348	1.40	1243	1415	1.56	1381	1479	1.72	1526	1541	1.89	1677	1601	2.06	1834
2000	1377	1.53	1359	1442	1.69	1500	1505	1.86	1648	1565	2.03	1801	1624	2.21	1961
2100	1406	1.67	1485	1470	1.83	1629	1531	2.00	1780	1591	2.18	1936	1648	2.36	2098
2200	1437	1.83	1621	1499	1.99	1769	1559	2.16	1923	1617	2.34	2082	1673	2.53	2246
2300	1468	1.99	1769	1529	2.16	1920	1587	2.34	2077	1644	2.52	2239	**1699**	**2.71**	**2406**
2400	1500	2.17	1928	1559	2.35	2083	1616	2.53	2243	1672	2.71	2408	**1726**	**2.90**	**2579**
2500	1533	2.36	2098	1591	2.54	2257	1647	2.73	2421	—	—	—	—	—	—
2600	1566	2.57	2281	1623	2.75	2444	—	—	—	—	—	—	—	—	—
2700	1600	2.79	2477	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

BHP — Brake Horsepower

WATTS – Input watts to motor.

***Motor drive range: 1300 tp 1685 rpm. All other rpms require a field-supplied drive.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.90.

PRE-START-UP

⚠ WARNING

FIRE, EXPLOSION, ELECTRICAL SHOCK HAZARD

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

1. Follow recognized safety practices and wear protective goggles when checking or servicing refrigerant system.
2. Do not operate compressor or provide any electric power to unit unless compressor terminal cover is in place and secured.
3. Do not remove compressor terminal cover until all electrical sources are disconnected and tagged.
4. Relieve and recover all refrigerant from system before touching or disturbing anything inside terminal box if refrigerant leak is suspected around compressor terminals.
5. Never attempt to repair soldered connection while refrigerant system is under pressure.
6. Do not use torch to remove any component. System contains oil and refrigerant under pressure.
   To remove a component, wear protective goggles and proceed as follows:
   a. Shut off gas and then electrical power to unit and install lockout tag.
   b. Relieve and reclaim all refrigerant from system using both high- and low-pressure ports.
   c. Cut component connecting tubing with tubing cutter and remove component from unit.
   d. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Use the Start-Up Checklist supplied at the end of this book and proceed as follows to inspect and prepare the unit for initial start-up:

1. Remove access panel.
2. Read and follow instructions on all DANGER, WARNING, CAUTION, and INFORMATION labels attached to, or shipped with unit.
3. Make the following inspections:
   a. Inspect for shipping and handling damage, such as broken lines, loose parts, disconnected wires, etc.
   b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak-test all refrigerant tubing connections using an electronic leak detector, halide torch, or liquid-soap solution.
   c. Inspect all field- and factory-wiring connections. Be sure that connections are completed and tight.
   d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following conditions:
   a. Make sure that condenser-fan blade is correctly positioned in fan orifice. Top 1/3 of condenser-fan blade should be within fan orifice venturi.
   b. Make sure that air filter(s) is in place.
   c. Make sure that condensate drain trap is filled with water to ensure proper drainage.
   d. Make sure that all tools and miscellaneous loose parts have been removed.

START-UP

UNIT PREPARATION

Make sure that unit has been installed in accordance with these installation instructions and applicable codes. Make sure Start-Up Checklist on back page is filled out and completed.

RETURN-AIR FILTERS

Make sure correct filters are installed in filter tracks. See Table 1. Do not operate unit without return-air filters.

COMPRESSOR MOUNTING

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

INTERNAL WIRING

Check all electrical connections in unit control boxes. Tighten as required. Ensure wiring does not come in contact with refrigerant tubing.

GAS PIPING

⚠ 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

To service refrigerant service ports, remove compressor access panel. Each unit system has 4 Schrader-type service gage ports: one on the suction line, one on the liquid line, and two on the compressor discharge line. Be sure that caps on the ports are tight. One of the Schrader-type valves on the compressor discharge line is located under the low-pressure switch.

The Schrader valve on the compressor discharge line that is located under the high pressure switch does not contain a Schrader core in the valve.

HIGH FLOW VALVES

Located on the compressor hot gas and suction tubes are high flow valves. Large black plastic caps distinguish these valves with o-rings located inside the caps. These valves cannot be accessed for service in the field. Ensure the plastic caps are in place and tight or the possibility of refrigerant leakage could occur.

COMPRESSOR ROTATION

On 3-phase units with scroll compressors, it is important to be certain compressor is rotating in the proper direction. To determine whether or not compressor is 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 and tag disconnect.
3. Reverse any two of the unit power leads.
4. Reapply power to the unit.

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

NOTE: When the compressor is rotating in the wrong direction, the unit makes an elevated level of noise and does not provide cooling.

COOLING

Set space thermostat to OFF position. To start unit, turn on main power supply. Set system selector switch at COOL position and fan switch at AUTO. position. Adjust thermostat to a setting below room temperature. Compressor, outdoor fan and evaporator motor start on closure of contactor.

Check unit charge. Refer to Refrigerant Charge section, page 39. Reset thermostat at a position above room temperature. Compressor will shut off. Evaporator fan will shut off after 30-second delay.

To Shut Off Unit

Set system selector switch at OFF position. Resetting thermostat at a position above room temperature shuts unit off temporarily until space temperature exceeds thermostat setting.

MAIN BURNERS

Main burners are factory set and should require no adjustment.

TO CHECK ignition of main burners and heating controls, move thermostat set point above room temperature and verify that the burners light and evaporator fan is energized. After ensuring that the unit continues to heat the building, lower the thermostat setting below room temperature and verify that the burners and evaporator fan turn off. (Fan will turn off only if fan selector switch is in the AUTO. position.)

Refer to Table 30A and 30B for the correct orifice to use at high altitudes.

XI. HEATING

1. Purge gas supply line of air by opening union ahead of gas valve. If gas odor is detected, tighten union and wait 5 minutes before proceeding.
2. Turn on electrical supply and manual gas valve.
3. Set system switch selector at HEAT position and fan switch at AUTO. or ON position. Set heating temperature lever above room temperature.
4. The induced-draft motor will start.
5. After a call for heating, the main burners should light within 5 seconds. If the burner does not light, then there is a 22-second delay before another 5-second try. If the burner still does not light, the time delay is repeated. If the burner does not light within 15 minutes, there is a lockout. To reset the control, break the 24-v power to W1.
6. The evaporator-fan motor will turn on 45 seconds after the burners are ignited.
7. The evaporator-fan motor will turn off 45 seconds after thermostat temperature is satisfied.
8. Adjust airflow to obtain a temperature rise within the range specified on the unit nameplate.

NOTE: The default value for the evaporator-fan motor ON/OFF delay is 45 seconds. The Integrated Gas Unit Controller (IGC) modifies this value when abnormal limit switch cycles occur. Based upon unit operating conditions, the ON delay can be reduced to 0 seconds and the OFF delay can be extended to 180 seconds. When one flash of the LED is observed, the evaporator-fan ON/OFF delay has been modified.

If the limit switch trips at the start of the heating cycle during the evaporator ON delay, the time period of the ON delay for the next cycle will be 5 seconds less than the time at which the switch tripped. (Example: If the limit switch trips at 30 seconds, the evaporator-fan ON delay for the next cycle will occur at 25 seconds.) To prevent short-cycling, a 5-second reduction will only occur if a minimum of 10 minutes has elapsed since the last call for heating.

The evaporator-fan OFF delay can also be modified. Once the call for heating has ended, there is a 10-minute period during which the modification can occur. If the limit switch trips during this period, the evaporator-fan OFF delay will increase by 15 seconds. A maximum of 9 trips can occur, extending the evaporator-fan OFF delay to 180 seconds.

To restore the original default value, reset the power to the unit.

To Shut Off Unit

Set system selector switch at OFF position. Resetting heating selector lever below room temperature will temporarily shut unit off until space temperature falls below thermostat setting.

Table 30A - Altitude Compensation* - Standard Units

Elevation (ft)	74,000 and 115,000 BTUH Nominal Input		150,000 BTUH Nominal Input	
	Natural Gas Orifice Size†	Propane Orifice Size†	Natural Gas Orifice Size†	Propane Orifice Size†
0-2,000	33	43	30	37
2,000	36	44	31	39
3,000	36	45	31	40
4,000	37	45	32	41
5,000	38	46	32	42
6,000	40	47	34	43
7,000	41	48	35	43
8,000	42	49	36	44
9,000	43	50	37	45
10,000	44	50	39	46
11,000	45	51	41	47
12,000	46	52	42	48
13,000	47	52	43	49
14,000	48	53	44	50

*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.
†Orifices available through your distributor.

Table 30B – Altitude Compensation* – Low NOx Units

ELEVATION (ft)	60,000 AND 90,000 BTUH NOMINAL INPUT		120,000 BTUH NOMINAL INPUT	
	Natural Gas Orifice Size†	Propane Orifice Size†	Natural Gas Orifice Size	Propane Orifice Size†
0–2,000	38	45	32	42
2,000	40	47	33	43
3,000	41	48	35	43
4,000	42	49	36	44
5,000	43	49	37	45
6,000	43	50	38	45
7,000	44	50	39	46
8,000	45	51	41	47
9,000	46	52	42	48
10,000	47	52	43	49
11,000	48	53	44	50
12,000	49	53	44	51
13,000	50	54	46	52
14,000	51	54	47	52

*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.

†Orifices available through your distributor.

SAFETY RELIEF

A soft solder joint at the suction service Schrader port provides pressure relief under abnormal temperature and pressure conditions (i.e., fire in building).

VENTILATION (CONTINUOUS FAN)

Set fan and system selector switches at ON and OFF positions, respectively. Evaporator fan operates continuously to provide constant air circulation. When the evaporator–fan selector switch is turned to the OFF position, there is a 30–second delay before the fan turns off.

OPERATING SEQUENCE

Cooling, Units without Economizer

When thermostat calls for cooling, terminals G and Y1 and the compressor contactor (C) are energized. The indoor (evaporator) fan motor (IFM), compressor, and outdoor (condenser) fan motor (OFM) start. The OFM runs continuously while the unit is in cooling. When the thermostat is satisfied, C is deenergized and the compressor and OFM shut off. After a 30–second delay, the (IFM) shuts off. If the thermostat fan selector switch is in the ON position, the evaporator motor will run continuously.

Heating, Units without Economizer

When the thermostat calls for heating, terminal W1 is energized. The induced–draft motor is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. 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 is 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 set point limits.

Integrated economizer operation on single–stage units requires a 2–stage thermostat (Y1 and Y2).

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 fans will be energized and deenergized.

If field–installed accessory CO_2 sensors are connected to the economizer control, a demand controlled ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 set point, the minimum position of the damper will be increased proportionally. As the CO_2 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.

On the initial power to the economizer control, it will take the damper up to $2^1/_2$ minutes before it begins to position itself. Any change in damper position will take up to 30 seconds to initiate. Damper movement from full closed to full open (or vice versa) will take between $1^1/_2$ and $2^1/_2$ 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 temperature calls for heat, the heating controls are energized as described in the Heating, Units Without Economizer section. When the thermostat is satisfied, the economizer damper moves to the minimum position.

SERVICE

⚠ WARNING

FIRE, EXPLOSION, ELECTRICAL SHOCK, AND CARBON MONOXIDE POISON HAZARD

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

Before performing service or maintenance operations on unit, turn off gas supply to unit. *Then* turn off unit main power switch and install lockout tag.

CLEANING

Inspect unit interior at the beginning of heating and cooling season and as operating conditions require.

Evaporator Coil

1. Turn unit power off and install lockout tag. Remove evaporator coil access panel.
2. If economizer or two−position damper is installed, remove economizer by disconnecting Molex plug and removing mounting screws.
3. Slide filters out of unit.
4. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister.
5. Reinstall economizer and filters.
6. Reconnect wiring.
7. Replace access panels.

Condenser Coil

Inspect coil monthly. Clean condenser coil annually, and as required by location and outdoor air conditions. One−Row Coils (Size 036)

Wash coil with commercial coil cleaner. It is not necessary to remove top panel.

2−Row Coils (Sizes 048−072) Clean coil as follows:

1. Turn off unit power and install lockout tag.
2. Remove top panel screws on condenser end of unit.
3. Remove condenser coil corner post. See Fig. 35. To hold top panel open, place coil corner post between top panel and center post. See Fig. 36.
4. Remove screws securing coil to compressor plate and compressor access panel.
5. Remove fastener holding coil sections together at return end of condenser coil. Carefully separate the outer coil section 3 to 4 in. from the inner coil section. See Fig. 37.
6. Use a water hose or other suitable equipment to flush down between the 2 coil sections to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.
7. Secure inner and outer coil rows together with a field−supplied fastener.
8. Reposition the outer coil section and remove the coil corner post from between the top panel and center post. Reinstall the coil corner post and replace all screws.

FIGURE 35 Cleaning Condenser Coil

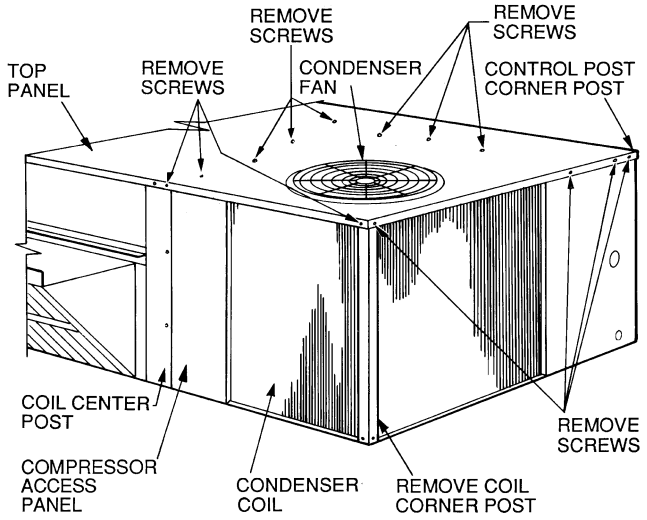


FIGURE 36 Propping Up Top Panel

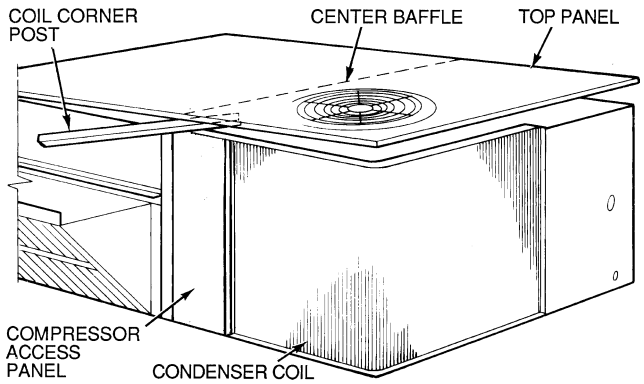
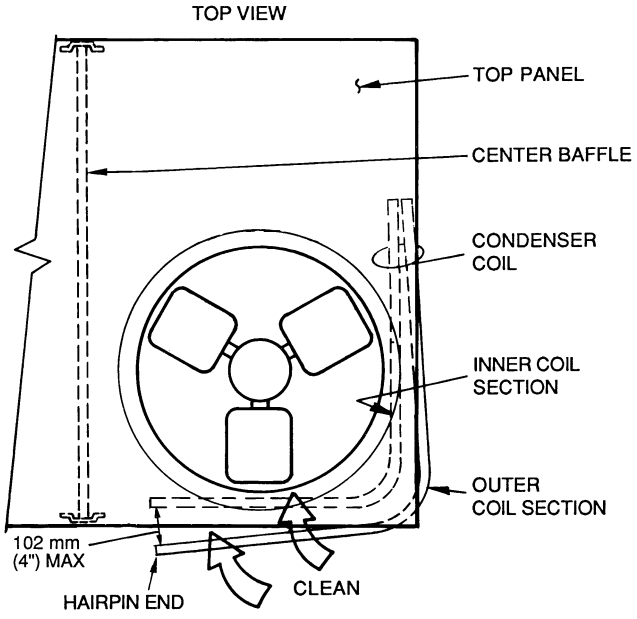


FIGURE 37 Separating Coil Sections



Condensate Drain

Check and clean each year at start of cooling season. In winter, protect condensate drain against freeze-up.

Filters

Clean or replace at start of each heating and cooling season, or more often if operating conditions require it. Replacement filters must be same dimensions as original filters.

Outdoor-Air Inlet Screen

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

LUBRICATION

Compressors

Each compressor is charged with the correct amount of oil at the factory.

Fan Motor Bearings

Fan motor bearings are of the permanently lubricated type. No further lubrication is required. No lubrication of condenser or evaporator fan motors is required.

BLOWER BELT ADJUSTMENT

Inspect blower belt for wear, proper belt tension, and pulley alignment as conditions require or at the beginning of each heating and air conditioning season.

Refer to Step 9 – Adjust Evaporator-Fan Speed on page 22 for adjustment and alignment procedures.Check belt tension at least once each heating or cooling season or as conditions require. Adjust as required.

MANUAL OUTDOOR-AIR DAMPER

If outdoor-air damper blade adjustment is required, see Manual Outdoor-Air Damper section on page 14.

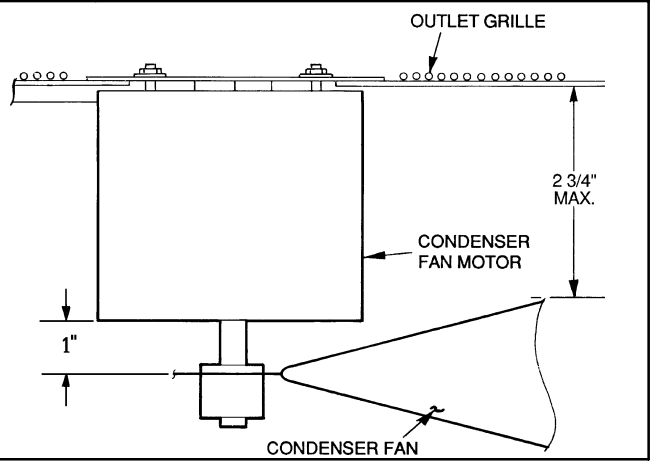
ECONOMIZER ADJUSTMENT

Refer to Optional economizer section on page 14.

CONDENSER-FAN ADJUSTMENT (Fig. 39)

Shut off unit power supply. Remove condenser-fan assembly (grille, motor, and fan) and loosen fan hub setscrews. Adjust fan height as shown in Fig. 38. Tighten setscrews and replace condenser-fan assembly.

FIGURE 38 | **Condensor Fan Adjustment**



REFRIGERANT CHARGE

Amount of refrigerant charge is listed on unit nameplate (also refer to Table 1). Compressor must run a minimum of 10 minutes before adjusting or checking charge.

Unit panels must be in place when unit is operating during charging procedure.

No Charge

Use standard evacuating techniques. After evacuating system, to 500 microns, weigh in the specified amount of refrigerant. (Refer to Table 1.)

Low-Charge Cooling

Using Cooling Charging Charts, Fig. 39-42, vary refrigerant until the conditions of the appropriate chart are met. Note the charging charts are different from type normally used. Charts are based on charging the units to the correct superheat for the various operating conditions. Accurate pressure gage and temperature sensing device are required. Do not use pocket type thermometers for measuring surface temperatures as they are not designed for this type of measurement. Connect the pressure gage to the service port on the suction line. Mount the temperature sensing device on the suction line and insulate it so that outdoor ambient temperature does not affect the reading. Indoor-air cfm must be within the normal operating range of the unit.

To Use Cooling Charging Chart

Take the outdoor ambient temperature and read the suction pressure gage. Refer to chart to determine what suction temperature should be. If suction temperature is high, add refrigerant. If suction temperature is low, carefully recover some of the charge. Recheck the suction pressure as charge is adjusted.

EXAMPLE: (Fig. 41)
Outdoor Temperature . . . . . 85 F Suction
Pressure . . . . . .80 psig Suction
Temperature should be . . . . . 76 F
(Suction Temperature may vary 5 F.)

FLUE GAS PASSAGEWAYS

To inspect the flue collector box and upper areas of the heat exchanger:

1. Remove the combustion blower wheel and motor assembly according to directions in Combustion-Air Blower section on page 39.
2. Remove the flue cover to inspect the heat exchanger.
3. Clean all surfaces as required using a wire brush.

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 bimonthly to determine proper cleaning frequency.

To access burner section, slide the sliding burner partition out of the unit.

To inspect blower wheel, shine a flashlight into draft hood opening. If cleaning is required, remove motor and wheel as follows:

1. Slide burner access panel out.

2. Remove the 7 screws that attach induced-draft motor housing to vestibule plate (Fig. 43).
3. The blower wheel can be cleaned at this point. If additional cleaning is required, continue with Steps 4 and 5.
4. To remove blower from the motor shaft, remove 2 setscrews.
5. To remove motor, remove the 4 screws that hold the motor to mounting plate. Remove the motor cooling fan by removing one setscrew. Then remove nuts that hold motor to mounting plate.
6. To reinstall, reverse the procedure outlined above.

LIMIT SWITCH

Remove blower access panel (Fig. 6). Limit switch is located on the fan deck.

BURNER IGNITION

Unit is equipped with a direct spark ignition 100% lockout system. Integrated Gas Unit Controller (IGC) is located in the control box (Fig. 10). The IGC contains a self-diagnostic LED (light-emitting diode). A single LED on the IGC provides a visual display of operational or sequential problems when the power supply is uninterrupted. When a break in power occurs, the IGC will be reset (resulting in a loss of fault history) and the indoor (evaporator) fan ON/OFF times will be reset. The LED error code can be observed through the viewport. During servicing refer to the label on the control box cover or Table 31 for an explanation of LED error code descriptions.

If lockout occurs, unit may be reset by interrupting power supply to unit for at least 5 seconds.

FIGURE 39 **Cooling Charging Chart, PGE036**

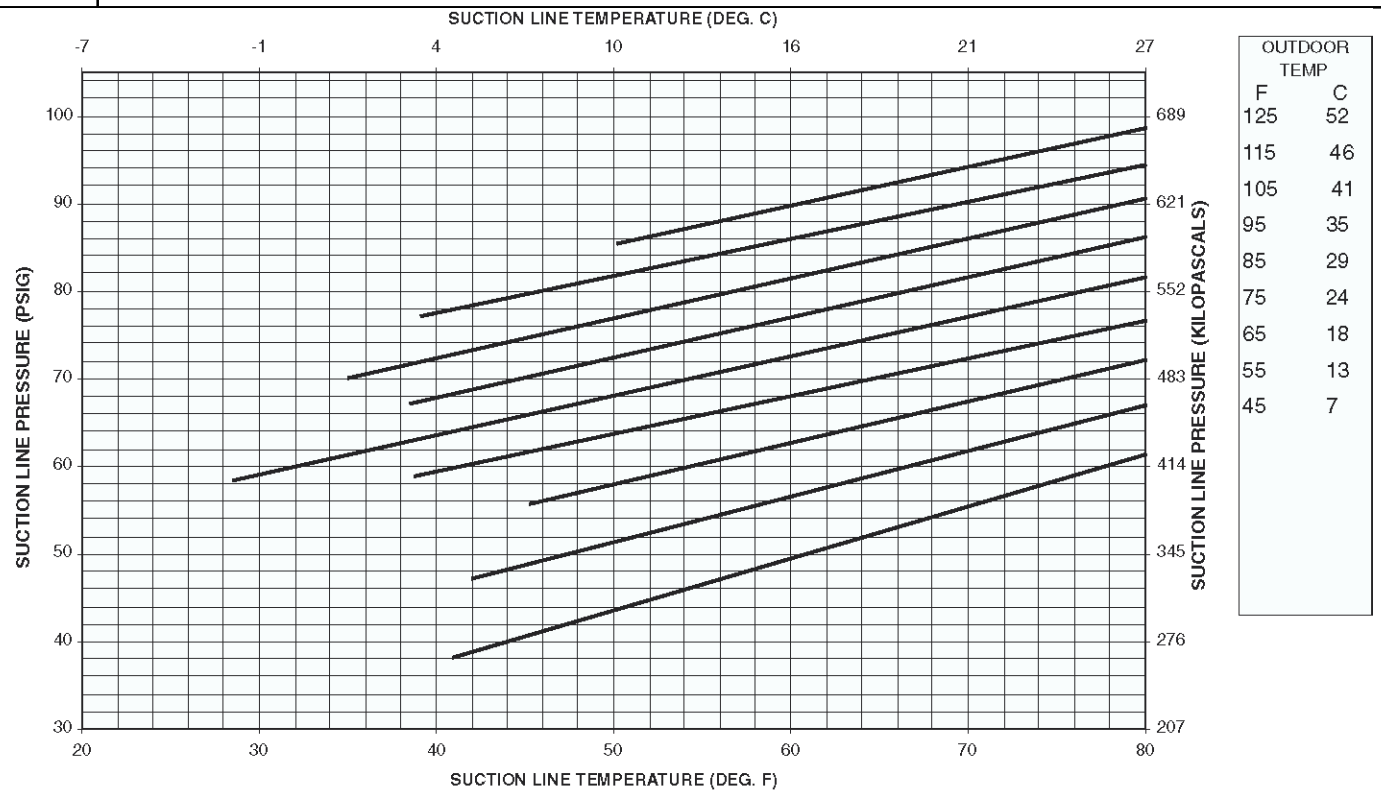


FIGURE 40 **Cooling Charging Chart, PGE048**

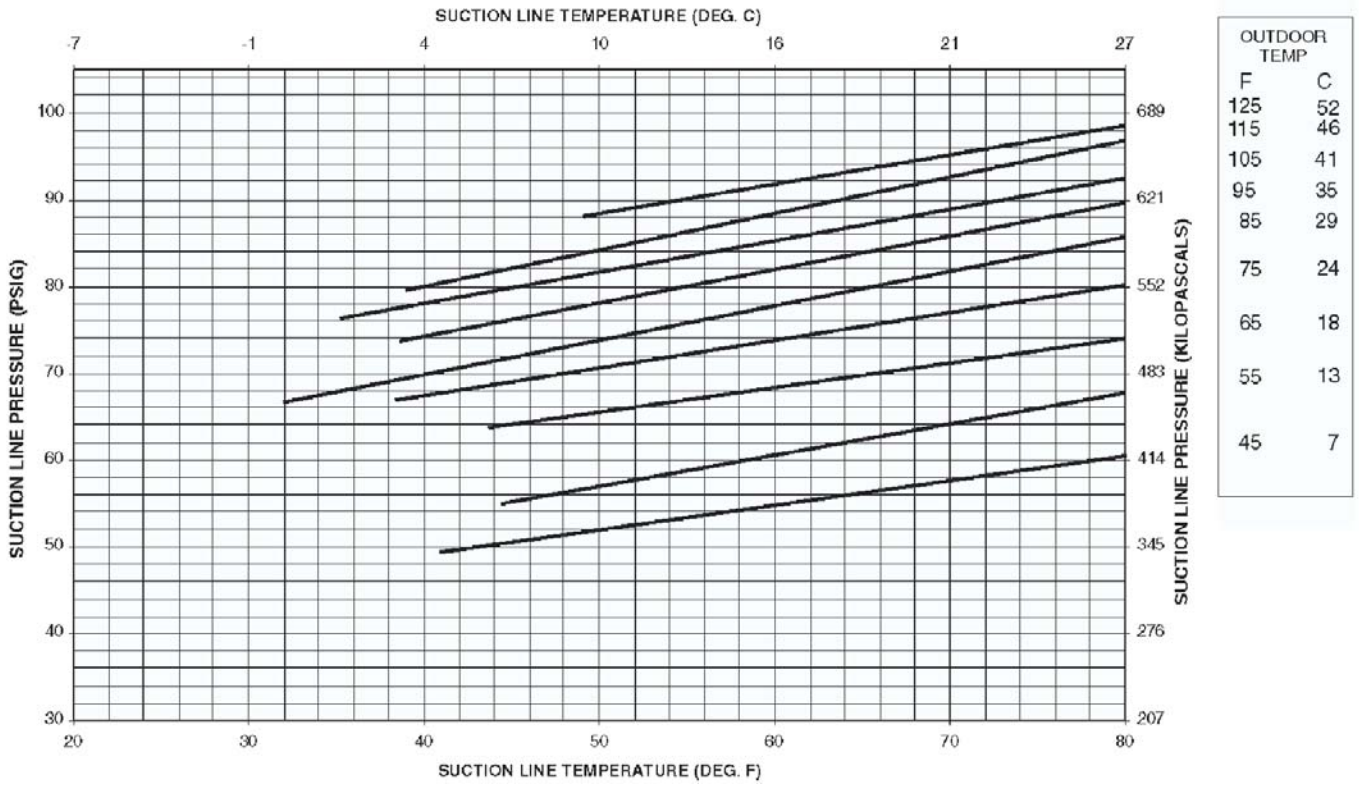


FIGURE 41 **Cooling Charging Chart, PGE060**

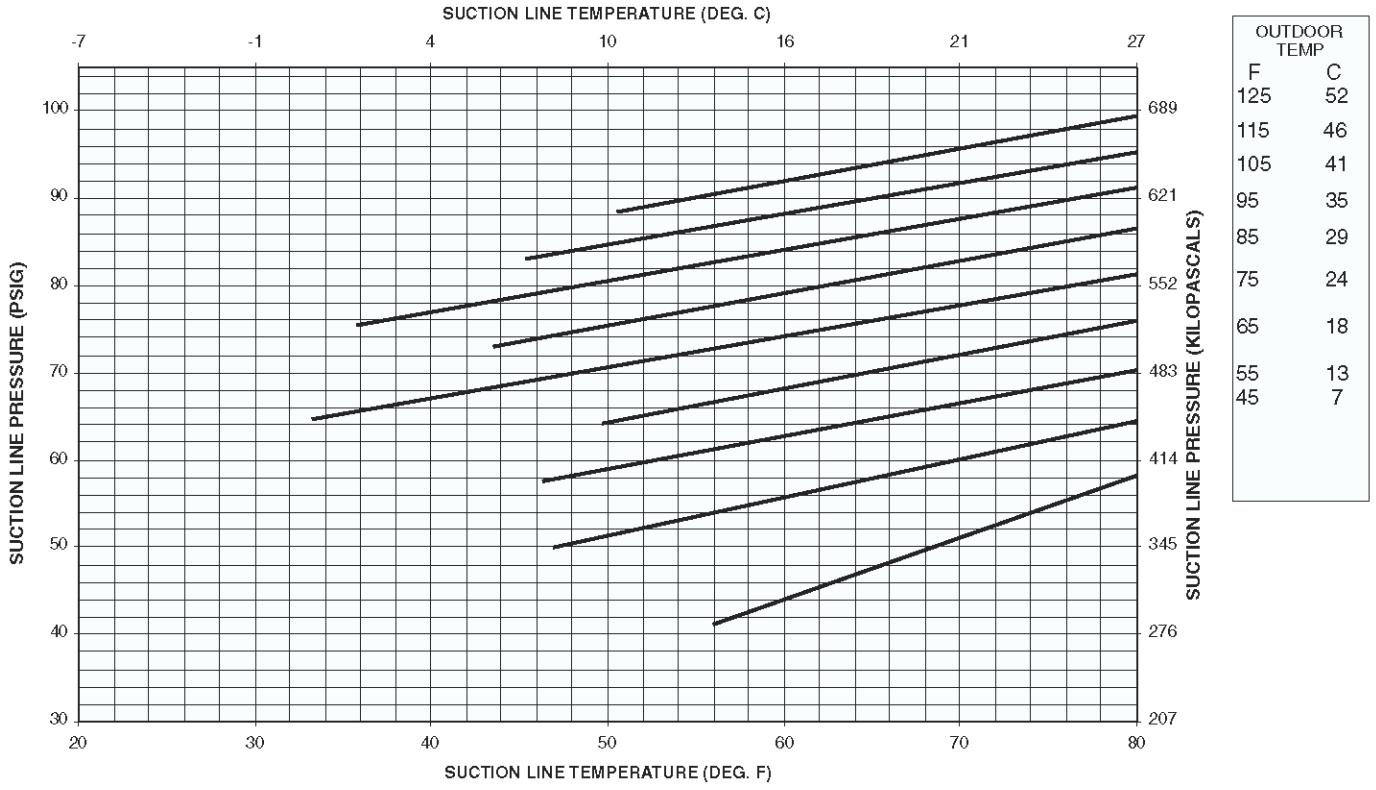


FIGURE 42 **Cooling Charging Chart, PGE072**

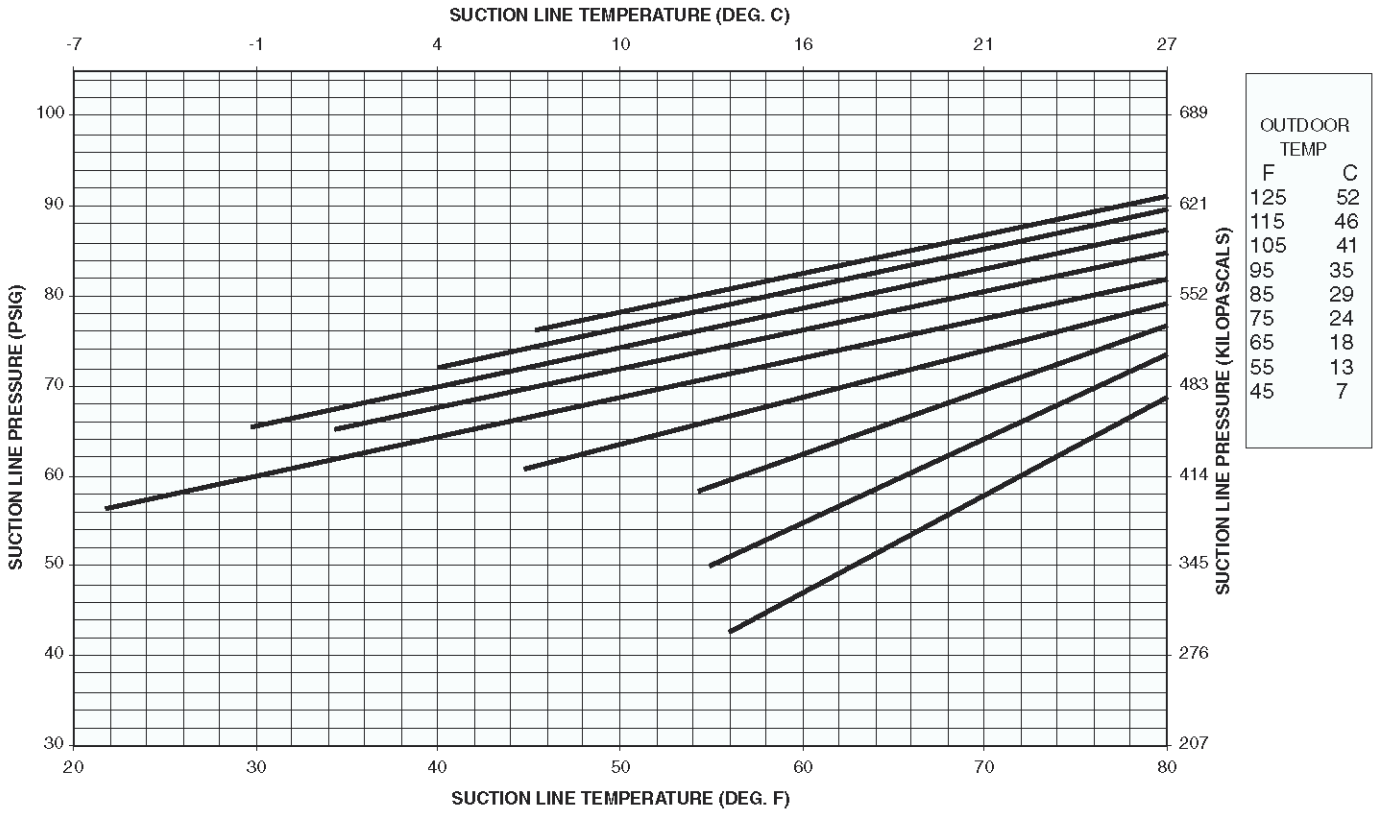


Table 31 – LED ERROR CODE DESCRIPTION

LED INDICATION	ERROR CODE DESCRIPTION
ON	Normal Operation
OFF	Hardware Failure
1 Flash†	Evaporator Fan On/Off Delay Modified
2 Flashes	Limit Switch Fault
3 Flashes	Flame Sense Fault
4 Flashes	4 Consecutive Limit Switch Faults
5 Flashes	Ignition Lockout Fault
6 Flashes	Induced-Draft Motor Fault
7 Flashes	Rollout Switch Fault
8 Flashes	Internal Control Fault
9 Flashes	Internal Software Processor Fault

LEGEND LED — Light-Emitting Diode

*A 3-second pause exists between LED error code flashes. If more than one error code exists, all applicable codes will be displayed in numerical sequence.

†Indicates a code that is not an error. The unit will continue to operate when this code is displayed. **IMPORTANT:** Refer to Troubleshooting Tables 32-34 for additional information.

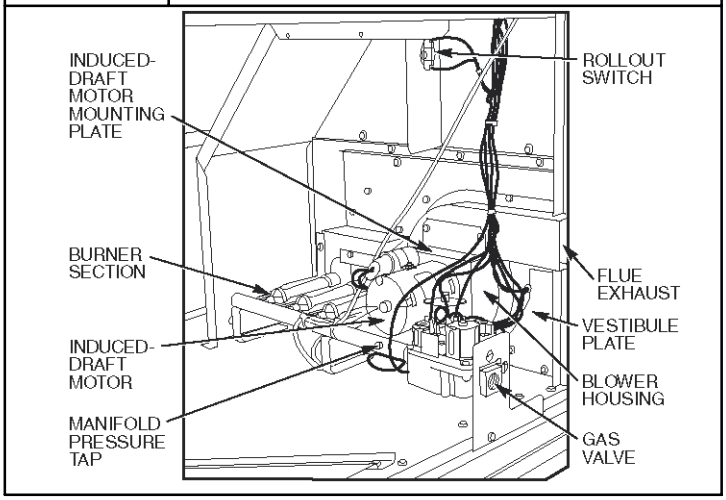
MAIN BURNERS

To access burners, remove burner access panel and slide out burner partition. At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames and adjust, if necessary.

Removal and Replacement of Gas Train (Fig. 43-45)

1. Shut off manual gas valve.
2. Shut off power to unit and tag disconnect.
3. Slide out burner partition.
4. Disconnect gas piping at unit gas valve.
5. Remove wires connected to gas valve. Mark each wire.

FIGURE 43 Burner Section Details



6. Remove ignitor wires and sensor wires at the Integrated Gas Unit Controller (IGC) (see Fig. 11).
7. Remove the 2 screws that attach the burner rack to the vestibule plate (Fig. 44).
8. Slide the burner tray out of the unit (Fig. 45).
9. To reinstall, reverse the procedure outlined above.

Cleaning and Adjustment

1. Remove burner rack from unit as described in Removal and Replacement of Gas Train section, above.
2. Inspect burners; if dirty, remove burners from rack.
3. Using a soft brush clean burners and cross-over port as required.
4. Adjust spark gap. See Fig. 45.
5. Reinstall burners on rack.
6. Reinstall burner rack as described in Removal and Replacement of Gas Train section, above.

HIGH-PRESSURE SWITCH

Located on the compressor hot gas line is a high-pressure switch containing a Schrader core depressor. This switch opens at 428 psig and closes at 320 psig. No adjustment is necessary. Refer to Table 1.

LOSS OF CHARGE SWITCH

Located on the condenser liquid line is a low-pressure switch which functions as a loss-of-charge switch. This switch contains a Schrader core depressor. This switch opens at 7 psig and closes at 22 psig. No adjustment is necessary. Refer to Table 1.

FREEZESTAT

Located on the hair pin end of the evaporator coil is a bimetal temperature sensing switch. This switch protects the evaporator coil from freeze-up due to lack of airflow. The switch opens at 30 F and closes at 45 F. No adjustment is necessary. Refer to Table 1.

REPLACEMENT PARTS

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

FIGURE 44 Burner Section Details

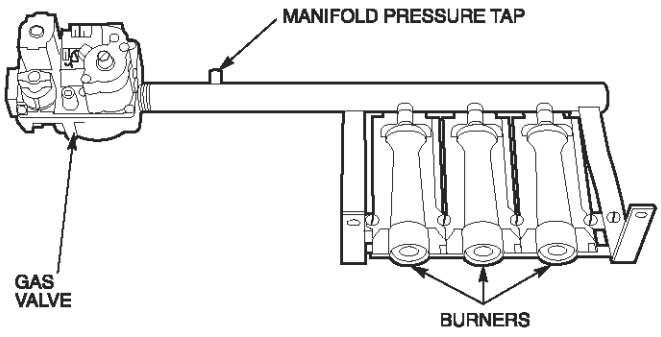
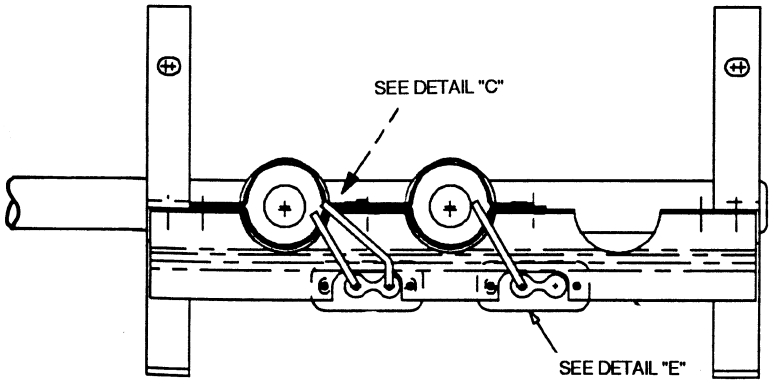
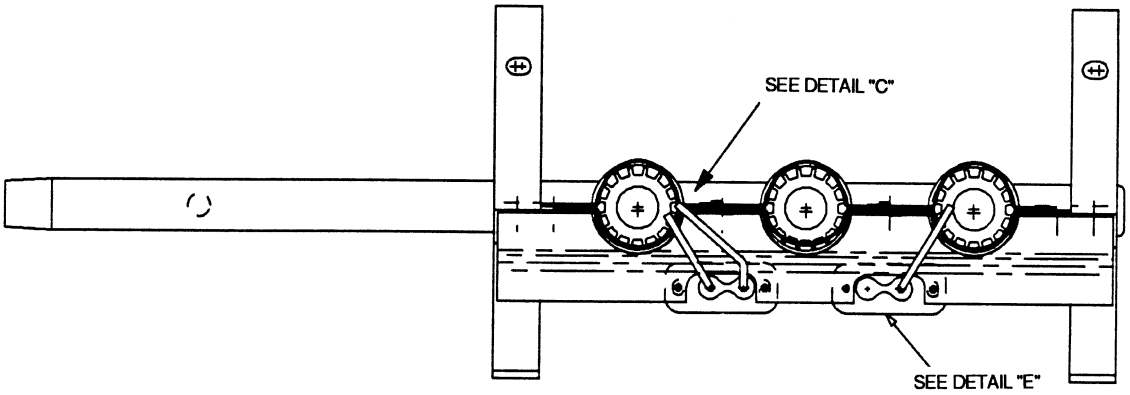


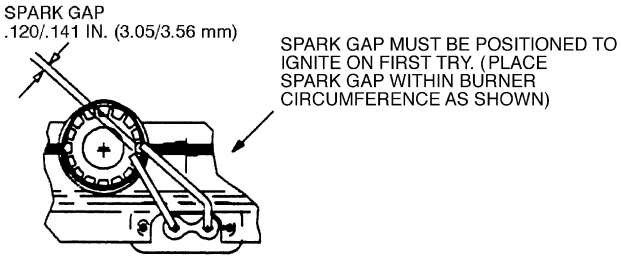
FIGURE 45 | **Spark Adjustment**



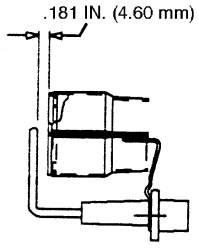
LOW HEAT
PGE036-72 - 74,000 BTUH INPUT
PGE036-60 (Low NOx) - 60,000 BTUH INPUT



MEDIUM AND HIGH HEAT
PGE036-72 - 115,000 BTUH INPUT
PGE048-72 - 150,000 BTUH INPUT
PGE036-60 (Low NOx) - 90,000 BTUH INPUT
PGE048-60 (Low NOx) - 120,000 BTUH INPUT



DETAIL "C"



DETAIL 'E'

TROUBLESHOOTING

Unit Troubleshooting

Refer to Tables 32-34 and Fig. 46 for unit troubleshooting information.

Economizer Troubleshooting

See Table 35 for economizer logic.

A functional view of the economizer is shown in Fig. 47. Typical settings, sensor ranges and jumper positions are also shown.

Economizer 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 troubleshooting. 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 SO and +. Connect 1.2 kilo-ohm 4074EJM checkout resistor across terminals SO and +.
8. Put 620-ohm resistor across terminals SR 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. Place 620-ohm resistor across SO and +.
3. Place 1.2 kilo-ohm resistor across SR and +. The Free Cool LED should be lit.
4. Remove 620-ohm resistor across SO 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 SR and +.
6. Remove 1.2 kilo-ohm checkout resistor from terminals SO and +. If used, reconnect sensor from terminals SO 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 32 - LED ERROR CODE SERVICE ANALYSIS

Table 1- TROUBLESHOOTING, LED Troubleshooting Error Code		
SYMPTOM	**CAUSE**	**REMEDY**
Hardware Failure (LED OFF)	Loss of power to control module (IGC).	Check 5 amp fuse on IGC, power to unit, 24-v circuit breaker, and transformer, Units withour a 24-v circuit breaker have an internal overload in the 24-v transformer. If the overload trips, allow 10 minutes to auto reset.
On/Off Delay Modified (LED 1 Flash)	High limit switch opens during heat exchanger warm-up period before fan-on delay expires. Limit switch opens within three minutes after blower-off delay timing in Heating mode.	Ensure unit is fired on rate and temperature rise is correct. Ensure unit's external static pressure is witin application guidelines.
Limit Switch Fault (LED 2 Flashes)	High temperature limit switch is open.	Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is in accordance with the range on the unit nameplate.
Flame Sense Fault (LED 3 Flashes)	The IGC sensed flame that should not be present.	Reset unit. If problem persists, replace control board.
4 Consecutive Limit Switch Faults (LED 4 Flashes)	Inadequate airflow to unit.	Check operation of indoor (evaporator) fan motor and that supply-air temperature rise agrees with range on unit nameplate.
Ignition Lockout Fault (LED 5 Flashes)	Unit unsuccessfully attempted ingnition for 15 minutes.	Check ignitor and flame sensor electrode spacing, gaps, etc. Ensure that flame sense and ignition wires are properly terminated. Verify that unit is obtaing proper amount of gas.
Induced-Draft Motor Fault (LED 6 Flashes)	IGC does not sense that induced-draft notor is operating.	Check for proper voltage. If motor is operating, check the speed sensor plug/IGC Terminal J2 connection. Proper connection: PIN 1 - White, PIN 2 - Red, PIN 3 - Black.
Rollout Switch Fault (LED 7 Flashes)	Rollout switch has opened.	Rollout switch will autmatically reset, but IGC will continue to lock out unit. Check gas valve operation. Ensure that induced draft blower wheeel is properly secured to motor shaft. Reset unit at unit disconnect.
Internal Switch Fault (LED 8 Flashes)	Micropreocessor has snesed an error in the software or hardware.	If error code is not cleared by resetting unit power, replace the IGC.
Internal Software Fault. (LED 9 flashes)	Internal Software Processor fault.	Fault code will automatically reset after one hour. Can be immediately reset by resetting unit power supply.
CAUTION: If the IGC must be replaced, be sure to ground yourself to dissipate any electrical charge that may be present before handling new control board. The IGC is sensitive to static electricity and may be damaged if the necessary precautions are not take.		**IMPORTANT:** Refer to Heating troubleshooting chart for additional troubleshooting analysis. LEGEND: IGC - Integrated Gas Controller. LED - Light emitting diode.

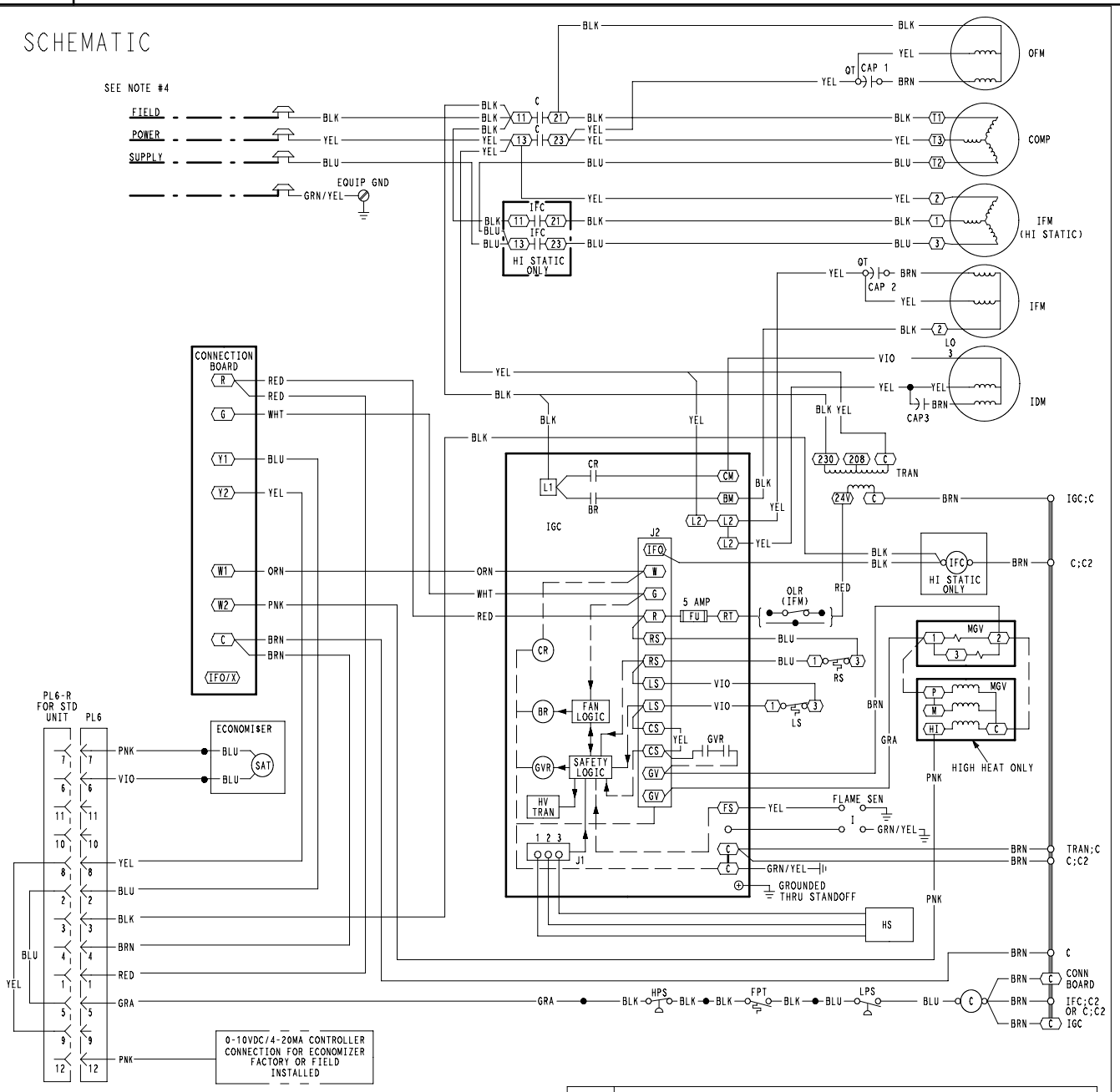
Table 33 – HEATING SERVICE ANALYSIS

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.
	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.	Use high speed tap, increase fan speed, or install optional blower, as suitable for individual units.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
	Too much outdoor air.	Adjust minimum position.
		Check economizer operation.
Poor Flame Characteristics.	Incomplete combustion (lack of combustion air) results in: Aldehyde odors, CO, sooting flame, or floating flame.	Check all screws around flue outlets and burner compartment. Tighten as necessary.
		Cracked heat exchanger.
		Overfired unit — reduce input, change orifices, or adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary.
		Check orifice to burner alignment.
Burners Will Not Turn Off.	Unit is locked into Heating mode for a one minute minimum.	Wait until mandatory one minute time period has elapsed or reset power to unit.

Table 34 – 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 run/start capacitor, overload, start relay.	Determine cause and replace.
	One leg of three-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 run/start capacitor, overload, or start relay.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor or capacitor.	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.
	Leaking valves in compressor.	Replace compressor.
	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.
	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.
	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
Excessive Suction Pressure.	High head load.	Check for source and eliminate.
	Compressor valves leaking.	Replace compressor.
	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.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Outdoor ambient below 25 F.	Install low-ambient kit.
Evaporator Fan Will Not Shut Off.	Time off delay not finished.	Wait for 30-second off delay.
Compressor Makes Excessive Noise (PGE072 Scroll Only).	Compressor rotating in wrong direction.	Reverse the 3-phase power leads as described in the Start-Up section on page 37.

FIGURE 46 | **Typical Unit Wiring Diagram**



NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP (ORN) AND CONNECT TO 208V TAP (RED). INSULATE END OF 230V WIRE.
4. USE COPPER CONDUCTORS ONLY.

LEGEND

C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CLO	COMPRESSOR LOCKOUT
COMP	COMPRESSOR MOTOR
EQUIP	EQUIPMENT
FPT	FREEZE UP PROTECTION THERMOSTAT
FSS	FILTER STATUS SWITCH
FU	FUSE
GND	GROUND
HPS	HIGH PRESSURE SWITCH
HS	HALL EFFECT SENSOR
I	IGNITOR
IAQ	INDOOR AIR QUALITY SENSOR
IARH	INDOOR AIR RELATIVE HUMIDITY SEN.
IDM	INDUCED DRAFT MOTOR
IFM	INDOOR FAN MOTOR
IGC	INTEGRATED GAS UNIT CONTROLLER
LA	LOW AMBIENT LOCKOUT
LPS	LOW PRESSURE SWITCH
LS	LIMIT SWITCH
MGV	MAIN GAS VALVE
OARH	OUTDOOR AIR RELATIVE HUMIDITY SEN.
OAT	OUTDOOR AIR TEMP. SEN.
OFM	OUTDOOR FAN MOTOR
OLR	OVERLOAD RELAY
P	PLUG
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
QT	QUADRUPLE TERMINAL
RAT	RETURN AIR TEMP. SEN.
RS	ROLLOUT SWITCH
SAT	SUPPLY AIR TEMP. SEN.
TRAN	TRANSFORMER

FIELD SPLICE
MARKED WIRE
TERMINAL (MARKED)
TERMINAL (UNMARKED)
TERMINAL BLOCK

SPLICE
SPLICE (MARKED)
FACTORY WIRING
FIELD CONTROL WIRING
FIELD POWER WIRING
ACCESSORY OR OPTIONAL WIRING
TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

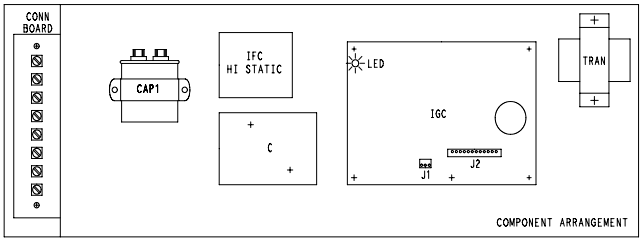


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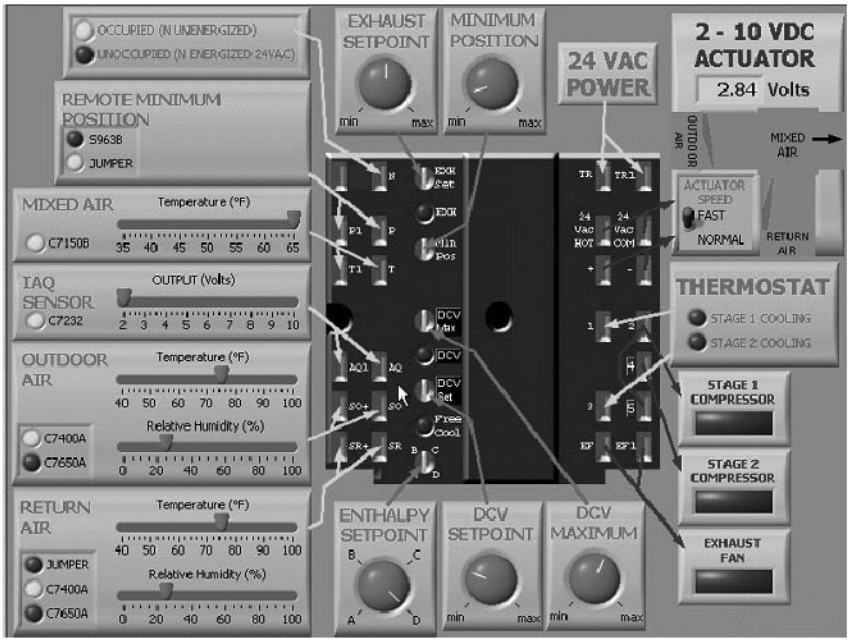
Table 35 – Economizer Input/Output Logic

INPUTS					OUTPUTS			
Demand Control Ventilation (DCV)	Enthalpy*				Compressor		N Terminal†	
							Occupied	Unoccupied
	Outdoor	Return	Y1	Y2	Stage 1	Stage 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	Minimum position	Closed
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		

FIGURE 47 **Economizer Functional View**



START-UP CHECKLIST

(Remove and Use in Job File)

I. PRELIMINARY INFORMATION:

MODEL NO.: _____ SERIAL NO.: _____

DATE: _____ TECHNICIAN: _____

BUILDING LOCATION: _____

II. PRE-START-UP (insert checkmark in box as each item is completed)

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTALLATION INSTRUCTIONS
- ☐ VERIFY THAT FLUE HOOD IS INSTALLED
- ☐ CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS
- ☐ CHECK TO ENSURE NO WIRES ARE TOUCHING REFRIGERANT TUBING OR SHARP EDGES
- ☐ CHECK GAS PIPING FOR LEAKS
- ☐ CHECK THAT RETURN-AIR FILTER IS CLEAN AND IN PLACE
- ☐ VERIFY THAT UNIT INSTALLATION IS LEVEL
- ☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS
- ☐ VERIFY PULLEY ALIGNMENT AND BELT TENSION ARE CORRECT

III. START-UP:

ELECTRICAL

SUPPLY VOLTAGE	L1-L2	_____	L2-L3	_____	L3-L1	_____
COMPRESSOR AMPS	L1	_____	L2	_____	L3	_____
INDOOR-FAN AMP	L1	_____	L2	_____	L3	_____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE	_____	DB	_____	WB	_____
RETURN-AIR TEMPERATURE	_____	DB	_____	WB	_____
COOLING SUPPLY AIR	_____	DB	_____	WB	_____
GAS HEAT SUPPLY AIR	_____	DB			

PRESSURES

GAS INLET PRESSURE	_____	IN. WG		
GAS MANIFOLD PRESSURE	_____	IN. WG (LOW FIRE)	_____	IN. WG (HI FIRE)
REFRIGERANT SUCTION	_____	PSIG	_____	TEMP F
REFRIGERANT DISCHARGE	_____	PSIG	_____	TEMP F

- ☐ VERIFY REFRIGERANT CHARGE USING CHARGING TABLES
- ☐ VERIFY THAT 3-PHASE SCROLL COMPRESSOR IS ROTATING IN CORRECT DIRECTION