48PG08−16
Single Package Rooftop Units
Electric Cooling/Gas Heating with Puron® (R−410A)
Refrigerant and Electromechanical Controls

Carrier
turn to the experts

Installation Instructions

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SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with kits or accessories when installing.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and National Electric Code (NEC) for special requirements.

Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instruction manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal 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.

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform the basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

Before installing or servicing unit, always turn off all power to unit. There may be more than 1 disconnect switch. Turn off accessory heater power, if applicable.

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

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

Puron® refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment.

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. What to do if you smell gas:

DO NOT try to light any appliance.
DO NOT touch any electrical switch, or use any phone in your building.
IMMEDIATELY call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
If you cannot reach your gas supplier, call the fire department.

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

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

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

INSTALLATION

Step 1 — Plan for Location

Select a location for the unit and its support system (curb or other) that provides minimum clearances required for safety, unit performance and service access below, around and above unit as specified in unit drawings. Consider also the effect of adjacent units.

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

Locate mechanical draft system flue assembly at least 4 ft from any opening through which combustion products could enter the building, and at least 4 ft from any adjacent building (or per local code). Locate the flue assembly at least 10 ft (or per local code) from an adjacent unit's fresh air intake hood if within 3 ft of same elevation. When unit is located adjacent to public walkways, flue assembly must be at least 7 ft above grade.

Select a unit mounting system that provides adequate height to allow installation of condensate trap per requirements. Refer to Step 7 — Install External Trap for Condensate Drain for required trap dimensions.

Roof Mount

Check building codes for weight distribution requirements. Unit operating weight is shown in Tables 1 and 2.

Step 2 — Provide Unit Support

Roof Curb

Assemble or install accessory roof curb in accordance with instructions shipped with this accessory. See Fig. 1 and 2. Install insulation, cant strips, roofing, and counter flashing as shown. Ductwork can be installed to roof curb before unit is set in place. Ductwork must be attached to curb and not to the unit. Curb must be level. This is necessary to permit unit drain to function properly. Unit leveling tolerance is $\pm\ ^1/_{16}$ in. per linear ft in any direction. Refer to Accessory Roof Curb Installation Instructions for additional information as required. When accessory roof curb is used, unit may be installed on class A, B, or C roof covering material. Carrier roof curb accessories are for flat roofs or slab mounting.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket with the roof curb as shown in Fig. 1, 2, and 3. Improperly applied gasket can also result in air leaks and poor unit performance. Do not slide unit to position on roof curb.

Alternate Unit Support

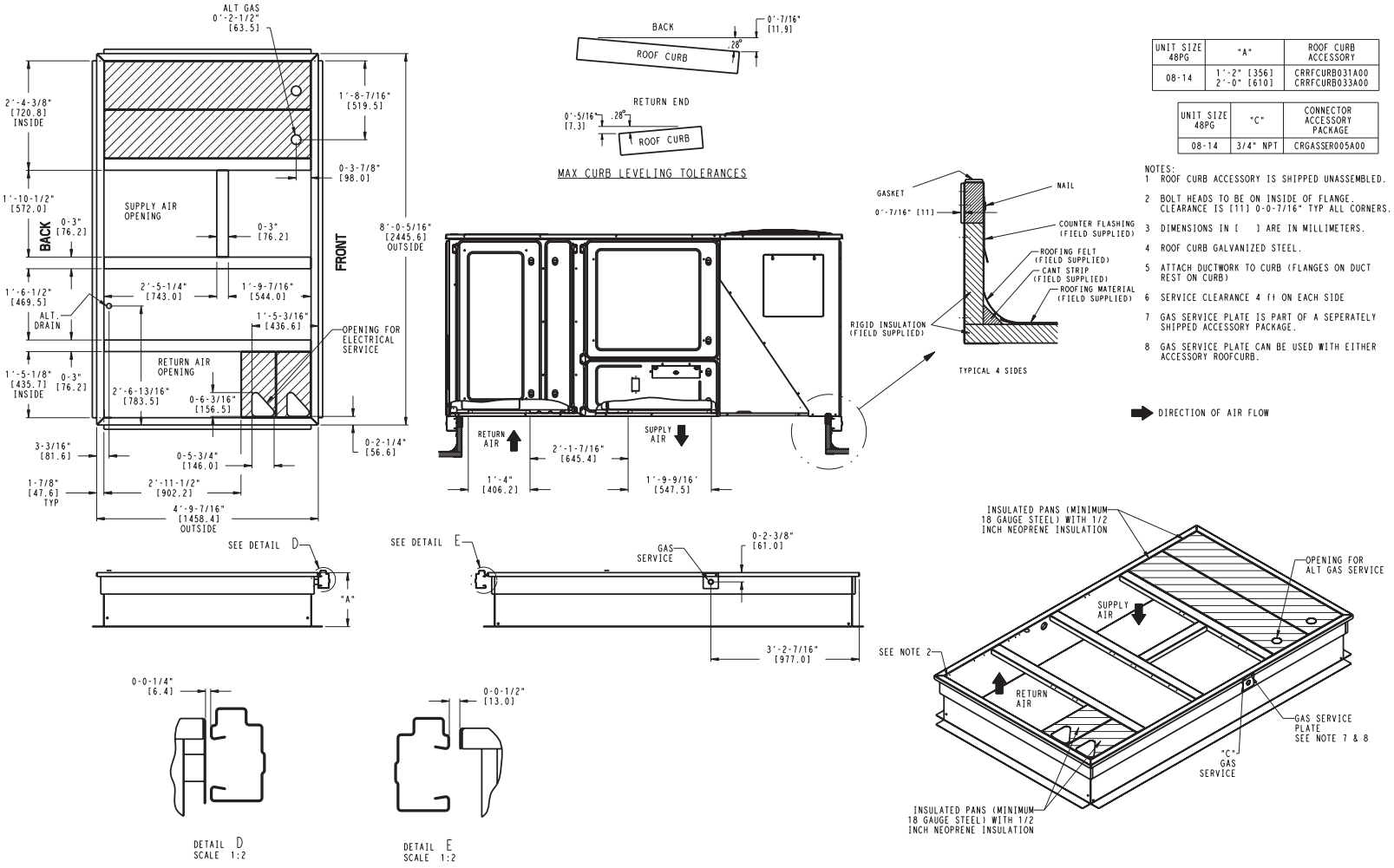
When a curb cannot be used, install unit on a noncombustible surface. Support unit with sleepers, using unit curb support area. If sleepers cannot be used, support long sides of unit with a minimum of 3 equally spaced 4-in. x 4-in. pads on each side.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

All panels must be in place when rigging.



UNIT SIZE 48PG	"A"	ROOF CURB ACCESSORY
08-14	1'-2" [356] 2'-0" [610]	CRRFCURB031A00 CRRFCURB033A00

UNIT SIZE 48PG	"C"	CONNECTOR ACCESSORY PACKAGE
08-14	3/4" NPT	CRGASSER005A00

NOTES:
1. ROOF CURB ACCESSORY IS SHIPPED UNASSEMBLED.
2. BOLT HEADS TO BE ON INSIDE OF FLANGE. CLEARANCE IS [11] 0-0-7/16" TYP ALL CORNERS.
3. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
4. ROOF CURB GALVANIZED STEEL.
5. ATTACH DUCTWORK TO CURB (FLANGES ON DUCT REST ON CURB)
6. SERVICE CLEARANCE 4 ft ON EACH SIDE
7. GAS SERVICE PLATE IS PART OF A SEPERATELY SHIPPED ACCESSORY PACKAGE.
8. GAS SERVICE PLATE CAN BE USED WITH EITHER ACCESSORY ROOFCURB.

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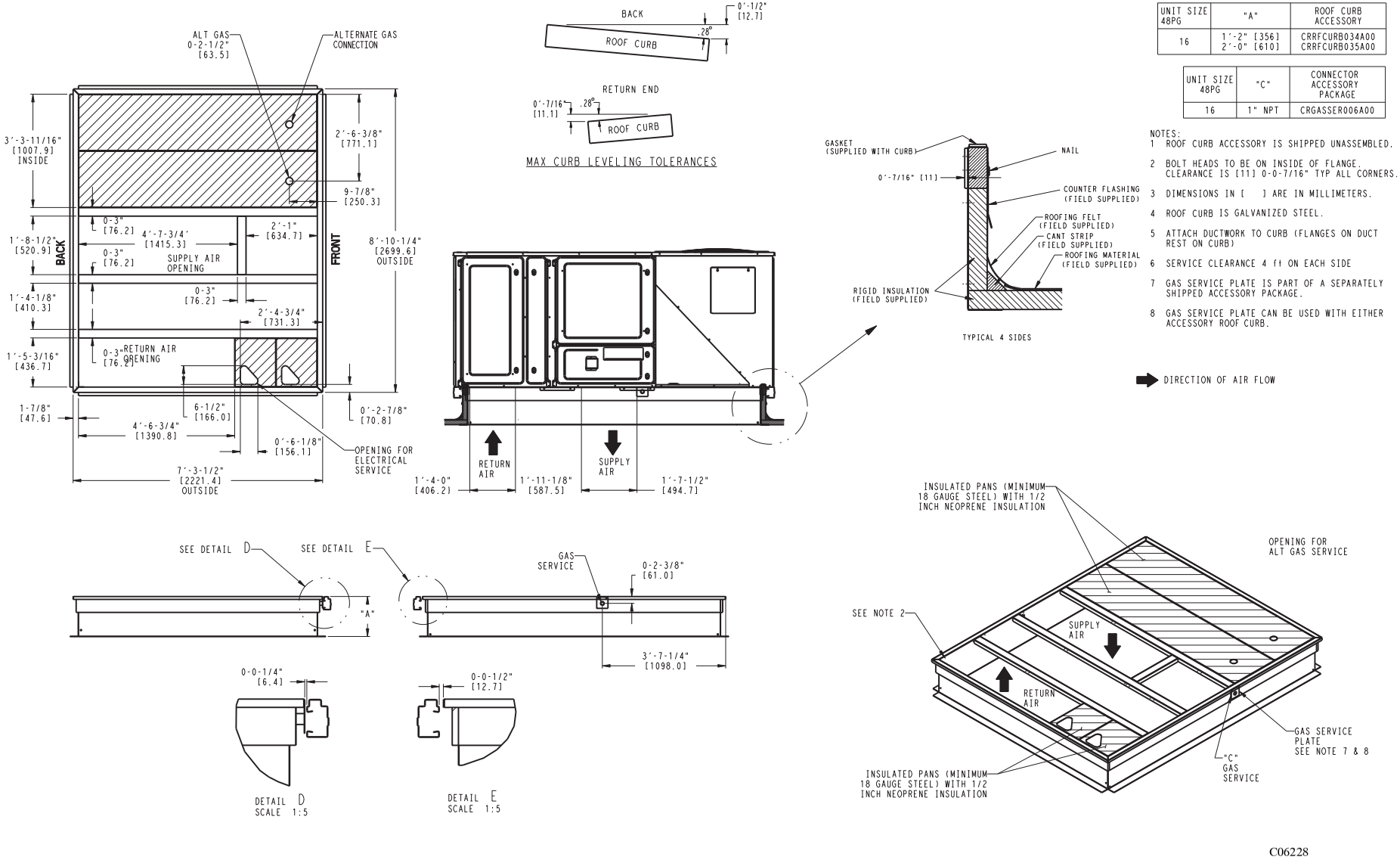
Fig. 1 – Roof Curb Details (48PG08-14)



UNIT SIZE 48PG	"A"	ROOF CURB ACCESSORY
16	1'-2" [356] 2'-0" [610]	CRRFCURB034A00 CRRFCURB035A00

UNIT SIZE 48PG	"C"	CONNECTOR ACCESSORY PACKAGE
16	1" NPT	CRGASSER006A00

NOTES:
1 ROOF CURB ACCESSORY IS SHIPPED UNASSEMBLED.
2 BOLT HEADS TO BE ON INSIDE OF FLANGE. CLEARANCE IS [11] 0-0-7/16" TYP ALL CORNERS.
3 DIMENSIONS IN [ ] ARE IN MILLIMETERS.
4 ROOF CURB IS GALVANIZED STEEL.
5 ATTACH DUCTWORK TO CURB (FLANGES ON DUCT REST ON CURB)
6 SERVICE CLEARANCE 4 ft ON EACH SIDE
7 GAS SERVICE PLATE IS PART OF A SEPARATELY SHIPPED ACCESSORY PACKAGE.
8 GAS SERVICE PLATE CAN BE USED WITH EITHER ACCESSORY ROOF CURB.

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Fig. 2 – Roof Curb Details (48PG16)

Step 3 — Rig and Place Unit

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution could result in unit and/or property damage.

Do not slide unit to position when it is sitting on the curb. Curb gasketing material may be damaged and leaks may result.

Inspect unit for transportation damage. See Tables 1 and 2 for physical data. File any claim with transportation agency.

Do not drop unit; keep upright. Use wooden top skid or spreader bars over unit to prevent sling or cable damage. Rollers may be used to move unit across a roof. Level by using unit rail as a reference; leveling tolerance is ± $^1/_{16}$ in. per linear ft in any direction. See Fig. 3 for additional information. Unit rigging weight is shown in Fig. 3.

Rigging holes are provided in the unit base rails as shown in Fig. 2. Refer to rigging instructions on unit.

Installation Onto Curb

The 48PG units are designed to fit on the accessory full perimeter curb. Correct placement of the unit onto the curb is critical to operating performance. To aid in correct positioning, place unit on roof curb to maintain $^1/_4$-in. gap between the inside of rail and roof curb on long sides and a $^1/_2$-in. gap between the inside of rail and roof curb on both duct and condenser ends. Refer to Fig. 1, 2, 3 and 4, to assure proper duct opening alignment.

NOTE: Before positioning unit on curb, make sure bottom drain connection plug is tight. See Step 7 — Install External Trap for Condensate Drain for more information.

Slab Mount (Horizontal Units Only)

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

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

⚠ CAUTION - NOTICE TO RIGGERS:
ACCESS PANEL MUST BE IN PLACE WHEN RIGGING.

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.

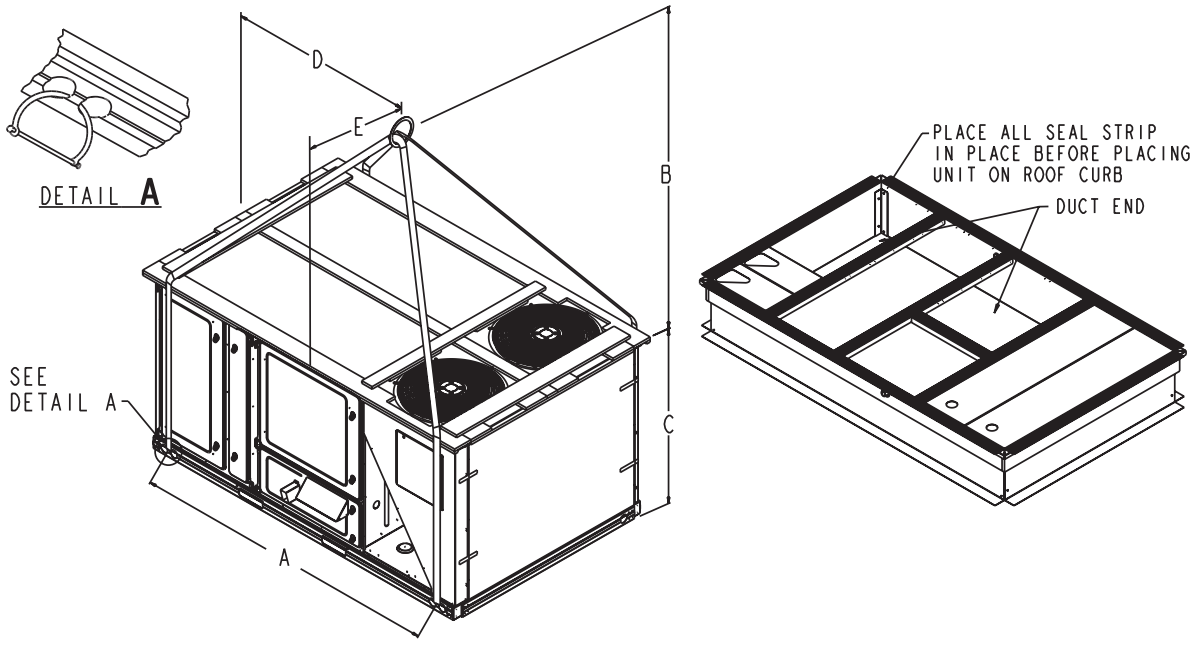

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Fig. 3 – 48PG Rigging Label

Table 1 — Physical Data (48PG08-14)

BASE UNIT 48PG		08	09	12	14
NOMINAL CAPACITY (Tons)		7 1/2	8 1/2	10	12 1/2
OPERATING WEIGHT (lb)					
Unit*		1217	1224	1324	1400
Economizer					
Vertical		57	57	57	57
Horizontal		59	59	59	59
Roof Curb					
14-in.		180	180	180	180
24-in.		268	268	268	268
COMPRESSOR		Fully Hermetic Scroll			
Quantity		2	2	2	2
Oil Type Sys A		Copeland 3MA	Copeland 3MA	Copeland 3MA	Copeland 3MA
Sys B		Copeland 3MA	Copeland 3MA	Copeland 3MA	Copeland 3MA
Number of Refrigerant Circuits		2	2	2	2
Oil (oz) Sys A		42	42	66	56
Sys B		42	42	66	56
REFRIGERANT TYPE		R-410A (Puron® Refrigerant)			
Expansion Device		TXV	TXV	TXV	TXV
Operating Charge (lb) Sys A		11.8	11.3	13.7	17.2
Sys B		11.8	11.3	13.7	17.2
Operating Charge Total All Systems (lb)		23.5	22.6	27.4	34.4
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins, Face Split			
Condenser A (Outer)					
Rows...Fins/in.		2…17	2…17	2…17	3…17
Face Area (sq ft)		17.4	17.4	17.4	17.4
Condenser B (Inner)					
Rows...Fins/in.		2...17	2...17	2...17	3...17
Face Area (sq ft)		17.4	17.4	17.4	17.4
CONDENSER FAN		Propeller			
Quantity…Diameter (in.)		2...24	2...24	2...24	2...24
Nominal Cfm (Total, all fans)		7204	7204	8241	7300
Motor Hp		1/4	1/4	1/3	1/3
Nominal Rpm		1100	1100	1100	1100
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Face Split			
Rows…Fins/in.		3…15	3…15	4…15	4…15
Face Area (sq ft)		14.9	14.9	14.9	14.9
EVAPORATOR FAN		Centrifugal Type, Belt Drive			
Quantity…Size (in.)	Low	1...15 x 15	1...15 x 15	1...15 x 15	1...15 x 15
	High	1...15 x 15	1...15 x 15	1...15 x 15	1...15 x 15
Type Drive	Low	Belt	Belt	Belt	Belt
	High	Belt	Belt	Belt	Belt
Nominal Cfm		3000	3400	4000	5000
Maximum Continuous Bhp	Low	2.4	2.4	3.1	3.7
	High	3.1	3.7	3.7	5.25
Motor Nominal Rpm		1725	1725	1725	1725
Motor Frame Size	Low	56Y	56Y	56Y	56Y
	High	56Y	56Y	56Y	56Y
Fan Rpm Range	Low	568-771	568-771	690-893	690-893
	High	812-1015	812-1015	852-1055	852-1055
Motor Bearing Type		Ball	Ball	Ball	Ball
Maximum Fan Rpm		1600	1600	1600	1600
Motor Pulley Pitch Diameter Range (in.)	Low	2.8-3.8	2.8-3.8	3.4-4.4	3.4-4.4
	High	4.0-5.0	4.0-5.0	4.6-5.6	4.6-5.6
Fan Pulley Pitch Diameter	Low	8.5	8.5	8.5	8.5
	High	8.5	8.5	8.5	8.5
Nominal Motor Shaft Diameter (in.)	Low	5/8	5/8	7/8	7/8
	High	7/8	7/8	7/8	7/8
Belt…Pitch Length (in.)	Low	63.3	63.3	63.3	63.3
	High	65.3	65.3	65.3	65.3
Belt…Type	Low	AX	AX	AX	AX
	High	AX	AX	AX	AX
Pulley Center Line Distance Min. (in.)	Low	21.0	21.0	21.0	21.0
	High	21.0	21.0	21.0	21.0
Pulley Center Line Distance Max. (in.)	Low	23.4	23.4	23.4	23.4
	High	23.4	23.4	23.4	23.4
Speed Change per Full Turn of Movable Pulley Flange (rpm)	Low	41	41	41	41
	High	41	41	41	41
Movable Pulley Maximum Full Turns from Closed Position	Low	5	5	5	5
	High	5	5	5	5
Factory Pulley Setting (rpm)	Low	568	568	690	690
	High	812	812	852	852
Fan Shaft Diameter at Pulley (in.)		1	1	1	1
GAS HEAT SECTION					
Rollout Switch					
Open Temperature (F)	Low	225	225	225	225
	Med	225	225	225	225
	High	225	225	225	225
Closed Temperature (F)	Low	175	175	175	175
	Med	175	175	175	175
	High	175	175	175	175
Gas Input (Btuh) Stage 1 /Stage 2	PGD/L	95,200/136,000	95,200/136,000	126,700/181,000	126,700/181,000
	PGE/M	126,700/181,000	126,700/181,000	158,200/226,000	158,200/226,000
	PGF/N	158,200/226,000	158,200/226,000	174,300/249,000	174,300/249,000
Burner Orifice Diameter (in. ...drill size)†					
Natural Gas		0.089...43	0.089...43	0.089...43	0.089...43
Liquid Propane		0.070...50	0.070...50	0.070...50	0.070...50
Thermostat Heat Anticipator Setting (amps)					
First Stage		.14	.14	.14	.14
Second Stage		.20	.20	.20	.20
Manifold Pressure (in. wg)					
Natural Gas		3.5	3.5	3.5	3.5
Liquid Propane		3.5	3.5	3.5	3.5

BASE UNIT 48PG		08	09	12	14
Gas Valve Quantity		1	1	1	1
Gas Supply Pressure Range (in. wg)		5.0-13.0	5.0-13.0	5.0-13.0	5.0-13.0
Field Gas Connection Size (in.)		3/4	3/4	3/4	3/4
HIGH-PRESSURE SWITCH (psig)					
Cutout		660 ± 10	660 ± 10	660 ± 10	660 ± 10
Reset (Auto.)		505 ± 20	505 ± 20	505 ± 20	505 ± 20
LOW-PRESSURE SWITCH (psig)					
Cutout		40 ± 7	40 ± 7	40 ± 7	40 ± 7
Reset (Auto.)		80 ± 7	80 ± 7	80 ± 7	80 ± 7
FREEZE PROTECTION THERMOSTAT (F)					
Cutout		30 ± 5	30 ± 5	30 ± 5	30 ± 5
Reset (Auto.)		45 ± 5	45 ± 5	45 ± 5	45 ± 5
RETURN-AIR FILTERS		Throwaway			
Quantity…Size (in.)		4...20 x 25 x 2	4...20 x 25 x 2	4...20 x 25 x 2	4...20 x 25 x 2

LEGEND

TXV — Thermostatic Expansion Valve

* Aluminum evaporator coil/aluminum condenser coil.

† For applications less than 2000 ft elevation.

Table 2 — Physical Data (48PG16)

BASE UNIT 48PG		16
NOMINAL CAPACITY (Tons)		15
OPERATING WEIGHT (lb)		
Unit*		1895
EconoMizer		
Vertical		149
Horizontal		149
Roof Curb		
14-in.		240
24-in.		360
COMPRESSOR		Fully Hermetic Scroll
Quantity		3
Oil Type Sys A		Copeland 3MA
Sys B		Copeland 3MA
Sys C		Copeland 3MA
Number of Refrigerant Circuits		3
Oil (oz) Sys A		66
Sys B		66
Sys C		66
REFRIGERANT TYPE		R-410A (Puron® Refrigerant)
Expansion Device		TXV
Operating Charge (lb) Sys A		13.5
Sys B		15.0
Sys C		15.0
Operating Charge Total All Systems (lb)		43.5
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins, Face Split
Condenser A (Outer)		
Rows...Fins/in.		2…17
Face Area (sq ft)		26.6
Condenser B (Inner)		
Rows...Fins/in.		2...17
Face Area (sq ft)		30.2
CONDENSER FAN		Propeller
Quantity…Diameter (in.)		3...24
Nominal Cfm (Total, all fans)		12,500
Motor Hp		1/3
Nominal Rpm		1100
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Face Split
Rows…Fins/in.		3…15
Face Area (sq ft)		22.2
EVAPORATOR FAN		Centrifugal Type, Belt Drive
Quantity…Size (in.)	Low	1...15x15, 1...12x12
	Mid-Low	1...15x15, 1...12x12
	High	1...15x15, 1...12x12
Type Drive	Low	Belt
	Mid-Low	Belt
	High	Belt
Nominal Cfm		6000
Maximum Continuous Bhp	Low	3.7
	Mid-Low	5.25
	High	7.5
Motor Frame Size	Low	56
	Mid-Low	56
	High	S213T
Fan Rpm Range	Low	710- 879
	Mid-Low	872-1066
	High	1066-1260
Motor Bearing Type		Ball
Motor Pulley Pitch Diameter Min (in.)	Low	4.2
	Mid-Low	4.2
	High	4.2
Motor Pulley Pitch Diameter Max (in.)	Low	5.2
	Mid-Low	5.2
	High	6.2
Fan Pulley Pitch Diameter (in.)	Low	10.2
	Mid-Low	8.5
	High	8.5
Nominal Motor Shaft Diameter (in.)	Low	7/8
	Mid-Low	7/8
	High	1 3/8

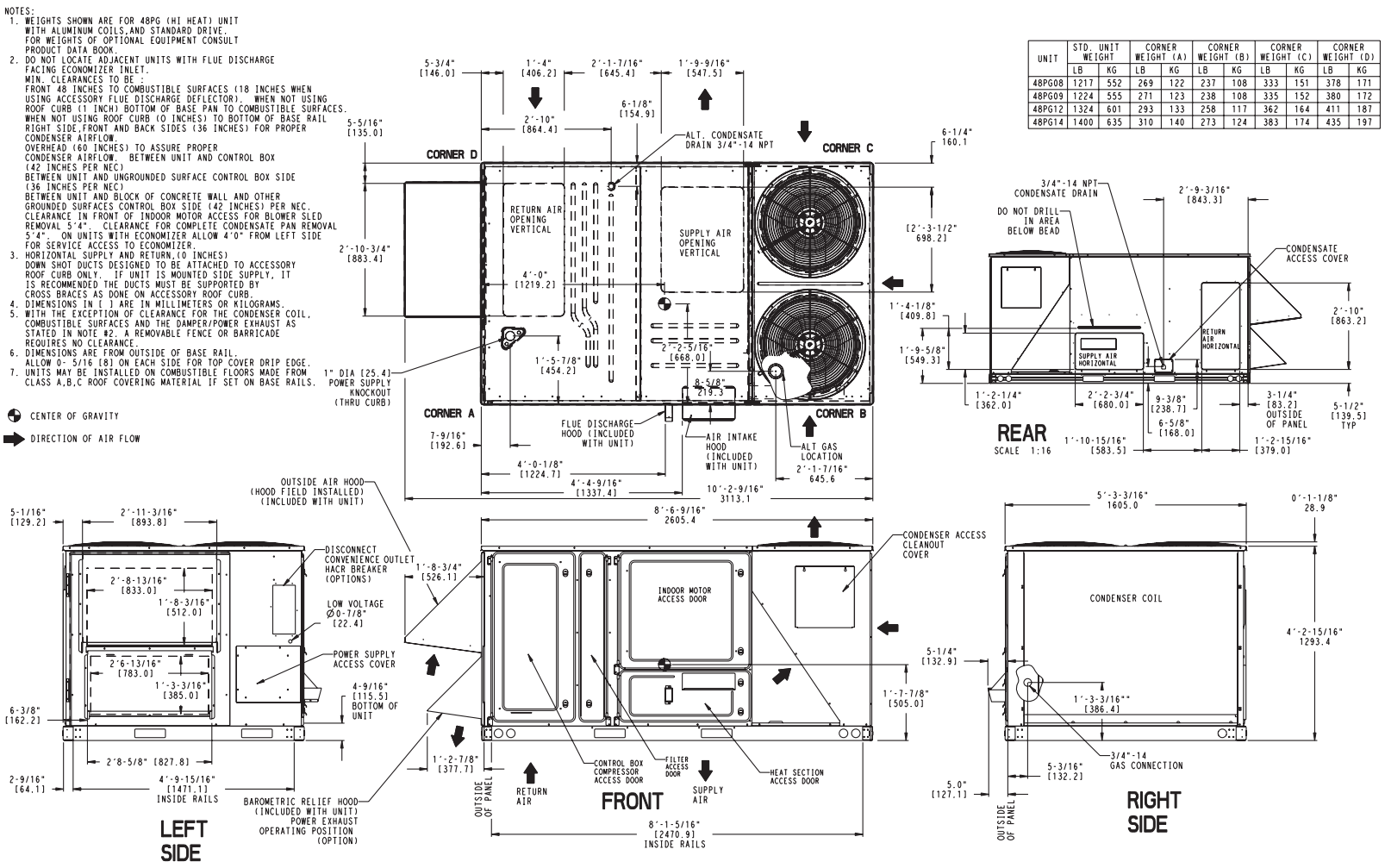
BASE UNIT 48PG		16
Belt…Pitch Length (in.)	Low	49.3
	Mid-Low	47.8
	High	43.8
Belt…Type	Low	AX
	Mid-Low	BX
	High	BX
Pulley Center Line Distance Min. (in.)	Low	14.2
	Mid-Low	10.8
	High	8.6
Pulley Center Line Distance Max. (in.)	Low	10.8
	Mid-Low	14.2
	High	12
Speed Change per Full Turn of Movable Pulley Flange (rpm)	Low	34
	Mid-Low	41
	High	41
Movable Pulley Maximum Full Turns from Closed Position	Low	5
	Mid-Low	5
	High	5
Factory Pulley Setting (rpm)	Low	812
	Mid-Low	983
	High	1191
Fan Shaft Diameter at Pulley (in.)		$1\,^{3}/_{16}$
GAS HEAT SECTION		
Rollout Switch		
Open Temperature (F)	Low	195
	Med	195
	High	195
Closed Temperature (F)	Low	115
	Med	115
	High	115
Gas Input (Btuh) Stage 1/Stage 2	PGD/L	176,000/220,000
	PGE/M	248,000/310,000
	PGF/N	320,000/400,000
Burner Orifice Diameter (in. ...drill size)†		
Natural Gas	Std	0.1285...30
Liquid Propane	Alt	0.1015...38
Thermostat Heat Anticipator Setting (amps)		
First Stage		.14
Second Stage		.20
Manifold Pressure (in. wg)		
Natural Gas	Std	3.0
Liquid Propane	Alt	3.0
Gas Valve Quantity		1
Gas Supply Pressure Range (in. wg)		5.0-13.0
Field Gas Connection Size (in.)		$^{3}/_{4}$
HIGH-PRESSURE SWITCH (psig)		
Cutout		660 ± 10
Reset (Auto.)		505 ± 20
LOW-PRESSURE SWITCH (psig)		
Cutout		40 ± 7
Reset (Auto.)		80 ± 7
FREEZE PROTECTION THERMOSTAT (F)		
Cutout		30 ± 5
Reset (Auto.)		45 ± 5
RETURN-AIR FILTERS		Throwaway
Quantity…Size (in)		8...20 x 20 x 2

LEGEND

TXV — Thermostatic Expansion Valve

* Aluminum evaporator coil/aluminum condenser coil.

† For applications less than 2000 ft elevation.



UNIT	STD. UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)	
	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG
48PG08	1217	552	269	122	237	108	333	151	378	171
48PG09	1224	555	271	123	238	108	335	152	380	172
48PG12	1324	601	293	133	258	117	362	164	411	187
48PG14	1400	635	310	140	273	124	383	174	435	197

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Fig. 4 – Base Unit Dimensions (48PG08-14)

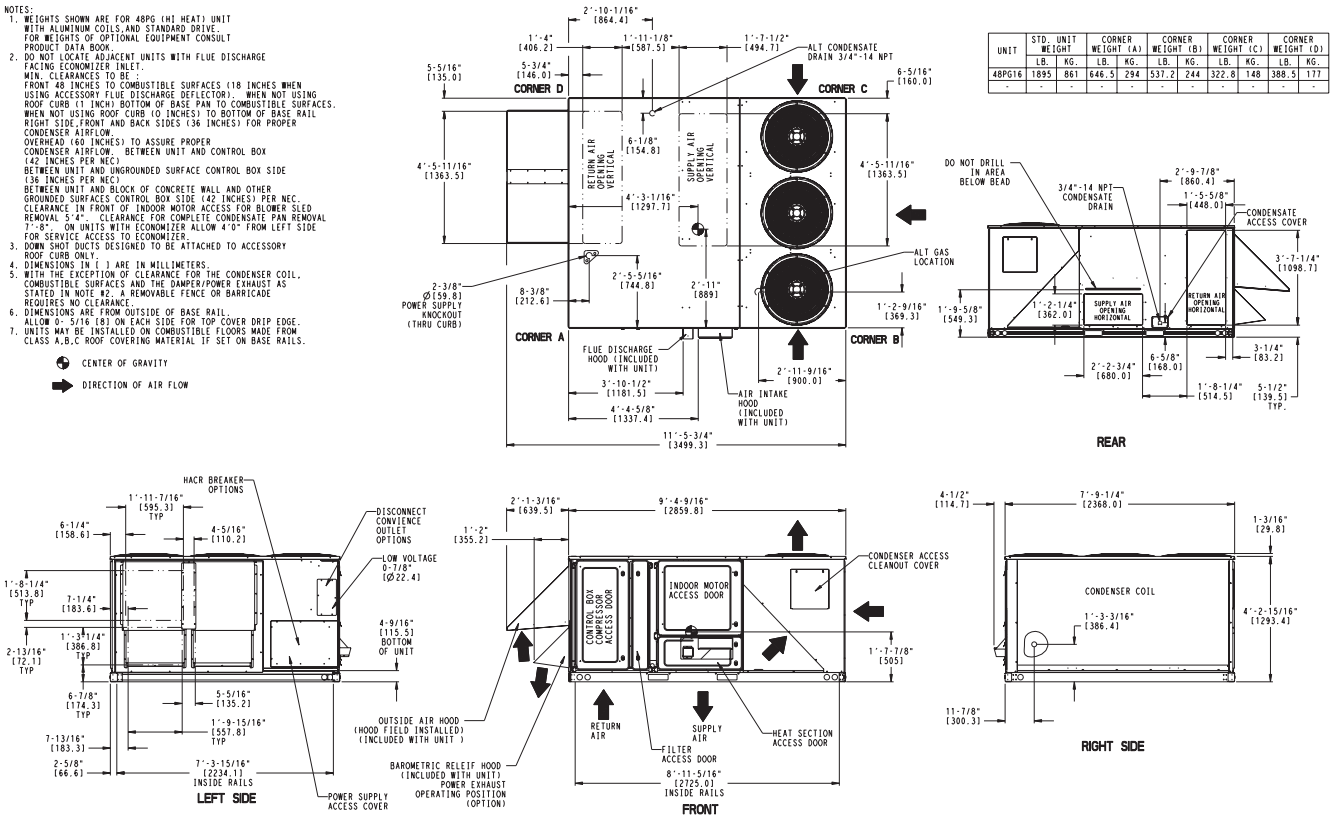

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Fig. 5 – Base Unit Dimensions (48PG16)

Step 4 —Field Fabricate Ductwork

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

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

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

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

These units are designed for a minimum continuous return-air temperature in heating 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 5 —Make Unit Duct Connections

Vertical Supply/Return Configuration

Unit is shipped in vertical supply/return configuration. Ductwork openings are shown in Fig. 1, 2, 4, and 5. Attach the ductwork to the roof curb. Do not attach duct directly to the unit.

⚠ CAUTION

PERSONAL INJURY HAZARD

Failure to follow this caution may result in personal injury.

For vertical supply and return units, tools or parts could drop into ductwork and cause an injury. Install a 90° turn in the return ductwork between the unit and the conditioned space. If a 90° elbow cannot be installed, then a grille of sufficient strength and density should be installed to prevent objects from falling into the conditioned space.

Horizontal Supply/Return Applications (Sizes 08-14 Only)

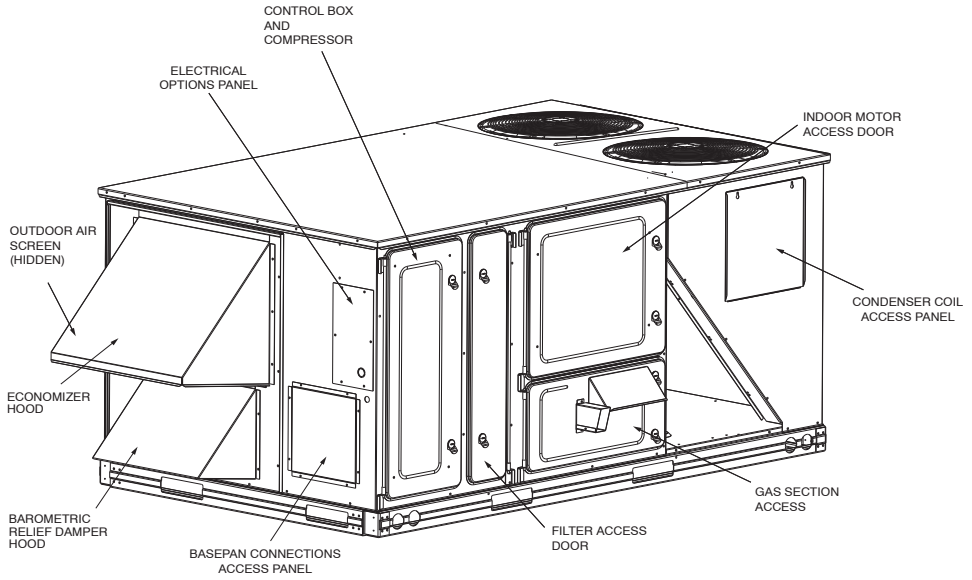
Unit can be field-converted from vertical supply/return to horizontal supply/return. Remove all screws securing horizontal duct covers to duct panel. Save panels. Apply a bead of RTV around flange of duct cover (on painted side). Install duct covers in the vertical duct openings in the basepan with the insulation side up. Covers will drop into openings and can be secured using field-supplied self-tapping screws. Ductwork can be attached to duct flanges provided on unit. When securing ductwork to unit, do not drill in area below bead or above top edge of duct opening. For 16 size units, an accessory kit is available for field-converting vertical to horizontal supply/return. Refer to instructions provided with kit. Duct openings are shown in Fig. 1, 2, 4, and 5.

Step 6 —Install Flue Hood and Inlet Hood

Flue hood (smaller hood), inlet hood (larger hood), and screens are shipped inside the unit in the gas section. To install, open the gas section access door. The flue hood is attached to the gas section access door from the outside using the screws provided. See Fig. 6 - 9.

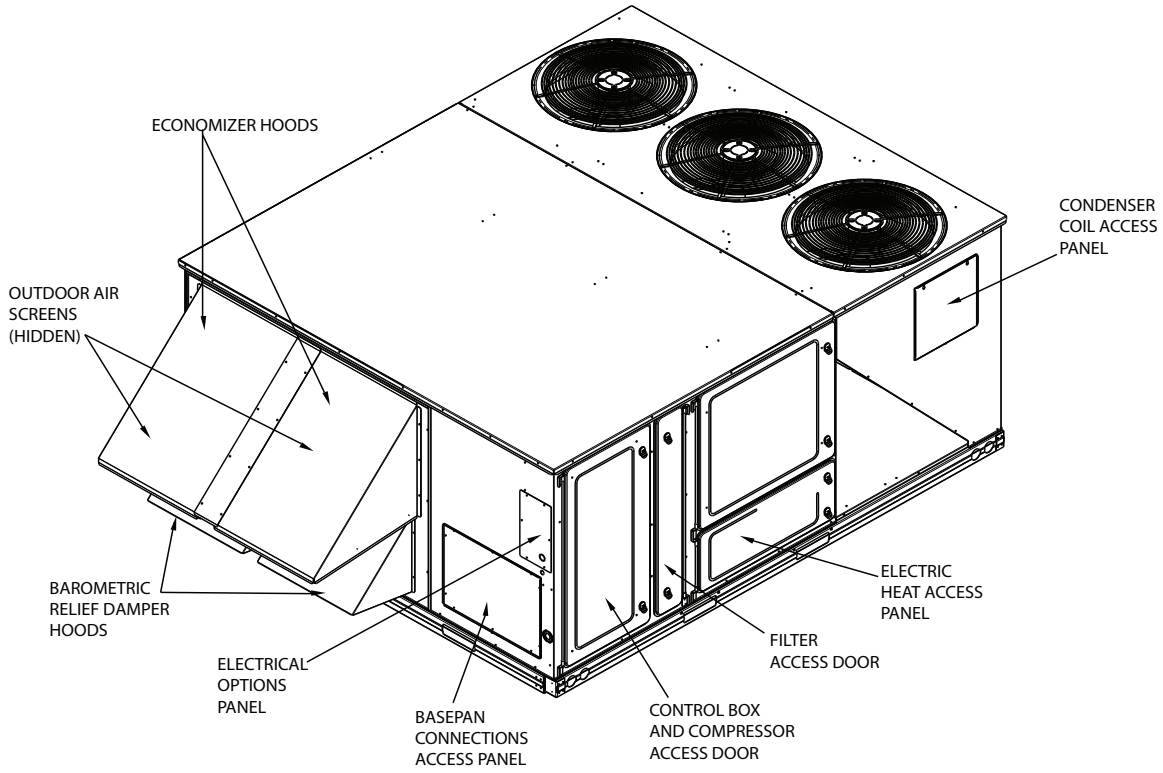
The inlet hood is installed by inserting the hood through the back of the gas section access door. Attach the hood by inserting the screws provided through the clearance holes in the gas section access door and into the intake hood.

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



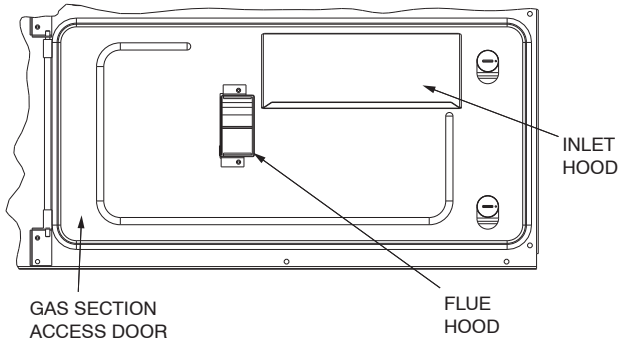
C06255

Fig. 6 — Panel and Filter Locations (48PG08-14)



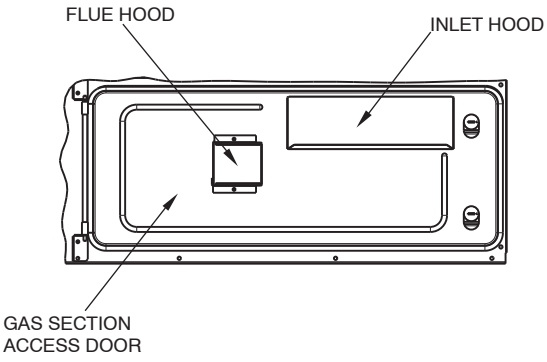
C06309

Fig. 7 – Panel and Filter Locations (48PG16)



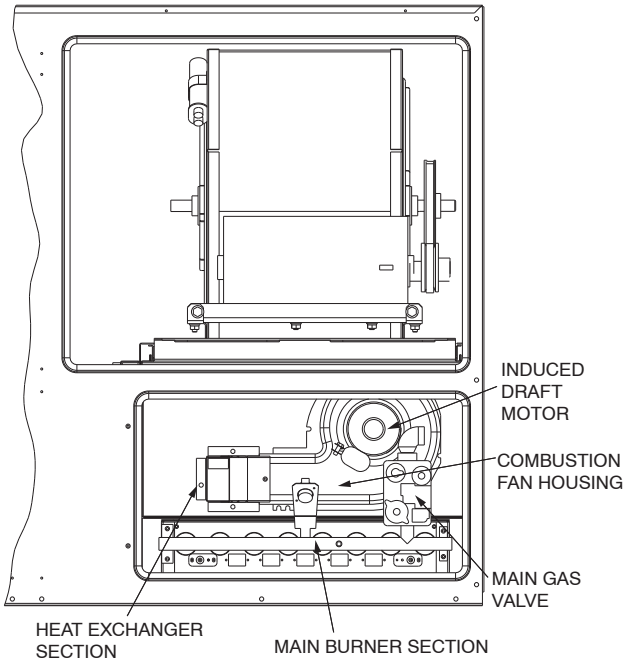
C06257

Fig. 8 – Flue and Inlet Hood Locations (48PG08-14)



C06230

Fig. 9 – Flue and Inlet Hood Locations (48PG16)



C06258

Fig. 10 – Typical Gas Heating Section (Sizes 08-14 Shown)

Step 7 —Install External Trap for Condensate Drain

The unit's $^3/_4$-in. condensate drain connections are located on the bottom and side of the unit. If the down drain is used, drill a minimum of 5/8-in. diameter hole but not larger than a 3/4-in. diameter hole through the drain pan. A dimple of 2 mm in diameter and 1.5 mm deep will be provided in the drain pan to help locate the drill bit and to start the hole. Do not cut through the PVC pipe threads. Unit discharge connections do not determine the use of drain connections; either drain connection can be used with vertical or horizontal applications. See Fig. 4 and 5 for locations.

When using the standard side drain connection, make sure the plug (red) covering the alternate bottom connection is tight before installing the unit. (See Fig. 11.)

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. A $^1/_2$-in. socket extension can be used to remove the plug. (See Fig. 11.) 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. 12 and 13.)

The 48PG units are provided with a removable condensate pan for ease of cleaning. It is recommended that a union be placed between the unit and condensate drainage to ease the removal of the pan during servicing. Adequate clearance should be allowed if removal of condensate pan is required. Allow 64-in. (sizes 08-14) or 93-in. (size 16) between condensate pan access panel and any obstruction for complete removal.

Step 8 —Install Gas Piping

Unit is equipped for use with natural gas. Refer to local building codes, or in the absence of local codes, to ANSI Z223.1-latest year and addendum Z223.1A-latest year entitled HFGC. In Canada, installation must be in accordance with the CAN1.B149.1 and CAN1.B149.2 installation codes for gas burning appliances.

Support gas piping as shown in the table in Fig. 14. 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 3 support beams. See Fig. 14 for typical pipe guide and locations of external manual gas shutoff valve.

Install field-supplied manual gas shutoff valve with a $^1/_8$-in. NPT pressure tap for test gauge connection at unit. The pressure tap is located on the gas manifold, adjacent to the gas valve. Field gas piping must include sediment trap and union. (See Fig. 15.) Install a field-supplied gas regulator.

⚠ WARNING

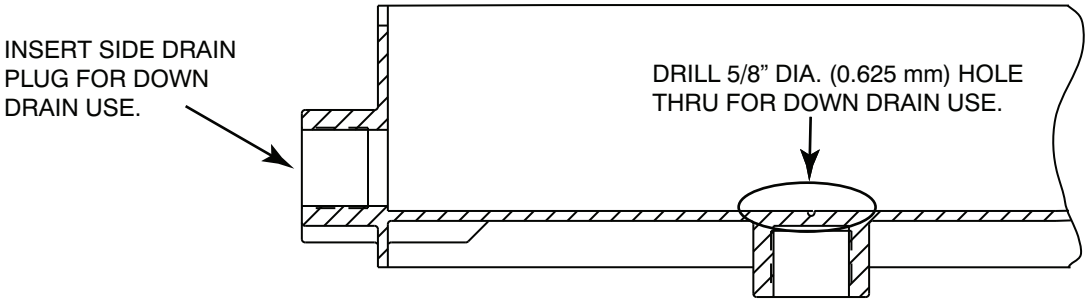
FIRE, EXPLOSION HAZARD

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

Do not pressure test gas supply while connected to unit. Always disconnect union before servicing. High pressures can cause gas valve damage resulting in a hazardous condition.

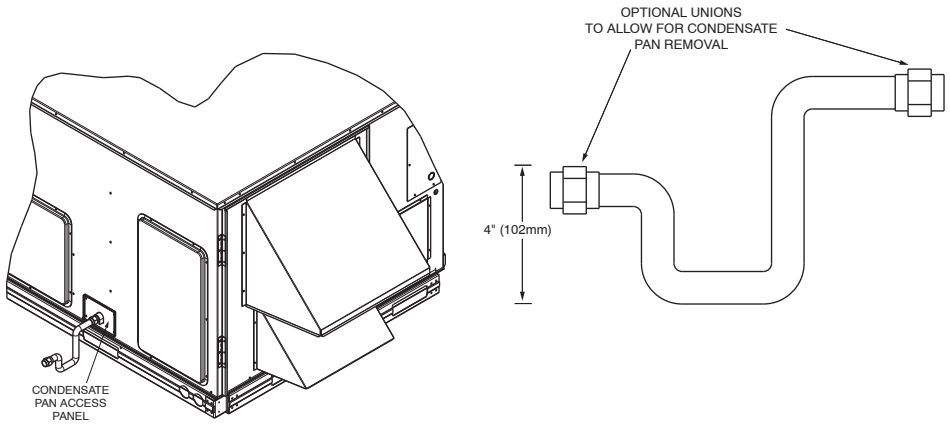
IMPORTANT: Natural gas pressure at unit gas connection must not be less than 5.0 in. wg or greater than 13.0 in. wg for all heat sizes.

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



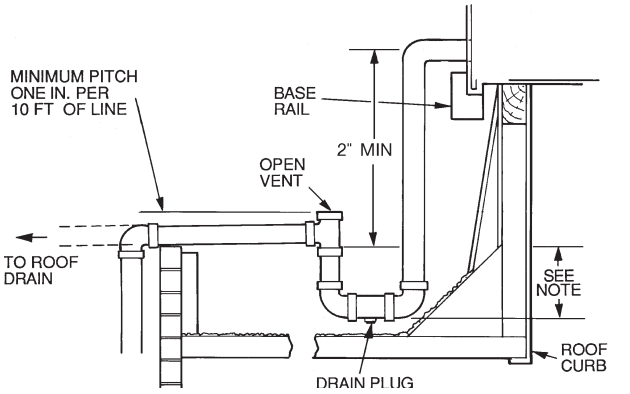
C10321

Fig. 11 – Condensate Drain Pan



C06234

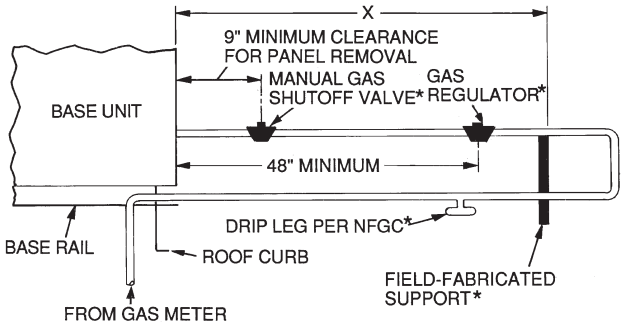
Fig. 12 – External Trap for Condensate Drain



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

C06235

Fig. 13 – Condensate Drain Piping Details



LEGEND

NFGC — National Fuel Gas Code

*Field supplied.

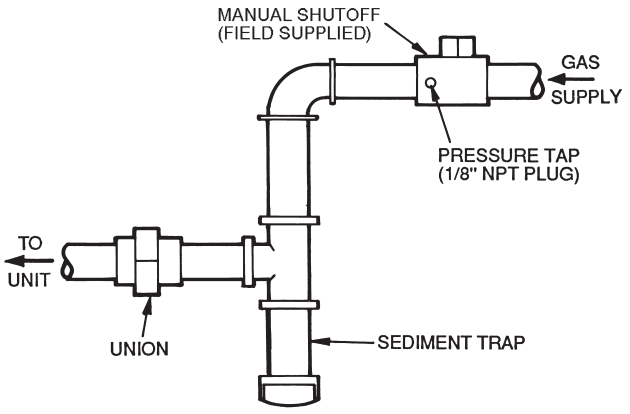
NOTE: Follow all local codes.

SPACING OF SUPPORTS

STEEL PIPE NOMINAL DIAMETER (in.)	SPACING OF SUPPORTS X DIMENSION (ft)
1/2	6
3/4 or 1	8
1 1/4 or larger	10

C06115

Fig. 14 – Gas Piping Guide (With Accessory Thru-the-Curb Service Connections)



C06236

Fig. 15 – Field Gas Piping

Step 9 —Make Electrical Connections

Field Power Supply

All 208/230-v units are factory wired for 230-v power supply. 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 quick connect from the 230-volt connection and moving to the 200-volt 1/4-in. male terminal on the primary side of the transformer.

Refer to unit label diagram for additional information. All field wiring must comply with NEC (National Electrical Code) and local codes. Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate on standard units. Leads are provided for field wire connections. Use UL (Underwriters' Laboratories) approved copper/aluminum connector.

When installing units, provide safety disconnect per NEC Article 440 or local codes. For non-fused disconnects, size the disconnect according to the sizing data provided in the electrical data tables. If a fused disconnect is used, determine the minimum size for the switch based on the disconnect sizing data provided in the electrical data tables and then coordinate the disconnect housing size to accommodate the Maximum Overcurrent Protection (MOCP) device size as marked on the unit informative plate. (See Table 3 and 4.)

See Fig. 16 for power wiring connection to unit leads and equipment ground.

Route power and ground lines through control box end panel or unit basepan (see Fig. 4 and 5) to connections as shown on unit wiring diagram and Fig. 16. Factory leads may be wired directly to the disconnect.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

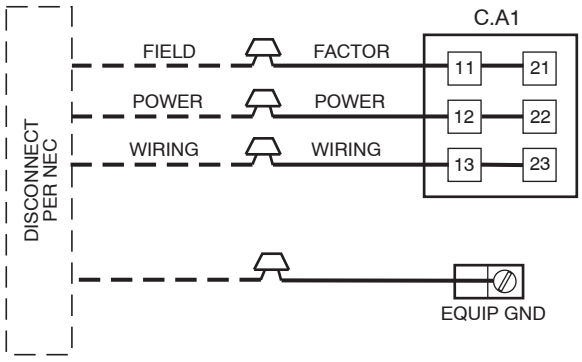
The correct power phasing is critical to the operation of the scroll compressors. An incorrect phasing will result in compressor shutdown on thermal overload and possible damage to compressor. Should this occur, power phase correction must be made to the incoming power.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC; ANSI (American National Standards Institute)/NFPA (National Fire Protection Association), latest edition, and local electrical codes. *Do not use gas piping as an electrical ground.*



C06237

Fig. 16 – Field Power Wiring Connections

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

Operating voltage to compressor must be within voltage range indicated on unit nameplate. Voltages between phases must be balanced within 2%.

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

Field Control Wiring

Unit can be controlled with either a Carrier-approved accessory thermostat. Install thermostat according to the installation instructions included with accessory. Locate thermostat assembly on a solid interior wall in the conditioned space to sense average temperature.

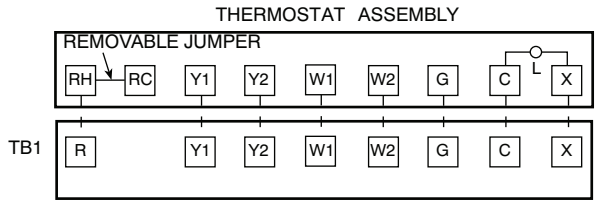
Route thermostat cable or equivalent single leads of colored wire from subbase terminals through conduit into unit to low-voltage connections as shown on unit label wiring diagram and in Fig. 17.

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

Set heat anticipator settings as follows:

VOLTAGE	STAGE 1 (W1) ON	STAGE 1 AND 2 (W1 AND W2) ON
All	0.14	0.20

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



C06238

Fig. 17 – Field Control Thermostat Wiring

Table 3 — Electrical Data — Units Without Optional Powered Convenience Outlet

UNIT 48PG	NOMINAL POWER SUPPLY VOLTS-PH-HZ	VOLTAGE RANGE		COMPRESSOR						OFM		IFM FLA	COMBUSTION FAN MOTOR FLA	PWR EXH FLA (ea)	IFM TYPE	POWER SUPPLY		DISCONNECT SIZE	
				No. 1		No. 2		No. 3								MCA	MOCP	FLA	LRA
		Min	Max	RLA	LRA	RLA	LRA	RLA	LRA	Qty	FLA (ea)								
08	208/230-3-60	187	253	13.5	88	13.5	88	—	—	2	1.5	5.2	0.52	—	STD	38.6/38.6	50/50	40/40	212/212
												7.5			ALT	40.9/40.9	50/50	43/43	238/238
												5.2		3.0	STD	41.6/41.6	50/50	44/44	216/216
												7.5			ALT	43.9/43.9	50/50	47/47	242/242
	460-3-60	414	506	6.4	39	6.4	39	—	—	2	0.8	2.6	0.30	—	STD	18.6	25	20	97
												3.4			ALT	19.4	25	20	110
												2.6		1.2	STD	19.8	25	21	100
												3.4			ALT	20.6	25	22	113
	575-3-60	518	633	5.1	34	5.1	34	—	—	2	0.8	2.0	0.24	—	STD	15.1	20	16	83
												2.8			ALT	15.9	20	17	94
												2.0		3.0	STD	18.1	20	19	87
												2.8			ALT	18.9	25	20	98
09	208/230-3-60	187	253	16.0	91	16.0	91	—	—	2	1.5	5.2	0.52	—	STD	44.2/44.2	60/60	46/46	218/218
												10.2			ALT	49.2/49.2	60/60	52/52	261/261
												5.2		3.0	STD	47.2/47.2	60/60	50/50	222/222
												10.2			ALT	52.2/52.2	60/60	55/55	265/265
	460-3-60	414	506	7.1	46	7.1	46	—	—	2	0.8	2.6	0.30	—	STD	20.2	25	21	111
												4.8			ALT	22.4	25	24	133
												2.6		1.2	STD	21.4	25	23	114
												4.8			ALT	23.6	30	25	136
	575-3-60	518	633	5.6	37	5.6	37	—	—	2	0.8	2.0	0.24	—	STD	16.2	20	17	89
												2.8			ALT	17	20	18	100
												2.0		3.0	STD	19.2	25	20	93
												2.8			ALT	20	25	21	104
12	208/230	187	253	17.6	123	17.6	123	—	—	2	1.9	7.5	0.52	—	STD	50.9/50.9	60/60	53/53	310/310
												10.2			ALT	53.6/53.6	60/60	57/57	327/327
												7.5		3.0	STD	53.9/53.9	60/60	57/57	314/314
												10.2			ALT	56.6/56.6	70/70	60/60	331/331
	460	414	506	7.7	50	7.7	50	—	—	2	1.0	3.4	0.30	—	STD	22.7	30	24	132
												4.8			ALT	24.1	30	26	141
												3.4		1.2	STD	23.9	30	25	135
												4.8			ALT	25.3	30	27	144
	575-3-60	518	633	6.1	40	6.1	40	—	—	2	0.8	2.8	0.24	—	STD	18.1	20	19	106
												2.8			ALT	18.1	20	19	106
												2.8		3.0	STD	21.1	25	23	110
												2.8			ALT	21.1	25	23	110
14	208/230-3-60	187	253	22.4	149	22.4	149	—	—	2	1.9	10.2	0.52	—	STD	64.4/64.4	80/80	68/68	379/379
												15.0			ALT	69.2/69.2	90/90	73/73	388/388
												10.2		3.0	STD	67.4/67.4	80/80	71/71	383/383
												15.0			ALT	72.2/72.2	90/90	77/77	392/392
	460-3-60	414	506	10.6	75	10.6	75	—	—	2	1.0	4.8	0.30	—	STD	30.7	40	32	191
												7.4			ALT	33.3	40	35	195
												4.8		1.2	STD	31.9	40	34	194
												7.4			ALT	34.5	45	37	198
	575-3-60	518	633	7.7	54	7.7	54	—	—	2	0.8	2.8	0.24	—	STD	21.7	25	23	134
												5.6			ALT	24.5	30	26	148
												2.8		3.0	STD	24.7	30	26	138
												5.6			ALT	27.5	30	29	152
16	208/230-3-60	187	253	18.1	137	18.1	137	17.6	123	3	1.9	10.2	0.52	—	STD	74.2/74.2	90/90	80/80	482/482
												15.0			ALT	79.0/79.0	90/90	86/86	491/491
												19.4			ALT	83.8/83.8	100/100	91/91	529/529
												10.2		3.0	STD	77.2/77.2	90/90	84/84	486/486
												15.0			ALT	82.0/82.0	100/100	89/89	495/495
												19.4			ALT	86.8/86.8	100/100	94/94	533/533
	460-3-60	414	506	9.0	62	9.0	62	7.7	50	3	1.0	4.8	0.30	—	STD	35.8	40	39	217
												7.4			ALT	38.4	45	42	221
												9.7			ALT	40.8	50	44	240
												4.8		1.2	STD	37	45	40	220
												7.4			ALT	39.6	45	43	224
												9.7			ALT	42	50	46	243
	575-3-60	518	633	6.8	50	6.8	50	6.1	40	3	0.8	2.8	0.24	—	STD	26.6	30	29	168
												5.6			ALT	29.4	35	32	182
												7.8			ALT	31.9	35	34	197
												2.8		3.0	STD	29.6	35	32	172
												5.6			ALT	32.4	35	35	186
												7.8			ALT	34.9	40	38	201

LEGEND

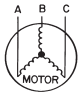
FLA – Full Load Amps
HACR – Heating, Air Conditioning and Refrigeration
IFM – Indoor (Evaporator) Fan Motor
LRA – Locked Rotor Amps
MCA – Minimum Circuit Amps
MOCP – Maximum Overcurrent Protection
NEC – National Electrical Code
OFM – Outdoor–Fan Motor
RLA – Rated Load Amps

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.
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 percentage of voltage imbalance.

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

Example: Supply voltage is 230-3-60



AB = 224 v
BC = 231 v
AC = 226 v

$$\text{Average Voltage} = \frac{224 + 231 + 226}{3} = \frac{681}{3} = 227$$

Determine maximum deviation from average voltage.
(AB) 227 – 223 = 3 v
(BC) 231 – 227 = 4 v
(AC) 227 – 226 = 1 v
Maximum deviation is 4 v.
Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{227} = 1.76\%$$

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.

Table 4 — Electrical Data — Units With Optional Convenience Outlet

UNIT 48PG	NOMINAL POWER SUPPLY Volts-Ph-Hz	VOLTAGE RANGE		COMPRESSOR						OFM		IFM FLA	COMBUSTION FAN MOTOR FLA	PWR EXH FLA (ea)	IFM TYPE	POWER SUPPLY		DISCONNECT SIZE	
		Min	Max	No. 1		No. 2		No. 3		Qty	FLA (ea)					MCA	MOCP	FLA	LRA
				RLA	LRA	RLA	LRA	RLA	LRA										
08	208/230-3-60	187	253	13.5	88	13.5	88	—	—	2	1.5	5.2	0.52	—	STD	43.4/43.4	50/50	46/46	217/217
												7.5			ALT	45.7/45.7	50/50	49/49	243/243
												5.2		3.0	STD	46.4/46.4	50/50	49/49	221/221
												7.5			ALT	48.7/48.7	60/60	52/52	247/247
	460-3-60	414	506	6.4	39	6.4	39	—	—	2	0.8	2.6	0.30	—	STD	20.8	25	22	99
												3.4			ALT	21.6	25	23	112
												2.6		1.2	STD	22	25	23	102
												3.4			ALT	22.8	25	24	115
	575-3-60	518	633	5.1	34	5.1	34	—	—	2	0.8	2.0	0.24	—	STD	16.8	20	18	85
												2.8			ALT	17.6	20	19	96
												2.0		3.0	STD	19.8	25	21	89
												2.8			ALT	20.6	25	22	100
09	208/230-3-60	187	253	16.0	91	16.0	91	—	—	2	1.5	5.2	0.52	—	STD	49.0/49.0	60/60	52/52	223/223
												10.2			ALT	54.0/54.0	60/60	58/58	266/266
												5.2		3.0	STD	52.0/52.0	60/60	55/55	227/227
												10.2			ALT	57.0/57.0	70/70	61/61	270/270
	460-3-60	414	506	7.1	46	7.1	46	—	—	2	0.8	2.6	0.30	—	STD	22.4	25	24	113
												4.8			ALT	24.6	30	26	135
												2.6		1.2	STD	23.6	30	25	116
												4.8			ALT	25.8	30	28	138
	575-3-60	518	633	5.6	37	5.6	37	—	—	2	0.8	2.0	0.24	—	STD	17.9	20	19	91
												2.8			ALT	18.7	25	20	102
												2.0		3.0	STD	20.9	25	22	95
												2.8			ALT	21.7	25	23	106
12	208/230-3-60	187	253	17.6	123	17.6	123	—	—	2	1.9	7.5	0.52	—	STD	55.7/55.7	70/70	59/59	315/315
												10.2			ALT	58.4/58.4	70/70	62/62	332/332
												7.5		3.0	STD	58.7/58.7	70/70	62/62	319/319
												10.2			ALT	61.4/61.4	70/70	66/66	336/336
	460-3-60	414	506	7.7	50	7.7	50	—	—	2	1.0	3.4	0.30	—	STD	24.9	30	26	134
												4.8			ALT	26.3	30	28	143
												3.4		1.2	STD	26.1	30	28	137
												4.8			ALT	27.5	30	29	146
	575-3-60	518	633	6.1	40	6.1	40	—	—	2	0.8	2.8	0.24	—	STD	19.8	25	21	108
												2.8			ALT	19.8	25	21	108
												2.8		3.0	STD	22.8	25	24	112
												2.8			ALT	22.8	25	24	112
14	208/230-3-60	187	253	22.4	149	22.4	149	—	—	2	1.9	10.2	0.52	—	STD	69.2/69.2	90/90	73/73	384/384
												15.0			ALT	74.0/74.0	90/90	79/79	393/393
												10.2		3.0	STD	72.2/72.2	90/90	77/77	388/388
												15.0			ALT	77.0/77.0	90/90	82/82	397/397
	460-3-60	414	506	10.6	75	10.6	75	—	—	2	1.0	4.8	0.30	—	STD	32.9	40	35	193
												7.4			ALT	35.5	45	38	197
												4.8		1.2	STD	34.1	40	36	196
												7.4			ALT	36.7	45	39	200
	575-3-60	518	633	7.7	54	7.7	54	—	—	2	0.8	2.8	0.24	—	STD	23.4	30	25	136
												5.6			ALT	26.2	30	28	150
												2.8		3.0	STD	26.4	30	28	140
												5.6			ALT	29.2	35	31	154
16	208/230-3-60	187	253	18.1	137	18.1	137	17.6	123	3	1.9	10.2	0.52	—	STD	79.0/79.0	90/90	86/ 86	487/487
												15.0			ALT	83.8/83.8	100/100	91/ 91	496/496
												19.4			ALT	88.6/88.6	100/100	96/ 96	534/534
												10.2		3.0	STD	82.0/82.0	100/100	89/ 89	491/491
												15.0			ALT	86.8/86.8	100/100	95/ 95	500/500
												19.4			ALT	91.6/91.6	100/100	100/100	538/538
	460-3-60	414	506	9.0	62	9.0	62	7.7	50	3	1.0	4.8	0.30	—	STD	38	45	41	219
												7.4			ALT	40.6	45	44	223
												9.7			ALT	43	50	47	242
												4.8		1.2	STD	39.2	45	42	222
												7.4			ALT	41.8	50	45	226
												9.7			ALT	44.2	50	48	245
	575-3-60	518	633	6.8	50	6.8	50	6.1	40	3	0.8	2.8	0.24	—	STD	28.3	35	31	170
												5.6			ALT	31.1	35	34	184
												7.8			ALT	33.6	40	36	199
												2.8		3.0	STD	31.3	35	34	174
												5.6			ALT	34.1	40	37	188
												7.8			ALT	36.6	40	40	203

LEGEND

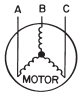
FLA – Full Load Amps
HACR – Heating, Air Conditioning and Refrigeration
IFM – Indoor (Evaporator) Fan Motor
LRA – Locked Rotor Amps
MCA – Minimum Circuit Amps
MOCP – Maximum Overcurrent Protection
NEC – National Electrical Code
OFM – Outdoor–Fan Motor
RLA – Rated Load Amps

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.
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 percentage of voltage imbalance.

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

Example: Supply voltage is 230-3-60



AB = 224 v
BC = 231 v
AC = 226 v

$$\text{Average Voltage} = \frac{224 + 231 + 226}{3} = \frac{681}{3} = 227$$

Determine maximum deviation from average voltage.
(AB) 227 – 223 = 3 v
(BC) 231 – 227 = 4 v
(AC) 227 – 226 = 1 v
Maximum deviation is 4 v.
Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{227} = 1.76\%$$

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.

Step 10 —Optional EconoMi$er IV

The optional EconoMi$er IV comes from the factory fully wired. The outdoor air hoods must be installed. No field wiring is required for standard outdoor dry bulb changeover operation. Field-wiring of accessory sensors is required for different operational modes.

Install Outdoor-Air Hoods

Perform the following procedure to install the outdoor-air hoods:

1. Economizer and barometric relief hoods are stored in the condenser section under the slanted coil for shipping. (See Fig. 18 and 19.) Size 16 units also have two 1-in. cleanable filters and a baffle stored between the economizer hoods. Barometric relief/power exhaust hood is shipped inside of economizer hood. Remove screws that secure the wooden rails of the hood assemblies to the unit. Save screws. Slide complete assembly from condenser section. On size 16 units, remove the baffle and save screws.
2. Remove the screws that secure the economizer and barometric relief/power exhaust hoods to the wooden railing. Discard or recycle wooden rails. Save screws.
3. The barometric relief damper is secured to the economizer panel for shipping. Remove the screw holding the barometric relief damper to the economizer panel. Damper should be free to swing open during operation. (See Fig. 20 and 21.) On size 16 units, repeat for second hood.
4. Hang the barometric relief/power exhaust hood on the mounting flange on the economizer panel. Secure hood to panel with screws saved from Step 2. See Fig. 20 - 22. On size 16 units, repeat for second hood.
5. Align hole in flange of economizer panel with left edge of hood. Hang economizer hood on the top flange of the economizer panel by rotating hood until top flange of the economizer hood engages the bent flange on the economizer panel. Rotate hood until hood is flush with the economizer panel. Hood will support itself from flange. Align holes in hood with holes in panel and secure hood to panel with screws saved from Step 2. (See Fig. 20, 21, and 23.)
   Size 16 Only — Loosen screws securing the clip on top of the flange of each opening. Rotate clip 180° and tighten screw. Install 1-in. filter provided by inserting under the clip on the flange and letting filter drop behind bracket holding barometric relief hoods. Repeat for second hood.
6. On size 16 units, install baffle between the outdoor air hoods with the screws saved from Step 1. (See Fig. 21.)

Economi$er IV Standard Sensors

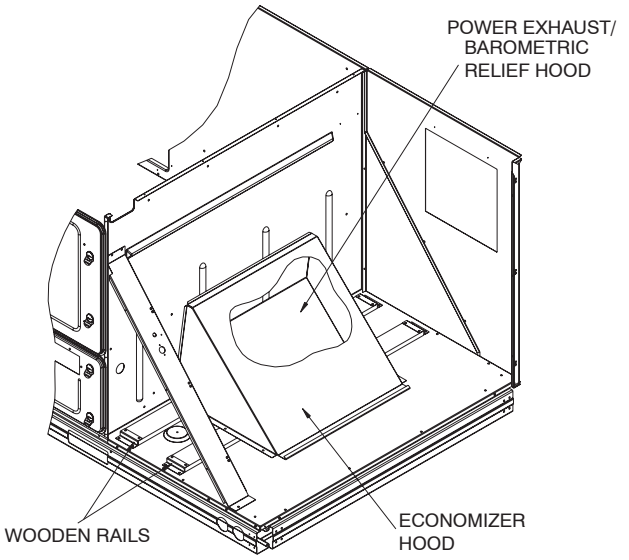
Outdoor Air Temperature (OAT) Sensor

The outdoor air temperature sensor is a 10 to 20 mA device used to measure the outdoor-air temperature. The outdoor-air temperature is used to determine when the EconoMi$er IV can be used for free cooling. The sensor is factory-installed on the EconoMi$er IV in the outdoor airstream. The operating range of temperature measurement is 40° to 100° F.

Mixed-Air Temperature (MAT) Sensor

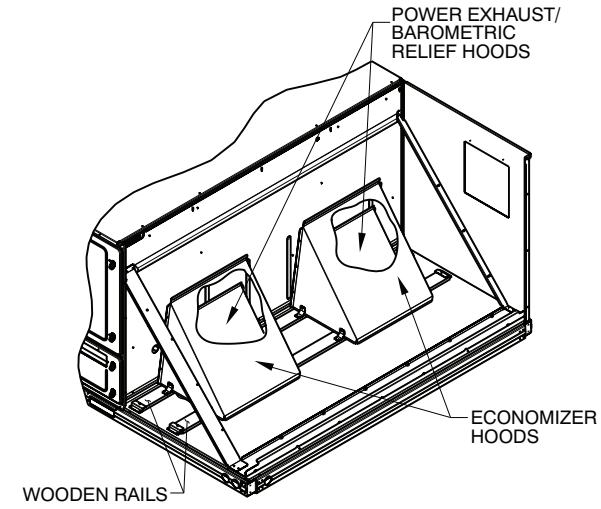
The mixed-air temperature sensor is a 3 K thermistor located at the discharge of the indoor fan. The sensor is mounted through the side plate of the blower. This sensor is factory installed. The operating range of temperature measurement is 0° to 158° F.

The temperature sensor looks like a probe with blue leads running to it. The sensor is sealed from moisture.



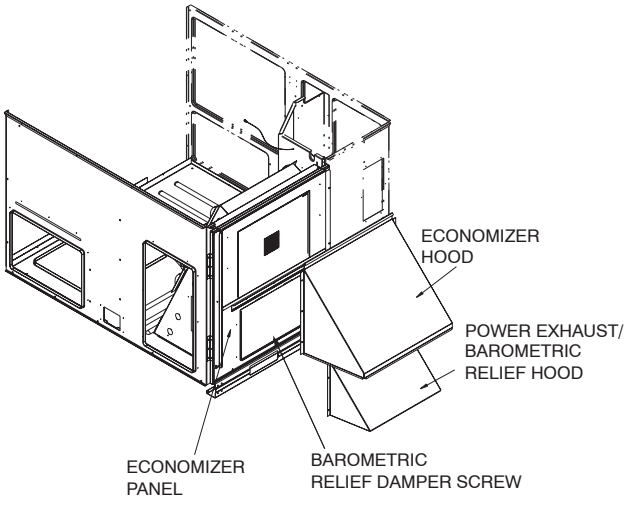
C06290

Fig. 18 – Economizer and Barometric Relief/Power Exhaust Hoods Shipping Positions (48PG08-14)



C06259

Fig. 19 – Economizer and Barometric Relief/Power Exhaust Hoods Shipping Positions (48PG16)



C06260

Fig. 20 – Hood Installation (48PG08-14)

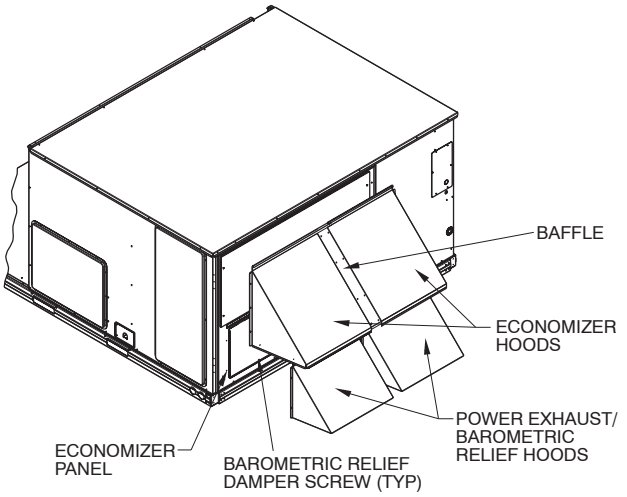


Fig. 21 – Hood Installation (48PG16)

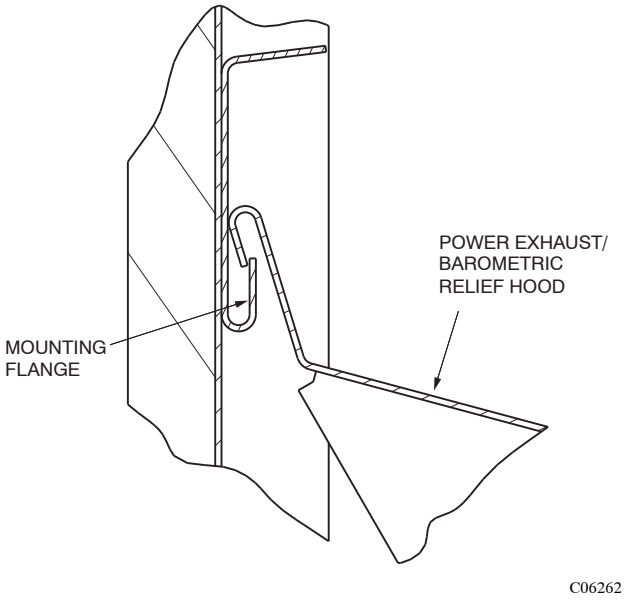


Fig. 22 – Barometric Relief/Power Exhaust Hood Flange

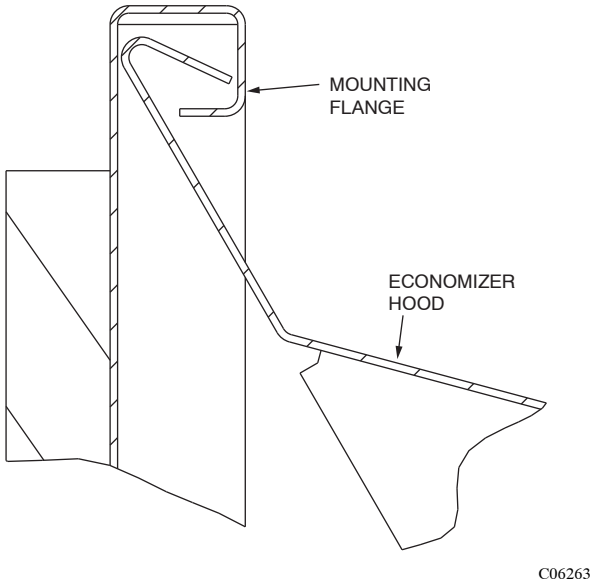


Fig. 23 – Economizer Flange

Outdoor Air Lockout Sensor

The EconoMi$er IV is equipped with a temperature limit switch located in the outdoor airstream which is used to lock out the compressors below a 50° F ambient temperature.

Economi$er IV Controller Wiring and Operational Mode

Determine the EconoMi$er IV control mode before installing sensors and accessories. Different sensors are required for different control modes, and a number of accessories are available. Refer to Table 5. The EconoMi$er IV is supplied from the factory with a mixed air temperature sensor and an outdoor air temperature sensor. This allows for operation of the EconoMi$er IV with outdoor air dry bulb changeover control. Additional accessories can be added to allow for different types of changeover control and operation of the EconoMi$er IV and unit. See Fig. 24 for wiring.

Outdoor Dry Bulb Changeover

The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air and mixed 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 EconoMi$er IV will adjust the outside air dampers to minimum position. If the outdoor-air temperature is below the set point, the position of the outside air dampers will be controlled to provided 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. The scale on the potentiometer is A, B, C, and D. See Fig. 25 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 CRTEMPSN002A00). The accessory sensor must be mounted in the return airstream. Connect the return air temperature sensor to the S_R terminal (after removing the 620-ohm resistor) and to the + terminal on the controller. (See Fig. 26.)

In this mode of operation, the outdoor-air temperature is compared to the return air temperature and the lower temperature airstream is used for cooling. When using this mode of changeover control, turn the enthalpy set point 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. 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 EconoMi$er IV controller. The set points are A, B, C, and D. (See Fig. 28.) The factory-installed 620-ohm jumper must be in place across terminals S_R and + on the EconoMi$er IV controller. (See Fig. 26.)

Differential Enthalpy Control

For differential enthalpy control, the EconoMi$er IV controller uses two enthalpy sensors (CRENTDIF004A00), one in the outside air and one in the return air duct. The EconoMi$er IV controller compares the outdoor air enthalpy to the return air enthalpy to determine EconoMi$er IV use. The controller selects the lower enthalpy air (return or outdoor) for cooling. For example, when the outdoor air has a lower enthalpy than the return air, the EconoMi$er IV opens to bring in outdoor air for free cooling.

Table 5 — EconoMi$er IV Sensor Usage

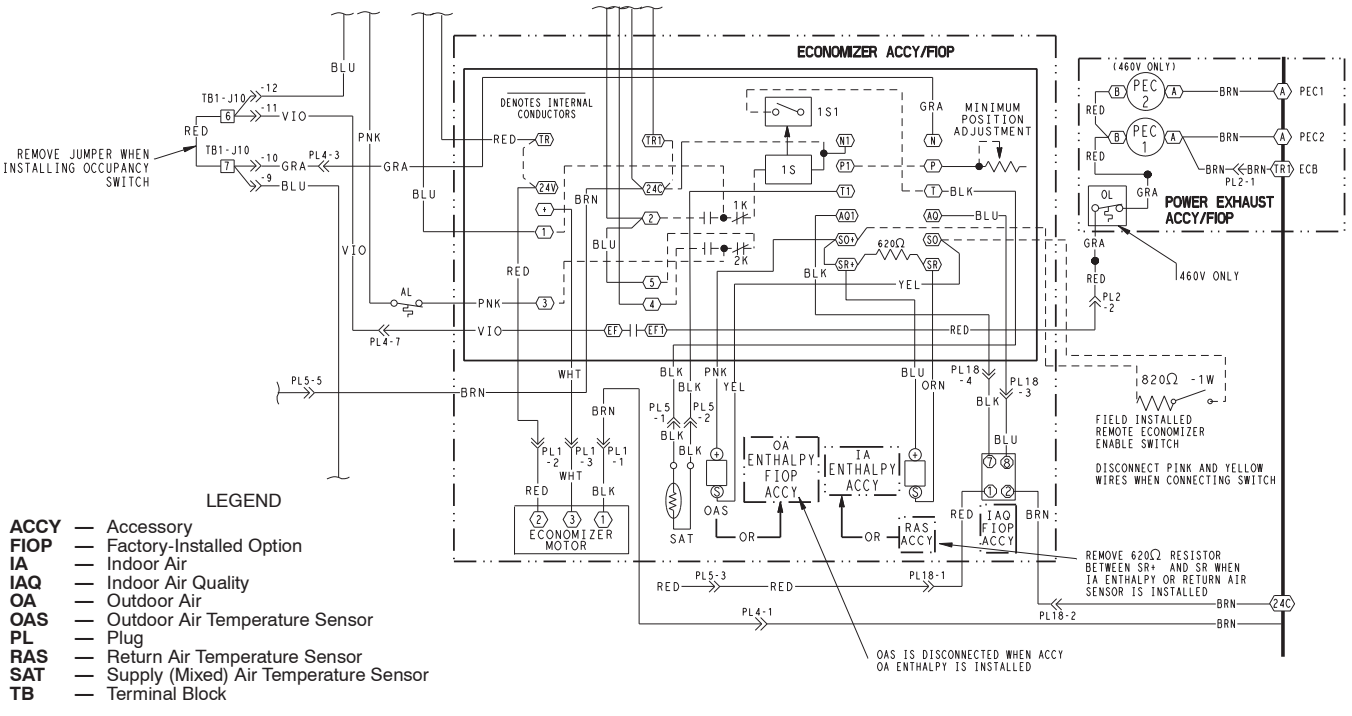
APPLICATION	ECONOMI$ER IV WITH OUTDOOR AIR DRY BULB SENSOR			ECONOMI$ER IV WITH SINGLE ENTHALPY SENSOR		
	Accessories Required			Accessories Required		
Outdoor Air Dry Bulb	None. The outdoor air dry bulb sensor is factory installed.			CRTEMPSN002A00*		
Differential Dry Bulb	CRTEMPSN002A00*			(2) CRTEMPSN002A00*		
Single Enthalpy	HH57AC078			None. The single enthalpy sensor is factory installed.		
Differential Enthalpy	HH57AC078 and CRENTDIF004A00*			CRENTDIF004A00*		
CO_2 for DCV Control using a Wall-Mounted CO_2 Sensor	33ZCSENCO2			33ZCSENCO2		
CO_2 for DCV Control using a Duct-Mounted CO_2 Sensor	33ZCSENCO2† and 33ZCASPCO2**	OR	CRCBDIOX005A00††	33ZCSENCO2† and 33ZCASPCO2**	OR	CRCBDIOX005A00††

* CRENTDIF004A00 and CRTEMPSN002A00 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.

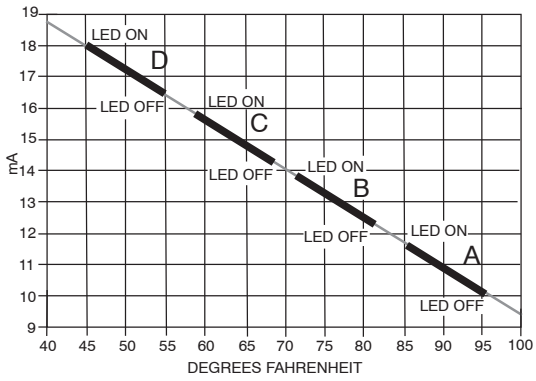
** 33ZCASPCO2 is an accessory aspirator box required for duct-mounted applications.

†† CRCBDIOX005A00 is an accessory that contains both 33ZCSENCO2 and 33ZCASPCO2 accessories.



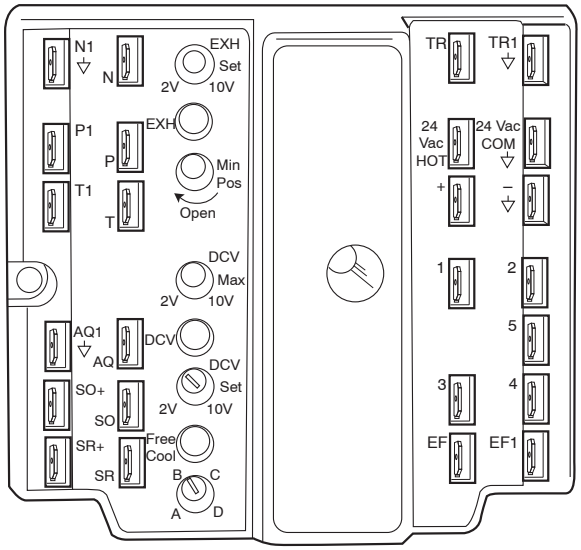
C06163

Fig. 24 – EconoMi$er IV Wiring



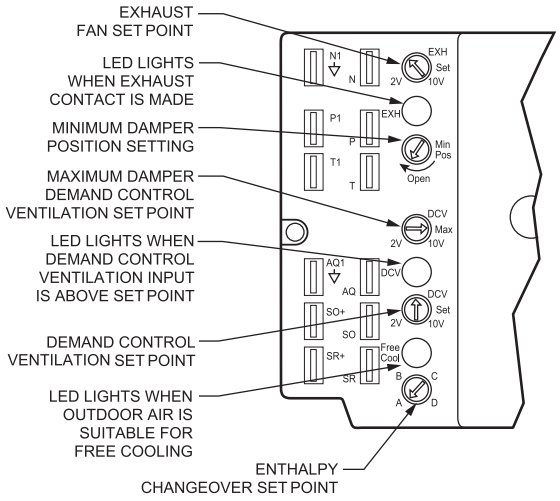
C06035

Fig. 25 – Temperature Changeover Set Points



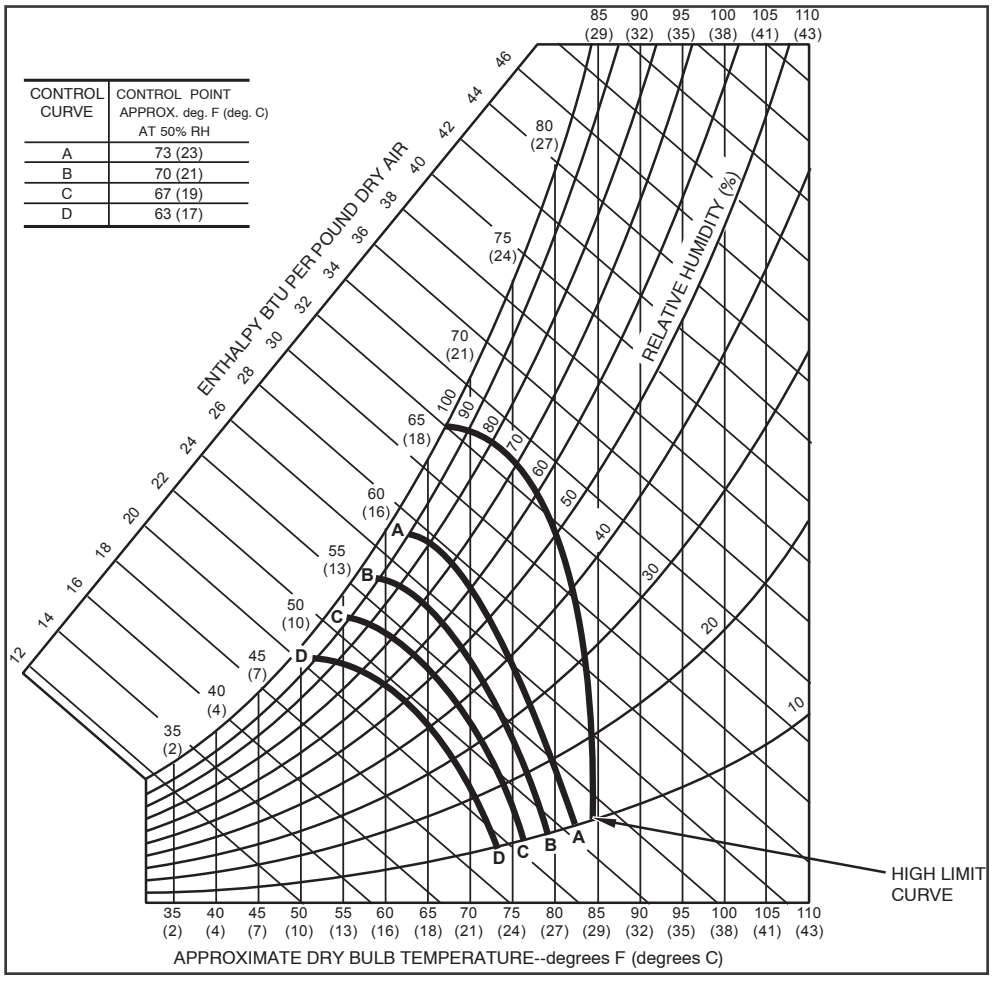
C06038

Fig. 26 – Economi$er IV Control



C06034

Fig. 27 – Economi$er IV Controller Potentiometer and LED Locations



C06037

Fig. 28 – Enthalpy Changeover Set Points

Replace the standard outside air dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. Mount the return air enthalpy sensor in the return air duct. The return air enthalpy sensor is wired to terminals S_R and + on the EconoMi$er IV controller. (See Fig. 26.) The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi$er IV controller. When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting.

Indoor Air Quality (IAQ) Sensor Input

The IAQ input can be used for demand control ventilation control based on the level of CO_2 measured in the space or return air duct.

Mount the optional IAQ sensor according to manufacturer specifications. The IAQ sensor should be wired to the AQ and AQ1 terminals of the controller. Adjust the DCV (demand controlled ventilation) potentiometers to correspond to the DCV

voltage output of the indoor air quality sensor at the user-determined set point. (See Fig. 29.)

If a separate field-supplied transformer is used to power the IAQ sensor, the sensor must not be grounded or the EconoMi$er IV control board will be damaged. (See Fig. 24.)

Power Exhaust

The factory-installed power exhaust will be factory wired and installed. If an accessory power exhaust is to be installed, see the accessory power exhaust installation instructions included with the power exhaust for installation and wiring. The wiring plug on the power exhaust is connected to wiring harness plug PL1-3,4.

Exhaust Set Point Adjustment

The exhaust set point will determine when the exhaust fan runs based on damper position (if accessory power exhaust is installed). The set point is modified with the Exhaust Fan Set Point (EXH SET) potentiometer. The set point represents the damper position above which the exhaust fans will be turned on. When there is a call for exhaust, the EconoMi$er IV 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 EconoMi$er IV controller. (See Fig. 27.) 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 compounds) ventilation requirements. The maximum demand ventilation position is used for fully occupied ventilation.

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

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

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

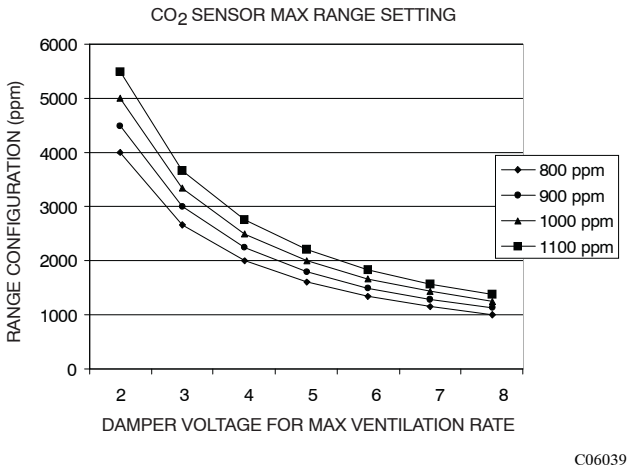
1. Calculate the appropriate mixed-air temperature using the following formula:
   $(T_O \times OA) + (T_R \times RA) = T_M$
   T_O = Outdoor-Air Temperature
   OA = Percent of Outdoor Air
   T_R = Return-Air Temperature
   RA = Percent of Return Air
   T_M = Mixed-Air Temperature

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

   $(60 \times .10) + (75 \times .90) = 73.5$ F
2. Disconnect the mixed-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. 24 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 mixed-air sensor to terminals T and T1.

Remote control of the EconoMi$er IV damper is desirable when requiring additional temporary ventilation. If a field-supplied remote potentiometer (Honeywell part number S963B1128) is wired to the EconoMi$er IV 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 EconoMi$er IV controller. Wire the field-supplied potentiometer to the P and P1 terminals on the EconoMi$er IV controller. (See Fig. 26.)



C06039

Fig. 29 – CO_2 Sensor Maximum Range Setting

Damper Movement

When the EconoMi$er IV board receives initial power, it can take the damper up to $2^1/_2$ minutes before it begins to position itself. After the initial positioning, subsequent changes to damper position will take up to 30 seconds to initiate. Damper movement from full open to full closed (or vice versa) takes $2^1/_2$ minutes.

Thermostats

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

Pressure Drop

See Fig. 30-32 for EconoMi$er IV pressure drop. Evaporator fan may need to be adjusted.

Demand Control Ventilation (DCV)

When using the EconoMi$er IV for demand control 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° difference in outside and return-air temperatures.

$(T_O \times OA) + (T_R \times RA) = T_M$

T_O = Outdoor-Air Temperature

OA = Percent of Outdoor Air

T_R = Return-Air Temperature

RA = Percent of Return Air

T_M = Mixed-Air Temperature

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

The same equation can be used to determine the occupied or maximum ventilation rate to the building. For example, an output of 3.6 volts to the actuator provides a base ventilation rate of 5% and an output of 6.7 volts provides the maximum ventilation rate of 20% (or base plus 15 cfm per person). Use Fig. 29 to determine the maximum setting of the 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. 29 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 EconoMi$er IV controller will output the 6.7 volts from the CO_2 sensor to the actuator when the CO_2 concentration in the space is at 1100 ppm. The DCV set point may be left at 2 volts since the CO_2 sensor voltage will be ignored by the EconoMi$er IV 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 6.)

Use setting 1 or 2 for Carrier equipment.

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 6.
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

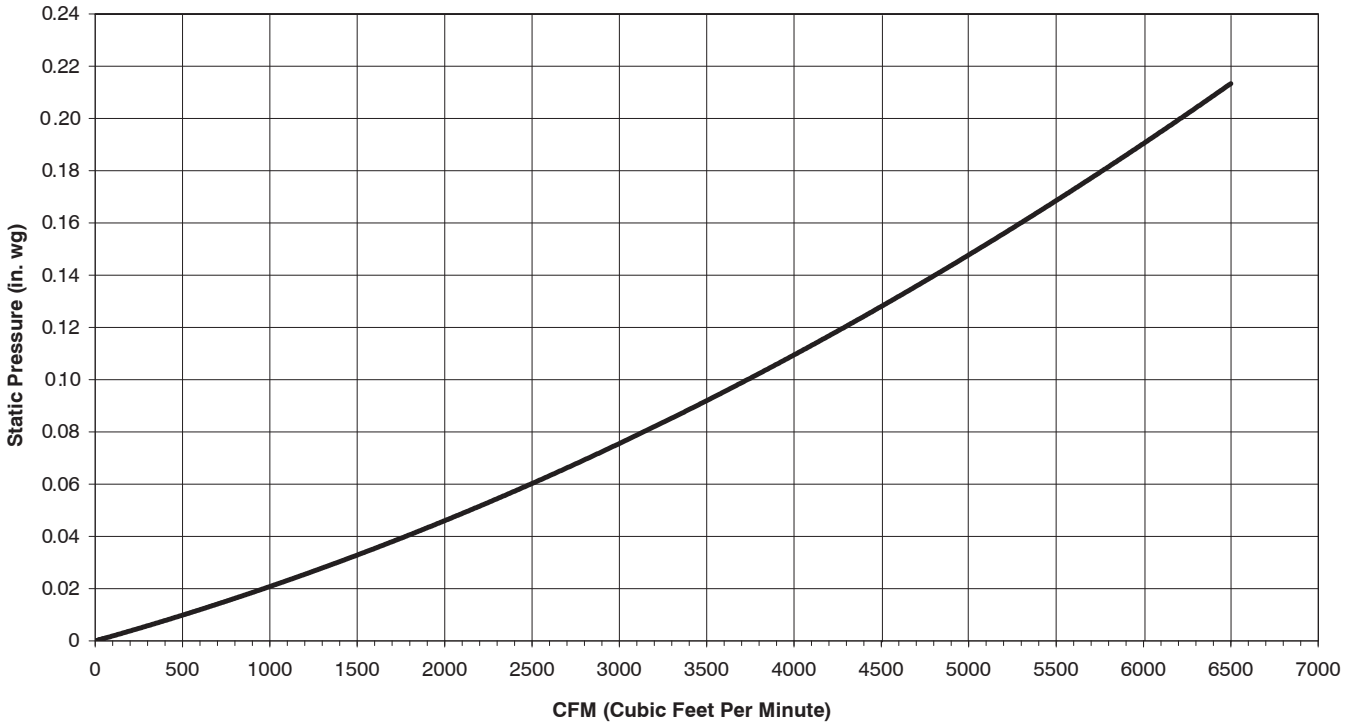
Information from ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) indicates that the largest humidity load on any zone is the fresh air introduced. For some applications, a device such as a 62AQ energy recovery unit is added to reduce the moisture content of the fresh 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.

This makes the control of the of the dehumidification device simple when using the enthalpy or differential enthalpy sensor. The enthalpy sensor or differential enthalpy sensor is installed on the equipment to determine economizer operation. The high enthalpy signal from the enthalpy sensor or differential enthalpy sensor can be used to turn on the outdoor air moisture removal device any time fresh air is required for the space.

The energy recovery device should be sized for maximum latent and sensible conditioning at maximum ventilation on a design day. A calculation for leaving-air temperature on a low ambient, low ventilation day should also be done to determine the mixed-air temperature of the return and pre-conditioned outside air. The design should produce an air temperature somewhat near room conditions to prevent reheat of the air mixture. The energy recovery device should be interlocked with the heat to turn off the device when in the heat mode.

Step 11 —Install All Accessories

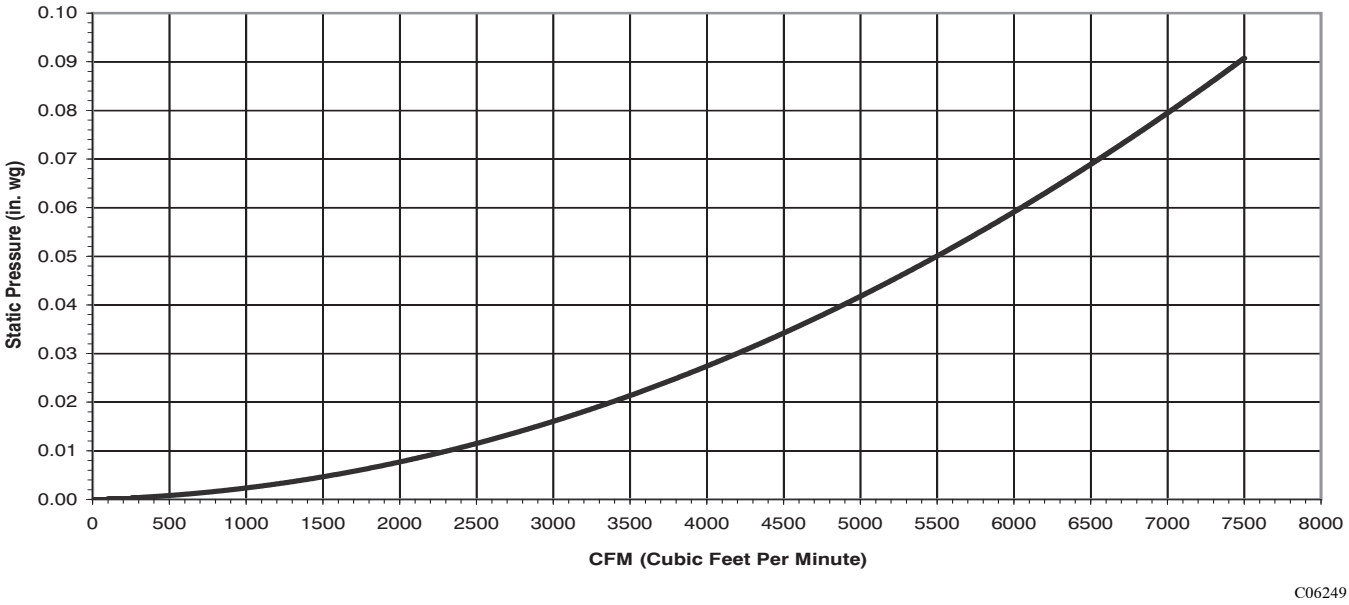
After all of the factory-installed options have been adjusted, install all field-installed accessories. Refer to the accessory installation instructions included with each accessory. Consult the Carrier Price Pages or RTU (rooftop unit) Builder software for accessory package numbers for particular applications. For applications with high outdoor air requirements it is recommended that the outdoor filter accessory be used to eliminate water entrainment during rainfall.



NOTE: Economizer damper pressure drop is with outdoor air damper totally closed and return air damper fully open.

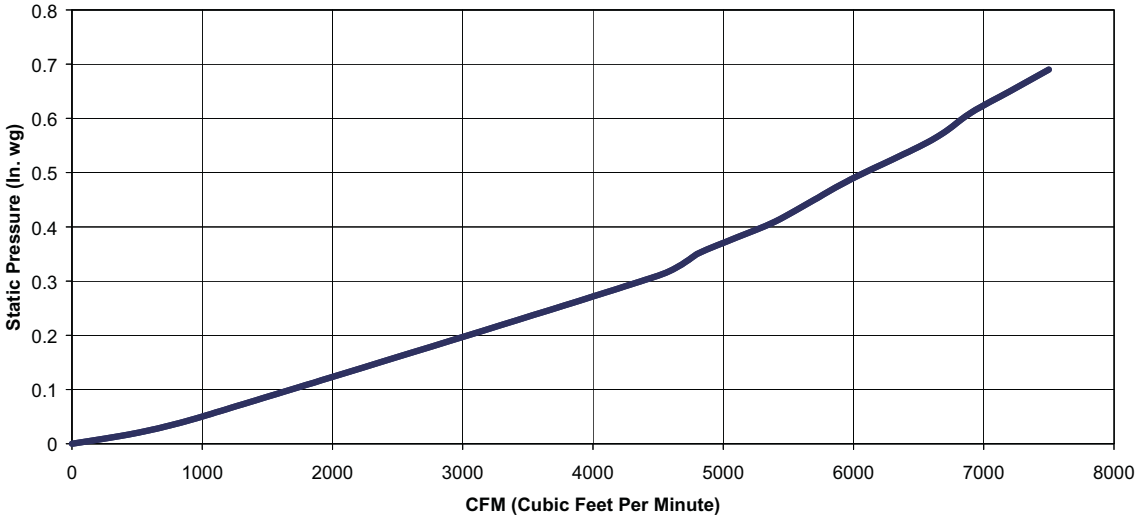
C06177

Fig. 30 – Pressure Drop for Vertical Economizer (48PG08-14)



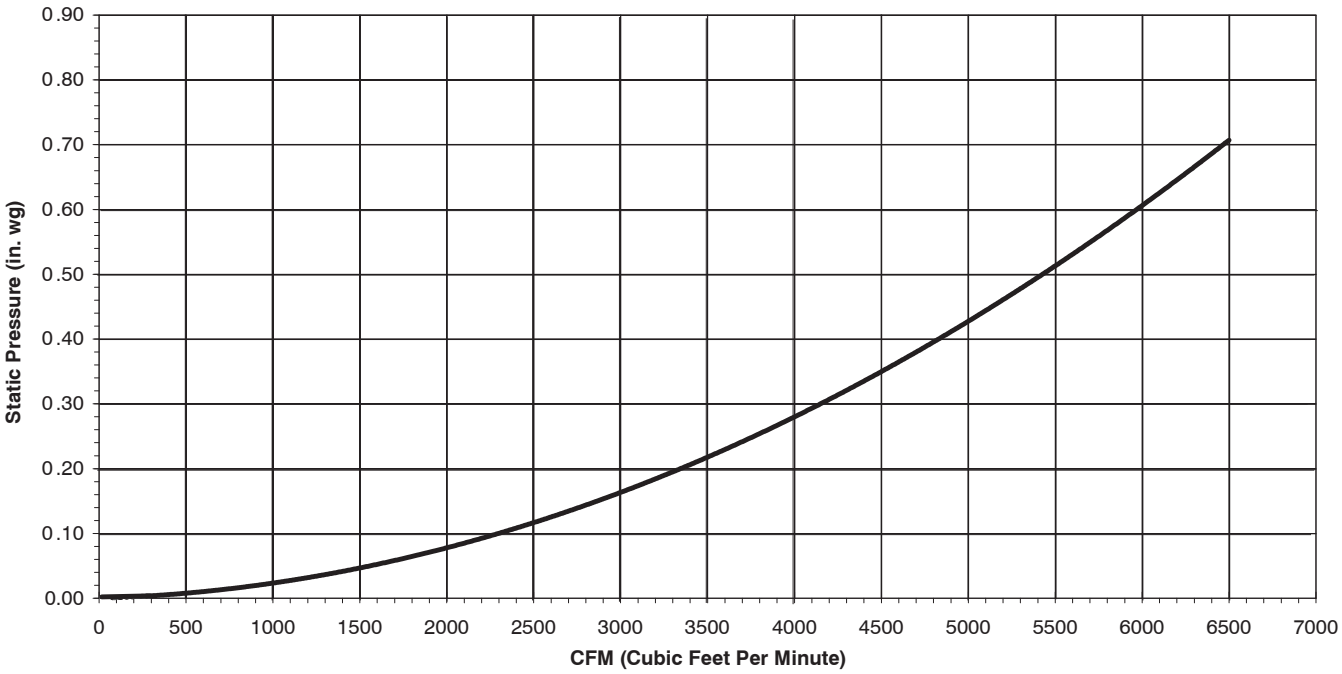
C06249

Fig. 31 – Pressure Drop for Vertical Economizer (48PG16)



C06181

Fig. 32 – Pressure Drop for Horizontal Economizer (48PG16)



NOTE: Economizer damper pressure drop is with outdoor air damper totally closed and return air damper fully open.

C06180

Fig. 33 – Pressure Drop for Horizontal Economizer (48PG08-14)

Table 6 — CO_2 Sensor Standard Settings

SETTING	EQUIPMENT	OUTPUT	VENTILATION RATE (cfm/Person)	ANALOG OUTPUT	CO_2 CONTROL RANGE (ppm)	OPTIONAL RELAY SET-POINT (ppm)	RELAY HYSTERESIS (ppm)
1	Interface With 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 and 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

PRE-START-UP

⚠ WARNING

PERSONAL INJURY HAZARD

Failure to follow this warning could result in personal injury.

Follow recognized safety practices and wear protective goggles when checking or the servicing refrigerant system.

Do not operate the compressor or provide any electric power to the unit unless the compressor terminal cover is in place and secured.

Do not remove the compressor terminal cover until all electrical sources are disconnected.

Relieve all pressure from the system before touching or disturbing anything inside the compressor terminal box if refrigerant leak is suspected around the compressor terminals.

Never attempt to repair a soldered connection while the refrigerant system is under pressure.

Do not use torch to remove any component. The system contains oil and refrigerant under pressure. To remove a component, wear protective goggles and proceed as follows:

Shut off gas and then electrical power to the unit. Install lockout tag.

Relieve all pressure from the system using both high-pressure and low-pressure ports.

Cut the component connection tubing with a tubing cutter, and remove the component from the unit.

Carefully unsweat the remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Proceed as follows to inspect and prepare the unit for initial start-up:

1. Remove all access panels.
2. Read and follow instructions on all WARNING, CAUTION, and INFORMATION labels attached to, or shipped with, the unit.
3. Make the following inspections:
   a. Inspect for shipping and handling damages such as broken lines, loose parts, or 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-wiring and factory-wiring connections. Be sure that connections are completed and tight.
   d. Inspect coil fins. If damaged during shipping and handling, carefully straighten the fins with a fin comb.
4. Verify the following conditions:
   a. Make sure that condenser fan blade is correctly positioned in the fan orifice. See Condenser-Fan Adjustment section for more details.
   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 installation instructions and applicable codes. Complete the Start-Up Checklist, located on the back page of this booklet.

Return-Air Filters

Make sure correct filters are installed in filter tracks (see Tables 1 and 2). Do not operate unit without return-air filters.

Outdoor-Air Inlet Screens

Outdoor-air inlet screen(s) must be in place before operating unit.

Compressor Mounting

Compressors are internally spring mounted. Do not loosen or remove compressor hold-down bolts.

Internal Wiring

Check all electrical connections in unit control boxes. Tighten as required.

Gas Piping

Check gas piping for leaks.

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

Disconnect gas piping from unit when leak testing at pressure greater than $^1/_2$ psig. Pressures greater than $^1/_2$ psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than $^1/_2$ psig, it *must* be replaced before use. When pressure testing field- supplied gas piping at pressures of $^1/_2$ psig or less, a unit connected to such piping must be isolated by manually closing the gas valve.

Refrigerant Service Ports

Each independent refrigerant system has a total of 4 Schrader-type service gauge ports per circuit. One port is located on the suction line, one on the compressor discharge line, and 2 on the liquid line on both sides of the filter drier. Be sure that caps on the ports are tight.

Crankcase Heater

Crankcase heaters are energized if compressor B1 is not operating.

High Flow Refrigerant Valves

Three high flow refrigerant valves are located on the compressor hot gas tube, suction tube, and the liquid line leaving the condenser. 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 that the plastic caps are in place and tight or the possibility of refrigerant leakage could occur.

Compressor Rotation

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

1. Connect service gauges to the 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 install lockout tag.
3. Reverse any two of the unit power leads.
4. Reapply power to the compressor.

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

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

When the compressors are rotating in the wrong direction, the unit will have increased noise levels and will not provide heating and cooling. Compressor failure will occur if the unit continues to operate in this condition.

Evaporator Fan

Fan belt and variable pitch pulleys are factory-installed. See Tables 7–36 for fan performance data. Be sure that fans rotate in the proper direction. See Table 37 for air quantity limits. See Table 38 for evaporator fan motor specifications. See Table 39 for fan rpm at various motor pulley settings. To alter fan performance, see Evaporator Fan Performance Adjustment section.

Cooling

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 starts on closure of contactors.

Check unit charge. Refer to Refrigerant Charge section.

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 switch at OFF position. Resetting thermostat at a position above room temperature shuts unit off temporarily until space temperature exceeds thermostat setting. Units are equipped with Cycle-LOC™ protection device. Unit shuts down on any safety trip and remains off; an indicator light on the thermostat comes on. Check reason for safety trip.

Compressor restart is accomplished by manual reset at the thermostat by turning the selector switch to OFF position and then to ON position.

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.

NOTE: Upon a call for heat the main burners will remain on for a minimum of 60 seconds.

Heating

1. Purge gas supply line of air by opening union ahead of gas valve. When gas odor is detected, tighten union and wait 5 minutes before proceeding.
2. Turn on electrical supply and open 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 burners do not light, then there is a 22-second delay before another 5-second try. If the burners still do not light, the time delay is repeated. If the burners do not light within 15 minutes, there is a lockout. To reset the control, break the 24 v power to W1.
6. The evaporator fan will turn on 45 seconds after a call for heating.
7. The evaporator fan will turn off 45 seconds after the thermostat temperature is satisfied.
8. Adjust airflow to obtain a temperature rise within the range specified on the unit nameplate and Tables 1 and 2.

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 off unit until space temperature falls below thermostat setting.

Safety Relief

A soft-solder joint at the suction-line Schrader port provides pressure relief under abnormal temperature and pressure conditions.

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 are energized. The indoor-fan contactor (IFC) and compressor contactor (CA.1) are energized and indoor-fan motor, compressor, and outdoor fan starts. The outdoor-fan motor runs continuously while unit is cooling.

If the thermostat is satisfied, Y1 and G deenergize. The compressor stops immediately and the indoor fan will continue to operate for 30 seconds.

If the thermostat calls for a second stage of cooling by energizing Y2, compressor contactor no. 2 (CB.1) is energized and compressor no. 2 starts. When the thermostat is satisfied, Y2 deenergizes, stopping compressor no. 2.

Size 16 units have 3 compressors and 2 stages of cooling. Compressors 1 and 2 are controlled by Y1 and compressor no. 3 is controlled by Y2.

Heating, Units Without Economizer

When the thermostat calls for heating, terminal W1 is energized. To prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. On units equipped for two stages of heat, when additional heat is needed, W2 (if equipped) 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 Economi$er IV

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 EconoMi$er IV control to provide a 50° to 55°F mixed-air temperature into the zone. As the mixed-air temperature fluctuates above 55° or below 50° F, the dampers will be modulated (open or close) to bring the mixed-air temperature back within control.

If the load is high and Y2 is energized, then the first stage of mechanical cooling will be used to supplement the free cooling provided by the economizer. If mechanical cooling is utilized with free cooling, the outdoor-air damper will maintain its current position at the time the compressor is started. If the increase in cooling capacity causes the mixed-air temperature to drop below 45°F, then the outdoor-air damper position will be decreased to the minimum position. If the mixed-air temperature continues to fall, the outdoor-air damper will close. Control returns to normal once the mixed-air temperature rises above 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 the position goes above or below the power exhaust set point. When the exhaust fan is required to be on, the LED on the control will be energized.

If field-installed accessory CO_2 sensors are connected to the EconoMi$er IV 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 from the minimum damper position to the maximum demand ventilation damper position. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed.

If there is no G signal then the control will drive the damper to the fully closed position.

The control is also equipped with an occupied/unoccupied input. If the input is closed, then the damper will be driven to the minimum position when G is energized. If the input is open then the damper will remain in the fully closed position unless there is a demand for free cooling of DCV ventilation.

On the initial power to the EconoMi$er IV 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 $1^1/_2$ to $2^1/_2$ 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), then the control will modulate the dampers open to maintain the mixed air temperature set point at 50° to 55° F.

If there is a further demand for cooling (cooling second stage — Y2 is energized), then the control will bring on compressor stage 1 to maintain the mixed air temperature set point. The EconoMi$er IV damper will be open at maximum position. EconoMi$er IV operation is limited to a single compressor.

Heating, Units With Economi$er IV

When the room temperature calls for heat, the heating controls are energized as described in the Heating, Units Without Economizer section. The IFM is energized and the EconoMi$er IV damper modulates to the minimum position. When the thermostat is satisfied, the damper modulates closed.

Table 7 — Fan Performance — 48PGD08 Vertical Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	464	0.35	541	0.46	612	0.58	677	0.70	739	0.83
2400	479	0.40	554	0.52	622	0.64	686	0.77	745	0.90
2550	496	0.46	568	0.58	633	0.71	695	0.84	753	0.98
2700	512	0.53	582	0.65	646	0.79	705	0.92	762	1.07
2850	530	0.60	597	0.73	658	0.87	716	1.01	771	1.16
3000	547	0.68	612	0.82	672	0.96	728	1.11	782	1.26
3150	565	0.77	628	0.91	686	1.06	741	1.21	793	1.37
3300	583	0.86	644	1.01	701	1.17	754	1.32	805	1.49
3450	602	0.97	661	1.12	716	1.28	768	1.44	817	1.61
3600	621	1.08	678	1.24	732	1.41	782	1.57	831	1.75
3750	640	1.20	696	1.37	748	1.54	797	1.71	844	1.89

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	797	0.96	852	1.10	905	1.25	955	1.40	1003	1.55
2400	802	1.04	856	1.19	908	1.34	957	1.49	1005	1.65
2550	808	1.13	861	1.28	912	1.43	960	1.59	1007	1.75
2700	816	1.22	867	1.37	917	1.53	965	1.70	1011	1.86
2850	824	1.31	874	1.47	923	1.64	970	1.81	1015	1.98
3000	833	1.42	882	1.58	930	1.75	976	1.93	1020	2.11
3150	843	1.53	891	1.70	937	1.88	982	2.05	1026	2.24
3300	854	1.66	900	1.83	946	2.01	990	2.19	1033	2.38
3450	865	1.79	911	1.97	955	2.15	998	2.34	1040	2.53
3600	877	1.93	922	2.11	965	2.30	1007	2.49	1048	2.69
3750	889	2.08	933	2.26	976	2.46	1017	2.65	1057	2.86

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 8 — Fan Performance — 48PGE08 Vertical Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	463	0.35	541	0.46	611	0.58	677	0.70	738	0.83
2400	481	0.41	556	0.52	623	0.64	687	0.77	747	0.90
2550	499	0.47	571	0.59	637	0.72	698	0.85	756	0.99
2700	518	0.54	587	0.66	650	0.80	710	0.93	766	1.08
2850	537	0.62	603	0.75	665	0.88	722	1.03	777	1.18
3000	556	0.70	620	0.84	680	0.98	735	1.13	789	1.28
3150	575	0.79	637	0.93	695	1.08	749	1.24	801	1.40
3300	595	0.89	655	1.04	711	1.19	764	1.35	814	1.52
3450	615	1.00	673	1.16	727	1.32	778	1.48	828	1.65
3600	635	1.12	691	1.28	744	1.44	794	1.62	842	1.79
3750	655	1.24	710	1.41	761	1.58	810	1.76	856	1.94

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	797	0.96	852	1.10	904	1.25	954	1.40	1002	1.55
2400	803	1.04	857	1.19	909	1.34	958	1.49	1006	1.65
2550	811	1.13	864	1.28	914	1.44	963	1.60	1009	1.76
2700	820	1.23	871	1.38	921	1.54	968	1.71	1014	1.88
2850	829	1.33	879	1.49	928	1.66	974	1.83	1019	2.00
3000	840	1.44	888	1.61	936	1.78	981	1.95	1026	2.13
3150	851	1.56	898	1.73	944	1.90	989	2.08	1033	2.27
3300	862	1.69	909	1.86	954	2.04	998	2.23	1040	2.41
3450	875	1.82	920	2.00	964	2.19	1007	2.38	1049	2.57
3600	888	1.97	932	2.15	975	2.34	1017	2.54	1058	2.73
3750	901	2.12	944	2.31	987	2.51	1028	2.71	1068	2.91

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 9 — Fan Performance — 48PGF08 Vertical Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	468	0.36	545	0.46	615	0.58	680	0.71	741	0.83
2400	486	0.41	560	0.53	627	0.65	691	0.78	750	0.91
2550	505	0.48	576	0.60	641	0.72	702	0.86	760	1.00
2700	524	0.55	592	0.68	655	0.81	714	0.95	771	1.09
2850	544	0.63	609	0.76	670	0.90	728	1.04	782	1.19
3000	564	0.71	627	0.85	686	1.00	741	1.14	794	1.30
3150	584	0.81	645	0.95	702	1.10	756	1.26	807	1.42
3300	604	0.91	663	1.06	719	1.22	771	1.38	821	1.54
3450	625	1.02	682	1.18	736	1.34	787	1.51	835	1.68
3600	646	1.15	701	1.31	753	1.48	803	1.65	850	1.82
3750	667	1.28	720	1.45	771	1.62	819	1.80	865	1.98

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	799	0.97	854	1.11	907	1.26	957	1.40	1005	1.56
2400	807	1.05	860	1.20	912	1.35	961	1.50	1008	1.66
2550	815	1.14	867	1.29	918	1.45	966	1.61	1013	1.77
2700	824	1.24	875	1.40	925	1.56	972	1.72	1018	1.89
2850	834	1.35	884	1.51	932	1.67	979	1.84	1024	2.02
3000	845	1.46	894	1.63	941	1.80	986	1.97	1030	2.15
3150	857	1.58	904	1.75	950	1.93	995	2.11	1038	2.29
3300	869	1.71	916	1.89	960	2.07	1004	2.25	1046	2.44
3450	882	1.85	928	2.03	971	2.22	1014	2.41	1055	2.60
3600	896	2.00	940	2.19	983	2.38	1025	2.57	1065	2.77
3750	910	2.16	953	2.35	995	2.55	1036	2.75	1076	2.95

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 10 — Fan Performance — 48PGD09 Vertical Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	496	0.46	568	0.58	633	0.71	695	0.84	753	0.98
2700	512	0.53	582	0.65	646	0.79	705	0.92	762	1.07
2850	530	0.60	597	0.73	658	0.87	716	1.01	771	1.16
3000	547	0.68	612	0.82	672	0.96	728	1.11	782	1.26
3150	565	0.77	628	0.91	686	1.06	741	1.21	793	1.37
3300	583	0.86	644	1.01	701	1.17	754	1.32	805	1.49
3450	602	0.97	661	1.12	716	1.28	768	1.44	817	1.61
3600	621	1.08	678	1.24	732	1.41	782	1.57	831	1.75
3750	640	1.20	696	1.37	748	1.54	797	1.71	844	1.89
3900	659	1.33	713	1.50	764	1.68	812	1.86	858	2.05
4050	679	1.47	731	1.65	781	1.83	828	2.02	873	2.21
4200	698	1.62	750	1.81	798	2.00	844	2.19	888	2.38

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	808	1.13	861	1.28	912	1.43	960	1.59	1007	1.75
2700	816	1.22	867	1.37	917	1.53	965	1.70	1011	1.86
2850	824	1.31	874	1.47	923	1.64	970	1.81	1015	1.98
3000	833	1.42	882	1.58	930	1.75	976	1.93	1020	2.11
3150	843	1.53	891	1.70	937	1.88	982	2.05	1026	2.24
3300	854	1.66	900	1.83	946	2.01	990	2.19	1033	2.38
3450	865	1.79	911	1.97	955	2.15	998	2.34	1040	2.53
3600	877	1.93	922	2.11	965	2.30	1007	2.49	1048	2.69
3750	889	2.08	933	2.26	976	2.46	1017	2.65	1057	2.86
3900	903	2.24	945	2.43	987	2.63	1027	2.83	1067	3.03
4050	916	2.40	958	2.60	999	2.81	1038	3.01	1077	3.22
4200	930	2.58	971	2.79	1011	3.00	1050	3.21	1088	3.42

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 11 — Fan Performance — 48PGE09 Vertical Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	499	0.47	571	0.59	637	0.72	698	0.85	756	0.99
2700	518	0.54	587	0.66	650	0.80	710	0.93	766	1.08
2850	537	0.62	603	0.75	665	0.88	722	1.03	777	1.18
3000	556	0.70	620	0.84	680	0.98	735	1.13	789	1.28
3150	575	0.79	637	0.93	695	1.08	749	1.24	801	1.40
3300	595	0.89	655	1.04	711	1.19	764	1.35	814	1.52
3450	615	1.00	673	1.16	727	1.32	778	1.48	828	1.65
3600	635	1.12	691	1.28	744	1.44	794	1.62	842	1.79
3750	655	1.24	710	1.41	761	1.58	810	1.76	856	1.94
3900	675	1.38	728	1.55	778	1.73	826	1.91	871	2.10
4050	695	1.52	747	1.71	796	1.89	842	2.08	886	2.27
4200	716	1.68	766	1.87	814	2.06	859	2.25	902	2.45

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	811	1.13	864	1.28	914	1.44	963	1.60	1009	1.76
2700	820	1.23	871	1.38	921	1.54	968	1.71	1014	1.88
2850	829	1.33	879	1.49	928	1.66	974	1.83	1019	2.00
3000	840	1.44	888	1.61	936	1.78	981	1.95	1026	2.13
3150	851	1.56	898	1.73	944	1.90	989	2.08	1033	2.27
3300	862	1.69	909	1.86	954	2.04	998	2.23	1040	2.41
3450	875	1.82	920	2.00	964	2.19	1007	2.38	1049	2.57
3600	888	1.97	932	2.15	975	2.34	1017	2.54	1058	2.73
3750	901	2.12	944	2.31	987	2.51	1028	2.71	1068	2.91
3900	915	2.29	957	2.48	999	2.68	1039	2.89	1078	3.09
4050	929	2.47	971	2.67	1011	2.87	1051	3.08	1089	3.29
4200	944	2.65	985	2.86	1024	3.07	1063	3.28	1100	3.50

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 12 — Fan Performance — 48PGF09 Vertical Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	505	0.48	576	0.60	641	0.72	702	0.86	760	1.00
2700	524	0.55	592	0.68	655	0.81	714	0.95	771	1.09
2850	544	0.63	609	0.76	670	0.90	728	1.04	782	1.19
3000	564	0.71	627	0.85	686	1.00	741	1.14	794	1.30
3150	584	0.81	645	0.95	702	1.10	756	1.26	807	1.42
3300	604	0.91	663	1.06	719	1.22	771	1.38	821	1.54
3450	625	1.02	682	1.18	736	1.34	787	1.51	835	1.68
3600	646	1.15	701	1.31	753	1.48	803	1.65	850	1.82
3750	667	1.28	720	1.45	771	1.62	819	1.80	865	1.98
3900	688	1.42	740	1.60	789	1.77	836	1.96	881	2.14
4050	709	1.57	760	1.75	808	1.94	854	2.13	898	2.32
4200	730	1.73	780	1.92	827	2.12	871	2.31	914	2.51

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	815	1.14	867	1.29	918	1.45	966	1.61	1013	1.77
2700	824	1.24	875	1.40	925	1.56	972	1.72	1018	1.89
2850	834	1.35	884	1.51	932	1.67	979	1.84	1024	2.02
3000	845	1.46	894	1.63	941	1.80	986	1.97	1030	2.15
3150	857	1.58	904	1.75	950	1.93	995	2.11	1038	2.29
3300	869	1.71	916	1.89	960	2.07	1004	2.25	1046	2.44
3450	882	1.85	928	2.03	971	2.22	1014	2.41	1055	2.60
3600	896	2.00	940	2.19	983	2.38	1025	2.57	1065	2.77
3750	910	2.16	953	2.35	995	2.55	1036	2.75	1076	2.95
3900	925	2.33	967	2.53	1008	2.73	1048	2.93	1087	3.14
4050	940	2.52	981	2.72	1021	2.92	1060	3.13	1099	3.35
4200	956	2.71	996	2.92	1035	3.13	1074	3.34	1111	3.56

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 13 — Fan Performance — 48PGD12 Vertical Units

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	566	0.72	630	0.86	688	1.00	744	1.15	797	1.31
3200	593	0.85	653	0.99	710	1.15	763	1.30	814	1.46
3400	620	0.99	678	1.15	732	1.30	783	1.47	832	1.64
3600	647	1.15	702	1.31	754	1.48	804	1.65	851	1.83
3800	674	1.33	728	1.50	778	1.67	825	1.85	871	2.03
4000	702	1.52	753	1.70	802	1.88	848	2.07	892	2.26
4200	729	1.73	779	1.92	826	2.11	870	2.31	913	2.50
4400	757	1.96	805	2.16	850	2.36	894	2.56	935	2.77
4600	785	2.21	832	2.42	875	2.63	917	2.84	958	3.05
4800	814	2.49	858	2.70	901	2.92	941	3.14	981	3.36
5000	842	2.78	885	3.01	926	3.23	966	3.46	1004	3.69

Airflow (Cfm)	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	847	1.47	896	1.63	943	1.80	988	1.98	1032	2.16
3200	863	1.63	910	1.80	955	1.98	999	2.16	1042	2.35
3400	879	1.81	925	1.99	969	2.17	1012	2.36	1054	2.55
3600	897	2.01	941	2.19	984	2.38	1026	2.58	1066	2.78
3800	915	2.22	958	2.41	1000	2.61	1040	2.81	1080	3.02
4000	935	2.45	976	2.65	1017	2.86	1056	3.06	1095	3.28
4200	955	2.71	995	2.91	1035	3.12	1073	3.34	1110	3.55
4400	976	2.98	1015	3.19	1053	3.41	1090	3.63	—	—
4600	997	3.27	1035	3.49	—	—	—	—	—	—
4800	1019	3.59	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 14 — Fan Performance — 48PGE12 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	574	0.74	636	0.87	695	1.02	750	1.17	802	1.32
3200	601	0.87	661	1.01	717	1.17	770	1.32	820	1.49
3400	629	1.02	686	1.17	740	1.33	791	1.49	840	1.66
3600	657	1.18	712	1.34	764	1.51	813	1.68	860	1.86
3800	686	1.36	739	1.53	788	1.71	836	1.89	881	2.07
4000	715	1.56	765	1.74	813	1.93	859	2.12	903	2.31
4200	744	1.78	792	1.97	839	2.17	883	2.36	925	2.56
4400	773	2.03	820	2.22	864	2.43	907	2.63	949	2.84
4600	802	2.29	848	2.50	891	2.71	932	2.92	972	3.13
4800	832	2.58	876	2.79	917	3.01	958	3.23	996	3.45
5000	862	2.88	904	3.11	944	3.34	983	3.56	–	–

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	853	1.48	901	1.65	948	1.82	993	2.00	1037	2.18
3200	869	1.65	916	1.83	961	2.00	1005	2.19	1048	2.37
3400	887	1.84	932	2.02	976	2.20	1019	2.39	1060	2.58
3600	905	2.04	949	2.23	992	2.42	1033	2.61	1074	2.81
3800	925	2.26	967	2.46	1009	2.65	1049	2.86	1088	3.06
4000	945	2.50	987	2.70	1027	2.91	1066	3.12	1104	3.33
4200	967	2.76	1007	2.97	1046	3.18	1084	3.40	1121	3.62
4400	988	3.05	1027	3.26	1065	3.48	1102	3.70	–	–
4600	1011	3.35	1049	3.57	–	–	–	–	–	–
4800	1034	3.68	–	–	–	–	–	–	–	–
5000	–	–	–	–	–	–	–	–	–	–

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 15 — Fan Performance — 48PGF12 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	578	0.74	640	0.88	698	1.03	753	1.18	805	1.33
3200	606	0.88	665	1.03	721	1.18	774	1.34	824	1.50
3400	635	1.03	691	1.18	745	1.34	795	1.51	844	1.68
3600	663	1.20	718	1.36	769	1.53	818	1.70	865	1.88
3800	693	1.38	745	1.56	794	1.73	841	1.91	886	2.10
4000	722	1.59	772	1.77	820	1.95	865	2.14	909	2.33
4200	752	1.81	800	2.00	846	2.20	889	2.39	932	2.59
4400	781	2.06	828	2.26	872	2.46	914	2.66	955	2.87
4600	811	2.33	856	2.54	899	2.75	940	2.96	980	3.17
4800	841	2.62	884	2.84	926	3.05	966	3.28	1004	3.50
5000	871	2.94	913	3.16	953	3.39	992	3.62	–	–

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	856	1.49	904	1.66	951	1.83	996	2.01	1040	2.19
3200	873	1.67	919	1.84	965	2.02	1008	2.20	1051	2.39
3400	891	1.85	936	2.03	980	2.22	1022	2.41	1064	2.60
3600	910	2.06	954	2.25	996	2.44	1037	2.63	1078	2.83
3800	930	2.29	972	2.48	1014	2.68	1054	2.88	1093	3.09
4000	951	2.53	992	2.73	1032	2.94	1071	3.15	1109	3.36
4200	973	2.80	1013	3.00	1051	3.22	1089	3.43	1126	3.65
4400	995	3.08	1034	3.30	1072	3.52	–	–	–	–
4600	1018	3.39	1056	3.61	–	–	–	–	–	–
4800	–	–	–	–	–	–	–	–	–	–
5000	–	–	–	–		–	–	–	–	–

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 16 — Fan Performance — 48PGD14 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	667	1.28	721	1.45	772	1.62	820	1.80	866	1.98
3950	695	1.47	747	1.65	796	1.83	842	2.01	887	2.20
4150	723	1.68	772	1.86	820	2.05	865	2.25	908	2.44
4350	750	1.90	799	2.10	844	2.30	888	2.50	930	2.70
4550	778	2.15	825	2.35	869	2.56	911	2.77	952	2.98
4750	807	2.42	851	2.63	894	2.85	935	3.06	975	3.28
4950	835	2.71	878	2.93	920	3.15	960	3.38	998	3.61
5150	863	3.02	905	3.25	946	3.48	984	3.72	1022	3.95
5350	892	3.36	933	3.60	972	3.84	1009	4.08	1046	4.32
5550	920	3.72	960	3.97	998	4.22	1035	4.47	1070	4.72
5750	949	4.10	987	4.36	1024	4.62	1060	4.88	1095	5.14
5950	978	4.52	1015	4.78	1051	5.05	–	–	–	–
6150	1006	4.96	1043	5.23	–	–	—	—	—	—
6250	1021	5.19	–	–	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	911	2.17	954	2.36	996	2.55	1037	2.75	1076	2.95
3950	930	2.39	972	2.59	1012	2.79	1052	3.00	1091	3.21
4150	950	2.64	991	2.85	1030	3.05	1069	3.27	1106	3.48
4350	971	2.91	1010	3.12	1048	3.34	1086	3.55	1123	3.78
4550	992	3.20	1030	3.41	1068	3.64	1104	3.86	1140	4.09
4750	1013	3.50	1051	3.73	1087	3.96	1123	4.19	1158	4.43
4950	1036	3.84	1072	4.07	1108	4.31	1142	4.55	1176	4.79
5150	1058	4.19	1094	4.43	1129	4.68	1162	4.93	1196	5.18
5350	1082	4.57	1116	4.82	1150	5.07	–	–	–	–
5550	1105	4.98	1139	5.23	–	–	—	—	—	—
5750	–	–	–	–	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 17 — Fan Performance — 48PGE14 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	679	1.31	732	1.49	782	1.66	830	1.84	876	2.02
3950	708	1.51	759	1.69	807	1.87	853	2.06	897	2.25
4150	737	1.73	786	1.92	832	2.11	877	2.30	920	2.50
4350	766	1.96	813	2.16	858	2.36	901	2.56	943	2.76
4550	795	2.22	841	2.43	884	2.63	926	2.84	966	3.06
4750	825	2.50	869	2.72	911	2.93	951	3.15	990	3.37
4950	854	2.80	897	3.03	938	3.25	977	3.48	1015	3.71
5150	884	3.13	925	3.36	965	3.60	1003	3.83	1040	4.07
5350	914	3.49	954	3.73	992	3.97	1029	4.21	1065	4.46
5550	944	3.86	982	4.11	1020	4.36	1056	4.62	1091	4.87
5750	974	4.27	1011	4.53	1048	4.79	1083	5.05	–	–
5950	1004	4.70	1040	4.97	1076	5.24	–	–	–	–
6150	1034	5.17	–	–	–	–	–	–	–	–
6250	–	–	–	–	—	—	–	–	–	–

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	920	2.21	963	2.40	1004	2.59	1045	2.79	1084	3.00
3950	940	2.44	982	2.64	1022	2.84	1061	3.05	1100	3.26
4150	961	2.70	1001	2.90	1041	3.11	1079	3.33	1116	3.54
4350	983	2.97	1022	3.19	1060	3.40	1097	3.62	1134	3.85
4550	1005	3.27	1043	3.49	1080	3.72	1117	3.94	1152	4.17
4750	1028	3.59	1065	3.82	1101	4.05	1137	4.29	1171	4.52
4950	1052	3.94	1088	4.17	1123	4.41	1157	4.65	1191	4.90
5150	1076	4.31	1111	4.55	1145	4.80	1179	5.05	—	—
5350	1100	4.70	1134	4.95	1168	5.21	—	—	—	—
5550	1125	5.13	—	—	—	—	—	—	—	—
5750	—	—	—	—	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.710 for low range motor/drive and 5.25 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 18 — Fan Performance — 48PGF14 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	685	1.33	738	1.51	788	1.68	835	1.86	881	2.04
3950	715	1.54	765	1.71	813	1.90	859	2.08	903	2.27
4150	744	1.76	793	1.94	839	2.13	883	2.33	926	2.53
4350	774	2.00	821	2.19	865	2.39	908	2.59	950	2.80
4550	804	2.26	849	2.47	892	2.67	934	2.88	974	3.10
4750	834	2.54	877	2.76	919	2.98	959	3.19	998	3.42
4950	864	2.85	906	3.08	946	3.30	985	3.53	1023	3.76
5150	894	3.19	935	3.42	974	3.65	1012	3.89	1049	4.13
5350	924	3.55	964	3.79	1002	4.03	1039	4.28	1074	4.52
5550	955	3.94	993	4.19	1030	4.44	1066	4.69	1101	4.94
5750	985	4.35	1023	4.61	1058	4.87	1093	5.13	—	—
5950	1016	4.79	1052	5.06	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	925	2.23	968	2.42	1009	2.62	1050	2.82	1089	3.02
3950	946	2.47	987	2.67	1027	2.87	1067	3.08	1105	3.29
4150	967	2.73	1007	2.93	1047	3.14	1085	3.36	1122	3.58
4350	990	3.01	1029	3.22	1067	3.44	1104	3.66	1140	3.89
4550	1012	3.31	1050	3.53	1087	3.76	1123	3.99	1159	4.22
4750	1036	3.64	1073	3.87	1109	4.10	1144	4.34	1178	4.57
4950	1060	3.99	1096	4.23	1131	4.47	1165	4.71	1199	4.96
5150	1084	4.37	1119	4.61	1153	4.86	1187	5.11	—	—
5350	1109	4.77	1143	5.02	—	—	—	—	—	—
5550	1135	5.20	—	—	—	—	—	—	—	—
5750	—	—	—	—	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 19 — Fan Performance — 48PGD16 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	606	0.91	693	1.25	764	1.58	827	1.91	884	2.23
4800	633	1.05	718	1.41	789	1.77	851	2.12	907	2.47
5100	661	1.21	744	1.60	814	1.98	875	2.35	930	2.73
5400	689	1.39	771	1.80	839	2.20	899	2.60	954	3.00
5700	717	1.58	797	2.01	864	2.44	924	2.87	978	3.29
6000	745	1.80	824	2.25	890	2.70	949	3.15	1002	3.60
6300	774	2.04	851	2.51	916	2.98	974	3.46	1027	3.93
6600	803	2.30	878	2.78	942	3.28	1000	3.78	1052	4.27
6900	832	2.58	906	3.08	969	3.61	1025	4.13	1077	4.65
7200	861	2.89	933	3.41	996	3.95	1051	4.50	1102	5.04
7500	891	3.22	961	3.76	1023	4.32	1078	4.89	1128	5.46

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	937	2.56	987	2.88	1034	3.21	1079	3.53	1122	3.86
4800	959	2.82	1008	3.16	1054	3.51	1098	3.85	1141	4.20
5100	981	3.09	1030	3.46	1075	3.83	1119	4.20	1161	4.56
5400	1004	3.39	1052	3.78	1097	4.17	1140	4.56	1181	4.95
5700	1028	3.70	1075	4.12	1119	4.53	1161	4.94	1202	5.35
6000	1051	4.04	1098	4.47	1142	4.91	1183	5.34	1224	5.77
6300	1075	4.39	1121	4.85	1165	5.31	1206	5.76	1246	6.22
6600	1100	4.76	1145	5.25	1188	5.73	1229	6.21	1268	6.68
6900	1125	5.16	1169	5.67	1212	6.17	1252	6.67	1291	7.17
7200	1149	5.58	1194	6.11	1236	6.64	1276	7.16	—	—
7500	1175	6.02	1219	6.58	1260	7.13	—	—	—	—

LEGEND

Bhp — Brake Horsepower

——— Mid–Low Range Motor/Drive Required

High Range Motor Required

NOTES:

1. Motor drive range is 710 to 879 rpm for low range motor/drive and 872 to 1066 rpm for mid–low range motor/drive, and 1066 to 1260 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for mid–low range motor/drive and 7.50 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 20 — Fan Performance — 48PGE16 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	646	1.05	727	1.40	795	1.74	856	2.07	911	2.40
4800	678	1.23	756	1.60	822	1.96	882	2.31	937	2.67
5100	709	1.42	785	1.82	851	2.20	909	2.58	962	2.96
5400	741	1.64	815	2.06	879	2.47	936	2.87	989	3.27
5700	774	1.88	846	2.32	908	2.75	964	3.18	1016	3.60
6000	806	2.14	876	2.60	937	3.06	993	3.52	1043	3.96
6300	839	2.42	907	2.91	967	3.40	1021	3.88	1071	4.35
6600	872	2.74	938	3.25	997	3.76	1050	4.26	1100	4.76
6900	905	3.08	970	3.61	1027	4.15	1080	4.68	1128	5.20
7200	938	3.45	1002	4.01	1058	4.57	1109	5.12	1157	5.66
7500	972	3.85	1034	4.43	1089	5.01	1139	5.59	1186	6.16

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	963	2.72	1012	3.05	1058	3.38	1103	3.71	1145	4.05
4800	988	3.02	1036	3.37	1081	3.72	1125	4.07	1167	4.42
5100	1012	3.33	1060	3.70	1105	4.07	1147	4.45	1189	4.82
5400	1038	3.67	1085	4.06	1129	4.45	1171	4.85	1211	5.24
5700	1064	4.02	1110	4.44	1153	4.86	1195	5.27	1235	5.69
6000	1091	4.41	1136	4.85	1179	5.29	1219	5.72	1259	6.16
6300	1118	4.82	1162	5.28	1204	5.74	1245	6.20	1283	6.66
6600	1146	5.25	1189	5.74	1231	6.23	1270	6.71	—	—
6900	1173	5.72	1216	6.23	1257	6.74	1296	7.24	—	—
7200	1202	6.21	1244	6.74	1284	7.28	—	—	—	—
7500	1230	6.73	1272	7.29	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

——— Mid–Low Range Motor/Drive Required

High Range Motor Required

NOTES:

1. Motor drive range is 710 to 879 rpm for low range motor/drive and 872 to 1066 rpm for mid–low range motor/drive, and 1066 to 1260 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for mid–low range motor/drive and 7.50 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 21 — Fan Performance — 48PGF16 Vertical Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	660	1.11	739	1.46	806	1.80	867	2.13	922	2.46
4800	693	1.29	769	1.67	835	2.03	894	2.39	948	2.74
5100	725	1.50	800	1.90	864	2.29	922	2.67	975	3.05
5400	759	1.73	831	2.15	894	2.57	950	2.97	1002	3.37
5700	792	1.98	862	2.43	924	2.87	979	3.30	1030	3.73
6000	826	2.26	894	2.73	954	3.20	1009	3.65	1059	4.11
6300	860	2.57	926	3.06	985	3.55	1038	4.04	1088	4.51
6600	894	2.90	959	3.42	1016	3.94	1069	4.44	1117	4.94
6900	929	3.26	992	3.81	1048	4.35	1099	4.88	1147	5.41
7200	963	3.66	1024	4.23	1079	4.79	1130	5.35	1177	5.90
7500	998	4.08	1058	4.68	1111	5.27	1161	5.85	1207	6.42

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	974	2.79	1022	3.12	1069	3.46	1113	3.79	1155	4.13
4800	999	3.10	1047	3.45	1092	3.80	1135	4.16	1177	4.51
5100	1025	3.42	1072	3.80	1116	4.17	1159	4.55	1200	4.93
5400	1051	3.77	1097	4.17	1141	4.57	1183	4.97	1224	5.36
5700	1078	4.15	1124	4.57	1167	4.99	1208	5.41	1248	5.83
6000	1106	4.55	1151	5.00	1193	5.44	1234	5.88	1273	6.32
6300	1134	4.98	1178	5.45	1220	5.92	1260	6.38	1298	6.84
6600	1163	5.44	1206	5.93	1247	6.42	1286	6.91	—	—
6900	1191	5.93	1234	6.44	1274	6.96	—	—	—	—
7200	1221	6.45	1263	6.99	—	—	—	—	—	—
7500	1250	7.00	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

Mid–Low Range Motor/Drive Required

High Range Motor Required

NOTES:

1. Motor drive range is 710 to 879 rpm for low range motor/drive and 872 to 1066 rpm for mid–low range motor/drive, and 1066 to 1260 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for mid–low range motor/drive and 7.50 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 22 — Fan Performance — 48PGD08 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	409	0.29	493	0.39	567	0.50	636	0.62	700	0.75
2400	422	0.33	503	0.44	576	0.56	642	0.68	704	0.81
2550	436	0.38	515	0.49	585	0.62	650	0.74	710	0.88
2700	450	0.43	527	0.55	595	0.68	658	0.81	717	0.95
2850	465	0.49	539	0.62	606	0.75	667	0.89	724	1.03
3000	480	0.56	552	0.69	617	0.83	676	0.97	732	1.12
3150	496	0.63	566	0.77	629	0.91	687	1.06	741	1.21
3300	511	0.70	579	0.85	641	1.00	698	1.16	751	1.31
3450	527	0.79	593	0.94	653	1.10	709	1.26	761	1.42
3600	543	0.88	608	1.04	666	1.21	721	1.37	772	1.54
3750	560	0.98	622	1.15	680	1.32	733	1.49	783	1.66

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	760	0.88	817	1.01	871	1.16	923	1.30	972	1.45
2400	763	0.94	819	1.09	872	1.23	923	1.38	972	1.54
2550	768	1.02	822	1.16	874	1.32	924	1.47	973	1.63
2700	773	1.10	826	1.25	877	1.40	927	1.56	974	1.73
2850	779	1.18	831	1.34	881	1.50	929	1.66	976	1.83
3000	786	1.27	837	1.43	886	1.60	933	1.77	979	1.94
3150	793	1.37	843	1.54	891	1.70	938	1.88	983	2.06
3300	802	1.48	851	1.65	898	1.82	943	2.00	987	2.18
3450	811	1.59	859	1.76	905	1.94	949	2.12	992	2.31
3600	820	1.71	867	1.89	912	2.07	956	2.26	998	2.45
3750	830	1.84	876	2.02	920	2.21	963	2.40	1005	2.60

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 23 — Fan Performance — 48PGE08 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	408	0.28	492	0.39	567	0.50	635	0.62	699	0.74
2400	424	0.33	505	0.44	577	0.56	644	0.68	706	0.81
2550	440	0.38	519	0.50	588	0.62	653	0.75	713	0.88
2700	457	0.44	532	0.56	600	0.69	662	0.82	721	0.96
2850	473	0.50	547	0.63	612	0.77	673	0.90	730	1.05
3000	490	0.57	561	0.71	625	0.85	684	0.99	740	1.14
3150	507	0.65	576	0.79	638	0.94	695	1.08	750	1.24
3300	524	0.73	591	0.88	651	1.03	708	1.19	760	1.34
3450	542	0.82	606	0.98	665	1.13	720	1.29	772	1.46
3600	559	0.92	622	1.08	679	1.24	733	1.41	783	1.58
3750	577	1.02	638	1.19	694	1.36	746	1.53	795	1.71

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	760	0.88	817	1.01	871	1.16	923	1.30	972	1.45
2400	765	0.95	820	1.09	874	1.24	924	1.39	973	1.54
2550	770	1.03	825	1.17	877	1.32	927	1.48	975	1.64
2700	777	1.11	830	1.26	881	1.42	930	1.58	977	1.74
2850	784	1.20	836	1.35	886	1.51	934	1.68	981	1.85
3000	793	1.29	843	1.45	892	1.62	939	1.79	985	1.96
3150	801	1.40	851	1.56	899	1.73	945	1.91	990	2.09
3300	811	1.51	859	1.68	906	1.85	951	2.03	995	2.21
3450	821	1.63	868	1.80	914	1.98	958	2.16	1001	2.35
3600	831	1.75	878	1.93	923	2.11	966	2.30	1008	2.49
3750	843	1.89	888	2.07	932	2.26	974	2.45	1016	2.65

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 24 — Fan Performance — 48PGF08 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	413	0.29	496	0.39	571	0.51	639	0.63	703	0.75
2400	429	0.34	510	0.45	581	0.57	647	0.69	709	0.82
2550	446	0.39	524	0.51	593	0.63	657	0.76	717	0.89
2700	464	0.45	538	0.57	605	0.70	667	0.83	726	0.97
2850	481	0.52	553	0.65	618	0.78	678	0.92	735	1.06
3000	499	0.59	569	0.72	632	0.86	690	1.01	746	1.16
3150	517	0.67	584	0.81	646	0.95	703	1.10	756	1.26
3300	535	0.75	600	0.90	660	1.05	715	1.21	768	1.37
3450	553	0.85	617	1.00	675	1.16	729	1.32	780	1.48
3600	571	0.95	633	1.11	690	1.27	742	1.44	792	1.61
3750	590	1.06	650	1.23	705	1.40	756	1.57	805	1.74

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2250	763	0.88	820	1.02	874	1.16	925	1.31	974	1.46
2400	768	0.96	824	1.10	877	1.25	927	1.40	976	1.55
2550	774	1.04	829	1.18	881	1.33	930	1.49	978	1.65
2700	781	1.12	834	1.27	885	1.43	934	1.59	981	1.75
2850	789	1.21	841	1.37	891	1.53	939	1.70	985	1.87
3000	798	1.31	849	1.47	897	1.64	944	1.81	990	1.98
3150	808	1.42	857	1.58	905	1.75	951	1.93	995	2.11
3300	818	1.53	866	1.70	913	1.88	958	2.06	1001	2.24
3450	829	1.65	876	1.83	921	2.01	965	2.19	1008	2.38
3600	840	1.78	886	1.96	931	2.15	974	2.34	1016	2.53
3750	852	1.92	897	2.11	941	2.30	983	2.49	1024	2.69

LEGEND

Bhp — Brake Horsepower

——— High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.10 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 25 — Fan Performance — 48PGD09 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	436	0.38	515	0.49	585	0.62	650	0.74	710	0.88
2700	450	0.43	527	0.55	595	0.68	658	0.81	717	0.95
2850	465	0.49	539	0.62	606	0.75	667	0.89	724	1.03
3000	480	0.56	552	0.69	617	0.83	676	0.97	732	1.12
3150	496	0.63	566	0.77	629	0.91	687	1.06	741	1.21
3300	511	0.70	579	0.85	641	1.00	698	1.16	751	1.31
3450	527	0.79	593	0.94	653	1.10	709	1.26	761	1.42
3600	543	0.88	608	1.04	666	1.21	721	1.37	772	1.54
3750	560	0.98	622	1.15	680	1.32	733	1.49	783	1.66
3900	576	1.08	637	1.26	693	1.44	745	1.61	794	1.79
4050	593	1.19	652	1.38	707	1.56	758	1.75	806	1.93
4200	610	1.32	668	1.51	721	1.70	771	1.89	818	2.08

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	768	1.02	822	1.16	874	1.32	924	1.47	973	1.63
2700	773	1.10	826	1.25	877	1.40	927	1.56	974	1.73
2850	779	1.18	831	1.34	881	1.50	929	1.66	976	1.83
3000	786	1.27	837	1.43	886	1.60	933	1.77	979	1.94
3150	793	1.37	843	1.54	891	1.70	938	1.88	983	2.06
3300	802	1.48	851	1.65	898	1.82	943	2.00	987	2.18
3450	811	1.59	859	1.76	905	1.94	949	2.12	992	2.31
3600	820	1.71	867	1.89	912	2.07	956	2.26	998	2.45
3750	830	1.84	876	2.02	920	2.21	963	2.40	1005	2.60
3900	841	1.98	886	2.16	929	2.35	971	2.55	1012	2.75
4050	852	2.12	896	2.31	938	2.51	980	2.71	1020	2.91
4200	863	2.27	906	2.47	948	2.67	989	2.88	1028	3.09

LEGEND

Bhp — Brake Horsepower

——— High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 26 — Fan Performance — 48PGE09 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	440	0.38	519	0.50	588	0.62	653	0.75	713	0.88
2700	457	0.44	532	0.56	600	0.69	662	0.82	721	0.96
2850	473	0.50	547	0.63	612	0.77	673	0.90	730	1.05
3000	490	0.57	561	0.71	625	0.85	684	0.99	740	1.14
3150	507	0.65	576	0.79	638	0.94	695	1.08	750	1.24
3300	524	0.73	591	0.88	651	1.03	708	1.19	760	1.34
3450	542	0.82	606	0.98	665	1.13	720	1.29	772	1.46
3600	559	0.92	622	1.08	679	1.24	733	1.41	783	1.58
3750	577	1.02	638	1.19	694	1.36	746	1.53	795	1.71
3900	594	1.13	654	1.31	708	1.49	759	1.66	808	1.84
4050	612	1.25	670	1.44	723	1.62	773	1.80	821	1.99
4200	630	1.38	686	1.57	738	1.76	787	1.95	834	2.14

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	770	1.03	825	1.17	877	1.32	927	1.48	975	1.64
2700	777	1.11	830	1.26	881	1.42	930	1.58	977	1.74
2850	784	1.20	836	1.35	886	1.51	934	1.68	981	1.85
3000	793	1.29	843	1.45	892	1.62	939	1.79	985	1.96
3150	801	1.40	851	1.56	899	1.73	945	1.91	990	2.09
3300	811	1.51	859	1.68	906	1.85	951	2.03	995	2.21
3450	821	1.63	868	1.80	914	1.98	958	2.16	1001	2.35
3600	831	1.75	878	1.93	923	2.11	966	2.30	1008	2.49
3750	843	1.89	888	2.07	932	2.26	974	2.45	1016	2.65
3900	854	2.03	898	2.22	941	2.41	983	2.61	1024	2.81
4050	866	2.18	909	2.37	951	2.57	992	2.77	1032	2.98
4200	878	2.34	921	2.54	962	2.74	1002	2.95	1041	3.16

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 27 — Fan Performance — 48PGF09 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	446	0.39	524	0.51	593	0.63	657	0.76	717	0.89
2700	464	0.45	538	0.57	605	0.70	667	0.83	726	0.97
2850	481	0.52	553	0.65	618	0.78	678	0.92	735	1.06
3000	499	0.59	569	0.72	632	0.86	690	1.01	746	1.16
3150	517	0.67	584	0.81	646	0.95	703	1.10	756	1.26
3300	535	0.75	600	0.90	660	1.05	715	1.21	768	1.37
3450	553	0.85	617	1.00	675	1.16	729	1.32	780	1.48
3600	571	0.95	633	1.11	690	1.27	742	1.44	792	1.61
3750	590	1.06	650	1.23	705	1.40	756	1.57	805	1.74
3900	608	1.18	667	1.35	720	1.53	771	1.71	819	1.89
4050	627	1.30	684	1.49	736	1.67	786	1.85	832	2.04
4200	646	1.44	701	1.63	752	1.82	801	2.01	846	2.20

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	774	1.04	829	1.18	881	1.33	930	1.49	978	1.65
2700	781	1.12	834	1.27	885	1.43	934	1.59	981	1.75
2850	789	1.21	841	1.37	891	1.53	939	1.70	985	1.87
3000	798	1.31	849	1.47	897	1.64	944	1.81	990	1.98
3150	808	1.42	857	1.58	905	1.75	951	1.93	995	2.11
3300	818	1.53	866	1.70	913	1.88	958	2.06	1001	2.24
3450	829	1.65	876	1.83	921	2.01	965	2.19	1008	2.38
3600	840	1.78	886	1.96	931	2.15	974	2.34	1016	2.53
3750	852	1.92	897	2.11	941	2.30	983	2.49	1024	2.69
3900	864	2.07	908	2.26	951	2.46	993	2.65	1033	2.86
4050	877	2.23	920	2.42	962	2.62	1003	2.83	1042	3.03
4200	890	2.40	933	2.60	974	2.80	1013	3.01	1052	3.22

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 568 to 771 rpm for low range motor/drive and 812 to 1015 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 2.40 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 28 — Fan Performance — 48PGD12 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	502	0.60	571	0.73	634	0.87	693	1.01	748	1.16
3200	525	0.70	592	0.85	652	0.99	709	1.14	762	1.30
3400	549	0.82	613	0.97	671	1.13	726	1.29	777	1.45
3600	573	0.95	634	1.11	691	1.28	743	1.44	793	1.61
3800	597	1.10	656	1.27	711	1.44	762	1.62	810	1.79
4000	621	1.26	678	1.44	731	1.62	781	1.80	828	1.99
4200	645	1.43	700	1.62	752	1.81	800	2.00	846	2.20
4400	669	1.62	723	1.83	772	2.02	819	2.22	864	2.42
4600	694	1.83	745	2.04	794	2.25	839	2.46	883	2.67
4800	719	2.06	768	2.28	815	2.50	860	2.71	902	2.93
5000	743	2.30	791	2.53	837	2.76	880	2.98	922	3.21

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	800	1.32	851	1.48	899	1.64	946	1.82	992	1.99
3200	813	1.46	862	1.63	909	1.80	955	1.98	999	2.16
3400	827	1.62	874	1.79	920	1.97	964	2.15	1007	2.34
3600	841	1.79	887	1.97	932	2.15	975	2.34	1017	2.53
3800	857	1.97	901	2.16	945	2.35	986	2.55	1027	2.75
4000	873	2.18	916	2.37	958	2.56	999	2.77	1039	2.97
4200	889	2.39	932	2.59	973	2.80	1013	3.00	1051	3.22
4400	907	2.63	948	2.83	988	3.04	1027	3.26	1065	3.48
4600	925	2.88	965	3.09	1004	3.31	1042	3.53	–	–
4800	943	3.15	982	3.37	1020	3.59	–	–	–	–
5000	962	3.44	1000	3.67	–	–	–	–	–	–

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 29 — Fan Performance — 48PGE12 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	510	0.61	579	0.75	641	0.89	699	1.03	754	1.18
3200	535	0.72	600	0.87	660	1.01	716	1.16	769	1.32
3400	560	0.84	623	1.00	680	1.15	734	1.31	785	1.48
3600	585	0.98	645	1.14	701	1.31	753	1.47	802	1.65
3800	610	1.14	668	1.31	722	1.48	772	1.65	820	1.83
4000	635	1.30	691	1.48	743	1.66	792	1.85	839	2.03
4200	661	1.49	715	1.68	765	1.87	813	2.06	858	2.25
4400	687	1.69	739	1.89	788	2.09	834	2.29	878	2.49
4600	713	1.91	763	2.12	811	2.33	855	2.53	898	2.74
4800	739	2.15	788	2.37	834	2.58	877	2.80	919	3.02
5000	765	2.41	812	2.63	857	2.86	899	3.08	940	3.31

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	806	1.34	856	1.50	905	1.66	951	1.84	997	2.01
3200	820	1.48	868	1.65	915	1.82	961	2.00	1005	2.18
3400	834	1.64	881	1.82	927	2.00	971	2.18	1014	2.37
3600	850	1.82	896	2.00	940	2.19	983	2.38	1024	2.57
3800	866	2.01	911	2.20	954	2.39	995	2.59	1036	2.79
4000	884	2.22	927	2.42	969	2.61	1009	2.82	1049	3.02
4200	902	2.45	944	2.65	984	2.85	1024	3.06	1062	3.28
4400	920	2.69	961	2.90	1001	3.11	1039	3.33	1077	3.55
4600	939	2.96	979	3.17	1018	3.39	1055	3.61	–	–
4800	959	3.24	998	3.46	1035	3.69	–	–	–	–
5000	979	3.54	–	–	–	–	–	–	–	–

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 30 — Fan Performance — 48PGF12 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	514	0.62	583	0.75	645	0.89	702	1.04	757	1.19
3200	540	0.73	605	0.88	665	1.02	720	1.18	773	1.33
3400	565	0.86	628	1.01	685	1.17	739	1.33	790	1.49
3600	591	1.00	651	1.16	706	1.33	758	1.49	808	1.66
3800	617	1.16	675	1.33	728	1.50	778	1.67	826	1.85
4000	643	1.33	699	1.51	750	1.69	799	1.87	845	2.06
4200	670	1.52	723	1.71	773	1.90	820	2.09	865	2.28
4400	696	1.72	748	1.92	796	2.12	842	2.32	885	2.52
4600	723	1.95	772	2.16	819	2.37	864	2.57	906	2.78
4800	749	2.19	797	2.41	843	2.63	886	2.84	927	3.06
5000	776	2.46	823	2.69	867	2.91	909	3.14	949	3.36

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	809	1.35	859	1.51	908	1.67	954	1.85	999	2.02
3200	823	1.50	872	1.66	919	1.84	964	2.01	1008	2.20
3400	839	1.66	886	1.83	931	2.01	975	2.20	1018	2.39
3600	855	1.84	900	2.02	944	2.21	987	2.40	1029	2.59
3800	872	2.04	916	2.22	959	2.42	1000	2.61	1041	2.81
4000	890	2.25	933	2.44	974	2.64	1015	2.85	1054	3.05
4200	908	2.48	950	2.68	990	2.89	1030	3.10	1068	3.31
4400	927	2.73	968	2.94	1007	3.15	1046	3.37	1083	3.59
4600	947	3.00	987	3.21	1025	3.43	1062	3.65	–	–
4800	967	3.28	1006	3.51	–	–	–	–	–	–
5000	988	3.59	–	–	–	–	–	–	–	–

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.10 for low range motor/drive and 3.70 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 31 — Fan Performance — 48PGD14 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	591	1.06	651	1.23	706	1.40	757	1.57	806	1.75
3950	615	1.22	672	1.40	726	1.57	776	1.75	823	1.94
4150	639	1.39	695	1.58	746	1.76	795	1.95	841	2.14
4350	663	1.58	717	1.77	767	1.97	814	2.17	859	2.36
4550	688	1.78	740	1.99	788	2.19	834	2.40	878	2.60
4750	712	2.00	763	2.22	810	2.43	855	2.65	897	2.86
4950	737	2.24	786	2.47	832	2.69	875	2.91	917	3.14
5150	762	2.50	809	2.73	853	2.97	896	3.20	937	3.43
5350	787	2.77	832	3.02	876	3.26	917	3.50	957	3.75
5550	811	3.07	856	3.33	898	3.58	938	3.83	977	4.08
5750	836	3.39	879	3.65	920	3.92	960	4.18	998	4.44
5950	861	3.72	903	4.00	943	4.28	982	4.55	1019	4.81
6150	886	4.09	927	4.37	966	4.66	1004	4.94	1040	5.21
6250	899	4.28	939	4.57	977	4.85	1015	5.14	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	853	1.93	898	2.11	941	2.30	983	2.49	1025	2.69
3950	869	2.12	912	2.31	955	2.51	996	2.71	1036	2.91
4150	885	2.34	928	2.53	969	2.74	1009	2.94	1048	3.15
4350	902	2.57	944	2.77	984	2.98	1023	3.19	1061	3.41
4550	920	2.81	961	3.03	1000	3.24	1038	3.46	1075	3.68
4750	938	3.08	978	3.30	1016	3.52	1053	3.75	1090	3.98
4950	957	3.36	996	3.59	1033	3.82	1069	4.05	1105	4.29
5150	976	3.67	1014	3.90	1050	4.14	1086	4.38	1121	4.62
5350	995	3.99	1032	4.23	1068	4.48	1103	4.72	1137	4.97
5550	1015	4.33	1051	4.58	1086	4.84	1120	5.09	—	—
5750	1035	4.70	1070	4.96	1105	5.22	—	—	—	—
5950	1055	5.08	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 32 — Fan Performance — 48PGE14 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	604	1.10	662	1.26	717	1.43	767	1.61	816	1.78
3950	629	1.26	686	1.44	738	1.62	787	1.80	834	1.98
4150	655	1.44	709	1.63	760	1.82	808	2.00	853	2.20
4350	681	1.64	733	1.83	782	2.03	829	2.23	873	2.43
4550	706	1.85	757	2.06	805	2.26	850	2.47	893	2.68
4750	732	2.09	782	2.30	828	2.52	872	2.73	914	2.95
4950	759	2.34	806	2.56	851	2.79	894	3.01	935	3.24
5150	785	2.61	831	2.85	874	3.08	916	3.31	956	3.54
5350	811	2.91	856	3.15	898	3.39	939	3.63	978	3.88
5550	838	3.22	881	3.48	922	3.73	961	3.98	999	4.23
5750	864	3.56	906	3.82	946	4.08	985	4.34	1022	4.60
5950	891	3.92	931	4.19	970	4.46	1008	4.73	1044	5.00
6150	917	4.31	957	4.59	995	4.87	1032	5.15	—	—
6250	931	4.51	970	4.80	1007	5.08	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	862	1.96	907	2.15	950	2.34	992	2.53	1033	2.73
3950	879	2.17	923	2.36	965	2.56	1006	2.76	1045	2.96
4150	897	2.39	939	2.59	980	2.79	1020	3.00	1059	3.21
4350	915	2.63	957	2.84	996	3.05	1035	3.26	1073	3.48
4550	934	2.89	975	3.10	1013	3.32	1051	3.54	1088	3.76
4750	954	3.16	993	3.39	1031	3.61	1068	3.84	1104	4.07
4950	974	3.46	1012	3.69	1049	3.92	1085	4.16	1120	4.39
5150	994	3.78	1032	4.02	1068	4.25	1103	4.50	1137	4.74
5350	1015	4.12	1051	4.36	1087	4.61	1121	4.86	1155	5.11
5550	1036	4.48	1072	4.73	1106	4.99	1140	5.24	—	—
5750	1058	4.86	1092	5.12	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 33 — Fan Performance — 48PGF14 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	611	1.12	669	1.28	723	1.45	773	1.63	821	1.80
3950	637	1.28	693	1.46	745	1.64	794	1.82	840	2.01
4150	663	1.47	717	1.66	767	1.84	815	2.03	860	2.22
4350	690	1.67	742	1.87	790	2.06	836	2.26	880	2.46
4550	716	1.89	766	2.10	813	2.30	858	2.51	901	2.72
4750	743	2.13	791	2.35	837	2.56	880	2.77	922	2.99
4950	770	2.39	816	2.62	861	2.84	903	3.06	944	3.29
5150	796	2.67	842	2.90	885	3.14	926	3.37	965	3.60
5350	823	2.97	867	3.22	909	3.46	949	3.70	988	3.94
5550	850	3.29	893	3.55	933	3.80	972	4.05	1010	4.30
5750	877	3.64	918	3.90	958	4.16	996	4.42	1033	4.68
5950	904	4.01	944	4.28	983	4.55	1020	4.82	1056	5.09
6150	931	4.41	970	4.69	1008	4.97	1044	5.24	—	—
6250	945	4.61	983	4.90	1020	5.18	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3750	868	1.99	912	2.17	955	2.36	997	2.56	1038	2.76
3950	885	2.19	928	2.39	970	2.58	1011	2.79	1051	2.99
4150	904	2.42	946	2.62	986	2.82	1026	3.03	1065	3.24
4350	923	2.66	963	2.87	1003	3.08	1042	3.30	1079	3.52
4550	942	2.93	982	3.14	1021	3.36	1058	3.58	1095	3.81
4750	962	3.21	1001	3.43	1039	3.66	1075	3.88	1111	4.12
4950	983	3.51	1020	3.74	1057	3.97	1093	4.21	1128	4.45
5150	1004	3.84	1040	4.07	1076	4.31	1111	4.56	1146	4.80
5350	1025	4.18	1061	4.43	1096	4.67	1130	4.92	1164	5.18
5550	1046	4.55	1082	4.80	1116	5.06	—	—	—	—
5750	1068	4.94	1103	5.20	—	—	—	—	—	—
5950	—	—	—	—	—	—	—	—	—	—
6150	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 690 to 893 rpm for low range motor/drive and 852 to 1055 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 34 — Fan Performance — 48PGD16 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	633	1.01	709	1.32	771	1.62	826	1.91	877	2.20
4800	663	1.18	738	1.52	799	1.84	853	2.15	903	2.46
5100	694	1.37	768	1.73	828	2.07	881	2.41	930	2.74
5400	725	1.57	797	1.96	857	2.33	909	2.68	957	3.04
5700	757	1.80	828	2.22	886	2.61	938	2.99	985	3.36
6000	788	2.05	858	2.49	916	2.91	967	3.31	1013	3.71
6300	820	2.33	888	2.79	945	3.24	996	3.66	1042	4.08
6600	852	2.63	919	3.12	975	3.59	1025	4.04	1070	4.48
6900	884	2.95	949	3.47	1005	3.96	1055	4.44	1099	4.90
7200	916	3.31	980	3.85	1036	4.37	1084	4.87	1129	5.36
7500	949	3.69	1011	4.25	1066	4.80	1114	5.33	1158	5.84

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	925	2.50	971	2.80	1015	3.10	1059	3.41	1101	3.73
4800	950	2.77	994	3.09	1037	3.41	1079	3.73	1120	4.06
5100	975	3.07	1019	3.40	1060	3.74	1101	4.08	1140	4.42
5400	1002	3.39	1044	3.74	1085	4.09	1124	4.45	1162	4.81
5700	1029	3.73	1070	4.10	1110	4.47	1148	4.84	1185	5.22
6000	1056	4.10	1097	4.49	1136	4.88	1173	5.27	1210	5.66
6300	1084	4.49	1124	4.90	1162	5.31	1199	5.72	1235	6.13
6600	1112	4.91	1152	5.34	1189	5.77	1226	6.20	1260	6.63
6900	1141	5.36	1180	5.81	1217	6.26	1252	6.71	1287	7.15
7200	1170	5.84	1208	6.31	1245	6.78	1280	7.25	—	—
7500	1199	6.35	1237	6.84	1273	7.33	—	—	—	—

LEGEND

Bhp — Brake Horsepower

——— Mid–Low Range Motor/Drive Required

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 710 to 879 rpm for low range motor/drive and 872 to 1066 rpm for mid–low range motor/drive, and 1066 to 1260 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for mid–low range motor/drive and 7.50 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 35 — Fan Performance — 48PGE16 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	664	1.13	735	1.44	795	1.74	849	2.04	900	2.34
4800	698	1.33	767	1.66	826	1.99	878	2.30	927	2.62
5100	732	1.55	800	1.91	857	2.25	908	2.59	956	2.93
5400	767	1.79	832	2.17	889	2.54	939	2.90	985	3.26
5700	801	2.05	865	2.46	920	2.86	970	3.24	1015	3.61
6000	836	2.35	899	2.78	953	3.20	1001	3.60	1046	4.00
6300	871	2.67	932	3.13	985	3.57	1033	4.00	1077	4.42
6600	906	3.02	966	3.50	1018	3.97	1065	4.42	1108	4.87
6900	941	3.40	1000	3.91	1051	4.40	1097	4.88	1140	5.35
7200	977	3.81	1034	4.35	1084	4.87	1130	5.37	1171	5.86
7500	1012	4.26	1068	4.83	1118	5.37	1162	5.89	1203	6.41

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	947	2.64	993	2.95	1038	3.26	1081	3.58	1123	3.90
4800	974	2.94	1018	3.26	1061	3.59	1102	3.92	1143	4.26
5100	1001	3.26	1044	3.60	1086	3.95	1126	4.29	1165	4.65
5400	1029	3.61	1071	3.97	1112	4.33	1151	4.69	1189	5.06
5700	1058	3.99	1099	4.37	1139	4.75	1177	5.13	1214	5.51
6000	1088	4.40	1128	4.79	1166	5.19	1203	5.59	1239	5.99
6300	1118	4.84	1157	5.25	1195	5.67	1231	6.08	1266	6.50
6600	1148	5.31	1187	5.74	1224	6.18	1259	6.61	1294	7.05
6900	1179	5.81	1217	6.26	1253	6.72	1288	7.17	—	—
7200	1211	6.34	1248	6.82	1283	7.30	—	—	—	—
7500	1242	6.91	1279	7.41	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

——— Mid–Low Range Motor/Drive Required

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 710 to 879 rpm for low range motor/drive and 872 to 1066 rpm for mid–low range motor/drive, and 1066 to 1260 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for mid–low range motor/drive and 7.50 for high range motor/drive.
3. See page 48 for General Fan Performance Notes.

Table 36 — Fan Performance — 48PGF16 Horizontal Units

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	705	1.31	771	1.62	828	1.92	881	2.23	931	2.54
4800	743	1.54	806	1.87	862	2.20	913	2.53	961	2.85
5100	781	1.80	842	2.16	896	2.51	946	2.85	993	3.20
5400	819	2.09	878	2.47	931	2.84	979	3.21	1025	3.57
5700	857	2.41	915	2.82	966	3.21	1013	3.60	1057	3.98
6000	896	2.76	952	3.19	1002	3.61	1048	4.02	1091	4.43
6300	935	3.15	989	3.60	1038	4.05	1083	4.48	1125	4.91
6600	974	3.57	1027	4.05	1074	4.52	1118	4.97	1159	5.42
6900	1013	4.03	1064	4.54	1111	5.03	1153	5.51	1194	5.98
7200	1052	4.54	1102	5.06	1148	5.58	1189	6.08	1229	6.57
7500	1092	5.08	1140	5.63	1185	6.17	1226	6.69	1264	7.21

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4500	979	2.85	1024	3.16	1069	3.49	1112	3.82	1154	4.15
4800	1007	3.18	1051	3.51	1094	3.85	1136	4.20	1176	4.55
5100	1037	3.54	1080	3.90	1121	4.25	1161	4.61	1200	4.97
5400	1068	3.94	1109	4.31	1149	4.68	1188	5.06	1226	5.44
5700	1099	4.37	1140	4.76	1178	5.15	1216	5.54	1253	5.94
6000	1132	4.83	1171	5.24	1209	5.65	1245	6.06	1281	6.47
6300	1165	5.33	1203	5.76	1240	6.19	1275	6.61	—	—
6600	1198	5.87	1235	6.32	1271	6.76	—	—	—	—
6900	1232	6.45	1268	6.91	—	—	—	—	—	—
7200	1266	7.06	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

Mid–Low Range Motor/Drive Required

High Range Motor/Drive Required

NOTES:

1. Motor drive range is 710 to 879 rpm for low range motor/drive and 872 to 1066 rpm for mid–low range motor/drive, and 1066 to 1260 rpm for high range motor/drive. All other rpms require a field-supplied drive.
2. Maximum continuous bhp is 3.70 for low range motor/drive and 5.25 for mid–low range motor/drive and 7.50 for high range motor/drive.
3. See below for General Fan Performance Notes.

GENERAL NOTES FOR FAN PERFORMANCE DATA TABLES

1. Static pressure losses (i.e., economizer, etc.) must be added to external static pressure before entering Fan Performance table.
2. Interpolation is permissible. Do not extrapolate.
3. Fan performance is based on wet coils, clean filters, and casing losses. See Accessory/FIOP Static Pressure information in Fig. 30-32.
4. Extensive motor and drive testing on these units ensures that the full horsepower range of the motor can be utilized with confidence. Using fan motors up to the bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
5. Use of a field-supplied motor may affect wire size. Recalculate the unit power supply MCA and MOCP if required. Contact Carrier representative for details.
6. Use the following formula to calculate input watts:
   Input Watts = Bhp x (746/Motor Eff)

Table 37 — Operation Air Quantity Limits

UNIT 48PG	COOLING (cfm)		HEATING (cfm)†	
	Min	Max	Min	Max
08 (Low Heat)	2250	3750	2060	5160
08 (Med Heat)	2250	3750	2110	6870
08 (High Heat)	2250	3750	2450	4900
09 (Low Heat)	2550	4250	2060	5160
09 (Med Heat)	2550	4250	2110	6870
09 (High Heat)	2550	4250	2450	4900
12 (Low Heat)	3000	5000	2110	6870
12 (Med Heat)	3000	5000	2450	4900
12 (High Heat)	3000	5000	3150	6300
14 (Low Heat)	3750	6250	2110	6870
14 (Med Heat)	3750	6250	2450	4900
14 (High Heat)	3750	6250	3150	6300
16 (Low Heat)	4500	7500	3040	6680
16 (Med Heat)	4500	7500	3870	7750
16 (High Heat)	4500	7500	4670	8680

Table 38 — Evaporator Fan Motor Specifications

48PG	DRIVE	VOLTAGE/PHASE	MOTOR P/N	EFFICIENCY	MAX BHP	MAX AMPS
08	Low	208/3ph	HD56FE652	0.80	2.4	6.4
		230/3ph	HD56FE652	0.80	2.4	6.4
		460/3ph	HD56FE652	0.80	2.4	3.2
		575/3ph	HD56FE575	0.80	2.4	2.4
	High	208/3ph	HD58FE653	0.84	3.1	8.8
		230/3ph	HD58FE653	0.84	3.1	8.8
		460/3ph	HD58FE653	0.84	3.1	4.4
		575/3ph	HD58FE576	0.82	3.7	4.2
09	Low	208/3ph	HD56FE652	0.80	2.4	6.4
		230/3ph	HD56FE652	0.80	2.4	6.4
		460/3ph	HD56FE652	0.80	2.4	3.2
		575/3ph	HD56FE575	0.80	2.4	2.4
	High	208/3ph	HD60FE655	0.83	3.7	11.0
		230/3ph	HD60FE655	0.83	3.7	11.0
		460/3ph	HD60FE655	0.83	3.7	5.5
		575/3ph	HD58FE576	0.82	3.7	4.2
12	Low	208/3ph	HD58FE653	0.84	3.1	8.8
		230/3ph	HD58FE653	0.84	3.1	8.8
		460/3ph	HD58FE653	0.84	3.1	4.4
		575/3ph	HD58FE576	0.82	3.7	4.2
	High	208/3ph	HD60FE655	0.83	3.7	11.0
		230/3ph	HD60FE655	0.83	3.7	11.0
		460/3ph	HD60FE655	0.83	3.7	5.5
		575/3ph	HD58FE576	0.82	3.7	4.2
14	Low	208/3ph	HD60FE655	0.83	3.7	11.0
		230/3ph	HD60FE655	0.83	3.7	11.0
		460/3ph	HD60FE655	0.83	3.7	5.5
		575/3ph	HD58FE576	0.82	3.7	4.2
	High	208/3ph	HD60FK650	0.81	5.25	14.8
		230/3ph	HD60FK650	0.81	5.25	14.8
		460/3ph	HD60FK650	0.81	5.25	7.4
		575/3ph	HD60FE575	0.81	5.25	5.9
16	Low	208/3ph	HD60FE655	0.83	3.7	11.0
		230/3ph	HD60FE655	0.83	3.7	11.0
		460/3ph	HD60FE655	0.83	3.7	5.5
		575/3ph	HD58FE576	0.83	3.7	4.2
	Mid-Low	208/3ph	HD60FK650	0.81	5.25	14.8
		230/3ph	HD60FK650	0.81	5.25	14.8
		460/3ph	HD60FK650	0.81	5.25	7.4
		575/3ph	HD60FE575	0.81	5.25	5.9
	High	208/3ph	HD60FL650	0.89	7.5	19.4
		230/3ph	HD60FL650	0.89	7.5	19.4
		460/3ph	HD60FL650	0.89	7.5	9.7
		575/3ph	HD60FL575	0.81	7.5	7.8

NOTES:

1. Extensive motor and electrical testing ensures that the motors can be utilized with confidence up to the maximum applied bhp, watts, and amps. Using the fan motor up to the maximum ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
2. Convert bhp to watts using the following formula:

$$\text{watts} = \frac{\text{bhp (746)}}{\text{motor efficiency}}$$

3. The EPACT (Energy Policy Act of 1992) regulates energy requirements for specific types of indoor fan motors. Motors regulated by EPACT include any general purpose, T-frame (three-digit, 143 and larger), single-speed, foot mounted, polyphase, squirrel cage induction motors of NEMA (National Electrical Manufacturers Association) design A and B, manu- factured for use in the United States. Ranging from 1 to 200 Hp, these continuous-duty motors operate on 230 and 460 volt, 60 Hz power. If a motor does not fit into these specifications, the motor does not have to be replaced by an EPACT-compliant energy-efficient motor. Variable-speed motors are exempt from EPACT compliance requirements. Therefore, the indoor fan motors for Carrier 48PG08-16 units are exempt from these requirements.

Table 39 — Fan Rpm at Motor Pulley Settings*

UNIT 48PG	DRIVE	MOTOR PULLEY TURNS OPEN										
		0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5
08	Low	771	751	731	710	690	670	649	629	609	589	568
	High	1015	994	974	954	934	913	893	873	852	832	812
09	Low	771	751	731	710	690	670	649	629	609	589	568
	High	1015	994	974	954	934	913	893	873	852	832	812
12	Low	893	873	852	832	812	791	771	751	731	710	690
	High	1055	1035	1015	994	974	954	934	913	893	873	852
14	Low	893	873	852	832	812	791	771	751	731	710	690
	High	1055	1035	1015	994	974	954	934	913	893	873	852
16	Low	879	863	846	829	812	795	778	761	744	727	710
	Mid-Low	1066	1047	1027	1008	988	969	950	930	911	892	872
	High	1260	1240	1221	1202	1182	1163	1144	1124	1105	1085	1066

*Approximate fan rpm shown, based on 1725 rpm motor.

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

Before performing service or maintenance operations on unit, always turn off all power to unit. There may be more than 1 disconnect switch.

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

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

Puron® (R-410A)refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment.

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. What to do if you smell gas:

DO NOT try to light any appliance.
DO NOT touch any electrical switch, or use any phone in your building.
IMMEDIATELY call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
If you cannot reach your gas supplier, call the fire department.

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

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

⚠ WARNING

FIRE, 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.

Cleaning

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

Coil Maintenance and Cleaning Recommendation

Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit. The following maintenance and cleaning procedures are recommended as part of the routine maintenance activities to extend the life of the coil.

Remove Surface Loaded Fibers

Surface loaded fibers or dirt should be removed with a vacuum cleaner. If a vacuum cleaner is not available, a soft non-metallic bristle brush may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges can be easily bent over and damage to the coating of a protected coil) if the tool is applied across the fins.

NOTE: Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers must be completely removed prior to using low velocity clean water rinse.

Periodic Clean Water Rinse

A periodic clean water rinse is very beneficial for coils that are applied in coastal or industrial environments. However, it is very important that the water rinse is made with very low velocity water stream to avoid damaging the fin edges. Monthly cleaning as described below is recommended.

Routine Cleaning of Coil Surfaces

Monthly cleaning with Totaline® environmentally sound coil cleaner is essential to extend the life of coils. This cleaner is available from Carrier Replacement parts division as part number P902-0301 for a one gallon container, and part number P902-0305 for a 5 gallon container. It is recommended that all coils, including standard aluminum, pre-coated, copper/copper or E-coated coils be cleaned with the Totaline environmentally sound coil cleaner as described below. Coil cleaning should be part of the unit's regularly scheduled maintenance procedures to ensure long life of the coil. Failure to clean the coils may result in reduced durability in the environment.

Avoid the use of:

- coil brighteners
- acid cleaning prior to painting
- high pressure washers
- poor quality water for cleaning

Totaline environmentally sound coil cleaner is non-flammable, hypoallergenic, nonbacterial, and a USDA accepted biodegradable agent that will not harm the coil or surrounding components such as electrical wiring, painted metal surfaces, or insulation. Use of non-recommended coil cleaners is strongly discouraged since coil and unit durability could be affected.

Totaline Environmentally Sound Coil Cleaner Application Equipment

- $2^1/_2$ gallon garden sprayer
- water rinse with low velocity spray nozzle

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

Harsh chemicals, household bleach or acid or basic cleaners should not be used to clean outdoor or indorr coils of any kind. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion at the fin/tube interface where dissimilar materials are in contact. If there is dirt below the surface of the coil, use the Totaline environmentally sound coil cleaner as described above.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

High velocity water from a pressure washer, garden hose, or compressed air should never be used to clean a coil. The force of the water or air jet will bend the fin edges and increase airside pressure drop. Reduced unit performance or nuisance unit shutdown may occur.

Totaline Environmentally Sound Coil Cleaner Application Instructions

1. Proper eye protection such as safety glasses is recommended during mixing and application.
2. Remove all surface loaded fibers and dirt with a vacuum cleaner as described above.
3. Thoroughly wet finned surfaces with clean water and a low velocity garden hose, being careful not to bend fins.
4. Mix Totaline environmentally sound coil cleaner in a $2^1/_2$ gallon garden sprayer according to the instructions included with the cleaner. The optimum solution temperature is 100° F.

NOTE: Do NOT USE water in excess of 130°F, as the enzymatic activity will be destroyed.

5. Thoroughly apply Totaline® environmentally sound coil cleaner solution to all coil surfaces including finned area, tube sheets and coil headers.
6. Hold garden sprayer nozzle close to finned areas and apply cleaner with a vertical, up-and-down motion. Avoid spraying in horizontal pattern to minimize potential for fin damage.
7. Ensure cleaner thoroughly penetrates deep into finned areas.
8. Interior and exterior finned areas must be thoroughly cleaned.
9. Finned surfaces should remain wet with cleaning solution for 10 minutes.
10. Ensure surfaces are not allowed to dry before rinsing. Reapplying cleaner as needed to ensure 10-minute saturation is achieved.
11. Thoroughly rinse all surfaces with low velocity clean water using downward rinsing motion of water spray nozzle. Protect fins from damage from the spray nozzle.

Condensate Drain Pan

Check and clean each year at the start of the cooling season.

To clean the condensate pan:

1. Disconnect condensate drain system from side or bottom drain connection.
2. Remove and clean trap.
3. Remove 4 screws securing condensate pan access cover to unit. Save screws and panel.
4. Slide condensate pan out from unit and clean. Pan is made of non-corrosive plastic. Use a mild cleaner to remove heavy deposits of dirt and grime.
5. Replace pan in unit.
6. Replace condensate pan access cover with 4 screws saved from Step 3.
7. Re-attach and prime condensate trap.
8. Connect condensate drainage system.

NOTE: During winter in low (subfreezing) temperature regions, add antifreeze solutions to the drain. Protect against contact with children, pets and animals.

Filters

Clean or replace at start of each heating and cooling season, or more often if operating conditions require. Refer to Tables 1 and 2 for type and size.

Outdoor-Air Inlet Screens

Clean screens with steam or hot water and a mild detergent.

Main Burner

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

Flue Gas Passageways

The flue collector box and heat exchanger cells may be inspected by opening heat section access door (Fig. 10), flue box cover, and main burner assembly (Fig. 33). Refer to Main Burners section on page 56 for burner removal sequence. If cleaning is required, clean tubes with 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 bi-monthly to determine proper cleaning frequency.

To inspect blower wheel, open heat section door. Using a flashlight, look into the flue exhaust duct to inspect. If cleaning is required, remove motor and wheel assembly by removing the screws holding the flue box cover to the flue box. See Fig. 33. Remove the screws holding the inducer housing to the inlet plate. The wheel can then be removed from the motor shaft and cleaned with a detergent or solvent. Replace the wheel onto the motor shaft in the correct position and reassemble the flue cover onto the flue box.

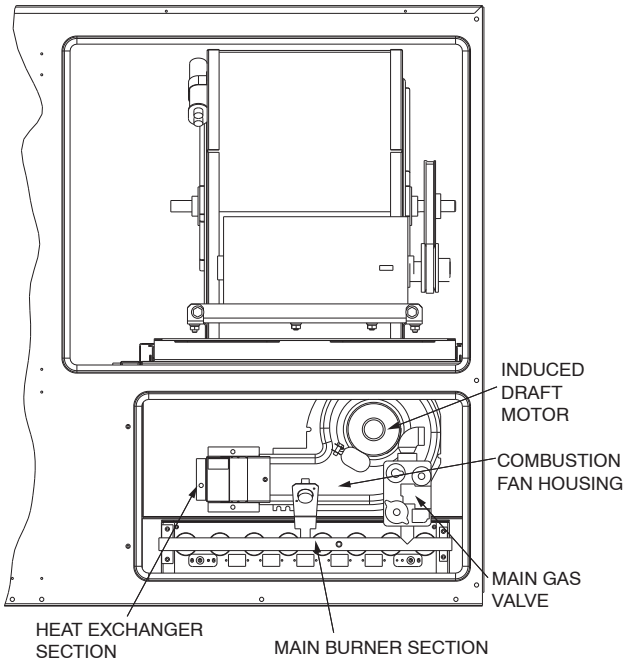


Fig. 34 – Typical Gas Heating Section (Sizes 08-14 Shown)

Lubrication

Compressors

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

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

The compressor is in a Puron® refrigerant system and uses a polyolester (POE) oil. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oils can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Avoid exposure of the oil to the atmosphere. Damage to components could result.

Polyolester (POE) compressor lubricants are known to cause long term damage to some synthetic roofing materials. Exposure, even if immediately cleaned up, may cause roofing materials to become brittle (leading to cracking) within a year. When performing any service which may risk exposure of compressor oil to the roof, take appropriate precautions to protect roofing. Procedures which risk oil leakage include compressor replacement, repairing refrigerant leaks, and replacing refrigerant components. To prepare rooftop:

1. Cover extended roof work area with an impermeable plastic dropcloth or tarp. Make sure a 10 x 10 ft area around the work area is covered.
2. Cover area in front of the unit service panel with a terry cloth shop towel to absorb lubricant spills and prevent run-offs. Towel will also protect dropcloth from tears caused by tools or components.
3. Place terry cloth shop towel inside the unit directly under components to be serviced to prevent spills through the bottom of the unit.
4. Perform the required service.
5. Remove an dispose of any oil contaminated material per local codes.

Indoor Fan Shaft Bearings

The indoor fan has permanently sealed bearings. No field lubrication is necessary.

Indoor Fan Shaft Bearings (Size 16)

Lubricate bearings at least every 6 months with suitable bearing grease. Typical lubricants are given below:

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

*Preferred lubricant because it contains rust and oxidation inhibitors.

Condcnser and Evaporator-Fan Motor Bearings

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

Evaporator Fan Service and Replacement

The 48PG units feature a slide-out fan deck for easy servicing of the indoor-fan motor, pulleys, belt, and bearings. To service components in this section, perform the following procedure:

1. Turn off unit power.
2. Open the fan section access door.
3. Remove two no. 10 screws at front of slide-out fan deck. Save screws. (See Fig. 35.)
4. Disconnect the electrical wires connected to the slide-out fan deck (supply air thermistor and fan status switch if installed). Wires may be damaged if not disconnected.
5. Fan deck can now be slid out to access serviceable components.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damge.

DO NOT SLIDE FAN DECK OUT PAST THE FAN DECK STOP. If further access is required, the fan deck must be supported. Make sure plugs and wiring are not pinched between fan housing and unit sheet metal post.

6. To replace fan deck to operating position, slide fan deck back into the unit. Secure with the two no. 10 screws removed in Step 3.
7. Re-attach electrical wires.
8. Close fan section access door.
9. Restore power to unit.

Evaporator Fan Performance Adjustment (Fig. 35 and 36)

Fan motor pulleys are factory set for speed shown in Table 39.

To change fan speeds:

1. Shut off unit power supply.
2. Loosen nuts on the 4 carriage bolts in the mounting base. Using adjusting bolts and plate, slide motor and remove belt.
3. Loosen movable-pulley flange setscrew. (See Fig. 36.)
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 39.
   See Table 37 for air quantity limits.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 39 for speed change for each full turn of pulley flange.)

6. Replace belts.
7. Realign fan and motor pulleys:
   a. Loosen fan pulley setscrews.
   b. Slide fan pulley along fan shaft.
   c. Make angular alignment by loosening motor from mounting plate.
8. Tighten belts.
9. Restore power to unit.

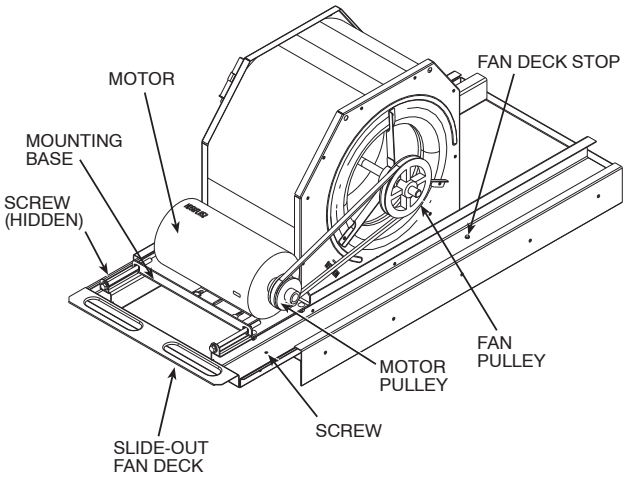


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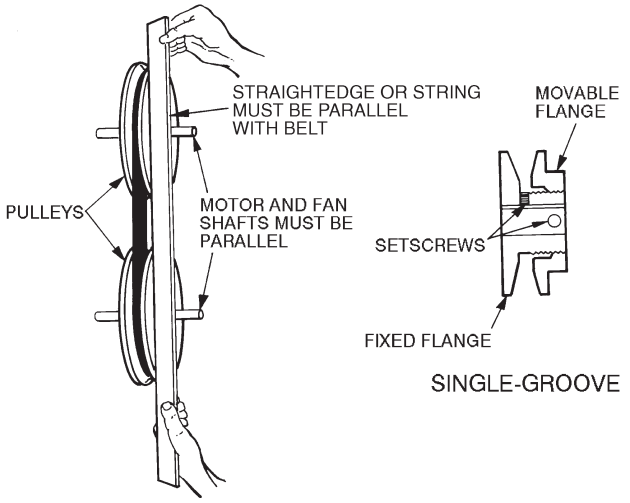
Fig. 35 – Evaporator-Fan Motor Adjustment (Sizes 08-14 Shown)



C06041

Fig. 36 – Evaporator-Fan Alignment and Adjustment

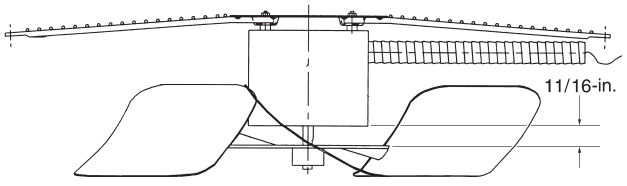
Evaporator Fan Belt Tension Adjustment

To adjust belt tension:

1. Turn off unit power.
2. Slide out fan deck to service position as shown in Evaporator Fan Service and Replacement section above.
3. Loosen motor mounting plate bolts.
4. Move motor mounting plate to adjust to proper belt tension. Motor adjuster bolts may be used to tighten belts. (See Fig. 30.) **Do not overtighten belt.**
5. Check for proper belt alignment. Adjust if necessary.
6. Tighten motor mounting plate bolts to lock motor in proper position.
7. Return fan deck back into operating position.
8. Restore power to unit.Condenser-Fan Adjustment (Fig. 37)

Condenser Fan Adjustment

1. Shut off unit power supply.
2. Remove condenser-fan assembly (grille, motor, motor cover, and fan) and loosen fan hub setscrews.
3. Adjust fan height as shown in Fig. 37.
4. Tighten setscrews and replace condenser-fan assembly.
5. Turn on power to unit.



C06180

Fig. 37 – Evaporator-Fan Alignment and Adjustment

Verify Sensor Performance

Using an ohmmeter and a thermometer, compare measured temperature to the resistance shown in Table 40.

Table 40 — 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 Operation During Power Failure

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

Evacuation

Proper evacuation of the system will remove noncondensables and ensure a tight, dry system before charging. Evacuate from both high and low side ports. Never use the system compressor as a vacuum pump. Refrigerant tubes and indoor coil should be evacuated to 500 microns. Always break a vacuum with dry nitrogen. The two possible methods are the deep vacuum method and the triple evacuation method.

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a minimum vacuum of 500 microns and a vacuum gauge capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water. (See Fig. 38.)

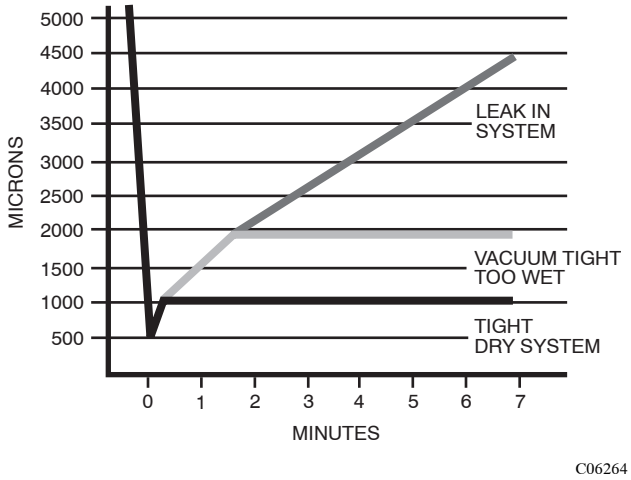


Fig. 38 – Deep Vacuum Graph

Triple Evacuation Method

The triple evacuation method should only be used when vacuum pump is capable of pumping down to 28 in. of mercury and system does not contain any liquid water. Proceed as follows:

1. Pump system down to 28 in. of mercury and allow pump to continue operating for an additional 15 minutes.
2. Close service valves and shut off vacuum pump.
3. Connect a nitrogen cylinder and regulator to system and open until system pressure is 2 psig.
4. Close service valve and allow system to stand for 1 hr. During this time, dry nitrogen will be able to diffuse throughout the system, absorbing moisture.
5. Repeat this procedure. System will then contain minimal amounts of contaminants and water vapor.

Refrigerant Charge

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

Puron® (R-410A) refrigerant cylinders contain a dip tube which allows liquid refrigerant to flow from the cylinder in an upright position. Charge units with cylinder in the upright position and a commercial type metering device in the manifold hose.

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

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

This system uses Puron® refrigerant which has higher pressures than standard R-22 and other refrigerants. No other refrigerant may be used in this system. Gauge set, hoses and recovery system must be designed to handle Puron® refrigerant. If unsure about equipment, consult the equipment manufacturer.

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

No Charge

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

Low Charge Cooling

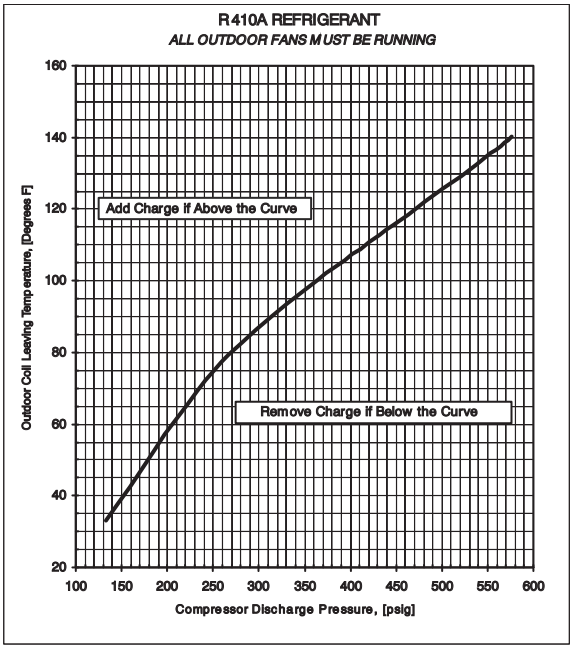
Using cooling charging chart (see Fig. 39-42), add or remove refrigerant until conditions of the chart are met. An accurate pressure gauge and temperature-sensing device is required. Charging is accomplished by ensuring the proper amount of liquid subcooling. Connect pressure gauge to the compressor discharge service valve. Connect temperature sensing device to the liquid line between the condenser and the TXV (thermostatic expansion valve) and insulate it so that ambient temperature does not affect reading.

To Use The Cooling Charging Chart

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

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

The TXV is set to maintain between 10 and 15° of superheat at the compressors. The valves are factory set and cannot be adjusted. Do not use a TXV designed for use with R-22 refrigerant.



C06265

Fig. 39 – Charging Chart — 48PG08 and 09

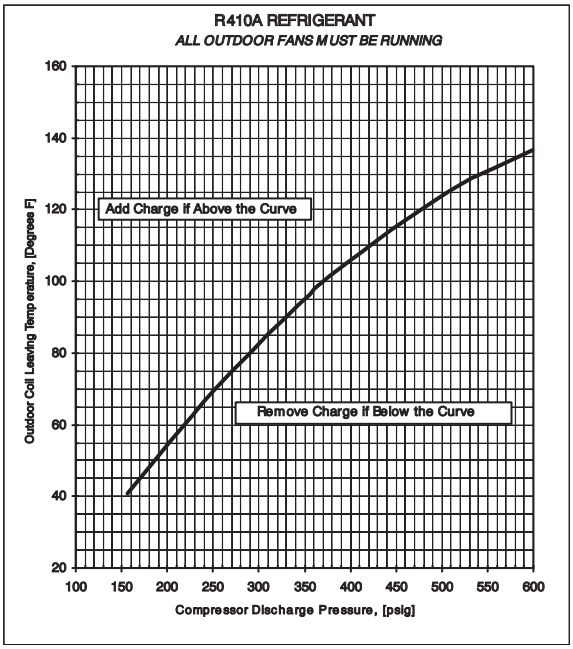


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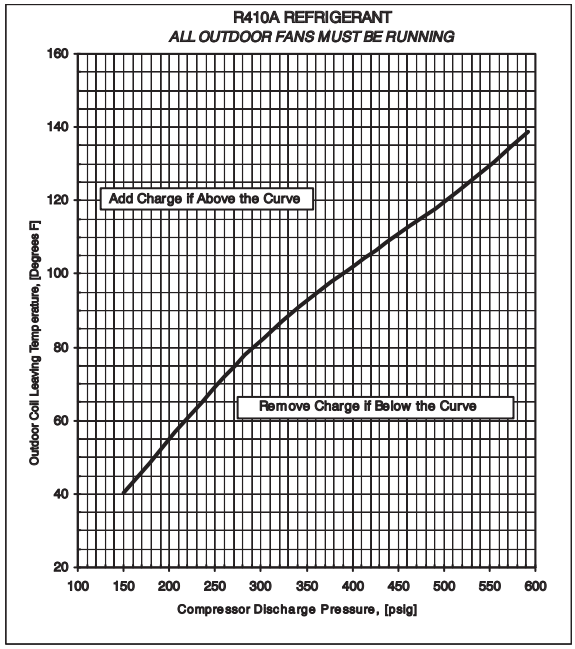
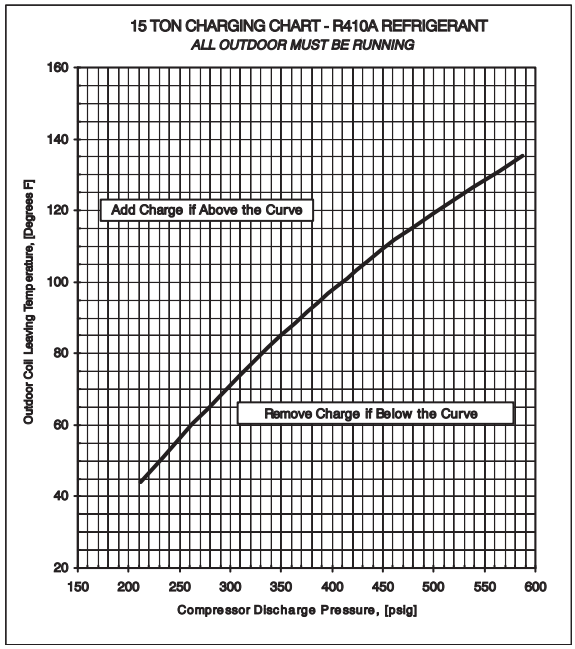
Fig. 40 – Charging Chart — 48PG12



C06267

Fig. 41 – Charging Chart — 48PG14



C06268

Fig. 42 – Charging Chart — 48PG16

Puron® Refrigerant

Puron® refrigerant operates at 50 to 70% higher pressures than R-22. Be sure that servicing equipment and replacement components are designed to operate with Puron refrigerant. Do not mix with components that have been used with other refrigerants. Puron® refrigerant, as with other HFCs, is only compatible with POE oils.

Recovery cylinder service pressure rating must be 400 psig. Puron® refrigerant systems should be charged with liquid refrigerant. Use a commercial-type metering device in the manifold hose. Manifold sets should be 750 psig high-side and 200 psig low-side with 520 psig low-side retard. Use hoses with 750 psig service pressure rating. Leak detectors should be designed to detect HFC refrigerant.

Gas Valve Adjustment

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

When power is supplied to valve terminals W2 (High Fire) and C1, the main valve opens to its preset position.

The regular factory setting is stamped on the valve body.

To adjust regulator:

1. Set unit at setting for no call for heat.
2. Turn main gas valve to OFF position.
3. Remove $^1/_8$-in. pipe plug from manifold pressure tap connection. Install a suitable pressure-measuring device.
4. Set main gas valve to ON position.
5. Set thermostat at setting to call for heat.
6. Remove screw cap covering regulator adjustment screw. (See Fig. 43.)
7. Turn adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure. The setting is 3.50 in. wg on sizes 08-14 and 3.00 in. wg on size 16.
8. Once desired pressure is established, set unit setting for no call for heat, turn off main gas valve, remove pressure-measuring device, and replace $^1/_8$-in. pipe plug and screw cap.

High Altitude

For high altitude applications greater than 2,000 ft the heat input rate should be reduced. The higher the altitude is above sea level, the less oxygen is in the air. See Table 41 for orifice sizing. A high altitude kit is available to convert unit for altitudes up to 7,000 ft.

LP (Liquid Propane) Gas Use

Base units are equipped with orifice sizes selected for Natural Gas use at elevations below 2000 ft. If LP fuel will be used, change the orifices according to Table 41 data. Manifold pressure is NOT changed when using LP fuel. Check per Start-Up section.

Main Burners

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

Main Burner Removal

1. Shut off (field-supplied) manual main gas valve.
2. Shut off power to unit.
3. Open gas section access door.
4. Disconnect gas piping from gas valve inlet.
5. Remove wires from gas valve.
6. Remove wires from rollout switch.
7. Remove sensor wire and ignitor cable from IGC board.
8. Remove 2 screws that hold the burner assembly to vestibule plate.
9. Rotate the burner/manifold assembly to the right, away from the flue extension and lift burner/manifold assembly out of unit.

Cleaning and Adjustment

1. Remove burner rack from unit as described in Main Burner Removal section above.
2. Inspect burners, and if dirty, remove burners from rack. The two outer burners have the flame crossover closed off in order to prevent gas flow from exiting the sides of the burner assembly. To prevent ignition problems, make sure the outer burners are returned to their original position when done servicing.
3. Using a soft brush, clean burners and crossover port as required.
4. Adjust spark gap. (See Fig. 43.)
5. Reinstall burners on rack.
6. Reinstall burner rack as described above.

Filter Drier

Replace whenever refrigerant system is exposed to atmosphere. Only use factory specified liquid-line filter driers with working pressures no less than 650 psig. Do not install a suction-line filter drier in liquid line. A liquid-line filter drier designed for use with Puron refrigerant is required on every unit.

Table 41 — Altitude Compensation*

48PG08-14

ELEVATION (ft)	NATURAL GAS ORIFICE†	LP ORIFICE†
0-1,999	43	50
2,000	44	51
3,000	44	51
4,000	44	51
5,000	45	51
6,000	45	52
7,000	47	52
8,000	47	52
9,000	47	53
10,000	48	53
11,000	49	53
12,000	50	54
13,000	50	54
14,000	51	55

48PG16

ELEVATION (ft)	NATURAL GAS ORIFICE†	LP ORIFICE†
0-1,999	30	38
2,000	30	40
3,000	31	40
4,000	31	41
5,000	31	41
6,000	31	42
7,000	32	42
8,000	32	43
9,000	32	43
10,000	35	44
11,000	36	44
12,000	37	45
13,000	38	46
14,000	39	47

LEGEND

LP — Liquid Propane

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

† Orifices available through the local Carrier dealer.

Protective Devices

Compressor Protection

High-Pressure Switch

If the high-pressure switch opens, the compressor will shut down and the compressor lockout (CLO) device will energize to block further compressor operation. The high-pressure switch will reset automatically as the refrigerant pressure drops below its reset level. The CLO will remain energized until manually reset.

Low-Pressure Switch

If the low-pressure switch opens, the compressor will shut down and the compressor lockout (CLO) device will energize to block further compressor operation. The low-pressure switch will reset automatically as the refrigerant pressure rises above its reset level. The CLO will remain energized until manually reset.

Freeze Protection Switch

This switch is installed on each evaporator coil section to provide protection against continued unit operation with a frosted evaporator surface. If the freeze protection switch opens, the compressor on this circuit will shut down and the compressor lockout (CLO) device will energize to block further compressor operation. The freeze protection switch will reset as the evaporator tube temperature rises above its reset level. The CLO will remain energized until manually reset.

Compressor Lockout (CLO) Device

The CLO prevents automatic recycling of the compressor as safety controls reset. If the high-pressure switch, low-pressure switch or freeze protection switch opens, the CLO device will energize to block further compressor operation. To reset the CLO (after all safety switches have reset), either open the thermostat to remove the cooling demand signal (and then re-close) or cycle the control power in the unit.

Overcurrent

Each compressor has internal line break motor protection.

Overtemperature —

Each compressor has an internal protector to protect it against excessively high discharge gas temperatures.

Evaporator Fan Motor Protection

Indoor-fan motors less than 5 hp are equipped with internal overcurrent and overtemperature protection. Protection devices reset automatically. Do not bypass protective devices to correct problem. Disconnect and lock out power when servicing motor.

Indoor- fan motors 5 hp and larger are equipped with a manual reset, calibrated trip, magnetic circuit breaker and overcurrent protection. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

Condenser-Fan Motor Protection

Each condenser-fan motor is internally protected against overtemperature.

Relief Devices

All units have relief devices to protect against damage from excessive pressures (i.e., fire). These devices protect the high and low side and are located at the suction line service port. Protect joint during brazing operations near joint.

Control Circuit, 24-V

Each control circuit is protected against overcurrent by a 3.2 amp circuit breaker. Breaker can be reset. If it trips, determine cause of trouble before resetting. See Fig. 43 and 44.

Replacement Parts

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

Diagnostic LEDs

The IGC control board has a LED for diagnostic purposes.

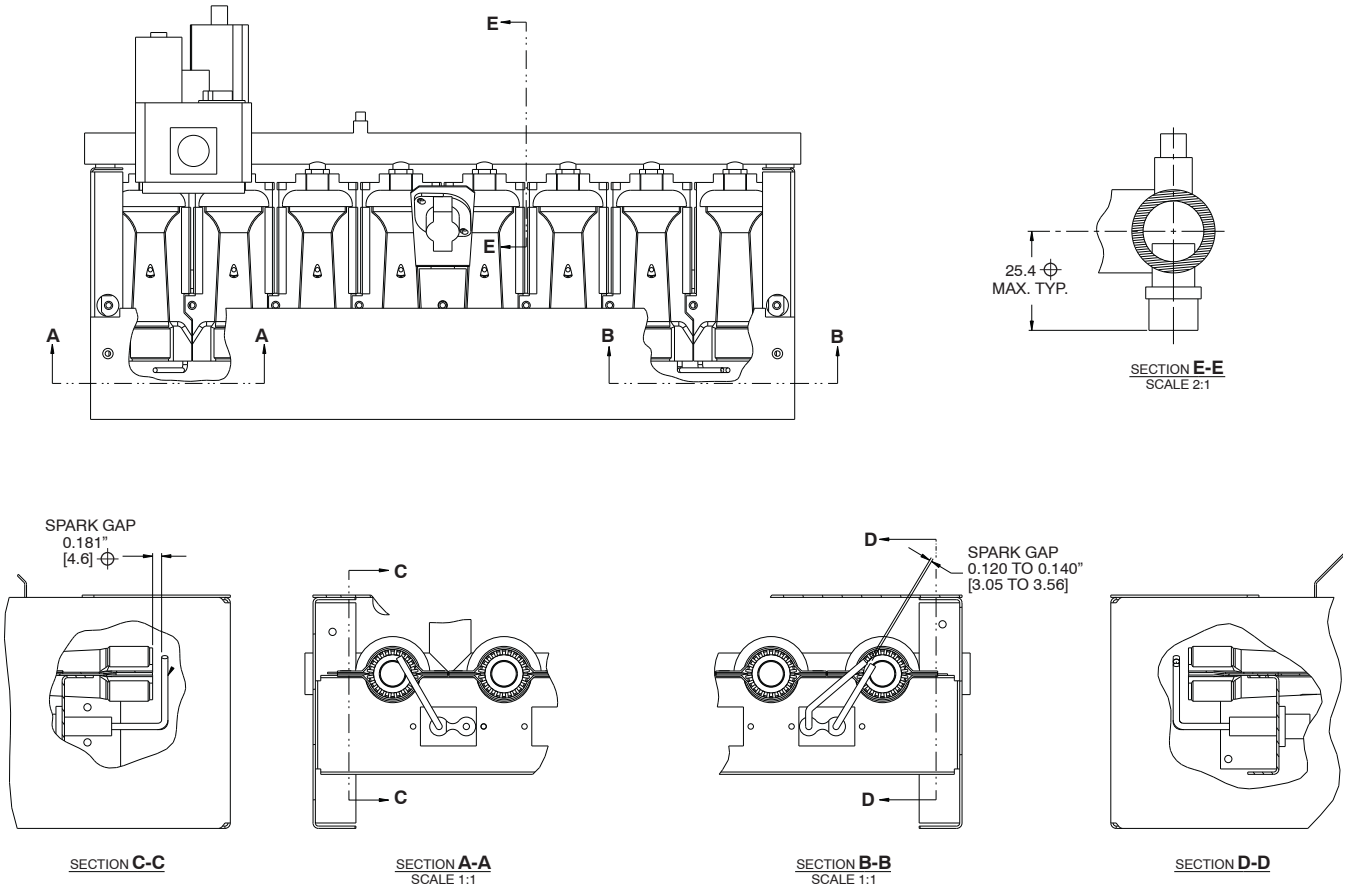
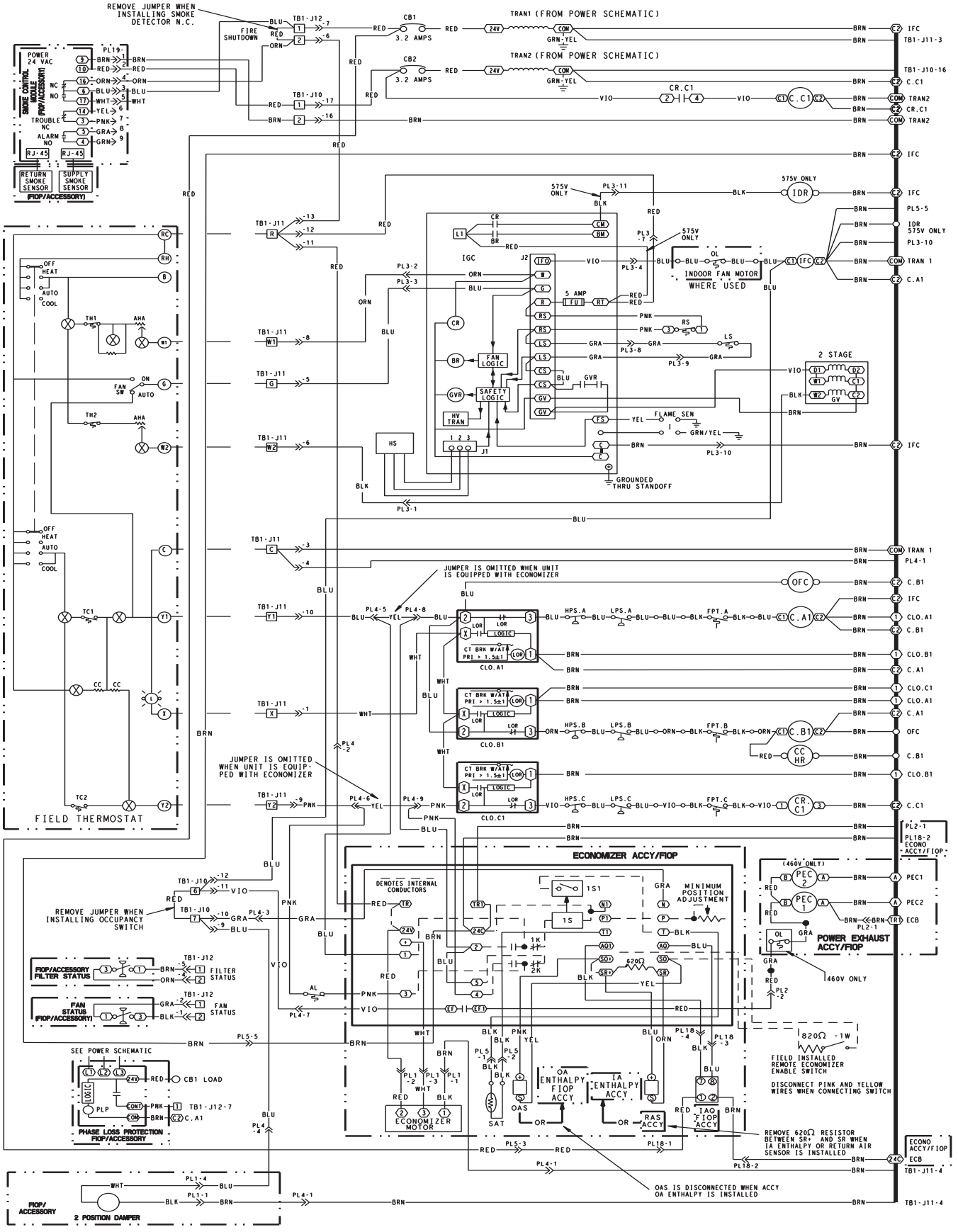
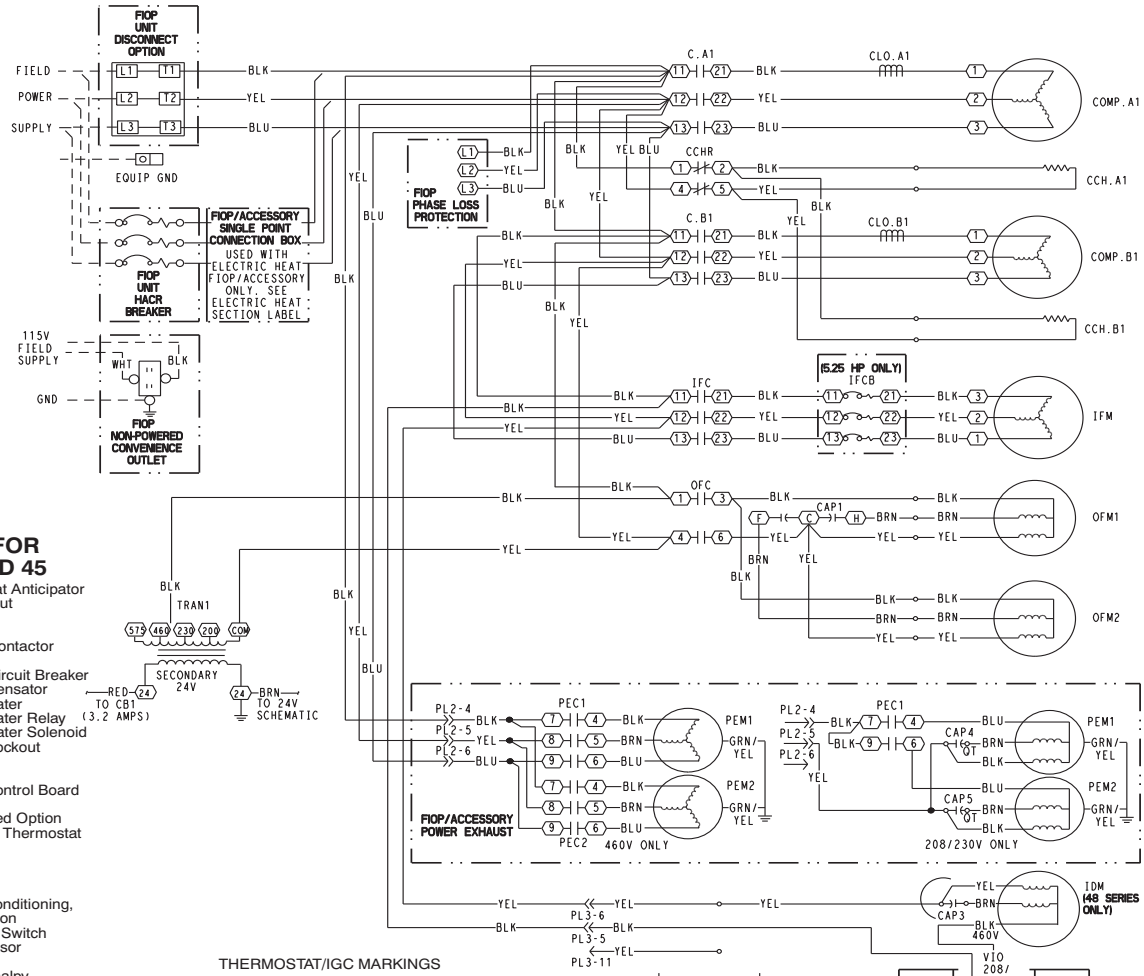


Fig. 43 – Spark Gap Adjustment



C06270

Fig. 44 – Typical Low Voltage Control Schematic



LEGEND FOR FIG. 44 AND 45

AHA	—	Adjustable Heat Anticipator
AL	—	Ambient Lockout
---A	—	Circuit A
---B	—	Circuit B
C	—	Compressor Contactor
CAP	—	Capacitor
CB	—	Compressor Circuit Breaker
CC	—	Cooling Compensator
CCH	—	Crankcase Heater
CCHR	—	Crankcase Heater Relay
CCHS	—	Crankcase Heater Solenoid
CLO	—	Compressor Lockout
COMP	—	Compressor
CT BRK	—	Circuit Breaker
ECB	—	Economizer Control Board
ECON	—	Economizer
FIOP	—	Factory-Installed Option
FPT	—	Freeze Protect Thermostat
FS	—	Flame Sensor
FU	—	Fuse
GND	—	Ground
GV	—	Gas Valve
HACR	—	Heating, Air Conditioning, and Refrigeration
HPS	—	High-Pressure Switch
HS	—	Hall Effect Sensor
I	—	Ignitor
IAE	—	Indoor Air Enthalpy
IAQ	—	Indoor Air Quality
IDM	—	Induced-Draft Motor
IFC	—	Indoor-Fan Contactor
IFCB	—	Indoor Fan Circuit Breaker
IFM	—	Indoor-Fan Motor
IGC	—	Integrated Gas Controller
LOR	—	Lockout Relay
LPS	—	Low-Pressure Switch
LS	—	Limit Switch
LSM	—	Mechanical Limit Switch
OAE	—	Outdoor-Air Enthalpy
OAS	—	Outdoor-Air Sensor
OFC	—	Outdoor-Fan Contactor
OFM	—	Outdoor-Fan Motor
OL	—	Overload Relay
PEC	—	Power Exhaust Contactor
PEM	—	Power Exhaust Motor
PL	—	Plug
QT	—	Quadruple Terminal
RAS	—	Return Air Sensor
RS	—	Rollout Switch
SAT	—	Supply-Air Temperature
TB	—	Terminal Block
TC	—	Thermostat-Cooling
TH	—	Thermostat-Heating
TRAN	—	Transformer
W/AT	—	With Auxiliary Trip

Terminal (Marked)

Terminal (Unmarked)

X — Terminal Block

Factory Wiring

Field Control Wiring

Field Power Wiring

Accessory or Optional Wiring

To Indicate Common Potential Only. Not to Represent Wiring.

THERMOSTAT/IGC MARKINGS

BM	—	Blower Motor
C	—	Common
CM	—	Combustion Motor
CS	—	Centrifugal Switch
G	—	Fan
IFO	—	Indoor Fan On
L1	—	Line 1
R	—	Thermostat Power
RT	—	Power Supply
SS	—	Speed Sensor
W	—	Thermostat Heat
W1	—	1st Stage of Heating
W2	—	2nd Stage of Heating
X	—	Alarm Output
Y1	—	1st Stage of Cooling
Y2	—	2nd Stage of Cooling

NOTES:
1. If any of the original wire furnished must be replaced, it must be replaced with Type 90° C or its equivalent.
2. Three-phase motors are protected under primary single-phasing conditions.
3. Use copper conductors only.
4. RED jumper wire must be added between R and W1 for space temperature mode and temporarily during Service-Test mode when the heaters need to operate.
5. TRAN1 and 2 are wired for 230-v on 208/230-v units. If unit is to be run with 208-v power supply, disconnect BLK wire from 230-v terminal and connect to 200-v terminal.

C06271

Fig. 45 – Typical Power Schematic

TROUBLESHOOTING

Unit Troubleshooting

See Table 42 for unit cooling troubleshooting. See Tables 43 and 44 for unit heating troubleshooting.

Table 42 — 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 3-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor Cycles (Other Than Normally Satisfying Thermostat).	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor.	Replace and determine cause.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective 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 heat 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.

Table 43 — Heating Service Analysis

PROBLEM	CAUSE	REMEDY
Burners Will Not Ignite.	Misaligned spark electrodes.	Check flame ignition and sensor electrode positioning. Adjust as needed.
	No gas at main burners.	Check gas line for air purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to relight unit.
		Check gas valve.
	Water in gas line.	Drain water and install drip leg to trap water.
	No power to furnace.	Check power supply, fuses, wiring, and circuit breaker.
	No 24 v power supply to control circuit.	Check transformer. Transformers with internal overcurrent protection require a cool-down period before resetting. Check 24-v circuit breaker; reset if necessary.
	Miswired or loose connections.	Check all wiring and wirenut connections.
	Burned-out heat anticipator in thermostat.	Replace thermostat.
	Broken thermostat wires.	Run continuity check. Replace wires, if necessary.
Inadequate Heating.	Dirty air filter.	Clean 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, Adjust pulley.
	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 (carbon monoxide), sooting flame, or floating flame.	Check all screws around flue outlets and burner compartment. Tighten as necessary.
		Cracked heat exchanger. Replace 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 44 — IGC Board LED Alarm Codes

LED FLASH CODE	DESCRIPTION	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
On	Normal Operation	—	—	—
Off	Hardware Failure	No gas heating.	—	Loss of power to the IGC. Check 5 amp fuse on IGC, power to unit, 24V circuit breaker, transformer, and wiring to the IGC.
1 Flash	Indoor Fan On/Off Delay Modified	5 seconds subtracted from On delay. 5 seconds added to Off delay (3 min max).	Power reset.	High temperature limit switch opens during heat exchanger warm-up period before fan-on delay expires. High temperature limit switch opens within 10 minutes of heat call (W) Off. See Limit Switch Fault.
2 Flashes	Limit Switch Fault	Gas valve and igniter Off. Indoor fan and inducer On.	Limit switch closed, or heat call (W) Off.	High temperature limit switch is open. Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is within the range on the unit nameplate. Check wiring and limit switch operation.
3 Flashes	Flame Sense Fault	Indoor fan and inducer On.	Flame sense normal. Power reset for LED reset.	The IGC sensed a flame when the gas valve should be closed. Check wiring, flame sensor, and gas valve operation.
4 Flashes	Four Consecutive Limit Switch Fault	No gas heating.	Heat call (W) Off. Power reset for LED reset.	4 consecutive limit switch faults within a single call for heat. See Limit Switch Fault.
5 Flashes	Ignition Fault	No gas heating.	Heat call (W) Off. Power reset for LED reset.	Unit unsuccessfully attempted ignition for 15 minutes. Check igniter and flame sensor electrode spacing, gaps, etc. Check flame sense and igniter wiring. Check gas valve operation and gas supply.
6 Flashes	Induced Draft Motor Fault	If heat off: no gas heating. If heat on: gas valve Off and inducer On.	Inducer sense normal, or heat call (W) Off.	Inducer sense On when heat call Off, or inducer sense Off when heat call On. Check wiring, voltage, and operation of IGC motor. Check speed sensor wiring to IGC.
7 Flashes	Rollout Switch Lockout	Gas valve and igniter Off. Indoor fan and inducer On.	Power reset.	Rollout switch has opened. Check gas valve operation. Check induced-draft blower wheel is properly secured to motor shaft.
8 Flashes	Internal Control Lockout	No gas heating.	Power reset.	IGC has sensed internal hardware or software error. If fault is not cleared by resetting 24 v power, replace the IGC.
9 Flashes	Temporary Software Lockout	No gas heating.	1 hour auto reset, or power reset.	Electrical interference is disrupting the IGC software.

LEGEND

IGC — Integrated Gas Unit
LED — Light–Emitting Diode

NOTES:

1. There is a 3-second pause between alarm code displays.
2. If more than one alarm code exists, all applicable alarm codes will be displayed in numerical sequence.
3. Alarm codes on the IGC will be lost if power to the unit is interrupted.

EconoMi$er IV Troubleshooting

Economi$er IV Preparation

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 EconoMi$er IV.

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

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

Differential Enthalpy

To check differential enthalpy:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Place 620-ohm resistor across S_O and +.
3. Place 1.2 kilo-ohm resistor across S_R and +. The Free Cool LED should be lit.
4. Remove 620-ohm resistor across S_O and +. The Free Cool LED should turn off.
5. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

Single Enthalpy

To check single enthalpy:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Set the enthalpy potentiometer to A (fully CCW). The Free Cool LED should be lit.
3. Set the enthalpy potentiometer to D (fully CW). The Free Cool LED should turn off.
4. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

DCV (Demand Controlled Ventilation) and Power Exhause

To check DCV and Power Exhaust:

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

DCV Minimum and Maximum Position

To check the DCV minimum and maximum position:

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

Mixed-Air Input

To check mixed-air input:

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

Economi$er IV Troubleshooting Completion

This procedure is used to return the EconoMi$er IV to operation. No troubleshooting or testing is done by performing the following procedure.

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

Phase Loss Protection

The phase loss protection option will monitor the three-phase electrical system to provide phase reversal and phase loss protection.

Phase Reversal Protection

If the control senses an incorrect phase relationship, the relay (K1) will be de-energized (opening its contact). If the phase relationship is correct, the relay will be energized. The control has a self-bypass function after a pre-set time. If the control determines that the three phases stay in a correct relationship for 10 consecutive minutes, the relay will stay energized regardless of the phase sequence of three inputs as long as 24-vac control voltage is applied. This self-bypass function will be reset if all three phases are restored in a phase loss event.

Phase Loss Protection

If the reverse rotation board senses any one of the three phase inputs has no AC voltage, the relay will be deenergized (opening its contact). This protection is always active as long as 24-vac control voltage is applied, and is not affected by the self bypass function of the phase sequence monitoring function. However, in the event of phase loss, the relay will be re-energized only if all three phases are restored and the three phases are in the correct sequence.

A red LED is provided to indicate the function of the board. See the table below.

LED STATUS	FUNCTION
On Continuously	Relay contact closed (normal operation).
Blinking	Relay contact open (phase loss or phase reversal has occurred) – No power will be supplied to the control system.
Off	24 vac control power not present (off).

UNIT START-UP CHECKLIST

MODEL NO.: _____ **SERIAL NO.:** _____

DATE: _____ **TECHNICIAN:** _____

I. PRE-START-UP:

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ VERIFY INSTALLATION OF OUTDOOR AIR HOOD
- ☐ VERIFY INSTALLATION OF FLUE EXHAUST AND INLET HOOD
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS
- ☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
- ☐ VERIFY GAS PRESSURE TO UNIT GAS VALVE IS WITHIN SPECIFIED RANGE
- ☐ CHECK GAS PIPING FOR LEAKS
- ☐ CHECK THAT INDOOR-AIR FILTERS ARE CLEAN AND IN PLACE
- ☐ CHECK THAT OUTDOOR AIR INLET SCREENS ARE IN PLACE
- ☐ VERIFY THAT UNIT IS LEVEL
- ☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE, AND VERIFY SETSCREW IS TIGHT
- ☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED
- ☐ VERIFY THAT SCROLL COMPRESSORS ARE ROTATING IN THE CORRECT DIRECTION
- ☐ VERIFY INSTALLATION OF THERMOSTAT
- ☐ VERIFY THAT CRANKCASE HEATERS HAVE BEEN ENERGIZED FOR AT LEAST 24 HOURS

II. START-UP

ELECTRICAL

SUPPLY VOLTAGE	L1-L2	_____	L2-L3	_____	L3-L1	_____	
COMPRESSOR AMPS —	COMPRESSOR A1	L1	_____	L2	_____	L3	_____
—	COMPRESSOR B1	L1	_____	L2	_____	L3	_____
—	COMPRESSOR C1 (16)	L1	_____	L2	_____	L3	_____
SUPPLY FAN AMPS		L1	_____	L2	_____	L3	_____

TEMPERATURES

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

PRESSURES

GAS INLET PRESSURE		_____	IN. WG		
GAS MANIFOLD PRESSURE	STAGE NO. 1	_____	IN. WG	STAGE NO. 2 _____	IN. WG
REFRIGERANT SUCTION	CIRCUIT A	_____	PSIG		
	CIRCUIT B	_____	PSIG		
	CIRCUIT C (16)	_____	PSIG		
REFRIGERANTDISCHARGE	CIRCUIT A	_____	PSIG		
	CIRCUIT B	_____	PSIG		
	CIRCUIT C (16)	_____	PSIG		

☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS

GENERAL

☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS