48TF,TM008-014
Single-Package Rooftop
Gas Heating/Electric Cooling Units

Installation, Start-Up and Service Instructions

CONTENTS

SAFETY CONSIDERATIONS

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 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.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

⚠ WARNING

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 ever 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(s).

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit, install lockout tag. Ensure voltage listed on unit data plate agrees with electrical supply provided for the unit. Electrical shock could cause personal injury.

INSTALLATION

Unit is shipped in the vertical discharge configuration. To convert to horizontal configuration, remove screws from side duct opening covers and remove covers. Using the same screws, install covers on vertical duct openings with the insulation side down. Seals around duct openings must be tight. See Fig. 1.

Confirm before installation of unit that voltage, amperage and circuit protection requirements listed on unit data plate agree with power supply provided.

Step 1 — Provide Unit Support

ROOF CURB — Assemble and install accessory roof curb in accordance with instructions shipped with curb. See Fig. 2. Install insulation, cant strips, roofing felt, and counter flashing as shown. *Ductwork must be attached to curb.* If gas or electrical connections are to be routed through the curb, attach the accessory thru-the-curb service connection plate to the roof curb in accordance with the accessory installation instructions. Connections must be installed before unit is set in roof curb.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 2. Improperly applied gasket can also result in air or water leaks and poor unit performance.

Curb should be level. Unit leveling tolerances are shown in Fig. 3. This is necessary for unit drain to function properly. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

If gas or electrical connections are to be routed through the bottom of the unit, attach accessory thru-the-bottom service connections to the basepan in accordance with the accessory installation instructions.

ALTERNATE UNIT SUPPORT — When the curb or adapter cannot be used, support unit with sleepers using unit curb or adapter support area. If sleepers cannot be used, support long sides of unit with a minimum of three 4-in. x 4-in. pads, 2 at the corners and one at the unit's center of gravity. If more than 3 pads are used, equally space the pads along the sides of the unit.

SLAB MOUNT (Horizontal Units Only) — Provide a level concrete slab that extends a minimum of 6 in. beyond unit cabinet. Install a 6-in. 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.

Step 2 — Field Fabricate Ductwork — Secure all ducts to roof curb and building structure on vertical units. *Do not connect ductwork to unit.* For horizontal applications, field-supplied flanges should be attached to horizontal discharge openings and all ductwork secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

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

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

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

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

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

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

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

To use the bottom drain connection for a roof curb installation, relocate the factory-installed plug (Red) from the bottom connection to the side connection. See Fig. 4. The piping for the condensate drain and external trap can be completed after the unit is in place. See Fig. 5.

All units must have an external trap for condensate drainage. Install a trap a minimum of 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.).

The center drain plug looks like a star connection, however it can be removed with a 1/2 in. socket drive extension.

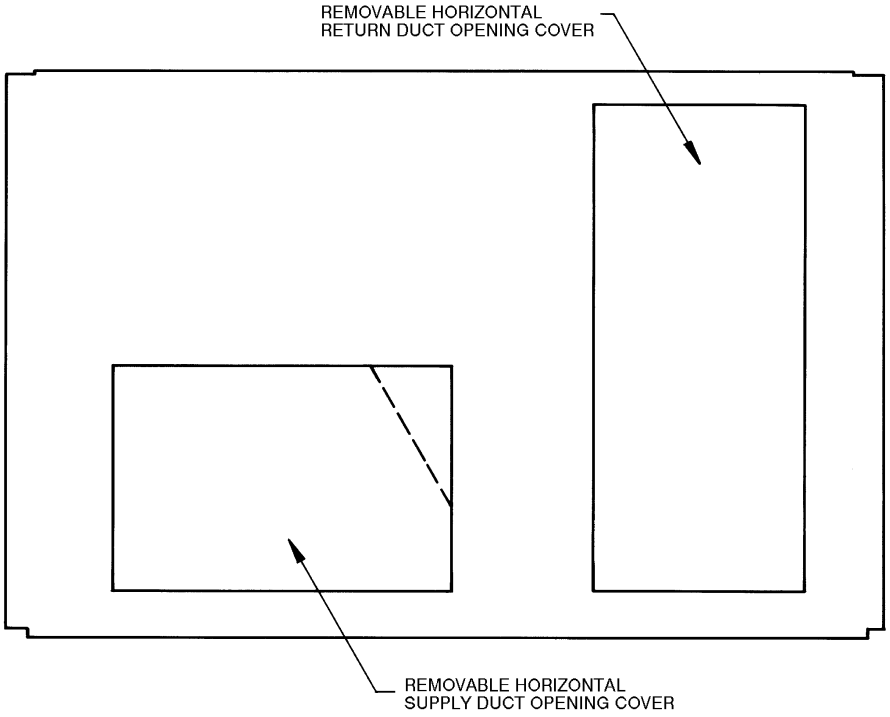


Fig. 1 — Horizontal Conversion Panels

CONNECTOR PKG. ACC.	B	C	D ALT DRAIN HOLE	GAS	POWER	CONTROL	ACCESSORY PWR
CRBTMPWR001A01 CRBTMPWR002A01	2′-8 7/16″ [827]	1′-10 15/16″ [583]	1 3/4″ [44.5]	3/4″ [19] NPT	3/4″ [19] NPT 1 1/4″ [31.7]	1/2″ [12.7] NPT	1/2″ [12.7] NPT
CRBTMPWR003A01	↓	↓	↓	1/2″ [12.7] NPT	3/4″ [19] NPT	↓	↓
CRBTMPWR004A01	↓	↓	↓	3/4″ [19] NPT	1 1/4″ [31.7]	↓	↓

ROOFCURB ACCESSORY	A	UNIT SIZE
CRRFCURB003A01	1′-2″ [356]	48TF,TM 008-014
CRRFCURB004A01	2′-0″ [610]	

NOTES:
1. ROOFCURB ACCESSORY IS SHIPPED DISASSEMBLED.
2. INSULATED PANELS: 1″ THK. POLYURETHANE FOAM, 1-3/4 # DENSITY.
3. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
4. ROOFCURB: 16 GAGE STEEL.
5. ATTACH DUCTWORK TO CURB. (FLANGES OF DUCT REST ON CURB)
6. SERVICE CLEARANCE 4′ ON EACH SIDE.
7. ▨ DIRECTION OF AIR FLOW.
8. CONNECTOR PACKAGES CRBTMPWR001A01 AND 2A01 ARE FOR THRU-THE-CURB GAS TYPE. PACKAGES CRBTMPWR003A01 AND 4A01 ARE FOR THE THRU-THE-BOTTOM TYPE GAS CONNECTIONS.

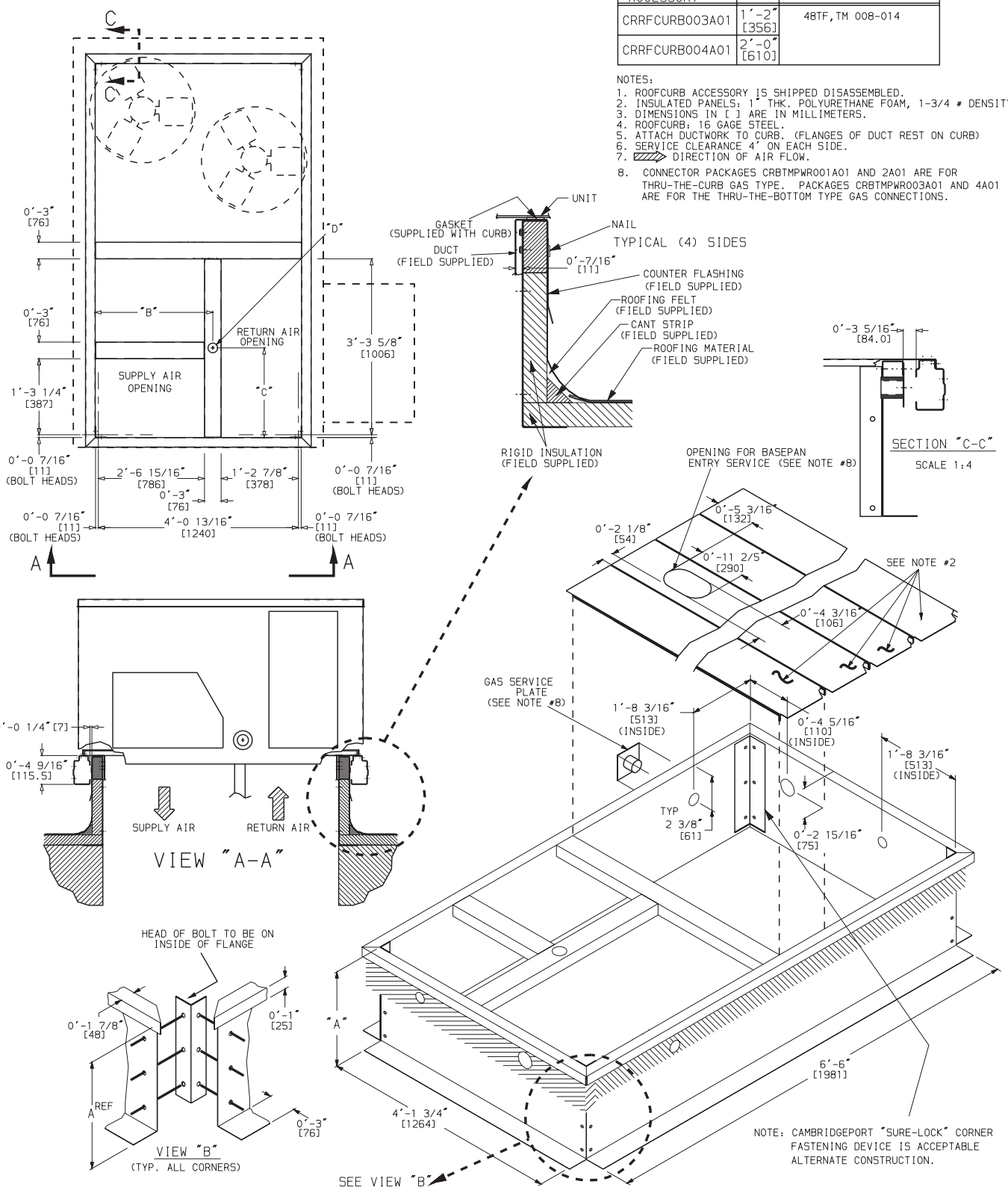


Fig. 2 — Roof Curb Details

Step 4 — Rig and Place Unit — Inspect unit for transportation damage. File any claim with transportation agency. Keep unit upright and do not drop. Spreader bars are not required if top crating is left on unit. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Tables 1A and 1B and Fig. 6 for additional information. Operating weight is shown in Tables 1A and 1B and Fig. 6.

Lifting holes are provided in base rails as shown in Fig. 6, 7A and 7B. Refer to rigging instructions on unit.

⚠ CAUTION

All panels must be in place when rigging and lifting. Unit is not designed for handling by a fork truck. Damage to unit may result.

POSITIONING — Maintain clearance around and above unit to provide minimum distance from combustible materials, proper airflow, and service access. See Fig. 7A and 7B Notes.

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

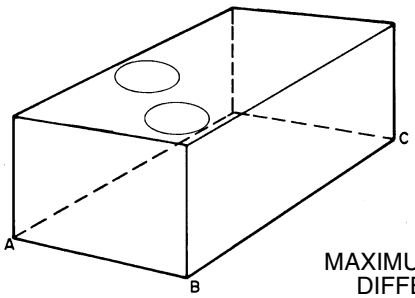
Be sure that unit is installed so that snow will not block the combustion intake or flue outlet.

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

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

Position unit on roof curb so that the following clearances are maintained: $^1/_4$-in. clearance between roof curb and base rails on each side and duct end of unit; $3^5/_{16}$-in. clearance between roof curb and condenser section end. (See Fig. 2, section C-C.)

Locate mechanical draft system flue assembly at least 48 in. from an adjacent building or combustible material. When unit is located adjacent to public walkways, flue assembly must be at least 7 ft above grade.



MAXIMUM ALLOWABLE DIFFERENCE (in.)

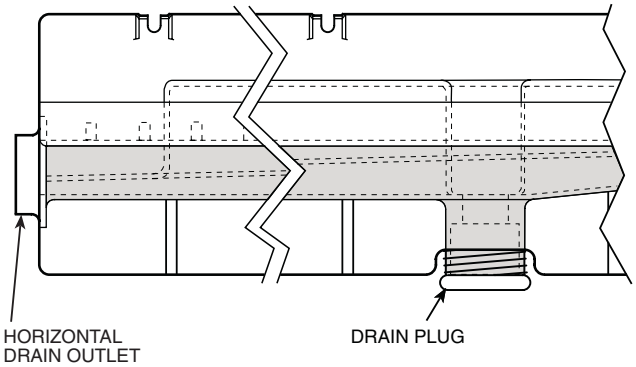
A-B	B-C	A-C
0.5	1.0	1.0

Fig. 3 — Unit Leveling Tolerances

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

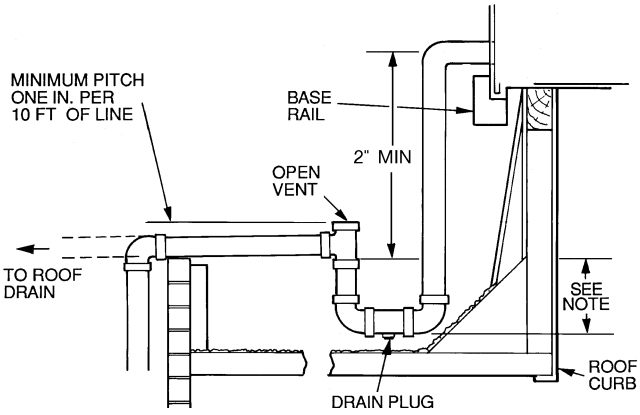
Flue gas can deteriorate building materials. Orient unit so that flue gas will not affect building materials.

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



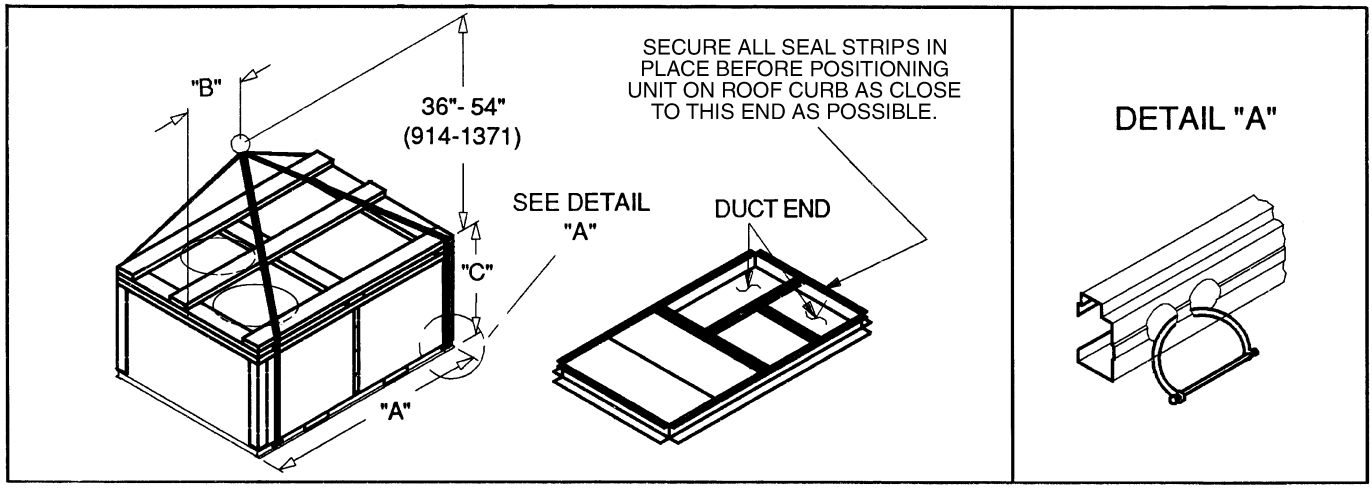
NOTE: Drain plug is shown in factory-installed position.

Fig. 4 — Condensate Drain Pan (Side View)



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

Fig. 5 — Condensate Drain Piping Details



NOTES:
1. Dimension in ( ) is in millimeters.
2. Hook rigging shackles through holes in base rail as shown in detail “A.” Holes in base rails are centered around the unit center of gravity. Use wooden top skid when rigging to prevent rigging straps from damaging unit.
3. Weights include base unit without economizer. See Tables 1A and 1B for economizer weights.

⚠ CAUTION

All panels must be in place when rigging. Unit is not designed for handling by a fork truck. Damage to unit may result.

48TF, 48TM UNIT SIZE	OPERATING WEIGHT		DIMENSIONS					
			“A”		“B”		“C”	
	lb	kg	in.	mm	in.	mm	in.	mm
008	870	395	87.38	2219	40.25	1022	41.31	1050
009	880	399	87.38	2219	40.25	1022	41.31	1050
012	1035	469	87.38	2219	40.25	1022	49.31	1253
014	1050	476	87.38	2219	40.25	1022	49.31	1253

Fig. 6 — Rigging Details

Table 1A — Physical Data — 48TF008-014

48TF UNIT SIZE		D/E/F008	D/E/F009	D/E/F012	D/E014
NOMINAL CAPACITY (tons)		7 1/2	8 1/2	10	12 1/2
OPERATING WEIGHT (lb)					
Unit					
Al/Al*		870	880	1035	1050
Al/Cu*		881	896	1057	1077
Cu/Cu*		893	907	1080	1100
Economizer					
EconoMi$er IV		75	75	75	75
Roof Curb†		143	143	143	143
COMPRESSOR		Reciprocating	Reciprocating	Reciprocating	Scroll
Quantity		2	2	2	2
No. Cylinders (per Circuit)		2	2	2	—
Oil (oz)		42 ea	65 ea	54 ea	54 ea
REFRIGERANT TYPE		R-22			
Expansion Device		Fixed Orifice Metering Device			
Operating Charge (lb-oz)					
Circuit 1		4-13	6-14	7- 3	8-10
Circuit 2		4-14	9- 2	7-13	8- 6
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins			
Rows...Fins/in.		1...17	2...17	2...17	2...17
Total Face Area (sq ft)		20.50	18.00	20.47	25.00
CONDENSER FAN		Propeller Type			
Nominal Cfm		6400	6400	7000	7000
Quantity...Diameter (in.)		2...22	2...22	2...22	2...22
Motor Hp...Rpm		1/4...1100	1/4...1100	1/4...1100	1/4...1100
Watts Input (Total)		600	600	600	600
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Face Split			
Rows...Fins/in.		3...15	3...15	3...15	4...15
Total Face Area (sq ft)		8.0	8.0	10.0	11.1
EVAPORATOR FAN		Centrifugal Type			
Quantity...Size (in.)	Std	1...15 x 15	1...15 x 15	1...15 x 15	1...15 x 15
	Alt	1...15 x 15	—	1...15 x 15	1...15 x 15
	High-Static	1...15 x 15	1...15 x 15	1...15 x 15	—
Type Drive	Std	Belt	Belt	Belt	Belt
	Alt	Belt	—	Belt	Belt
	High-Static	Belt	Belt	Belt	—
Nominal Cfm		3000	3100	4000	5000
Maximum Continuous Bhp	Std	2.40	2.40	2.40	3.70
	Alt	2.40	—	2.90	5.25
	High-Static	3.70	3.70	5.25	—
Motor Frame Size	Std	56	56	56	56
	Alt	56	—	56	56
	High-Static	56	56	56	—
Fan Rpm Range	Std	590-840	685-935	685-935	860-1080
	Alt	685-935	—	835-1085	830-1130
	High-Static	860-1080	860-1080	830-1130	—
Motor Bearing Type		Ball	Ball	Ball	Ball
Maximum Allowable Rpm		2100	2100	2100	2100
Motor Pulley Pitch Diameter Min/Max (in.)	Std	2.4/3.4	2.8/3.8	2.8/3.8	4.0/5.0
	Alt	2.8/3.8	—	3.4/4.4	3.1/4.1
	High-Static	4.0/5.0	4.0/5.0	2.8/3.8	—
Nominal Motor Shaft Diameter (in.)	Std	5/8	5/8	5/8	7/8
	Alt	1/2	—	7/8	7/8
	High-Static	7/8	7/8	7/8	—
Fan Pulley Pitch Diameter (in.)	Std	7.0	7.0	7.0	8.0
	Alt	7.0	—	7.0	5.9
	High-Static	8.0	8.0	5.8	—
Belt, Quantity...Type...Length (in.)	Std	1...A...48	1...A...48	1...A...49	1...A...53
	Alt	1...A...48	—	1...A...51	1...BX...48
	High-Static	1...A...53	1...A...53	1...BX...48	—
Pulley Center Line Distance (in.)	Std	16.75-19.25	16.75-19.25	15.85-17.50	15.85-17.50
	Alt	16.75-19.25	—	15.85-17.50	15.85-17.50
	High-Static	16.75-19.25	16.75-19.25	15.85-17.50	—
Speed Change per Full Turn of Movable Pulley Flange (rpm)	Std	50	50	50	44
	Alt	50	—	50	50
	High-Static	60	60	60	—
Movable Pulley Maximum Full Turns From Closed Position	Std	5	5	5	5
	Alt	5	—	5	6
	High-Static	5	5	6	—
Factory Setting	Std	5	5	5	5
	Alt	5	—	5	5
	High-Static	5	5	5	—
Factory Speed Setting (rpm)	Std	590	685	685	860
	Alt	685	—	835	887
	High-Static	860	860	887	—
Fan Shaft Diameter at Pulley (in.)		1	1	1	1

LEGEND

Al — Aluminum
Bhp — Brake Horsepower
Cu — Copper

*Evaporator coil fin material/condenser coil fin material. Contact your local representative for details about coated fins.

†Weight of 14-in. roof curb.
**Rollout switch lockout is manually reset by interrupting power to unit or resetting thermostat.

NOTE: High-static motor not available on size 014 units.

Table 1A — Physical Data — 48TF008-014 (cont)

48TF UNIT SIZE			D/E/F008	D/E/F009	D/E/F012	D/E014
FURNACE SECTION						
Rollout Switch Cutout Temp (F)**			195	195	195	195
Burner Orifice Diameter (in. ...drill size)						
Natural Gas	**Std**	**TFD**	.120...31	.120...31	.120...31	.120...31
		TFE	.120...31	.120...31	.120...31	.129...30
		TFF	.120...31	.120...31	.129...30	—
Liquid Propane	**Alt**	**TFD**	.096...41	.096...41	.096...41	.096...41
		TFE	.096...41	.096...41	.096...41	.102...38
		TFF	.096...41	.096...41	.102...38	—
Thermostat Heat Anticipator Setting (amps)						
208/230 v and 575 Stage 1			.14	.14	.14	.14
Stage 2			.20	.20	.20	.20
460 v Stage 1			.14	.14	.14	.14
Stage 2			.20	.20	.20	.20
Gas Input (Btuh) Stage 1		**TFD**	125,000	125,000	120,000	180,000
		TFE	120,000	120,000	180,000	200,000
		TFF	180,000	180,000	200,000	—
Stage 2		**TFD**	—	—	180,000	224,000
		TFE	180,000	180,000	224,000	250,000
		TFF	224,000	224,000	250,000	—
Efficiency (Steady State) (%)			80	80	80	80
Temperature Rise Range		**TFD**	20-50	20-50	35-65	35-65
		TFE	35-65	35-65	35-65	40-70
		TFF	45-75	45-75	40-70	—
Manifold Pressure (in. wg)						
Natural Gas	**Std**		3.5	3.5	3.5	3.5
Liquid Propane	**Alt**		3.5	3.5	3.5	3.5
Gas Valve Quantity			1	1	1	1
Gas Valve Pressure Range						
Psig			0.180-0.487	0.180-0.487	0.180-0.487	0.180-0.487
in. wg			5.0-13.5	5.0-13.5	5.0-13.5	5.0-13.5
Field Gas Connection Size (in.)			1/2/3/4/3/4	1/2/3/4/3/4	3/4/3/4/3/4	3/4/3/4
HIGH-PRESSURE SWITCH (psig)						
Standard Compressor				450 ± 50		500 ± 50
Internal Relief (Differential)						
Cutout				428		428
Reset (Auto.)				320		320
LOSS-OF-CHARGE (LOW-PRESSURE) SWITCH (psig)						
Cutout				7 ± 3		
Reset (Auto.)				22 ± 7		
FREEZE PROTECTION THERMOSTAT (F)						
Opens				30 ± 5		
Closes				45 ± 5		
OUTDOOR-AIR INLET SCREENS			Cleanable...Screen size and quantity varies by option selected.			
RETURN-AIR FILTERS			Throwaway			
Quantity...Size (in.)			4...16 x 20 x 2	4...16 x 20 x 2	4...20 x 20 x 2	4...20 x 20 x 2

LEGEND

Al — Aluminum
Bhp — Brake Horsepower
Cu — Copper

*Evaporator coil fin material/condenser coil fin material. Contact your local representative for details about coated fins.

†Weight of 14-in. roof curb.
**Rollout switch lockout is manually reset by interrupting power to unit or resetting thermostat.

NOTE: High-static motor not available on size 014 units.

Table 1B — Physical Data — 48TM008-014

48TM UNIT SIZE		D/E/F008	D/E/F009	D/E/F012	D/E014
NOMINAL CAPACITY (tons)		7 1/2	8 1/2	10	12 1/2
OPERATING WEIGHT (lb)					
Unit					
Al/Al*		870	880	1035	1050
Al/Cu*		891	896	1057	1077
Cu/Cu*		893	907	1080	1100
Economizer					
EconoMi$er IV		75	75	75	75
Roof Curb†		143	143	143	143
COMPRESSOR		Reciprocating	Scroll	Scroll	Scroll
Quantity		2	2	2	2
No. Cylinders (per Circuit)		2	2	2	2
Oil (oz) (each compressor)		42	53	50	60
REFRIGERANT TYPE		R-22			
Expansion Device		Acutrol™ Metering Device			
Operating Charge (lb-oz)					
Circuit 1		7-10	7-14	8-10	9-8
Circuit 2		8-2	8-5	8-8	9-5
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins			
Rows...Fins/in.		2...17	2...17	2...17	2...17
Total Face Area (sq ft)		20.50	20.50	25.00	25.00
CONDENSER FAN		Propeller Type			
Nominal Cfm		6500	6500	7000	7000
Quantity...Diameter (in.)		2...22	2...22	2...22	2...22
Motor Hp...Rpm		1/4...1100	1/4...1100	1/4...1100	1/4...1100
Watts Input (Total)		650	650	650	650
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Face Split			
Rows...Fins/in.		3...15	3...15	3...15	4...15
Total Face Area (sq ft)		8.9	8.9	10.0	11.1
EVAPORATOR FAN		Centrifugal Type			
Quantity...Size (in.)	**Std**	1...15 x 15	1...15 x 15	1...15 x 15	1...15 x 15
	Alt	1...15 x 15	—	1...15 x 15	1...15 x 15
	High-Static	1...15 x 15	1...15 x 15	1...15 x 15	—
Type Drive	**Std**	Belt	Belt	Belt	Belt
	Alt	Belt	—	Belt	Belt
	High-Static	Belt	Belt	Belt	—
Nominal Cfm		2900	3000	3200	5000
Maximum Continuous Bhp	**Std**	2.40	2.40	2.40	3.70
	Alt	2.40	—	2.90	5.25
	High-Static	3.70	3.70	5.25	—
Motor Frame Size	**Std**	56	56	56	56
	Alt	56	—	56	56
	High-Static	56	56	56	—
Fan Rpm Range	**Std**	590-840	685-935	685-935	860-1080
	Alt	685-935	—	835-1085	830-1130
	High-Static	860-1080	860-1080	830-1130	—
Motor Bearing Type		Ball	Ball	Ball	Ball
Maximum Allowable Rpm		2100	2100	2100	2100
Motor Pulley Pitch Diameter Min/Max (in.)	**Std**	2.4/3.4	2.8/3.8	2.8/3.8	4.0/5.0
	Alt	2.8/3.8	—	3.4/4.4	3.1/4.1
	High-Static	4.0/5.0	4.0/5.0	2.8/3.8	—
Nominal Motor Shaft Diameter (in.)	**Std**	5/8	5/8	5/8	7/8
	Alt	5/8	—	7/8	7/8
	High-Static	7/8	7/8	7/8	—
Fan Pulley Pitch Diameter (in.)	**Std**	7.0	7.0	7.0	8.0
	Alt	7.0	—	7.0	5.9
	High-Static	8.0	8.0	5.8	—
Belt, Quantity...Type...Length (in.)	**Std**	1...A...48	1...A...48	1...A...49	1...A...53
	Alt	1...A...48	—	1...A...51	1...BX...48
	High-Static	1...A...53	1...A...53	1...BX...48	—
Pulley Center Line Distance (in.)	**Std**	16.75-19.25	16.75-19.25	15.85-17.50	15.85-17.50
	Alt	16.75-19.25	—	15.85-17.50	15.85-17.50
	High-Static	16.75-19.25	16.75-19.25	15.85-17.50	—
Speed Change per Full Turn of Movable Pulley Flange (rpm)	**Std**	50	50	50	44
	Alt	50	—	50	50
	High-Static	60	60	60	—
Movable Pulley Maximum Full Turns From Closed Position	**Std**	5	5	5	5
	Alt	5	—	5	6
	High-Static	5	5	6	—
Factory Setting	**Std**	5	5	5	5
	Alt	5	—	5	5
	High-Static	5	5	5	—
Factory Speed Setting (rpm)	**Std**	590	685	685	860
	Alt	685	—	835	887
	High-Static	860	860	887	—
Fan Shaft Diameter at Pulley (in.)		1	1	1	1

LEGEND

Al — Aluminum
Bhp — Brake Horsepower
Cu — Copper

*Evaporator coil fin material/condenser coil fin material. Contact your local representative for details about coated fins.

†Weight of 14-in. roof curb.

**Rollout switch lockout is manually reset by interrupting power to unit or resetting thermostat.

NOTE: High-static motor not available on size 014 units.

Table 1B — Physical Data — 48TM008-014 (cont)

48TM UNIT SIZE			D/E/F008	D/E/F009	D/E/F012	D/E014
FURNACE SECTION						
Rollout Switch Cutout Temp (F)**			195	195	195	195
Burner Orifice Diameter (in. ...drill size)						
Natural Gas	Std	TMD	.120...31	.120...31	.120...31	.120...31
		TME	.120...31	.120...31	.120...31	.129...30
		TMF	.120...31	.120...31	.129...30	—
Liquid Propane	Alt	TMD	.096...41	.096...41	.096...41	.096...41
		TME	.096...41	.096...41	.096...41	.102...38
		TMF	.096...41	.096...41	.102...38	—
Thermostat Heat Anticipator Setting (amps)						
208/230 v and 575 Stage 1			.14	.14	.14	.14
Stage 2			.20	.20	.20	.20
460 v Stage 1			.14	.14	.14	.14
Stage 2			.20	.20	.20	.20
Gas Input (Btuh) Stage 1		TMD	125,000	125,000	120,000	180,000
		TME	120,000	120,000	180,000	200,000
		TMF	180,000	180,000	200,000	—
Stage 2		TMD	—	—	180,000	224,000
		TME	180,000	180,000	224,000	250,000
		TMF	224,000	224,000	250,000	—
Efficiency (Steady State) (%)			80	80	80	80
Temperature Rise Range		TMD	20-50	20-50	35-65	35-65
		TME	35-65	35-65	35-65	40-70
		TMF	45-75	45-75	40-70	—
Manifold Pressure (in. wg)						
Natural Gas	Std		3.5	3.5	3.5	3.5
Liquid Propane	Alt		3.5	3.5	3.5	3.5
Gas Valve Quantity			1	1	1	1
Gas Valve Pressure Range						
Psig			0.180-0.487	0.180-0.487	0.180-0.487	0.180-0.487
in. wg			5.0-13.5	5.0-13.5	5.0-13.5	5.0-13.5
Field Gas Connection Size (in.)		TMD	1/2	1/2	3/4	3/4
		TME	3/4	3/4	3/4	3/4
		TMF	3/4	3/4	3/4	—
HIGH-PRESSURE SWITCH (psig)						
Standard Compressor				450 ± 50		500 ± 50
Internal Relief (Differential)						
Cutout				428		428
Reset (Auto.)				320		320
LOW-PRESSURE SWITCH (psig)						
Cutout				7 ± 3		
Reset (Auto.)				22 ± 7		
FREEZE PROTECTION THERMOSTAT (F)						
Opens				30 ± 5		
Closes				45 ± 5		
OUTDOOR-AIR INLET SCREENS			Cleanable...Screen size and quantity varies by option selected.			
RETURN-AIR FILTERS			Throwaway			
Quantity...Size (in.)			4...16 x 20 x 2	4...16 x 20 x 2	4...20 x 20 x 2	4...20 x 20 x 2

LEGEND

Al — Aluminum
Bhp — Brake Horsepower
Cu — Copper

*Evaporator coil fin material/condenser coil fin material. Contact your local representative for details about coated fins.

†Weight of 14-in. roof curb.
**Rollout switch lockout is manually reset by interrupting power to unit or resetting thermostat.

NOTE: High-static motor not available on size 014 units.

UNIT	STD. UNIT WEIGHT		ECONOMI$ER IV WEIGHT		VERT. ECON IV W/ P.E. WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		"H"		"J"		"K"		"L"	
	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	FT -IN.	MM	FT -IN.	MM	FT -IN.	MM	FT -IN.	MM
48TFF/TFE/TFD008	870	395	75	34.1	145	65.9	189	86	161	73	239	109	280	127	1'-2 7/8"	378	3'-5 5/16"	1050	2'-9 11/16"	856	2'-2 7/16"	672
48TFF/TFE/TFD009	880	399	↓	↓	↓	↓	191	87	163	74	242	110	284	129	3'-3 7/8"	1013	3'-5 5/16"	1050	2'-9 11/16"	856	2'-2 7/16"	672
48TFF/TFE/TFD012	1035	469	↓	↓	↓	↓	225	102	192	87	285	129	333	151	2'-5 7/8"	759	4'-1 5/16"	1253	3'-0 3/8"	924	2'-10 7/16"	875
48TFE/TFD014	1050	476	↓	↓	↓	↓	228	103	195	88	289	131	338	153	1'-2 7/8"	378	4'-1 5/16"	1253	3'-0 3/8"	924	2'-10 7/16"	875

NOTES:

1. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. ⊕ CENTER OF GRAVITY.
3. ⇒ DIRECTION OF AIR FLOW.
4. ON VERTICAL DISCHARGE UNITS, DUCTWORK TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. FOR HORIZONTAL DISCHARGE UNITS FIELD SUPPLIED FLANGES SHOULD BE ATTACHED TO HORIZONTAL DISCHARGE OPENINGS, AND ALL DUCTWORK SHOULD BE ATTACHED TO THE FLANGES.
5. MINIMUM CLEARANCE (LOCAL CODES OR JURISDICTION MAY PREVAIL):
   a. BETWEEN UNIT, FLUE SIDE AND COMBUSTIBLE SURFACES, 48 INCHES. 18 INCHES WHEN USING ACCESSORY FLUE DISCHARGE DEFLECTOR.
   b. BOTTOM OF UNIT TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 1 INCH. BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 0 INCHES.
   c. CONDENSER COIL, FOR PROPER AIR FLOW, 36 INCHES ONE SIDE, 12 INCHES THE OTHER. THE SIDE GETTING THE GREATER CLEARANCE IS OPTIONAL.
   d. OVERHEAD, 60 INCHES TO ASSURE PROPER CONDENSER FAN OPERATION.
   e. BETWEEN UNITS, CONTROL BOX SIDE, 42 IN. PER NEC.
   f. BETWEEN UNIT AND UNGROUNDED SURFACES, CONTROL BOX SIDE, 36 IN. PER NEC.
   g. BETWEEN UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, CONTROL BOX SIDE, 42 IN. PER NEC.
   h. HORIZONTAL SUPPLY AND RETURN END, 0 INCHES WHEN THE ALTERNATE CONDENSATE DRAIN IS USED.
6. WITH THE EXCEPTION OF THE CLEARANCE FOR THE CONDENSER COIL AND COMBUSTION SIDE AS STATED IN NOTE #5a, b, AND c, A REMOVABLE FENCE OR BARRICADE REQUIRES NO CLEARANCE.
7. UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM WOOD OR CLASS A, B, OR C ROOF COVERING MATERIAL IF SET ON BASE RAIL.
8. THE VERTICAL CENTER OF GRAVITY IS 1'-7" [483] FOR 008 AND 009, 1'-11" [584] FOR 012 AND 014 UP FROM THE BOTTOM OF THE BASE RAIL.

	CONNECTION SIZES
A	1 3/8" DIA. [35] FIELD POWER SUPPLY HOLE
B	2 1/2"DIA [64] POWER SUPPLY KNOCK-OUT
C	1 3/4"DIA [44] CHARGING PORT HOLE
D	7/8" DIA. [22] FIELD CONTROL WIRING HOLE
E	3/4"-14 NPT CONDENSATE DRAIN
F	1/2"-14 NPT GAS CONN.48TFD008 & 009 3/4"-14 NPT GAS CONNECTION 48TFE,F008 & 009 48TFD,E012 & 014, 48TFF012
G	2" DIA [51] POWER SUPPLY KNOCK-OUT

BOTTOM POWER CHART:
THESE HOLES REQ'D FOR USE WITH ACCESSORY PACKAGES - CRBTMPWR001A01, 2A01, 3A01, OR 4A01

THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)
1/2"	ACC.	7/8" [22.2]
1/2"	24V	7/8" [22.2]
3/4" (001,003)	POWER*	1 1/8" [28.4]
1 1/4" (002,004)	POWER*	1 3/4" [44.4]
(003) 1/2"FPT	GAS	1 1/4" [31.8]
(004) 3/4"FPT	GAS	1 5/8" [41.3]

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

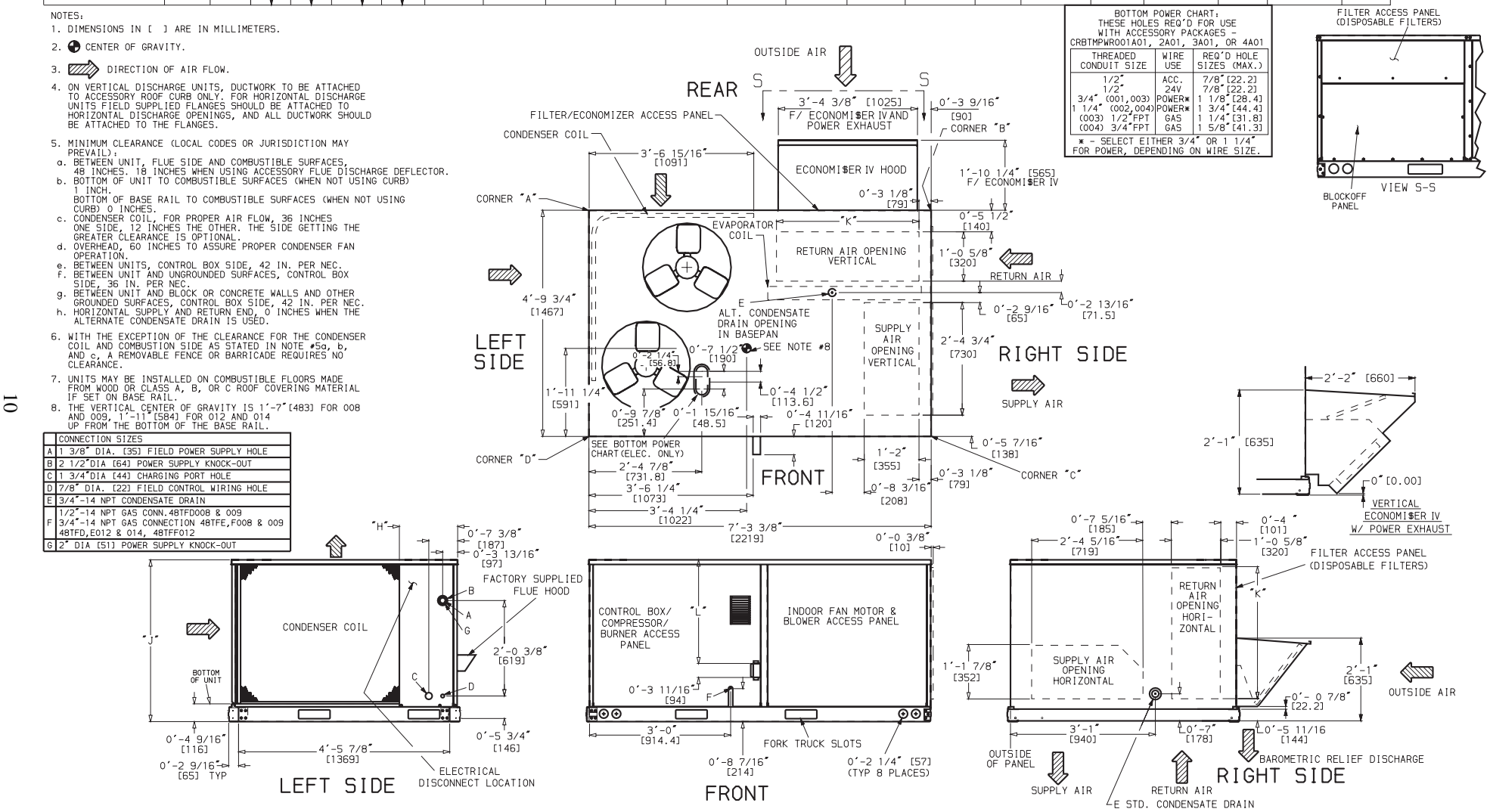


Fig. 7A — Base Unit Dimensions — 48TF008-014

UNIT	STD. UNIT WEIGHT		ECONOMI$ER IV WEIGHT		VERT. W/ P.E.	ECON IV WEIGHT	CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		"H"		"J"		"K"		"L"	
	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	FT -IN.	MM	FT -IN.	MM	FT -IN.	MM	FT -IN.	MM
48TM*008	870	395	75	34.1	145	65.9	189	86	161	73	239	109	280	127	2'-0 7/8"	632	3'-5 5/16"	1050	2'-9 11/16"	856	2'-2 7/16"	672
48TM*009	880	399	↓	↓	↓	↓	191	87	163	74	242	110	284	129	1' -2 7/8"	378	3'-5 5/16"	1050	2'-9 11/16"	856	2'-2 7/16"	672
48TM*012	1035	469	↓	↓	↓	↓	225	102	192	87	285	129	333	151	1' -2 7/8"	378	4'-1 5/16"	1253	3'-0 3/8"	924	2'-10 7/16"	875
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NOTES:
1. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
2. CENTER OF GRAVITY.
3. DIRECTION OF AIR FLOW.
4. ON VERTICAL DISCHARGE UNITS, DUCTWORK TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY. FOR HORIZONTAL DISCHARGE UNITS FIELD SUPPLIED FLANGES SHOULD BE ATTACHED TO HORIZONTAL DISCHARGE OPENINGS, AND ALL DUCTWORK SHOULD BE ATTACHED TO THE FLANGES.
5. MINIMUM CLEARANCE (LOCAL CODES OR JURISDICTION MAY PREVAIL):
   a. BETWEEN UNIT, FLUE SIDE AND COMBUSTIBLE SURFACES, 48 INCHES. 18 INCHES WHEN USING ACCESSORY FLUE DISCHARGE DEFLECTOR.
   b. BOTTOM OF UNIT TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 1 INCH.
      BOTTOM OF BASE RAIL TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 0 INCHES.
   c. CONDENSER COIL, FOR PROPER AIR FLOW, 36 INCHES ONE SIDE, 12 INCHES THE OTHER. THE SIDE GETTING THE GREATER CLEARANCE IS OPTIONAL.
   d. OVERHEAD, 60 INCHES TO ASSURE PROPER CONDENSER FAN OPERATION.
   e. BETWEEN UNITS, CONTROL BOX SIDE, 42 IN. PER NEC.
   f. BETWEEN UNIT AND UNGROUNDED SURFACES, CONTROL BOX SIDE, 36 IN. PER NEC.
   g. BETWEEN UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, CONTROL BOX SIDE, 42 IN. PER NEC.
   h. HORIZONTAL SUPPLY AND RETURN END, 0 INCHES WHEN THE ALTERNATE CONDENSATE DRAIN IS USED.
6. WITH THE EXCEPTION OF THE CLEARANCE FOR THE CONDENSER COIL AND COMBUSTION SIDE AS STATED IN NOTE #5a, b, AND c, A REMOVABLE FENCE OR BARRICADE REQUIRES NO CLEARANCE.
7. UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM WOOD OR CLASS A, B, OR C ROOF COVERING MATERIAL IF SET ON BASE RAIL.
8. THE VERTICAL CENTER OF GRAVITY IS 1'-7" [483] FOR 008 AND 009, 1'-11" [584] FOR 012 AND 014 UP FROM THE BOTTOM OF THE BASE RAIL.

	CONNECTION SIZES
A	1 3/8" DIA. [35] FIELD POWER SUPPLY HOLE
B	2 1/2"DIA [64] POWER SUPPLY KNOCK-OUT
C	1 3/4"DIA [44] CHARGING PORT HOLE
D	7/8" DIA. [22] FIELD CONTROL WIRING HOLE
E	3/4"-14 NPT CONDENSATE DRAIN
F	1/2"-14 NPT GAS CONN; 48TMD008 3/4"-14 NPT GAS CONN.; 48TMD/TME012,014; 48TMF012; 48TME/TMF008
G	2" DIA [51] POWER SUPPLY KNOCK-OUT

BOTTOM POWER CHART:
THESE HOLES REQ'D FOR USE WITH ACCESSORY PACKAGES - CRBTMPWR001A01, 2A01, 3A01, OR 4A01

THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)
1/2"	ACC.	7/8" [22.2]
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(003) 1/2"FPT	GAS	1 1/4" [31.8]
(004) 3/4"FPT	GAS	1 5/8" [41.3]

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

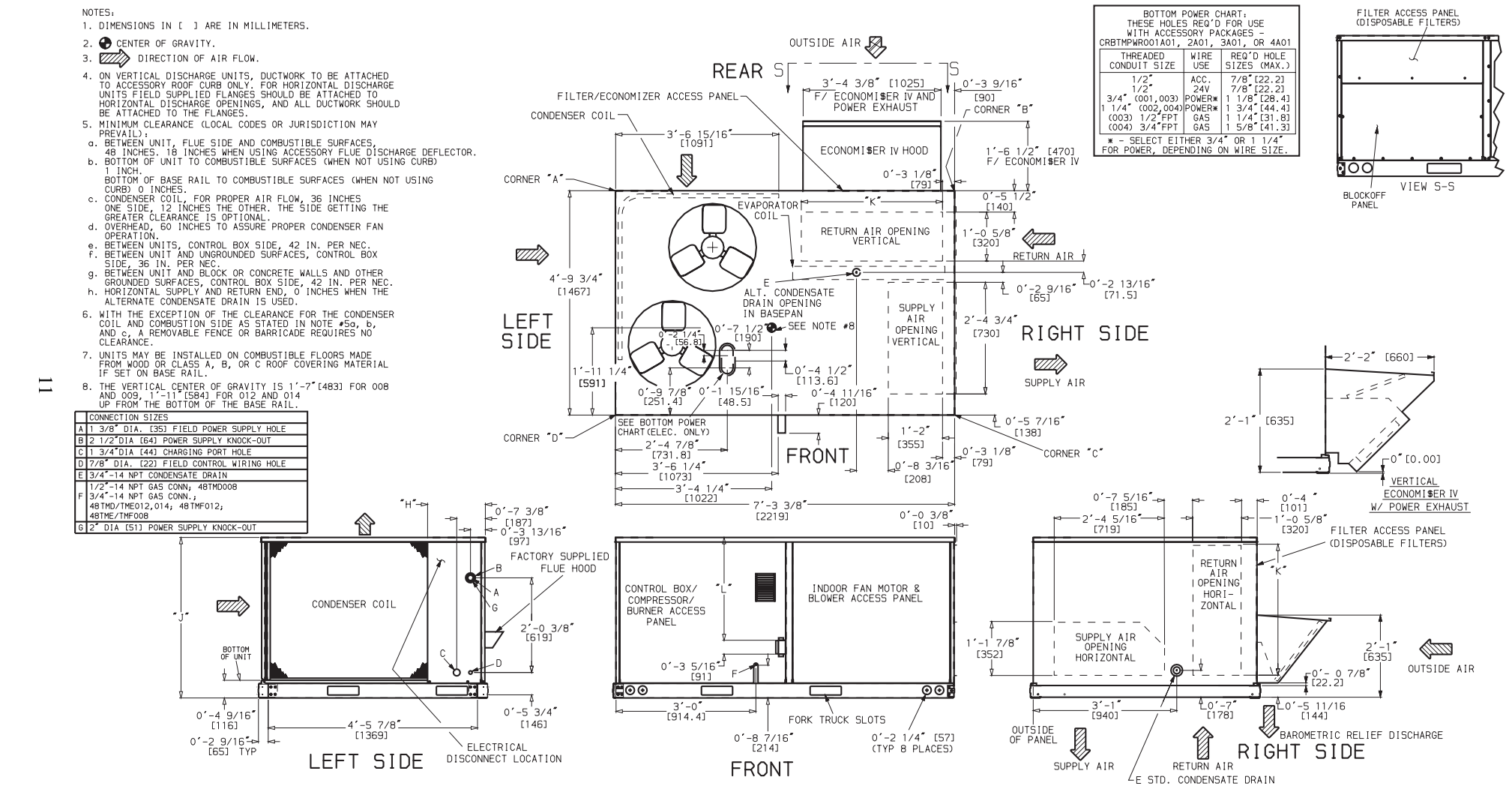


Fig. 7B — Base Unit Dimensions — 48TM008-014

Step 5 — Install Flue Hood — Flue hood is shipped screwed to the burner compartment access panel. Remove from shipping location and, using screws provided, install flue hood and screen in location shown in Fig. 8.

Step 6 — Install Gas Piping — Unit is equipped for use with type of gas shown on nameplate. Refer to local building codes, or in the absence of local codes, to ANSI Z223.1-latest year and addendum Z223.1A-latest year entitled National Fuel Gas Code. In Canada, installation must be in accordance with the CAN1.B149.1 and CAN1.B149.2 installation codes for gas burning appliances when installing gas piping.

For natural gas applications, gas pressure at unit gas connection must not be less than 4.0 in. wg (5.0 in. wg in high heat units) or greater than 13.0 in. wg while unit is operating. For liquid propane applications, the gas pressure must not be less than 5.0 in. wg or greater than 13.0 in. wg at the unit connection.

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

⚠ CAUTION

When connecting gas piping to gas valve inlet, use properly sized back-up wrench to prevent valve damage.

Support gas piping as shown in the table in Fig. 9. For example, a 3/4-in. gas pipe must have one field-fabricated support beam every 8 ft.

See Fig. 9 for typical pipe guide and locations of external manual gas shutoff valve.

NOTE: If field-installed thru-the-bottom connections are used, refer to the accessory installation instructions for power wiring and gas connections. Refer to Fig. 7A and 7B for drilling holes in basepan.

Step 7 — Make Electrical Connections

⚠ WARNING

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 (National Electrical Code), ANSI/NFPA (National Fire Protection Association), latest edition, and local electrical codes. *Do not use gas piping as an electrical ground.* Failure to follow this warning could result in the installer being liable for personal injury of others.

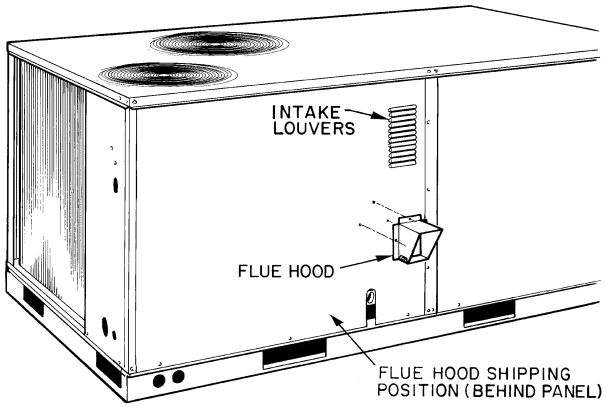
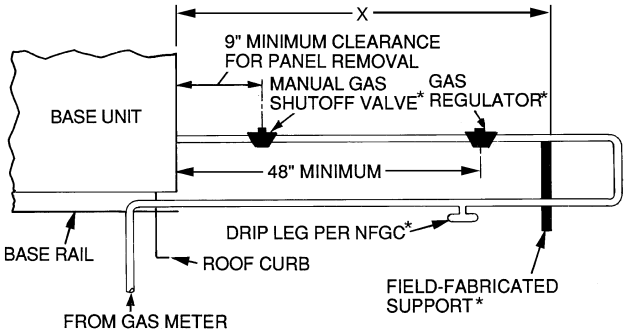


Fig. 8 — Flue Hood Details



LEGEND

NFGC — National Fuel Gas Code

*Field supplied.

NOTE: Follow all local codes.

SPACING OF SUPPORTS

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

Fig. 9 — Gas Piping Guide (With Accessory Thru-the-Curb Service Connections)

FIELD POWER SUPPLY — All units except 208/230-v units are factory wired for the voltage shown on the nameplate. If the 208/230-v unit is to be connected to a 208-v power supply, the transformer *must* be rewired by moving the black wire from the 230-v 1/4-in. spade terminal on the transformer and connecting it to the 208-v 1/4-in. spade terminal from the transformer.

Refer to unit label diagram for additional information. Pigtails are provided for field service.

When installing units, provide a disconnect per NEC. Use copper conductors only when splice connectors are used.

All field wiring must comply with NEC and local requirements. In Canada, electrical connections must be in accordance with CSA (Canadian Standards Association) C22.1 Canadian Electrical Code Part One.

Install conduit through side panel openings indicated in Fig. 7A and 7B. Route power lines through connector to terminal connections as shown in Fig. 10.

On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown in Tables 2A-2D, Note 2 to determine the percentage of voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

NOTE: If field-installed thru-the-bottom connections are used, refer to the accessory installation instructions for power wiring and gas connections. Refer to Fig. 7A and 7B for drilling holes in basepan.

FIELD CONTROL WIRING — Install a Carrier-approved accessory thermostat assembly according to installation instructions included with the accessory. Locate thermostat assembly on a solid wall in the conditioned space to sense average temperature in accordance with thermostat installation instructions.

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

Route thermostat cable or equivalent single leads of colored wire from thermostat subbase terminals to low-voltage connections on unit (shown in Fig. 11A and 11B) as described in Steps 1-4 below.

1. If unit is mounted on roof curb and accessory thru-the-curb service plate connection is used, route wire through connection plate.
2. Pass control wires through the hole provided on unit (see connection D in Connection Sizes table in Fig. 7A and 7B).
3. Feed wires through the raceway built into the corner post to the 24-v barrier located on the left side of the control box. See Fig. 12. The raceway provides the UL-required (Underwriters' Laboratories) clearance between high- and low-voltage wiring.
4. Connect thermostat wires to screw terminals on low-voltage connection board.

HEAT ANTICIPATOR SETTINGS — Set heat anticipator settings at 0.14 amp for the first stage and 0.20 amp for second-stage heating.

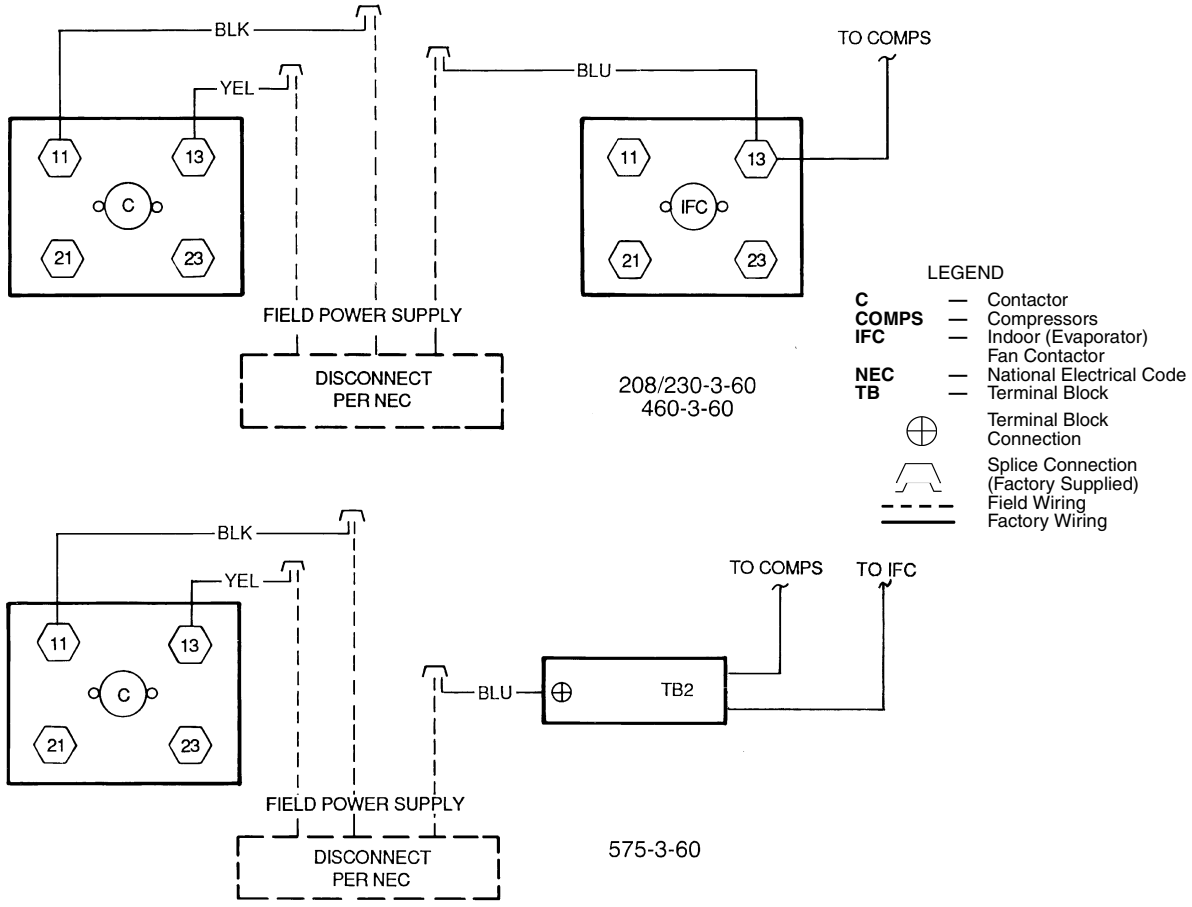
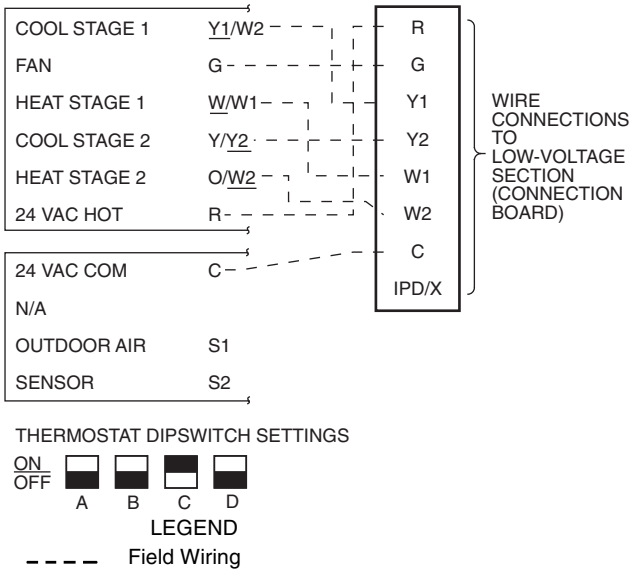


Fig. 10 — Power Wiring Connections



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

Fig. 11A — Low-Voltage Connections With or Without Economizer or Two-Position Damper

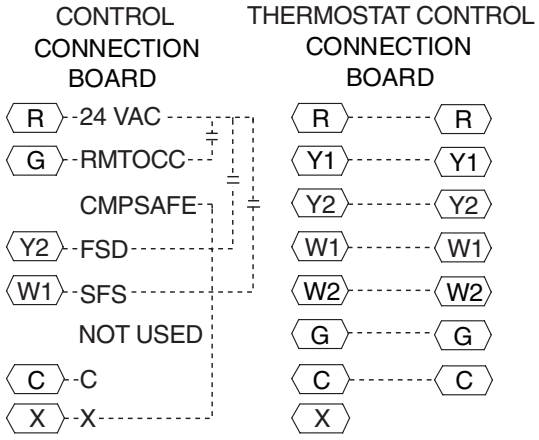


Fig. 11B — Low Voltage Connections (Units with PremierLink™ Controls)

Table 2A — Electrical Data — 48TF Units (Without Convenience Outlet)

48TF UNIT SIZE	NOMINAL VOLTAGE	IFM TYPE	VOLTAGE RANGE		COMPR (ea)		OFM (ea)			IFM	COMBUSTION FAN MOTOR FLA	POWER SUPPLY*		DISCONNECT SIZE†	
			Min	Max	RLA	LRA	Qty	Hp	FLA	FLA		MCA	MOCP**	FLA	LRA
008 (7 1/2 Tons)	208/230-3-60	Std	187	254	14.0	91.0	2	1/4	1.4	5.8	.6	40.1/40.1	45/45	42/42	229/229
		Alt								5.8		40.1/40.1	45/45	42/42	229/229
		High								10.6		44.9/44.9	50/50	48/48	273/273
	460-3-60	Std	414	508	6.4	42.0	2	1/4	0.7	2.6	.3	18.4	20	19	108
		Alt								2.6		18.4	20	19	108
		High								4.8		20.6	25	22	130
	575-3-60	Std	518	632	5.2	39.0	2	1/4	0.7	2.6	.3	14.9	20	16	97
		Alt								2.6		14.9	20	16	97
		High								4.8		16.7	20	18	114
009 (8 1/2 Tons)	208/230-3-60	Std	187	254	16.0	137.0	2	1/4	1.4	5.8	.6	44.6/44.6	50/50	47/47	321/321
		High								10.6		49.4/49.4	60/60	52/52	365/365
	460-3-60	Std	414	508	8.3	69.0	2	1/4	0.7	2.6	.3	22.7	25	24	162
		High								4.8		24.9	30	26	184
	575-3-60	Std	518	632	6.4	58.0	2	1/4	0.7	2.6	.3	17.6	20	18	135
		High								4.8		19.4	25	20	152
012 (10 Tons)	208/230-3-60	Std	187	254	15.8	130.0	2	1/4	1.4	5.8	.6	44.2/44.2	50/50	46/46	307/307
		Alt								7.5		45.9/45.9	50/50	48/48	326/326
		High								15.0		53.4/53.4	60/60	57/57	374/374
	460-3-60	Std	414	508	7.9	64.0	2	1/4	0.7	2.6	.3	21.8	25	23	152
		Alt								3.4		22.6	25	24	191
		High								7.4		26.6	30	28	185
	575-3-60	Std	518	632	6.6	52.0	2	1/4	0.7	2.6	.3	18.1	25	19	123
		Alt								3.4		18.7	25	20	155
		High								7.4		21.9	30	23	150
014 (12 1/2 Tons)	208/230-3-60	Std	187	254	23.0	146.0	2	1/4	1.4	10.6	.6	65.2/65.2	80/80††	68/68	383/383
		Alt								15.0		69.6/69.6	80/80††	73/73	406/406
	460-3-60	Std	414	508	10.4	73.0	2	1/4	0.7	4.8	.3	29.6	40	31	192
		Alt								7.4		32.2	45	34	203
	575-3-60	Std	518	632	8.3	58.4	2	1/4	0.7	4.8	.3	23.6	30	25	154
		Alt								7.4		25.7	30	27	162

LEGEND

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

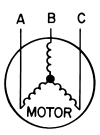
*The values listed in this table do not include power exhaust. See table below for power exhaust requirements.
†Used to determine minimum disconnect per NEC.
**Fuse or HACR circuit breaker.
††Fuse only.
***Data shown in table is for Compressor no. 1.
208/230-3-60: Compressor no. 2 RLA is 14.1 amps and LRA is 105 amps.
460-3-60: Compressor no. 2 RLA is 7.1 amps and LRA is 55 amps.
575-3-60: Compressor no. 2 RLA is 6.4 amps and LRA is 40 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. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

% Voltage Imbalance

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

Example: Supply voltage is 460-3-60.



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

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

$$= \frac{1371}{3}$$

$$= 457$$

Determine maximum deviation from average voltage.
(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

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

$$= 1.53\%$$

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

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

POWER EXHAUST ELECTRICAL DATA

POWER EXHAUST PART NO.	MCA (230 v)	MCA (460 v)	MCA (575 v)	MOCP (for separate power source)
CRPWREXH021A01	N/A	0.9	N/A	15
CRPWREXH022A01	3.3	N/A	1.32	15
CRPWREXH023A01	N/A	1.8	N/A	15
CRPWREXH024A01	1.6	N/A	0.64	15
CRPWREXH025A01	N/A	0.9	N/A	15
CRPWREXH026A01	3.3	N/A	1.32	15
CRPWREXH027A01	N/A	1.8	N/A	15
CRPWREXH028A01	1.7	N/A	0.68	15
CRPWREXH029A01	N/A	1.0	N/A	15
CRPWREXH030A01	1.6	N/A	0.64	15

N/A — Not available

NOTE: If a single power source is to be used, size wire to include power exhaust MCA and MOCP.

Check MCA and MOCP when power exhaust is powered through the unit. Determine the new MCA including the power exhaust using the following formula:

MCA New = MCA unit only + MCA of Power Exhaust

For example, using a 48TF008 unit with MCA = 40.1 and MOCP = 45, with CRPWREXH030A01 power exhaust.

MCA New = 40.1 amps + 1.6 amps = 41.7 amps

If the new MCA does not exceed the published MOCP, then MOCP would not change. The MOCP in this example is 45 amps and the MCA New is below 45; therefore the MOCP is acceptable. If "MCA New" is larger than the published MOCP, raise the MOCP to the next larger size. For separate power, the MOCP for the power exhaust will be 15 amps per NEC.

Table 2B — Electrical Data — 48TF Units (With Convenience Outlet)

48TF UNIT SIZE	NOMINAL VOLTAGE	IFM TYPE	VOLTAGE RANGE		COMPR (ea)		OFM (ea)			IFM	COMBUSTION FAN MOTOR FLA	POWER SUPPLY*		DISCONNECT SIZE†	
			Min	Max	RLA	LRA	Qty	Hp	FLA	FLA		MCA	MOCP**	FLA	LRA
008 (7 1/2 Tons)	208/230-3-60	Std	187	254	14.0	91.0	2	1/4	1.4	5.8	.6	46.1/46.1	50/50	48/48	233/233
		Alt								5.8		46.1/46.1	50/50	48/48	233/233
		High								10.6		50.9/50.9	60/60	53/53	273/273
	460-3-60	Std	414	508	6.4	42.0	2	1/4	0.7	2.6	.3	24.1	25	22	110
		Alt								2.6		24.1	25	22	110
		High								4.8		23.3	30	24	132
	575-3-60	Std	518	632	5.2	39.0	2	1/4	0.7	2.6	.3	20.9	25	18	99
		Alt								2.6		20.9	25	18	99
		High								4.8		19.4	25	20	117
009 (8 1/2 Tons)	208/230-3-60	Std	187	254	16.0	137.0	2	1/4	1.4	5.8	.6	50.6/50.6	60/60	52/52	325/325
		High								10.6		55.4/55.4	60/60	58/58	369/369
	460-3-60	Std	414	508	8.3	69.0	2	1/4	0.7	2.6	.3	25.4	30	26	164
		High								4.8		27.6	35	29	138
	575-3-60	Std	518	632	6.4	58.0	2	1/4	0.7	2.6	.3	20.3	25	20	137
		High								4.8		22.1	30	22	155
012 (10 Tons)	208/230-3-60	Std	187	254	15.8	130.0	2	1/4	1.4	5.8	.6	50.2/50.2	60/60	52/52	311/311
		Alt								7.5		51.9/51.9	60/60	54/54	330/330
		High								15.0		59.4/59.4	70/70††	62/62	378/378
	460-3-60	Std	414	508	7.9	64.0	2	1/4	0.7	2.6	.3	27.8	30	25	154
		Alt								3.4		25.3	30	26	193
		High								7.4		29.3	35	31	187
	575-3-60	Std	518	632	6.6	52.0	2	1/4	0.7	2.6	.3	24.1	25	21	109
		Alt								3.4		24.7	25	22	141
		High								7.4		24.6	30	25	136
014 (12 1/2 Tons)	208/230-3-60	Std	187	254	23.0	146.0	2	1/4	1.4	10.6	.6	71.2/71.2	80/80††	74/74	387/387
		Alt								15.0		75.6/75.6	80/80††	79/79	410/410
	460-3-60	Std	414	508	10.4	73.0	2	1/4	0.7	4.8	.3	35.6	40	34	194
		Alt								7.4		34.9	40	37	205
	575-3-60	Std	518	632	8.3	58.4	2	1/4	0.7	4.8	.3	29.6	35	27	156
		Alt								7.4		31.7	35	29	165

LEGEND

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

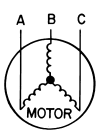
*The values listed in this table do not include power exhaust. See table below for power exhaust requirements.
†Used to determine minimum disconnect per NEC.
**Fuse or HACR circuit breaker.
††Fuse only.
***Data shown in table is for Compressor no. 1.
208/230-3-60: Compressor no. 2 RLA is 14.1 amps and LRA is 105 amps.
460-3-60: Compressor no. 2 RLA is 7.1 amps and LRA is 55 amps.
575-3-60: Compressor no. 2 RLA is 6.4 amps and LRA is 40 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. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

% Voltage Imbalance

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

Example: Supply voltage is 460-3-60.



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

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

$$= \frac{1371}{3}$$

$$= 457$$

Determine maximum deviation from average voltage.
(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

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

$$= 1.53\%$$

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

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

POWER EXHAUST ELECTRICAL DATA

POWER EXHAUST PART NO.	MCA (230 v)	MCA (460 v)	MCA (575 v)	MOCP (for separate power source)
CRPWREXH021A01	N/A	0.9	N/A	15
CRPWREXH022A01	3.3	N/A	1.32	15
CRPWREXH023A01	N/A	1.8	N/A	15
CRPWREXH024A01	1.6	N/A	0.64	15
CRPWREXH025A01	N/A	0.9	N/A	15
CRPWREXH026A01	3.3	N/A	1.32	15
CRPWREXH027A01	N/A	1.8	N/A	15
CRPWREXH028A01	1.7	N/A	0.68	15
CRPWREXH029A01	N/A	1.0	N/A	15
CRPWREXH030A01	1.6	N/A	0.64	15

N/A — Not available

NOTE: If a single power source is to be used, size wire to include power exhaust MCA and MOCP.

Check MCA and MOCP when power exhaust is powered through the unit. Determine the new MCA including the power exhaust using the following formula:

MCA New = MCA unit only + MCA of Power Exhaust

For example, using a 48TF008 unit with MCA = 40.1 and MOCP = 45, with CRPWREXH030A01 power exhaust.

MCA New = 40.1 amps + 1.6 amps = 41.7 amps

If the new MCA does not exceed the published MOCP, then MOCP would not change. The MOCP in this example is 45 amps and the MCA New is below 45; therefore the MOCP is acceptable. If "MCA New" is larger than the published MOCP, raise the MOCP to the next larger size. For separate power, the MOCP for the power exhaust will be 15 amps per NEC.

Table 2C — Electrical Data — 48TM Units (Without Convenience Outlet)

48TM UNIT SIZE	NOMINAL VOLTAGE	IFM TYPE	VOLTAGE RANGE		COMPR (ea)			OFM (ea)			IFM	COMBUSTION FAN MOTOR FLA	POWER SUPPLY*		DISCONNECT SIZE†	
			Min	Max	Qty	RLA	LRA	Qty	Hp	FLA	FLA		MCA	MOCP**	FLA	LRA
008 (7 1/2 Tons)	208/230-3-60	Std	187	254	2	14.0	91.0	2	1/4	1.4	5.8	.6	40.1/40.1	45/45	42/42	229/229
		Alt									5.8		40.1/40.1	45/45	42/42	229/229
		High									10.6		44.9/44.9	50/50	48/48	273/273
	460-3-60	Std	414	508	2	6.4	42.0	2	1/4	0.7	2.6	.3	18.4	20	19	108
		Alt									2.6		18.4	20	19	108
		High									4.8		20.6	25	22	130
	575-3-60	Std	518	632	2	5.2	39.0	2	1/4	0.7	2.6	.3	14.9	20	16	97
		Alt									2.6		14.9	20	16	97
		High									4.8		16.7	20	18	114
009 (8 1/2 Tons)	208/230-3-60	Std	187	254	2	17.3***	120.0***	2	1/4	1.4	5.8	.6	44.3/44.3	50/50	46/46	272/272
		High									10.6		49.1/49.1	60/60	52/52	316/316
	460-3-60	Std	414	508	2	7.9***	70.0***	2	1/4	0.7	2.6	.3	21.0	25	22	149
		High									4.8		23.2	30	24	171
	575-3-60	Std	518	632	2	5.5***	50.0***	2	1/4	0.7	2.6	.3	16.7	20	17	109
		High									4.8		18.5	25	19	126
012 (10 Tons)	208/230-3-60	Std	187	254	2	16.0	125.0	2	1/4	1.4	5.8	.6	44.6/44.6	50/50	47/47	297/297
		Alt									7.5		46.3/46.3	60/60	49/49	316/316
		High									15.0		53.4/53.4	60/60	57/57	374/374
	460-3-60	Std	414	508	2	8.0	62.5	2	1/4	0.7	2.6	.3	22.0	25	24	188
		Alt									3.4		22.8	25	24	191
		High									7.4		26.8	30	29	182
	575-3-60	Std	518	632	2	6.3	50.0	2	1/4	0.7	2.6	.3	17.4	20	18	119
		Alt									3.4		18.0	20	19	151
		High									7.4		21.2	25	23	146
014 (12 1/2 Tons)	208/230-3-60	Std	187	254	2	19.0	156.0	2	1/4	1.4	10.6	.6	56.2/56.2	70/70††	59/59	359/359
		Alt									15.0		60.6/60.6	70/70††	64/64	378/378
	460-3-60	Std	414	508	2	9.0	75.0	2	1/4	0.7	4.8	.3	26.5	30	28	174
		Alt									7.4		29.1	35	31	213
	575-3-60	Std	518	632	2	7.4	54.0	2	1/4	0.7	4.8	.3	21.6	25	23	127
		Alt									7.4		23.7	30	25	159

LEGEND

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

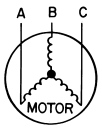
*The values listed in this table do not include power exhaust. See table below for power exhaust requirements.
†Used to determine minimum disconnect per NEC.
**Fuse or HACR circuit breaker.
††Fuse only.
***Data shown in table is for Compressor no. 1.
208/230-3-60: Compressor no. 2 RLA is 14.1 amps and LRA is 105 amps.
460-3-60: Compressor no. 2 RLA is 7.1 amps and LRA is 55 amps.
575-3-60: Compressor no. 2 RLA is 6.4 amps and LRA is 40 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. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

% Voltage Imbalance

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

Example: Supply voltage is 460-3-60.



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

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

$$= \frac{1371}{3}$$

$$= 457$$

Determine maximum deviation from average voltage.
(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

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

$$= 1.53\%$$

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

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

POWER EXHAUST ELECTRICAL DATA

POWER EXHAUST PART NO.	MCA (230 v)	MCA (460 v)	MCA (575 v)	MOCP (for separate power source)
CRPWREXH021A01	N/A	0.9	N/A	15
CRPWREXH022A01	3.3	N/A	1.32	15
CRPWREXH023A01	N/A	1.8	N/A	15
CRPWREXH024A01	1.6	N/A	0.64	15
CRPWREXH025A01	N/A	0.9	N/A	15
CRPWREXH026A01	3.3	N/A	1.32	15
CRPWREXH027A01	N/A	1.8	N/A	15
CRPWREXH028A01	1.7	N/A	0.68	15
CRPWREXH029A01	N/A	1.0	N/A	15
CRPWREXH030A01	1.6	N/A	0.64	15

N/A — Not available

NOTE: If a single power source is to be used, size wire to include power exhaust MCA and MOCP.

Check MCA and MOCP when power exhaust is powered through the unit. Determine the new MCA including the power exhaust using the following formula:

MCA New = MCA unit only + MCA of Power Exhaust

For example, using a 48TF008 unit with MCA = 40.1 and MOCP = 45, with CRPWREXH030A01 power exhaust.

MCA New = 40.1 amps + 1.6 amps = 41.7 amps

If the new MCA does not exceed the published MOCP, then MOCP would not change. The MOCP in this example is 45 amps and the MCA New is below 45; therefore the MOCP is acceptable. If "MCA New" is larger than the published MOCP, raise the MOCP to the next larger size. For separate power, the MOCP for the power exhaust will be 15 amps per NEC.

Table 2D — Electrical Data — 48TM Units (With Convenience Outlet)

48TM UNIT SIZE	NOMINAL VOLTAGE	IFM TYPE	VOLTAGE RANGE		COMPR (ea)			OFM (ea)			IFM	COMBUSTION FAN MOTOR FLA	POWER SUPPLY*		DISCONNECT SIZE†	
			Min	Max	Qty	RLA	LRA	Qty	Hp	FLA	FLA		MCA	MOCP**	FLA	LRA
008 (7 1/2 Tons)	208/230-3-60	Std	187	254	2	14.0	91.0	2	1/4	1.4	5.8	.6	44.9/44.9	50/50	48/48	234/234
		Alt									5.8		44.9/44.9	50/50	48/48	234/234
		High									10.6		49.7/49.7	60/60	53/53	277/277
	460-3-60	Std	414	508	2	6.4	42.0	2	1/4	0.7	2.6	.3	20.6	25	22	110
		Alt									2.6		20.6	25	22	110
		High									4.8		22.8	30	24	132
	575-3-60	Std	518	632	2	5.2	39.0	2	1/4	0.7	2.6	.3	16.6	20	18	99
		Alt									2.6		16.6	20	18	99
		High									4.8		18.4	20	20	116
009 (8 1/2 Tons)	208/230-3-60	Std	187	254	2	17.3***	120.0***	2	1/4	1.4	5.8	.6	49.1/49.1	60/60	52/52	277/277
		High									10.6		53.9/53.9	60/60	57/57	320/320
	460-3-60	Std	414	508	2	7.9***	70.0***	2	1/4	0.7	2.6	.3	23.2	30	24	151
		High									4.8		25.4	30	27	173
	575-3-60	Std	518	632	2	5.5***	50.0***	2	1/4	0.7	2.6	.3	18.4	25	19	111
		High									4.8		20.2	25	21	128
012 (10 Tons)	208/230-3-60	Std	187	254	2	16.0	125.0	2	1/4	1.4	5.8	.6	49.4/49.4	60/60	52/52	302/302
		Alt									7.5		51.9/51.9	60/60	54/54	321/321
		High									15.0		58.6/58.6	70/70††	63/63	369/369
	460-3-60	Std	414	508	2	8.0	62.5	2	1/4	0.7	2.6	.3	24.2	30	26	151
		Alt									3.4		25.0	30	26	190
		High									7.4		29.0	35	31	184
	575-3-60	Std	518	632	2	6.3	50.0	2	1/4	0.7	2.6	.3	19.1	25	20	121
		Alt									3.4		19.7	25	21	152
		High									7.4		22.9	25	25	148
014 (12 1/2 Tons)	208/230-3-60	Std	187	254	2	19.0	156.0	2	1/4	1.4	10.6	.6	61.0/61.0	70/70††	65/65	364/364
		Alt									15.0		65.4/65.4	80/80††	70/70	383/383
	460-3-60	Std	414	508	2	9.0	75.0	2	1/4	0.7	4.8	.3	28.7	35	30	176
		Alt									7.4		31.3	35	33	215
	575-3-60	Std	518	632	2	8.3	58.4	2	1/4	0.7	4.8	.3	23.3	30	25	129
		Alt									7.4		25.4	30	27	160

LEGEND

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

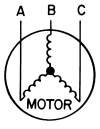
*The values listed in this table do not include power exhaust. See table below for power exhaust requirements.
†Used to determine minimum disconnect per NEC.
**Fuse or HACR circuit breaker.
††Fuse only.
***Data shown in table is for Compressor no. 1.
208/230-3-60: Compressor no. 2 RLA is 14.1 amps and LRA is 105 amps.
460-3-60: Compressor no. 2 RLA is 7.1 amps and LRA is 55 amps.
575-3-60: Compressor no. 2 RLA is 6.4 amps and LRA is 40 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. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

% Voltage Imbalance

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

Example: Supply voltage is 460-3-60.



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

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

$$= \frac{1371}{3}$$

$$= 457$$

Determine maximum deviation from average voltage.
(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

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

$$= 1.53\%$$

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

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

POWER EXHAUST ELECTRICAL DATA

POWER EXHAUST PART NO.	MCA (230 v)	MCA (460 v)	MCA (575 v)	MOCP (for separate power source)
CRPWREXH021A01	N/A	0.9	N/A	15
CRPWREXH022A01	3.3	N/A	1.32	15
CRPWREXH023A01	N/A	1.8	N/A	15
CRPWREXH024A01	1.6	N/A	0.64	15
CRPWREXH025A01	N/A	0.9	N/A	15
CRPWREXH026A01	3.3	N/A	1.32	15
CRPWREXH027A01	N/A	1.8	N/A	15
CRPWREXH028A01	1.7	N/A	0.68	15
CRPWREXH029A01	N/A	1.0	N/A	15
CRPWREXH030A01	1.6	N/A	0.64	15

N/A — Not available

NOTE: If a single power source is to be used, size wire to include power exhaust MCA and MOCP.

Check MCA and MOCP when power exhaust is powered through the unit. Determine the new MCA including the power exhaust using the following formula:
MCA New = MCA unit only + MCA of Power Exhaust

For example, using a 48TF008 unit with MCA = 40.1 and MOCP = 45, with CRPWREXH030A01 power exhaust.
MCA New = 40.1 amps + 1.6 amps = 41.7 amps
If the new MCA does not exceed the published MOCP, then MOCP would not change. The MOCP in this example is 45 amps and the MCA New is below 45; therefore the MOCP is acceptable. If "MCA New" is larger than the published MOCP, raise the MOCP to the next larger size. For separate power, the MOCP for the power exhaust will be 15 amps per NEC.

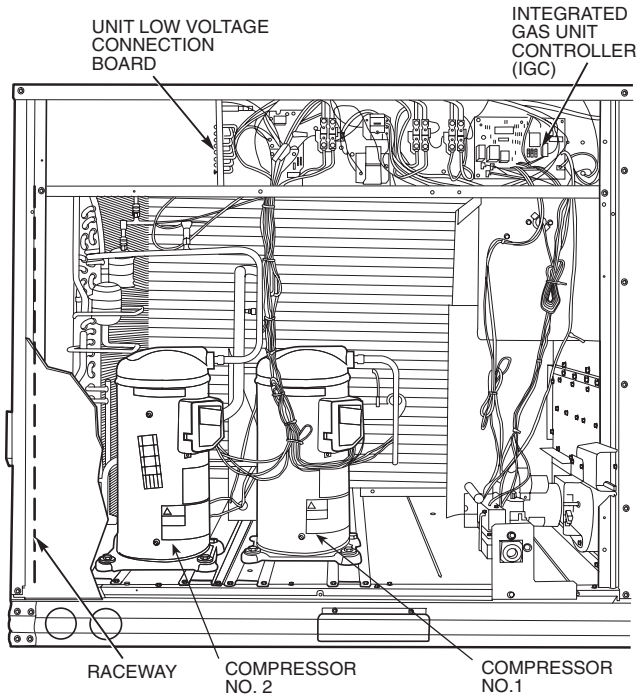


Fig. 12 — Field Control Wiring Raceway and Compressor Location

Step 8 — Adjust Factory-Installed Options

CONVENIENCE OUTLET — An optional convenience outlet provides power for rooftop use. For maintenance personnel safety, the convenience outlet power is off when the unit disconnect is off. Adjacent unit outlets may be used for service tools. An optional "Hot Outlet" is available from the factory as a special order item.

NOVAR CONTROLS — Optional Novar controls (ETM3051) are available for replacement or new construction jobs.

MANUAL OUTDOOR-AIR DAMPER — The outdoor-air hood and screen are attached to the basepan at the bottom of the unit for shipping.

Assembly:

1. Determine quantity of ventilation required for building. Record amount for use in Step 8.
2. Remove filter access panel by raising panel and swinging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove the filter access panel. Remove outdoor-air opening panel. Save panels and screws. See Fig. 13.
3. Separate hood and screen from basepan by removing the screws and brackets securing them. Save all screws and discard brackets.
4. Replace outdoor air opening panel with screws saved from Step 2.
5. Place hood on front of outdoor-air opening panel. See Fig. 14 for hood details. Secure top of hood with the 6 screws removed in Step 3. See Fig. 15.
6. Remove and save 6 screws (3 on each side) from sides of the manual outdoor-air damper.
7. Align screw holes on hood with screw holes on side of manual outdoor-air damper. See Fig. 14 and 15. Secure hood with 6 screws from Step 6.
8. Adjust minimum position setting of the damper blade by adjusting the manual outdoor-air adjustment screws on the front of the damper blade. See Fig. 13. Slide blade vertically until it is in the appropriate position determined by Fig. 16. Tighten screws.
9. Remove and save screws currently on sides of hood. Insert screens. Secure screens to hood using the screws. See Fig. 15.
10. Replace filter access panel. Ensure filter access panel slides along the tracks and is securely engaged.

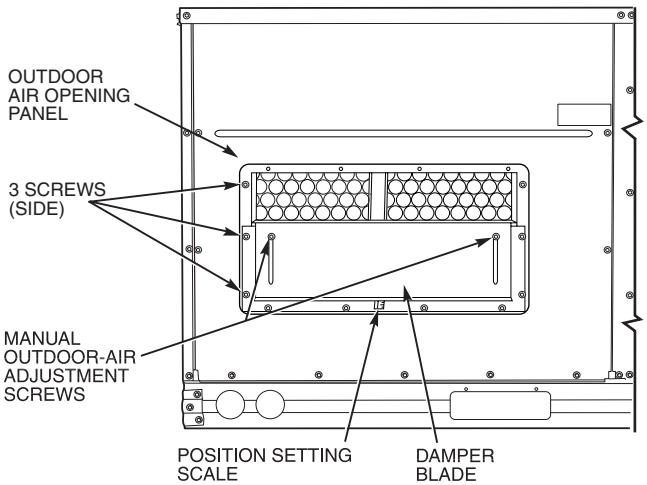


Fig. 13 — Damper Panel with Manual Outdoor-Air Damper Installed

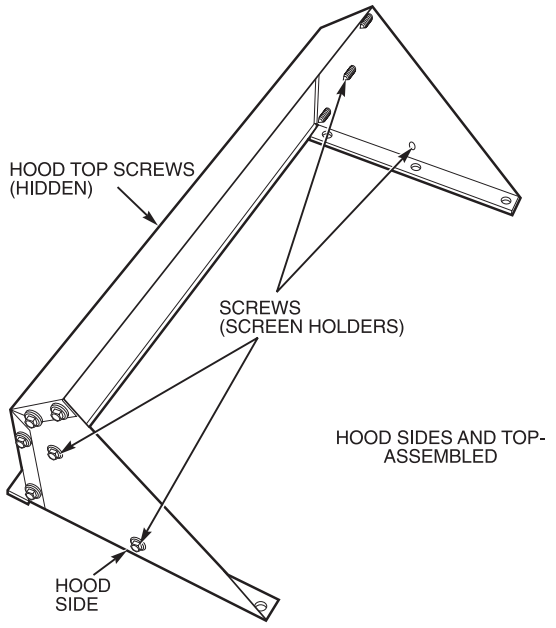


Fig. 14 — Outdoor-Air Hood Details

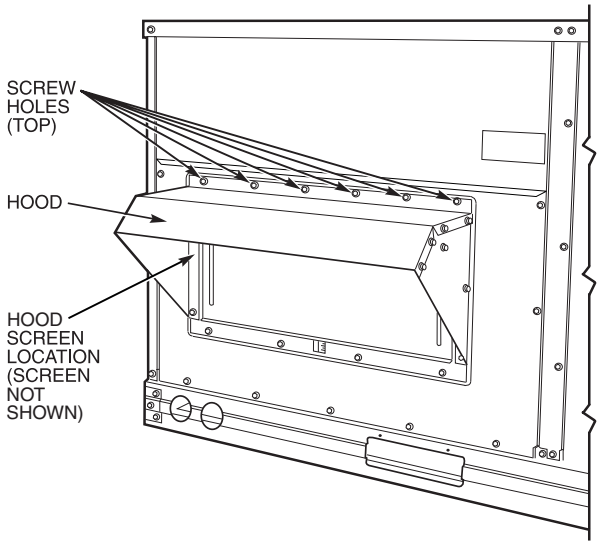


Fig. 15 — Optional Manual Outdoor-Air Damper with Hood Attached

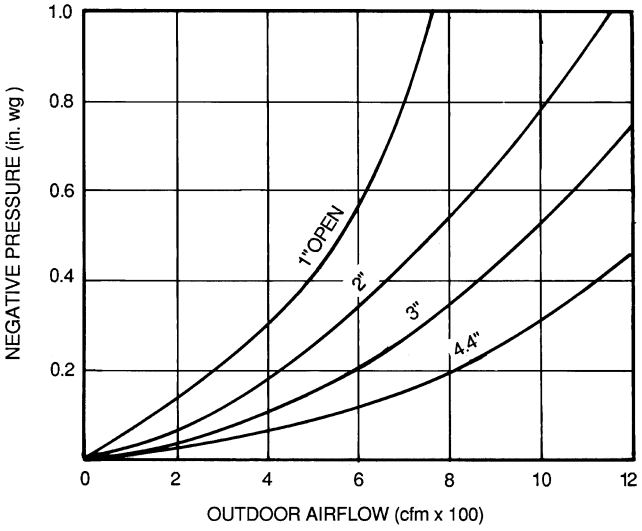


Fig. 16 — Outdoor-Air Damper Position Setting

PREMIERLINK™ CONTROL — The PremierLink controller is compatible with Carrier Comfort Network® (CCN) devices. This control is designed to allow users the access and ability to change factory-defined settings, thus expanding the function of the standard unit control board. Carrier's diagnostic standard tier display tools such as Navigator™ or Scrolling Marquee can be used with the PremierLink controller.

The PremierLink controller (see Fig. 17A and 17B) requires the use of a Carrier electronic thermostat or a CCN connection for time broadcast to initiate its internal timeclock. This is necessary for broadcast of time of day functions (occupied/unoccupied). No sensors are supplied with the field-mounted PremierLink control. The factory-installed PremierLink control includes only the supply-air sensor (SAT) and the outdoor air temperature sensor (OAT) as standard. An indoor air quality (CO_2) sensor can be added as an option. Refer to Table 3 for sensor usage. Refer to Fig. 18 for PremierLink controller wiring. The PremierLink control may be mounted in the control panel or an area below the control panel.

NOTE: PremierLink controller versions 1.3 and later are shipped in Sensor mode. If used with a thermostat, the PremierLink controller must be configured to Thermostat mode.

Install the Supply Air Temperature Sensor (SAT) — When the unit is supplied with a factory-mounted PremierLink control, the supply-air temperature (SAT) sensor (33ZCSENSAT) is factory-supplied and wired. The wiring is routed from the PremierLink control over the control box, through a grommet, into the fan section, down along the back side of the fan, and along the fan deck over to the supply-air opening.

The SAT probe is wire-tied to the supply-air opening (on the horizontal opening end) in its shipping position. Remove the sensor for installation. Re-position the sensor in the flange of the supply-air opening or in the supply air duct (as required by local codes). Drill or punch a $^1/_2$-in. hole in the flange or duct. Use two field-supplied, self-drilling screws to secure the sensor probe in a horizontal orientation.

NOTE: The sensor must be mounted in the discharge airstream downstream of the cooling coil and any heating devices. Be sure the probe tip does not come in contact with any of the unit or heat surfaces.

Outdoor Air Temperature Sensor (OAT) — When the unit is supplied with a factory-mounted PremierLink control, the outdoor-air temperature sensor (OAT) is factory-supplied and wired.

Install the Indoor Air Quality (CO_2) Sensor — Mount the optional indoor air quality (CO_2) sensor according to manufacturer specifications.

A separate field-supplied transformer must be used to power the CO_2 sensor.

Wire the CO_2 sensor to the COM and IAQI terminals of J5 on the PremierLink controller. Refer to the PremierLink Installation, Start-Up, and Configuration Instructions for detailed wiring and configuration information.

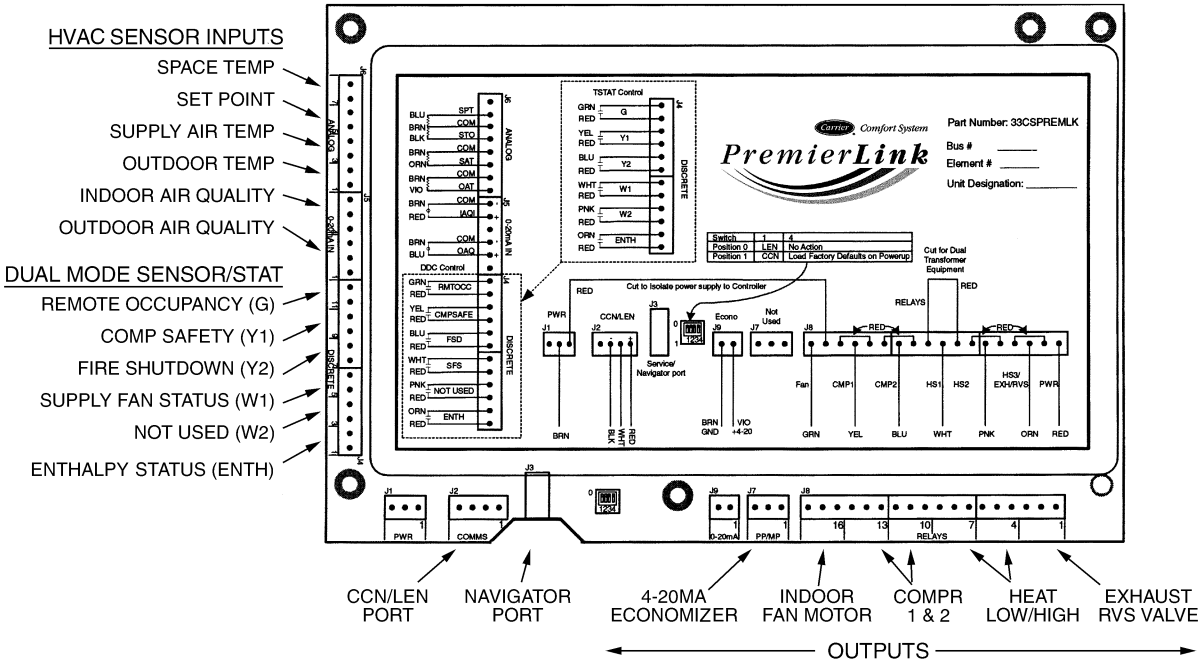


Fig. 17A — PremierLink™ Controller

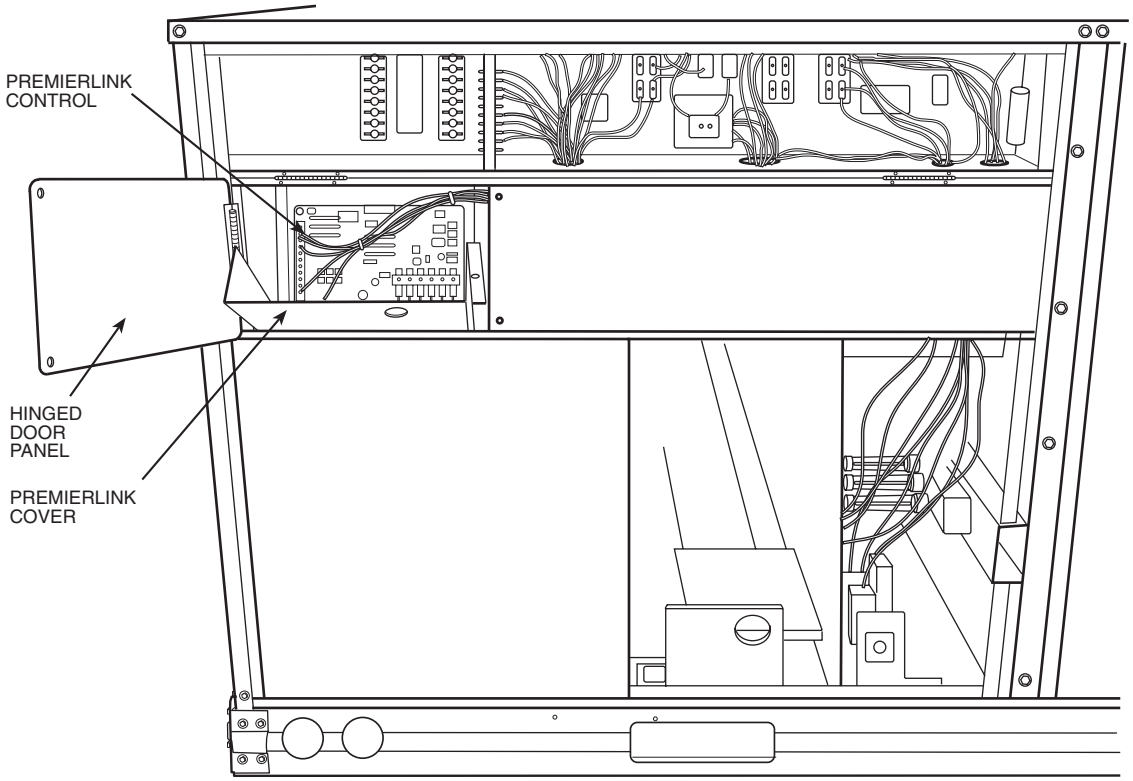


Fig. 17B — PremierLink Controller (Installed)

Table 3 — PremierLink™ Sensor Usage

APPLICATION	OUTDOOR AIR TEMPERATURE SENSOR	RETURN AIR TEMPERATURE SENSOR	OUTDOOR AIR ENTHALPY SENSOR	RETURN AIR ENTHALPY SENSOR
Dry Bulb Temperature with PremierLink* (PremierLink requires 4-20 mA Actuator)	Included — HH79NZ017	—	—	—
Differential Dry Bulb Temperature with PremierLink* (PremierLink requires 4-20 mA Actuator)	Included — HH79NZ017	Required — 33ZCT55SPT or Equivalent	—	—
Single Enthalpy with PremierLink* (PremierLink requires 4-20 mA Actuator)	Included — Not Used	—	Required — HH57AC077	—
Differential Enthalpy with PremierLink* (PremierLink requires 4-20 mA Actuator)	Included — Not Used	—	Required — HH57AC077	Required — HH57AC078

*PremierLink control requires Supply Air Temperature sensor 33ZCSENSAT and Outdoor Air Temperature sensor HH79NZ017 — Included with factory-installed PremierLink control; field-supplied and field-installed with field-installed PremierLink control.

NOTES:

1. CO_2 Sensors (Optional):
   33ZCSENCO2 — Room sensor (adjustable). Aspirator box is required for duct mounting of the sensor.
   33ZCASPCO2 — Aspirator box used for duct-mounted CO_2 room sensor.
   33ZCT55CO2 — Space temperature and CO_2 room sensor with override.
   33ZCT56CO2 — Space temperature and CO_2 room sensor with override and setpoint.
2. All units include the following Standard Sensors:
   Outdoor-Air Sensor — 50HJ540569 — Opens at 67 F, closes at 52 F, not adjustable.
   Mixed-Air Sensor — HH97AZ001 — (PremierLink control requires Supply Air Temperature sensor 33ZCSENSAT and Outdoor Air Temperature Sensor HH79NZ017)
   Compressor Lockout Sensor — 50HJ540570 — Opens at 35 F, closes at 50 F.

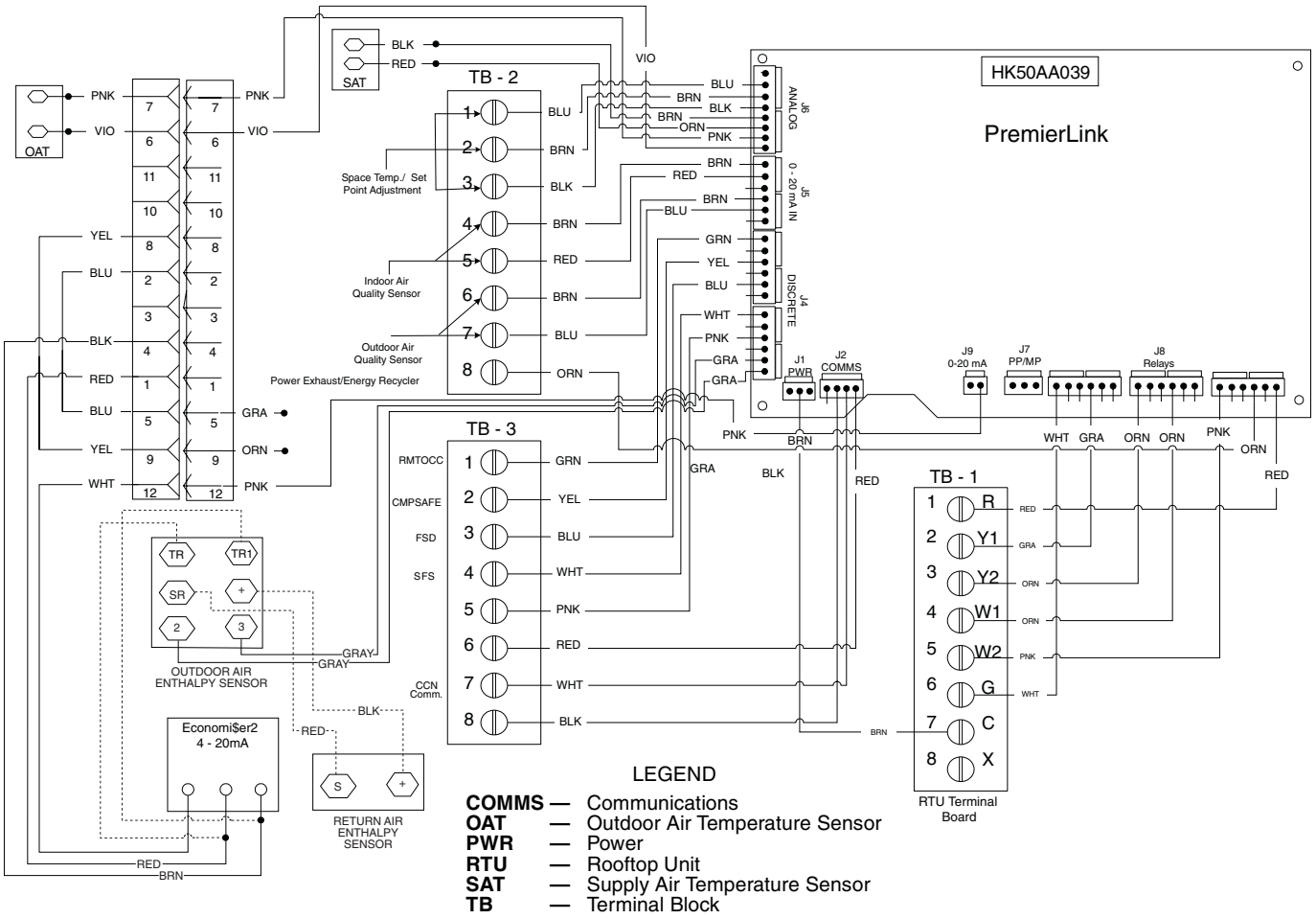


Fig. 18 — Typical PremierLink Controls Wiring

Enthalpy Sensors and Control — The enthalpy control (HH57AC077) is supplied as a field-installed accessory to be used with the economizer damper control option. The outdoor air enthalpy sensor is part of the enthalpy control. The separate field-installed accessory return air enthalpy sensor (HH57AC078) is required for differential enthalpy control.

NOTE: The enthalpy control must be set to the "D" setting for differential enthalpy control to work properly.

The enthalpy control receives the indoor and return enthalpy from the outdoor and return air enthalpy sensors and provides a dry contact switch input to the PremierLink™ controller. Locate the controller in place of an existing economizer controller or near the actuator. The mounting plate may not be needed if existing bracket is used.

A closed contact indicates that outside air is preferred to the return air. An open contact indicates that the economizer should remain at minimum position.

Outdoor Air Enthalpy Sensor/Enthalpy Controller (HH57AC077) — To wire the outdoor air enthalpy sensor, perform the following (see Fig. 19 and 20):

NOTE: The outdoor air sensor can be removed from the back of the enthalpy controller and mounted remotely.

1. Use a 4-conductor, 18 or 20 AWG cable to connect the enthalpy control to the PremierLink controller and power transformer.
2. Connect the following 4 wires from the wire harness located in rooftop unit to the enthalpy controller:
   a. Connect the BRN wire to the 24 vac terminal (TR1) on enthalpy control and to pin 1 on 12-pin harness.
   b. Connect the RED wire to the 24 vac GND terminal (TR) on enthalpy sensor and to pin 4 on 12-pin harness.
   c. Connect the GRAY/ORN wire to J4-2 on PremierLink controller and to terminal (3) on enthalpy sensor.
   d. Connect the GRAY/RED wire to J4-1 on PremierLink controller and to terminal (2) on enthalpy sensor.

NOTE: If installing in a Carrier rooftop, use the two gray wires provided from the control section to the economizer to connect PremierLink controller to terminals 2 and 3 on enthalpy sensor.

Return Air Enthalpy Sensor — Mount the return-air enthalpy sensor (HH57AC078) in the return-air duct. The return air sensor is wired to the enthalpy controller (HH57AC077). The outdoor enthalpy changeover set point is set at the controller.

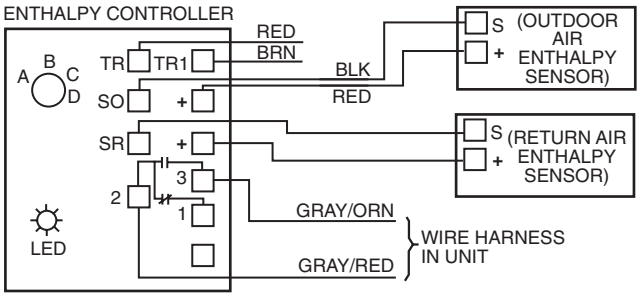
To wire the return air enthalpy sensor, perform the following (see Fig. 19):

1. Use a 2-conductor, 18 or 20 AWG, twisted pair cable to connect the return air enthalpy sensor to the enthalpy controller.
2. At the enthalpy control remove the factory-installed resistor from the (SR) and (+) terminals.
3. Connect the field-supplied RED wire to (+) spade connector on the return air enthalpy sensor and the (SR+) terminal on the enthalpy controller. Connect the BLK wire to (S) spade connector on the return air enthalpy sensor and the (SR) terminal on the enthalpy controller.

OPTIONAL ECONOMI$ER IV AND ECONOMI$ER2 — See Fig. 21 for EconoMi$er IV component locations. See Fig. 22 for EconoMi$er2 component locations.

NOTE: These instructions are for installing the optional EconoMi$er IV and EconoMi$er2 only. Refer to the accessory EconoMi$er IV or EconoMi$er2 installation instructions when field installing an EconoMi$er IV or EconoMi$er2 accessory.

1. To remove the existing unit filter access panel, raise the panel and swing the bottom outward. The panel is now disengaged from the track and can be removed. See Fig. 23.



NOTES:
1. Remove factory-installed jumper across SR and + before connecting wires from return air sensor.
2. Switches shown in high outdoor air enthalpy state. Terminals 2 and 3 close on low outdoor air enthalpy relative to indoor air enthalpy.
3. Remove sensor mounted on back of control and locate in outside airstream.

Fig. 19 — Outside and Return Air Sensor Wiring Connections for Differential Enthalpy Control

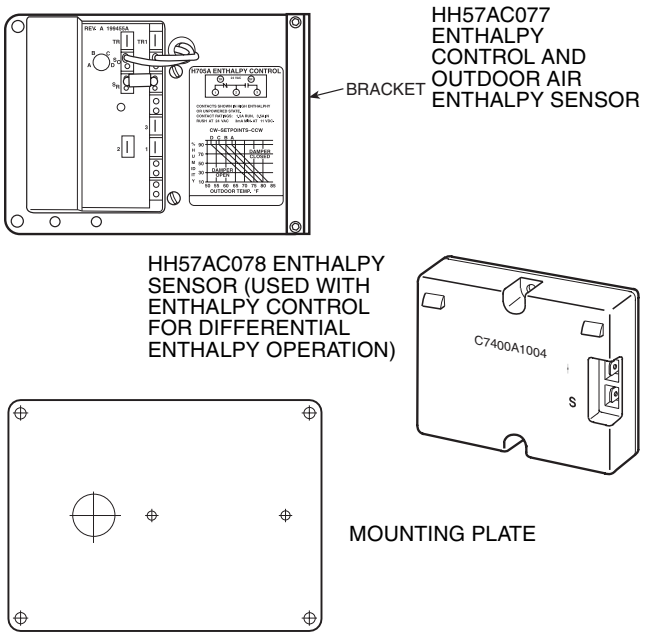


Fig. 20 — Differential Enthalpy Control, Sensor and Mounting Plate (33AMKITENT006)

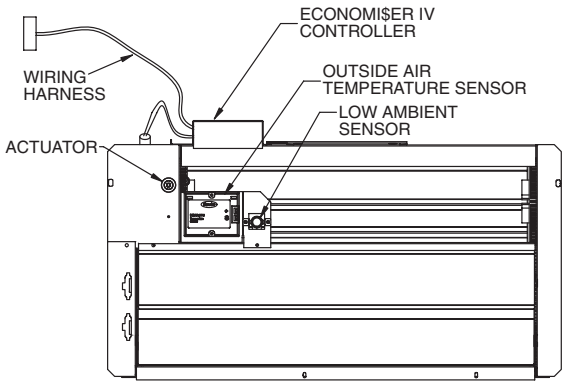


Fig. 21 — EconoMi$er IV Component Locations

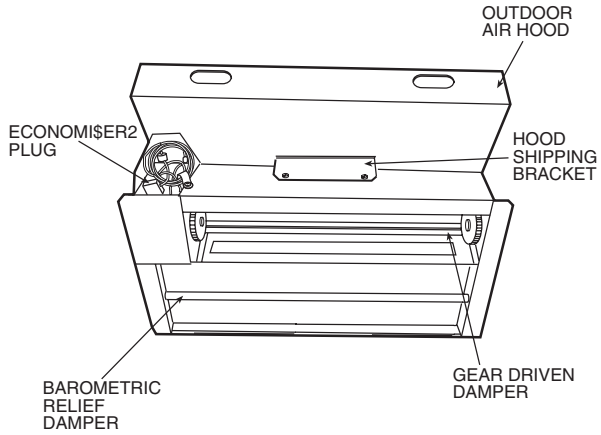


Fig. 22 — EconoMi$er2 Component Locations

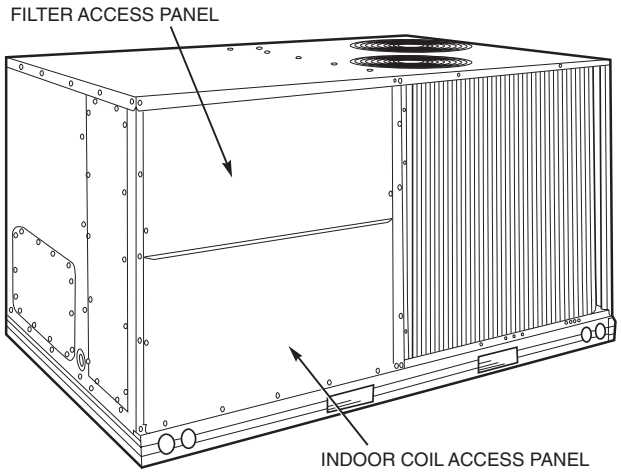


Fig. 23 — Typical Access Panel Locations

2. The box with the economizer hood components is shipped in the compartment behind the economizer. The EconoMi$er IV controller is mounted on top of the EconoMi$er IV in the position shown in Fig. 21. The optional EconoMi$er2 with 4 to 20 mA actuator signal control does not include the EconoMi$er IV controller. To remove the component box from its shipping position, remove the screw holding the hood box bracket to the top of the economizer. Slide the hood box out of the unit. See Fig. 24.

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

3. The indoor coil access panel will be used as the top of the hood. Remove the screws along the sides and bottom of the indoor coil access panel. See Fig. 25.
4. Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 26.
5. Remove the shipping tape holding the economizer barometric relief damper in place.

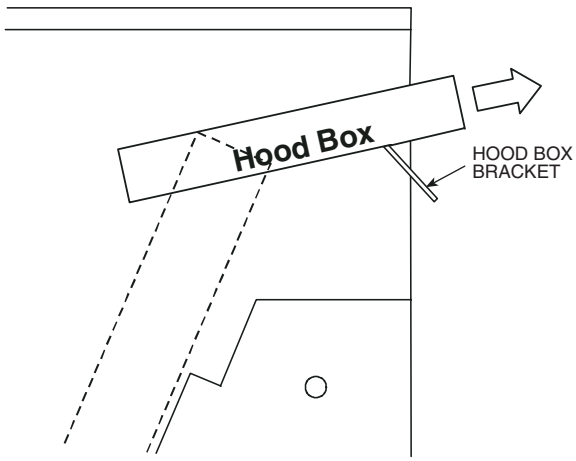


Fig. 24 — Hood Box Removal

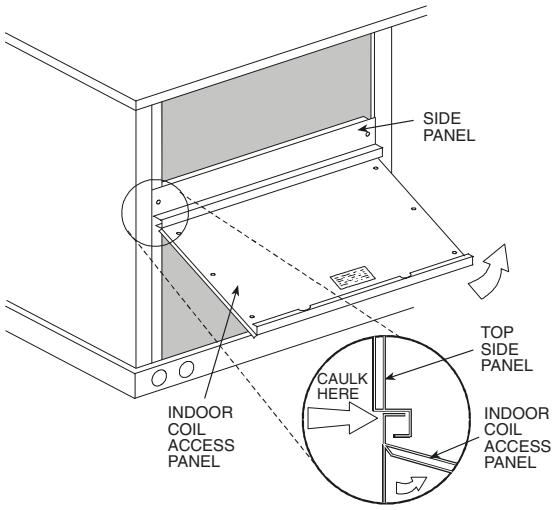


Fig. 25 — Indoor Coil Access Panel Relocation

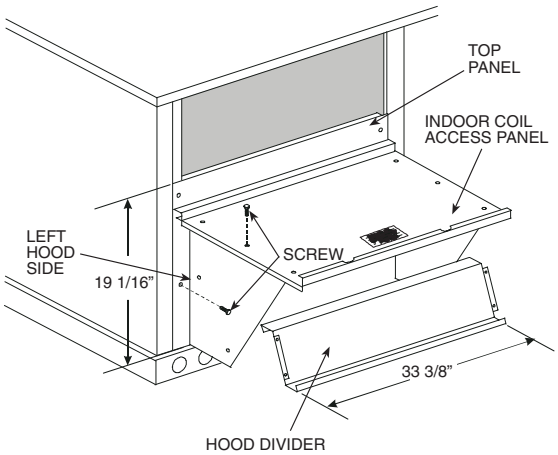


Fig. 26 — Outdoor-Air Hood Construction

6. Insert the hood divider between the hood sides. See Fig. 26 and 27. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.
7. Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 27.
8. Caulk the ends of the joint between the unit top panel and the hood top. See Fig. 25.
9. Replace the filter access panel.
10. Install all EconoMi$er IV accessories. EconoMi$er IV wiring is shown in Fig. 28. EconoMi$er2 wiring is shown in Fig. 29.

Barometric flow capacity is shown in Fig. 30. Outdoor air leakage is shown in Fig. 31. Return air pressure drop is shown in Fig. 32.

ECONOMI$ER IV STANDARD SENSORS

Outdoor Air Temperature (OAT) Sensor — The outdoor air temperature sensor (HH57AC074) is a 10 to 20 mA device used to measure the outdoor-air temperature. The outdoor-air temperature is used to determine when the EconoMi$er IV can be used for free cooling. The sensor is factory-installed on the EconoMi$er IV in the outdoor airstream. See Fig. 21. The operating range of temperature measurement is 40 to 100 F.

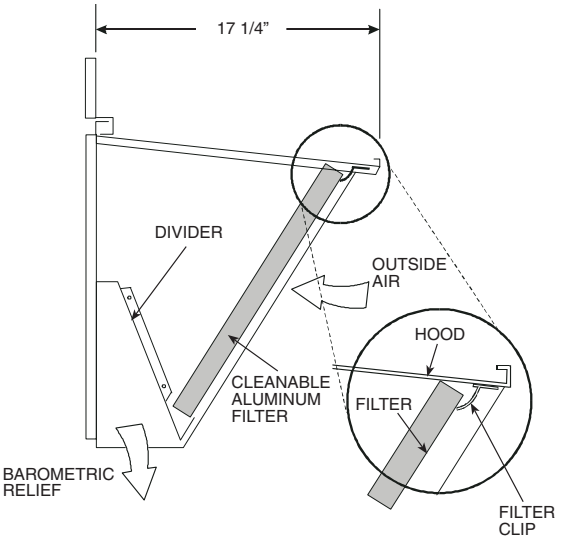
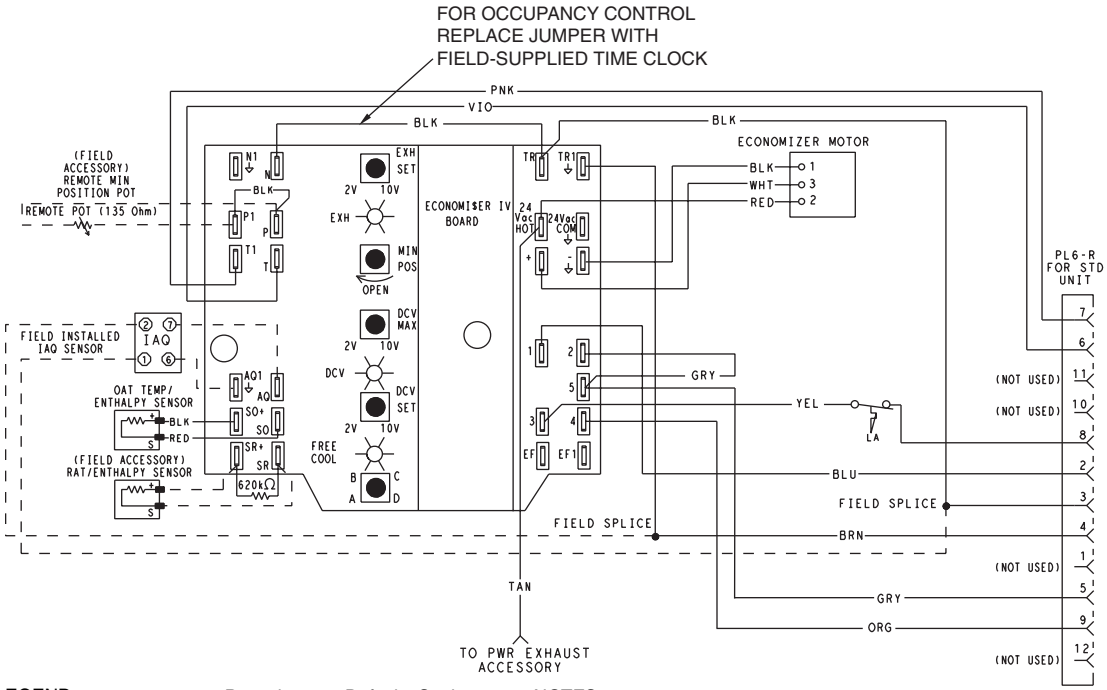


Fig. 27 — Filter Installation



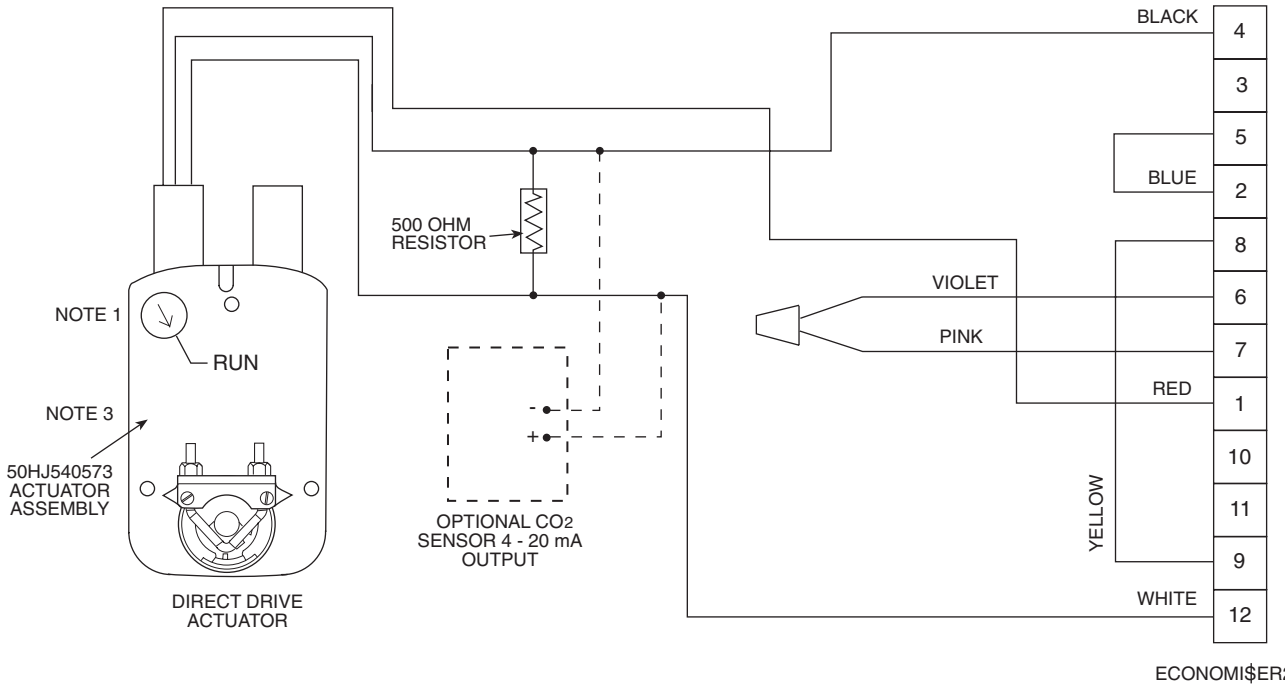
LEGEND

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

Potentiometer Defaults Settings:	
Power Exhaust	Middle
Minimum Pos.	Fully Closed
DCV Max.	Middle
DCV Set	Middle
Enthalpy	C Setting

NOTES:
1. 620 ohm, 1 watt 5% resistor should be removed only when using differential enthalpy or dry bulb.
2. If a separate field-supplied 24 v transformer is used for the IAQ sensor power supply, it cannot have the secondary of the transformer grounded.
3. For field-installed remote minimum position POT, remove black wire jumper between P and P1 and set control minimum position POT to the minimum position.

Fig. 28 — EconoMi$er IV Wiring



NOTES:
1. Switch on actuator must be in run position for economizer to operate.
2. PremierLink™ control requires that the standard 50HJ540569 outside-air sensor be replaced by either the CROASENR001A00 dry bulb sensor or HH57A077 enthalpy sensor.
3. 50HJ540573 actuator consists of the 50HJ540567 actuator and a harness with 500-ohm resistor.

Fig. 29 — EconoMi$er2 with 4 to 20 mA Control Wiring

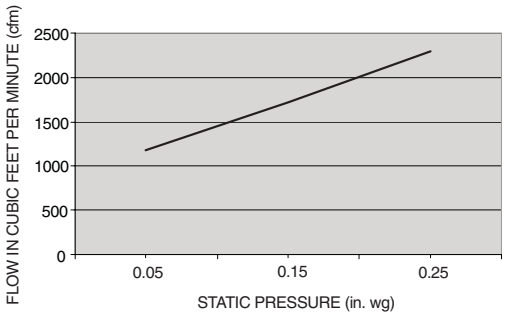


Fig. 30 — Barometric Relief Flow Capacity

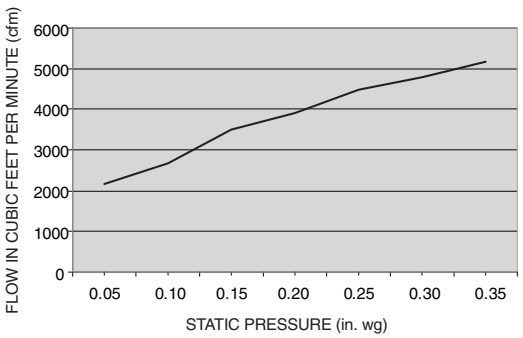


Fig. 32 — Return Air Pressure Drop

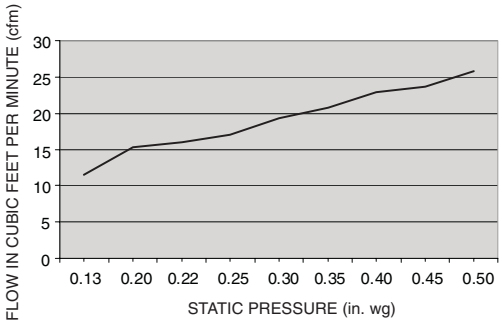


Fig. 31 — Outdoor Air Damper Leakage

Supply Air Temperature (SAT) Sensor — The supply air temperature sensor is a 3 K thermistor located at the inlet of the indoor fan. See Fig. 33. This sensor is factory installed. The operating range of temperature measurement is 0° to 158 F. See Table 4 for sensor temperature/resistance values.

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

Table 4 — Supply Air Sensor Temperature/ Resistance Values

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

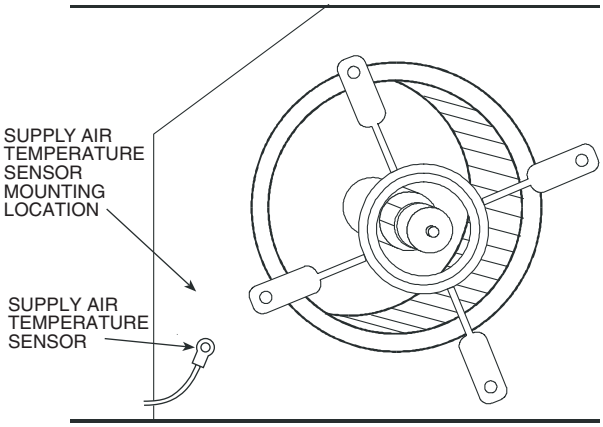


Fig. 33 — Supply Air Sensor Location

Outdoor Air Lockout Sensor — The Economi$er IV is equipped with an ambient temperature lockout switch located in the outdoor air stream which is used to lockout the compressors below a 42 F ambient temperature. See Fig. 21.

ECONOMI$ER IV CONTROL MODES

IMPORTANT: The optional EconoMi$er2 does not include a controller. The EconoMi$er2 is operated by a 4 to 20 mA signal from an existing field-supplied controller (such as PremierLink™ control). See Fig. 29 for wiring information.

Determine the EconoMi$er IV control mode before set up of the control. Some modes of operation may require different sensors. Refer to Table 5. The EconoMi$er IV is supplied from the factory with a supply 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.

Table 5 — EconoMi$er IV Sensor Usage

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

Outdoor Dry Bulb Changeover — The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air and supply air temperature sensors are included as standard. For this control mode, the outdoor temperature is compared to an adjustable set point selected on the control. If the outdoor-air temperature is above the set point, the EconoMi$er IV will adjust the outdoor air dampers to minimum position. If the outdoor-air temperature is below the set point, the position of the outdoor air dampers will be controlled to provide free cooling using outdoor air. When in this mode, the LED next to the free cooling set point potentiometer will be on. The changeover temperature set point is controlled by the free cooling set point potentiometer located on the control. See Fig. 34. The scale on the potentiometer is A, B, C, and D. See Fig. 35 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. See Fig. 36. Wiring is provided in the EconoMi$er IV wiring harness. See Fig. 28.

In this mode of operation, the outdoor air temperature is compared to the return air temperature and the lower temperature air stream is used for cooling. When using this mode of changeover control, turn the enthalpy setpoint potentiometer fully clockwise to the D setting. See Fig. 34.

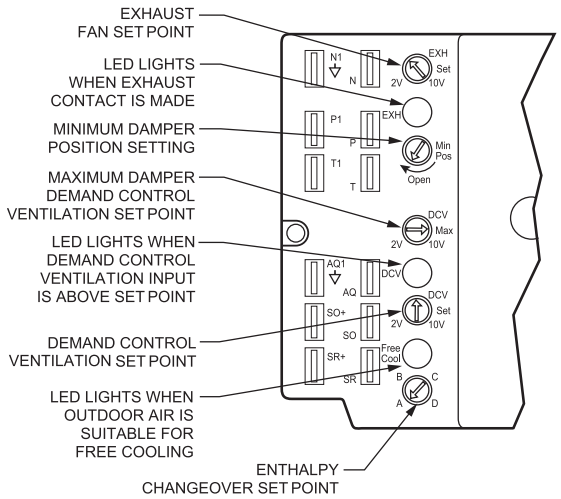


Fig. 34 — EconoMi$er IV Controller Potentiometer and LED Locations

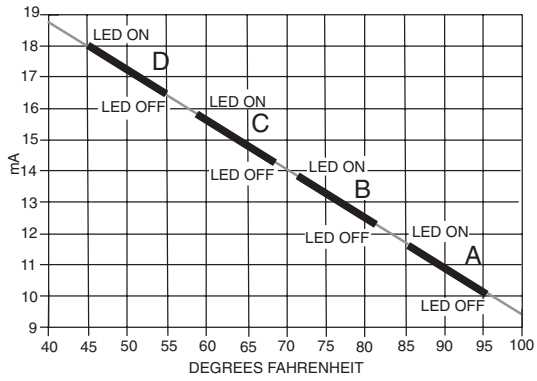


Fig. 35 — Outside Air Temperature Changeover Set Points

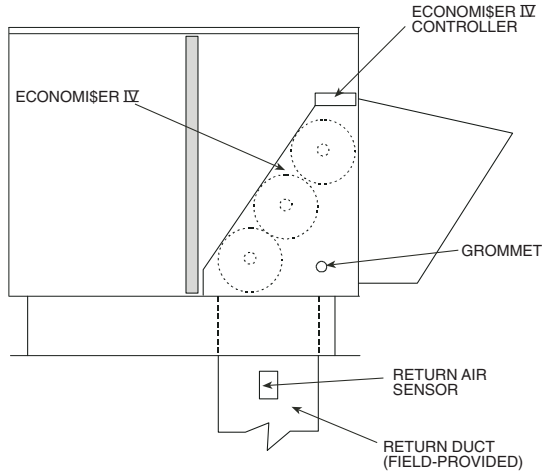


Fig. 36 — Return Air Temperature or Enthalpy Sensor Mounting Location

Outdoor Enthalpy Changeover — For enthalpy control, accessory enthalpy sensor (part number HH57AC074) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 21. 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$er IV controller. The set points are A, B, C, and D. See Fig. 37. The factory-installed 620-ohm jumper must be in place across terminals SR and SR+ on the EconoMi$er IV controller. See Fig. 21 and 38.

Differential Enthalpy Control — For differential enthalpy control, the EconoMi$er IV controller uses two enthalpy sensors (HH57AC078 and CRENTDIF004A00), one in the outside air and one in the return air duct. The EconoMi$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.

Replace the standard outside air dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 21. Mount the return air enthalpy sensor in the return air duct. See Fig. 36. Wiring is provided in the EconoMi$er IV wiring harness. See Fig. 28. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi$er IV controller. When using this mode of changeover control, turn the enthalpy setpoint 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 accessory IAQ sensor according to manufacturer specifications. The IAQ sensor should be wired to the AQ and AQ1 terminals of the controller. Adjust the DCV potentiometers to correspond to the DCV voltage output of the indoor air quality sensor at the user-determined set point. See Fig. 39.

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.

CONTROL CURVE	CONTROL POINT APPROX. °F (°C) AT 50% RH
A	73 (23)
B	70 (21)
C	67 (19)
D	63 (17)

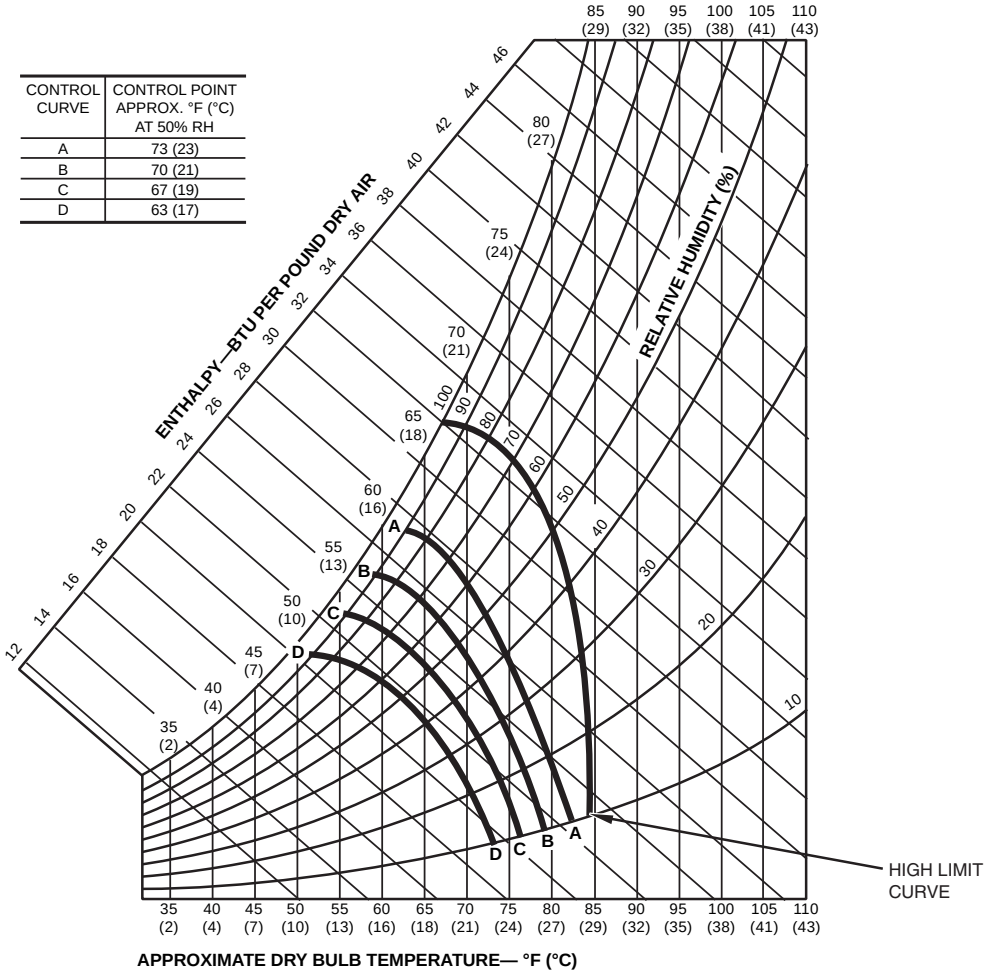


Fig. 37 — Enthalpy Changeover Set Points

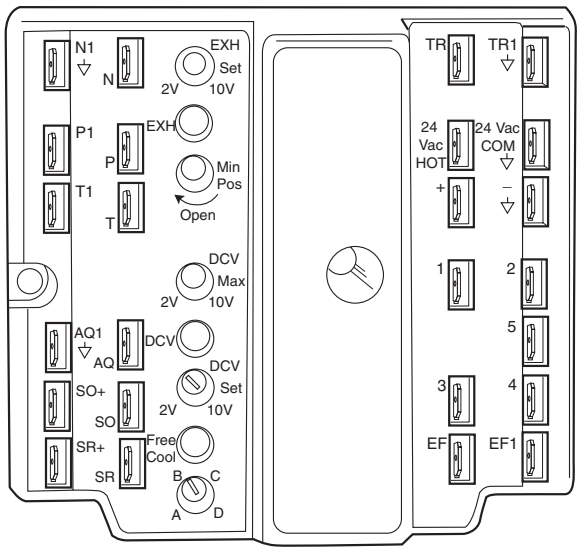


Fig. 38 — EconoMi$er IV Control

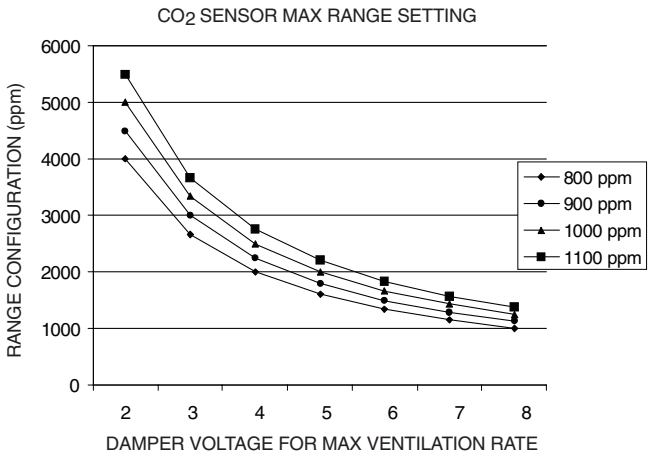


Fig. 39 — CO_2 Sensor Maximum Range Setting

Exhaust Set Point Adjustment — The exhaust set point will determine when the exhaust fan runs based on damper position (if accessory power exhaust is installed). The set point is modified with the Exhaust Fan Set Point (EXH SET) potentiometer. See Fig. 34. 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. 34. The minimum damper position maintains the minimum airflow into the building during the occupied period.

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

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

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

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

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

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

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

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

   (60 x .10) + (75 x .90) = 73.5 F
2. Disconnect the supply air sensor from terminals T and T1.
3. Ensure that the factory-installed jumper is in place across terminals P and P1. If remote damper positioning is being used, make sure that the terminals are wired according to Fig. 28 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 supply air temperature matches the calculated value.
6. Reconnect the supply 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. 38.

Damper Movement — 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.

Occupancy Control — The factory default configuration for the EconoMi$er IV control is occupied mode. Occupied status is provided by the black jumper from terminal TR to terminal N. When unoccupied mode is desired, install a field-supplied timeclock function in place of the jumper between TR and N. See Fig. 28. When the timeclock contacts are closed, the EconoMi$er IV control will be in occupied mode. When the timeclock contacts are open (removing the 24-v signal from terminal N), the EconoMi$er IV will be in unoccupied mode.

Demand Controlled Ventilation (DCV) — When using the EconoMi$er IV for demand controlled ventilation, there are some equipment selection criteria which should be considered. When selecting the heat capacity and cool capacity of the equipment, the maximum ventilation rate must be evaluated for design conditions. The maximum damper position must be calculated to provide the desired fresh air.

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

A proportional anticipatory strategy should be taken with the following conditions: a zone with a large area, varied occupancy, and equipment that cannot exceed the required ventilation rate at design conditions. Exceeding the required ventilation rate means the equipment can condition air at a maximum ventilation rate that is greater than the required ventilation rate for maximum occupancy. A proportional-anticipatory strategy will cause the fresh air supplied to increase as the room CO_2 level increases even though the CO_2 set point has not been reached. By the time the CO_2 level reaches the set point, the damper will be at maximum ventilation and should maintain the set point.

In order to have the CO_2 sensor control the economizer damper in this manner, first determine the damper voltage output for minimum or base ventilation. Base ventilation is the ventilation required to remove contaminants during unoccupied periods. The following equation may be used to determine the percent of outside-air entering the building for a given damper position. For best results there should be at least a 10 degree difference in outside and return-air temperatures.

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

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

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

The same equation can be used to determine the occupied or maximum ventilation rate to the building. For example, an output of 3.6 volts to the actuator provides a base ventilation rate of 5% and an output of 6.7 volts provides the maximum ventilation rate of 20% (or base plus 15 cfm per person). Use Fig. 39 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. 39 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. See Table 6.

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 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.

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

Step 9 — Adjust Evaporator-Fan Speed — Adjust evaporator-fan speed to meet jobsite requirement.

Table 7 shows fan rpm at motor pulley settings, Table 8 shows motor efficiencies. Table 9 shows motor performance. Tables 10 and 11 show accessory static pressure. Refer to Fan Performance Tables 12-41 to determine fan speed settings. Fan motor pulleys are factory set for speed shown in Tables 1A and 1B.

To change fan speed:

1. Shut off unit power supply and install lockout tag.
2. Loosen belt by loosening fan motor mounting plate nuts (see Fig. 40 and 41).
3. Loosen movable pulley flange setscrew (see Fig. 42).
4. Screw movable flange toward fixed flange to increase fan speed and away from fixed flange to decrease fan speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Tables 1A and 1B.
5. Set movable flange at nearest flat of pulley hub and tighten setscrew (see Tables 1A and 1B for speed change for each full turn of pulley flange).

To align fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft.
3. Make angular alignment by loosening motor from mounting plate.

To adjust belt tension (see Fig. 40 and 41):

1. Loosen fan motor mounting plate nuts.
2. *Unit Sizes 008,009* — Slide motor mounting plate away from fan scroll for proper belt tension ($^1/_2$-in. deflection with 8 to 10 lb of force) and tighten mounting nuts (see Fig. 40).

   Unit Sizes 012,014 — Slide motor mounting plate downward to tighten belt tension. ($^1/_2$-in. deflection with 5 to 10 lb of force.) Secure motor mounting plate nuts. See Fig. 41.
3. Adjust bolt and nut on mounting plate to secure motor in fixed position.

Realign fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft.
3. Make angular alignment by loosening motor from mounting plate.

Table 6 — CO_2 Sensor Standard Settings

SETTING	EQUIPMENT	OUTPUT	VENTILATION RATE (cfm/Person)	ANALOG OUTPUT	CO_2 CONTROL RANGE (ppm)	OPTIONAL RELAY SETPOINT (ppm)	RELAY HYSTERESIS (ppm)
1	Interface w/Standard Building Control System	Proportional	Any	0-10V 4-20 mA	0-2000	1000	50
2		Proportional	Any	2-10V 7-20 mA	0-2000	1000	50
3		Exponential	Any	0-10V 4-20 mA	0-2000	1100	50
4	Economizer	Proportional	15	0-10V 4-20 mA	0-1100	1100	50
5		Proportional	20	0-10V 4-20 mA	0- 900	900	50
6		Exponential	15	0-10V 4-20 mA	0-1100	1100	50
7		Exponential	20	0-10V 4-20 mA	0- 900	900	50
8	Health & Safety	Proportional	—	0-10V 4-20 mA	0-9999	5000	500
9	Parking/Air Intakes/ Loading Docks	Proportional	—	0-10V 4-20 mA	0-2000	700	50

LEGEND

ppm — Parts Per Million

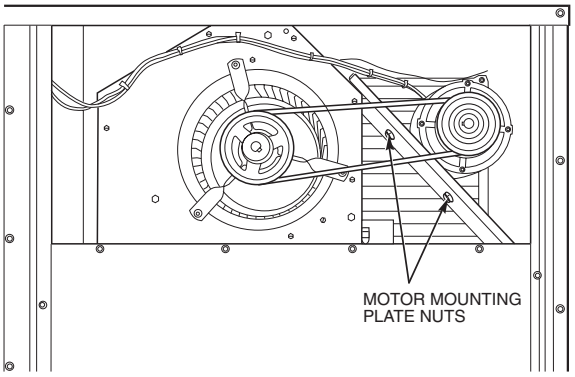


Fig. 40 — Typical Belt-Drive Motor Mounting for Sizes 008,009

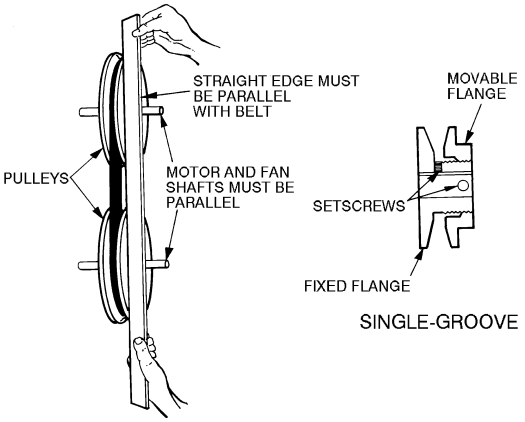


Fig. 42 — Evaporator-Fan Pulley Adjustment

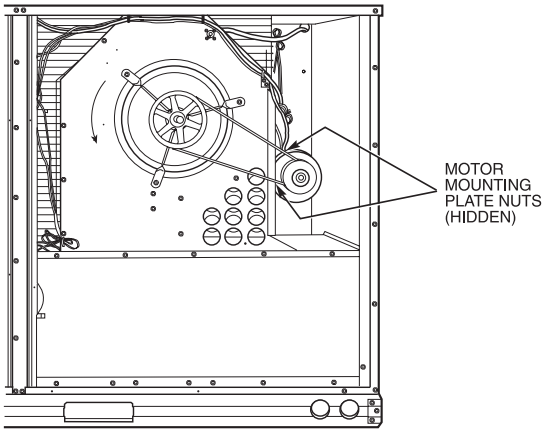


Fig. 41 — Typical Belt-Drive Motor Mounting for Sizes 012,014

Table 7 — Fan Rpm at Motor Pulley Settings*

UNIT 48TF,TM	MOTOR PULLEY TURNS OPEN												
	0	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6
008†	840	815	790	765	740	715	690	665	635	615	590	—	—
008**	935	910	885	860	835	810	785	760	735	710	685	—	—
008††	1080	1025	1007	988	970	952	933	915	897	878	860	—	—
009†	935	910	885	860	835	810	785	760	735	710	685	—	—
009††	1080	1025	1007	988	970	952	933	915	897	878	860	—	—
012†	935	910	885	860	835	810	785	760	735	710	685	—	—
012***	1085	1060	1035	1010	985	960	935	910	885	860	835	—	—
012††	1130	1112	1087	1062	1037	1012	987	962	937	912	887	862	830
014†	1080	1060	1035	1015	990	970	950	925	905	880	860	—	—
014***	1130	1112	1087	1062	1037	1012	987	962	937	912	887	862	830

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

Table 8 — Evaporator Fan Motor Efficiency

UNIT 48TF,TM	MOTOR EFFICIENCY (%)
008-012	80
014	87

Table 9 — Evaporator-Fan Motor Performance

UNIT 48TF,TM	EVAPORATOR-FAN MOTOR	UNIT VOLTAGE	MAXIMUM ACCEPTABLE CONTINUOUS BHP*	MAXIMUM ACCEPTABLE OPERATING WATTS	MAXIMUM AMP DRAW
008	Standard, Alternate	208/230	2.40	2120	6.7
		460			3.0
		575			3.0
	High Static	208/230	3.70	3313	12.2
		460			5.5
		575			5.5
009	Standard	208/230	2.40	2120	6.7
		460			3.0
		575			3.0
	High Static	208/230	3.70	3313	12.2
		460			5.5
		575			5.5
012	Standard	208/230	2.40	2120	6.7
		460			3.0
		575			3.0
	Alternate	208/230	2.90	2615	8.6
		460			3.9
		575			3.9
	High Static	208/230	5.25	4400	17.3
		460			8.5
		575			8.5
014	Standard	208/230	3.70	3313	12.2
		460			5.5
		575			5.5
	Alternate	208/230	5.25	4400	17.3
		460			8.5
		575			8.5

LEGEND

BHP — Brake Horsepower

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

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

Table 10 — Accessory Static Pressure Drop (in. wg) 48TF,TM008-014

COMPONENT	CFM									
	900	1200	1400	1600	1800	2000	2200	2400	2600	3000
1 Heater Module	0.05	0.07	0.09	0.09	0.10	0.11	0.11	0.12	0.13	0.15
2 Heater Modules	0.15	0.16	0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.19

Table 11 — Accessory/FIOP EconoMi$er IV and EconoMi$er2 Static Pressure* (in. wg)

COMPONENT	CFM							
	1250	1500	1750	2000	2250	2500	2750	3000
Vertical Economizer	0.045	0.065	0.08	0.12	0.145	0.175	0.22	0.255
Horizontal Economizer	—	—	0.1	0.125	0.15	0.18	0.225	0.275

LEGEND

FIOP — Factory-Installed Option

*The static pressure must be added to external static pressure. The sum and the evaporator entering-air cfm should be used in conjunction with the Fan Performance tables to determine indoor blower rpm and watts.

GENERAL NOTES FOR FAN PERFORMANCE DATA TABLES

1. Fan Performance is based on clean filters and wet coil data.
2. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using the fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Evaporator-Fan Motor Performance data, Table 9, for additional information.
3. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.
4. Interpolation is permissible. Do not extrapolate.

Table 12 — Fan Performance 48TF008 — Vertical Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**513**	**0.58**	**540**	593	0.75	702	663	0.94	873	726	1.13	1054	783	1.34	1245
2300	**520**	**0.61**	**570**	600	0.79	735	669	0.97	908	731	1.17	1092	789	1.38	1285
2400	**535**	**0.68**	**633**	613	0.86	803	681	1.05	983	743	1.26	1171	799	1.47	1369
2500	**551**	**0.75**	**700**	627	0.94	877	693	1.14	1062	754	1.35	1256	810	1.56	1459
2550	**559**	**0.79**	**736**	634	0.98	916	700	1.18	1104	760	1.39	1301	815	1.61	1506
2600	**567**	**0.83**	**773**	640	1.03	956	706	1.23	1147	766	1.44	1346	821	1.67	1554
2700	**582**	**0.91**	**851**	655	1.12	1040	719	1.33	1237	778	1.55	1441	832	1.77	1654
2800	598	1.00	935	669	1.21	1130	732	1.43	1333	790	1.65	1543	**844**	**1.89**	**1761**
2900	614	1.10	1024	683	1.31	1225	745	1.54	1434	802	1.77	1650	**855**	**2.01**	**1873**
3000	630	1.20	1119	698	1.42	1327	759	1.65	1542	815	1.89	1763	**867**	**2.14**	**1992**
3100	647	1.31	1220	713	1.54	1435	773	1.78	1655	828	2.02	1883	**879**	**2.27**	**2117**
3200	663	1.42	1328	728	1.66	1549	787	1.90	1776	**841**	**2.15**	**2008**	—	—	—
3300	680	1.55	1442	743	1.79	1669	801	2.04	1902	**854**	**2.30**	**2141**	—	—	—
3400	696	1.68	1563	758	1.93	1797	815	2.18	2036	—	—	—	—	—	—
3500	713	1.81	1690	774	2.07	1931	829	2.33	2177	—	—	—	—	—	—
3600	730	1.96	1825	789	2.22	2073	—	—	—	—	—	—	—	—	—
3700	747	2.11	1967	805	2.38	2221	—	—	—	—	—	—	—	—	—
3750	755	2.19	2041	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	837	1.55	1445	**887**	**1.77**	**1655**	**934**	**2.01**	**1874**	**979**	**2.25**	**2102**	—	—	—
2300	**842**	**1.60**	**1488**	**891**	**1.82**	**1699**	**938**	**2.06**	**1920**	**983**	**2.31**	**2150**	—	—	—
2400	**852**	**1.69**	**1576**	**901**	**1.92**	**1792**	**948**	**2.16**	**2017**	—	—	—	—	—	—
2500	**862**	**1.79**	**1670**	**911**	**2.03**	**1890**	**957**	**2.27**	**2119**	—	—	—	—	—	—
2550	**867**	**1.84**	**1719**	**916**	**2.08**	**1941**	**962**	**2.33**	**2173**	—	—	—	—	—	—
2600	**872**	**1.90**	**1770**	**921**	**2.14**	**1995**	**966**	**2.39**	**2227**	—	—	—	—	—	—
2700	**883**	**2.01**	**1875**	**931**	**2.26**	**2104**	—	—	—	—	—	—	—	—	—
2800	**894**	**2.13**	**1986**	—	—	—	—	—	—	—	—	—	—	—	—
2900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 590 to 840 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 13 — Fan Performance 48TF008 — Vertical Discharge Units; Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**513**	**0.58**	**540**	**593**	**0.75**	**702**	**663**	**0.94**	**873**	726	1.13	1054	783	1.34	1245
2300	**520**	**0.61**	**570**	**600**	**0.79**	**735**	**669**	**0.97**	**908**	731	1.17	1092	789	1.38	1285
2400	**535**	**0.68**	**633**	**613**	**0.86**	**803**	**681**	**1.05**	**983**	743	1.26	1171	799	1.47	1369
2500	**551**	**0.75**	**700**	**627**	**0.94**	**877**	693	1.14	1062	754	1.35	1256	810	1.56	1459
2550	**559**	**0.79**	**736**	**634**	**0.98**	**916**	700	1.18	1104	760	1.39	1301	815	1.61	1506
2600	**567**	**0.83**	**773**	**640**	**1.03**	**956**	706	1.23	1147	766	1.44	1346	821	1.67	1554
2700	**582**	**0.91**	**851**	**655**	**1.12**	**1040**	719	1.33	1237	778	1.55	1441	832	1.77	1654
2800	**598**	**1.00**	**935**	**669**	**1.21**	**1130**	732	1.43	1333	790	1.65	1543	844	1.89	1761
2900	**614**	**1.10**	**1024**	**683**	**1.31**	**1225**	745	1.54	1434	802	1.77	1650	855	2.01	1873
3000	**630**	**1.20**	**1119**	698	1.42	1327	759	1.65	1542	815	1.89	1763	867	2.14	1992
3100	**647**	**1.31**	**1220**	713	1.54	1435	773	1.78	1655	828	2.02	1883	879	2.27	2117
3200	**663**	**1.42**	**1328**	728	1.66	1549	787	1.90	1776	841	2.15	2008	—	—	—
3300	**680**	**1.55**	**1442**	743	1.79	1669	801	2.04	1902	854	2.30	2141	—	—	—
3400	696	1.68	1563	758	1.93	1797	815	2.18	2036	—	—	—	—	—	—
3500	713	1.81	1690	774	2.07	1931	829	2.33	2177	—	—	—	—	—	—
3600	730	1.96	1825	789	2.22	2073	—	—	—	—	—	—	—	—	—
3700	747	2.11	1967	805	2.38	2221	—	—	—	—	—	—	—	—	—
3750	755	2.19	2041	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	837	1.55	1445	887	1.77	1655	934	2.01	1874	**979**	**2.25**	**2102**	—	—	—
2300	842	1.60	1488	891	1.82	1699	**938**	**2.06**	**1920**	**983**	**2.31**	**2150**	—	—	—
2400	852	1.69	1576	901	1.92	1792	**948**	**2.16**	**2017**	—	—	—	—	—	—
2500	862	1.79	1670	911	2.03	1890	**957**	**2.27**	**2119**	—	—	—	—	—	—
2550	867	1.84	1719	916	2.08	1941	**962**	**2.33**	**2173**	—	—	—	—	—	—
2600	872	1.90	1770	921	2.14	1995	**966**	**2.39**	**2227**	—	—	—	—	—	—
2700	883	2.01	1875	931	2.26	2104	—	—	—	—	—	—	—	—	—
2800	894	2.13	1986	**941**	**2.38**	**2220**	—	—	—	—	—	—	—	—	—
2900	905	2.26	2104	—	—	—	—	—	—	—	—	—	—	—	—
3000	916	2.39	2228	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 685 to 935 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 14 — Fan Performance 48TF008 — Vertical Discharge Units; High-Static Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**513**	**0.58**	**540**	**593**	**0.75**	**702**	**663**	**0.94**	**873**	**726**	**1.13**	**1054**	**783**	**1.34**	**1245**
2300	**520**	**0.61**	**570**	**600**	**0.79**	**735**	**669**	**0.97**	**908**	**731**	**1.17**	**1092**	**789**	**1.38**	**1285**
2400	**535**	**0.68**	**633**	**613**	**0.86**	**803**	**681**	**1.05**	**983**	**743**	**1.26**	**1171**	**799**	**1.47**	**1369**
2500	**551**	**0.75**	**700**	**627**	**0.94**	**877**	**693**	**1.14**	**1062**	**754**	**1.35**	**1256**	**810**	**1.56**	**1459**
2550	**559**	**0.79**	**736**	**634**	**0.98**	**916**	**700**	**1.18**	**1104**	**760**	**1.39**	**1301**	**815**	**1.61**	**1506**
2600	**567**	**0.83**	**773**	**640**	**1.03**	**956**	**706**	**1.23**	**1147**	**766**	**1.44**	**1346**	**821**	**1.67**	**1554**
2700	**582**	**0.91**	**851**	**655**	**1.12**	**1040**	**719**	**1.33**	**1237**	**778**	**1.55**	**1441**	**832**	**1.77**	**1654**
2800	**598**	**1.00**	**935**	**669**	**1.21**	**1130**	**732**	**1.43**	**1333**	**790**	**1.65**	**1543**	**844**	**1.89**	**1761**
2900	**614**	**1.10**	**1024**	**683**	**1.31**	**1225**	**745**	**1.54**	**1434**	**802**	**1.77**	**1650**	**855**	**2.01**	**1873**
3000	**630**	**1.20**	**1119**	**698**	**1.42**	**1327**	**759**	**1.65**	**1542**	**815**	**1.89**	**1763**	867	2.14	1992
3100	**647**	**1.31**	**1220**	**713**	**1.54**	**1435**	**773**	**1.78**	**1655**	**828**	**2.02**	**1883**	879	2.27	2117
3200	**663**	**1.42**	**1328**	**728**	**1.66**	**1549**	**787**	**1.90**	**1776**	**841**	**2.15**	**2008**	892	2.41	2248
3300	**680**	**1.55**	**1442**	**743**	**1.79**	**1669**	**801**	**2.04**	**1902**	**854**	**2.30**	**2141**	904	2.56	2386
3400	**696**	**1.68**	**1563**	**758**	**1.93**	**1797**	**815**	**2.18**	**2036**	868	2.45	2281	917	2.71	2532
3500	**713**	**1.81**	**1690**	**774**	**2.07**	**1931**	**829**	**2.33**	**2177**	881	2.60	2427	930	2.88	2684
3600	**730**	**1.96**	**1825**	**789**	**2.22**	**2073**	**844**	**2.49**	**2324**	895	2.77	2581	943	3.05	2843
3700	**747**	**2.11**	**1967**	**805**	**2.38**	**2221**	**859**	**2.66**	**2479**	909	2.94	2742	956	3.23	3010
3750	**755**	**2.19**	**2041**	**813**	**2.46**	**2298**	866	2.74	2559	916	3.03	2825	963	3.32	3097

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**837**	**1.55**	**1445**	887	1.77	1655	934	2.01	1874	979	2.25	2102	1022	2.51	2338
2300	**842**	**1.60**	**1488**	891	1.82	1699	938	2.06	1920	983	2.31	2150	1026	2.56	2387
2400	**852**	**1.69**	**1576**	901	1.92	1792	948	2.16	2017	992	2.41	2250	1034	2.67	2491
2500	862	1.79	1670	911	2.03	1890	957	2.27	2119	1001	2.53	2356	1043	2.79	2601
2550	867	1.84	1719	916	2.08	1941	962	2.33	2173	1005	2.59	2412	1047	2.85	2658
2600	872	1.90	1770	921	2.14	1995	966	2.39	2227	1010	2.65	2468	1052	2.91	2717
2700	883	2.01	1875	931	2.26	2104	976	2.51	2342	1019	2.77	2586	1061	3.04	2839
2800	894	2.13	1986	941	2.38	2220	986	2.64	2462	1029	2.91	2711	1070	3.18	2968
2900	905	2.26	2104	952	2.51	2343	996	2.78	2588	1039	3.05	2842	1080	3.33	3103
3000	916	2.39	2228	963	2.65	2471	1007	2.92	2722	1049	3.20	2980	**1090**	**3.48**	**3245**
3100	928	2.53	2358	974	2.79	2606	1018	3.07	2861	1059	3.35	3124	**1100**	**3.64**	**3394**
3200	940	2.68	2495	985	2.95	2748	1028	3.23	3008	1070	3.51	3276	—	—	—
3300	952	2.83	2638	997	3.11	2897	1040	3.39	3162	**1081**	**3.68**	**3434**	—	—	—
3400	964	2.99	2789	1008	3.27	3052	1051	3.56	3323	—	—	—	—	—	—
3500	976	3.16	2946	1020	3.45	3216	—	—	—	—	—	—	—	—	—
3600	989	3.34	3112	1032	3.63	3386	—	—	—	—	—	—	—	—	—
3700	1002	3.52	3284	—	—	—	—	—	—	—	—	—	—	—	—
3750	1008	3.62	3374	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 860 to 1080 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 32 for General Fan Performance Notes.

Table 15 — Fan Performance 48TM008 — Vertical Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**513**	**0.54**	**505**	595	0.76	713	665	1.01	940	728	1.27	1187	786	1.56	1453
2300	**521**	**0.57**	**531**	601	0.79	741	671	1.04	972	734	1.31	1222	791	1.60	1489
2400	**535**	**0.63**	**584**	615	0.86	802	684	1.11	1038	745	1.39	1293	802	1.68	1566
2500	**551**	**0.69**	**642**	628	0.93	866	696	1.19	1109	757	1.47	1369	813	1.77	1647
2550	**558**	**0.72**	**673**	635	0.97	900	702	1.23	1146	763	1.51	1409	818	1.81	1689
2600	**566**	**0.76**	**705**	642	1.00	935	709	1.27	1183	769	1.55	1450	824	1.86	1732
2700	**582**	**0.83**	**771**	656	1.08	1008	721	1.35	1263	781	1.65	1535	835	1.95	1823
2800	597	0.90	842	670	1.16	1086	734	1.44	1347	793	1.74	1625	**847**	**2.06**	**1917**
2900	613	0.98	918	684	1.25	1169	748	1.54	1436	805	1.84	1720	**859**	**2.16**	**2019**
3000	629	1.07	999	699	1.35	1256	761	1.64	1530	818	1.95	1820	**871**	**2.28**	**2125**
3100	645	1.16	1085	713	1.45	1349	775	1.75	1630	831	2.06	1925	**883**	**2.40**	**2235**
3200	662	1.26	1176	728	1.55	1448	788	1.86	1734	**844**	**2.18**	**2036**	—	—	—
3300	678	1.36	1272	743	1.66	1551	802	1.98	1845	**857**	**2.31**	**2152**	—	—	—
3400	694	1.47	1374	758	1.78	1660	816	2.10	1961	—	—	—	—	—	—
3500	711	1.59	1482	773	1.90	1775	831	2.23	2082	—	—	—	—	—	—
3600	727	1.71	1596	789	2.03	1896	**845**	**2.37**	**2210**	—	—	—	—	—	—
3700	744	1.84	1716	804	2.17	2023	—	—	—	—	—	—	—	—	—
3750	752	1.91	1778	812	2.24	2089	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	839	1.86	1735	**889**	**2.18**	**2032**	—	—	—	—	—	—	—	—	—
2300	**844**	**1.90**	**1773**	**893**	**2.22**	**2073**	—	—	—	—	—	—	—	—	—
2400	**854**	**1.99**	**1855**	**903**	**2.32**	**2159**	—	—	—	—	—	—	—	—	—
2500	**865**	**2.08**	**1940**	—	—	—	—	—	—	—	—	—	—	—	—
2550	**870**	**2.13**	**1985**	—	—	—	—	—	—	—	—	—	—	—	—
2600	**875**	**2.18**	**2031**	—	—	—	—	—	—	—	—	—	—	—	—
2700	**886**	**2.28**	**2126**	—	—	—	—	—	—	—	—	—	—	—	—
2800	**897**	**2.39**	**2227**	—	—	—	—	—	—	—	—	—	—	—	—
2900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 590 to 840 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 16 — Fan Performance 48TM008 — Vertical Discharge Units; Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**513**	**0.54**	**505**	**595**	**0.76**	**713**	**665**	**1.01**	**940**	728	1.27	1187	786	1.56	1453
2300	**521**	**0.57**	**531**	**601**	**0.79**	**741**	**671**	**1.04**	**972**	734	1.31	1222	791	1.60	1489
2400	**535**	**0.63**	**584**	**615**	**0.86**	**802**	**684**	**1.11**	**1038**	745	1.39	1293	802	1.68	1566
2500	**551**	**0.69**	**642**	**628**	**0.93**	**866**	696	1.19	1109	757	1.47	1369	813	1.77	1647
2550	**558**	**0.72**	**673**	**635**	**0.97**	**900**	702	1.23	1146	763	1.51	1409	818	1.81	1689
2600	**566**	**0.76**	**705**	**642**	**1.00**	**935**	709	1.27	1183	769	1.55	1450	824	1.86	1732
2700	**582**	**0.83**	**771**	**656**	**1.08**	**1008**	721	1.35	1263	781	1.65	1535	835	1.95	1823
2800	**597**	**0.90**	**842**	**670**	**1.16**	**1086**	734	1.44	1347	793	1.74	1625	847	2.06	1917
2900	**613**	**0.98**	**918**	**684**	**1.25**	**1169**	748	1.54	1436	805	1.84	1720	859	2.16	2019
3000	**629**	**1.07**	**999**	699	1.35	1256	761	1.64	1530	818	1.95	1820	871	2.28	2125
3100	**645**	**1.16**	**1085**	713	1.45	1349	775	1.75	1630	831	2.06	1925	883	2.40	2235
3200	**662**	**1.26**	**1176**	728	1.55	1448	788	1.86	1734	844	2.18	2036	—	—	—
3300	**678**	**1.36**	**1272**	743	1.66	1551	802	1.98	1845	857	2.31	2152	—	—	—
3400	694	1.47	1374	758	1.78	1660	816	2.10	1961	—	—	—	—	—	—
3500	711	1.59	1482	773	1.90	1775	831	2.23	2082	—	—	—	—	—	—
3600	727	1.71	1596	789	2.03	1896	845	2.37	2210	—	—	—	—	—	—
3700	744	1.84	1716	804	2.17	2023	—	—	—	—	—	—	—	—	—
3750	752	1.91	1778	812	2.24	2089	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	839	1.86	1735	889	2.18	2032	—	—	—	—	—	—	—	—	—
2300	844	1.90	1773	893	2.22	2073	—	—	—	—	—	—	—	—	—
2400	854	1.99	1855	903	2.32	2159	—	—	—	—	—	—	—	—	—
2500	865	2.08	1940	—	—	—	—	—	—	—	—	—	—	—	—
2550	870	2.13	1985	—	—	—	—	—	—	—	—	—	—	—	—
2600	875	2.18	2031	—	—	—	—	—	—	—	—	—	—	—	—
2700	886	2.28	2126	—	—	—	—	—	—	—	—	—	—	—	—
2800	897	2.39	2227	—	—	—	—	—	—	—	—	—	—	—	—
2900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 685 to 935 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 17 — Fan Performance 48TM008 — Vertical Discharge Units; High-Static Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**513**	**0.54**	**505**	**595**	**0.76**	**713**	**665**	**1.01**	**940**	**728**	**1.27**	**1187**	**786**	**1.56**	**1453**
2300	**521**	**0.57**	**531**	**601**	**0.79**	**741**	**671**	**1.04**	**972**	**734**	**1.31**	**1222**	**791**	**1.60**	**1489**
2400	**535**	**0.63**	**584**	**615**	**0.86**	**802**	**684**	**1.11**	**1038**	**745**	**1.39**	**1293**	**802**	**1.68**	**1566**
2500	**551**	**0.69**	**642**	**628**	**0.93**	**866**	**696**	**1.19**	**1109**	**757**	**1.47**	**1369**	**813**	**1.77**	**1647**
2550	**558**	**0.72**	**673**	**635**	**0.97**	**900**	**702**	**1.23**	**1146**	**763**	**1.51**	**1409**	**818**	**1.81**	**1689**
2600	**566**	**0.76**	**705**	**642**	**1.00**	**935**	**709**	**1.27**	**1183**	**769**	**1.55**	**1450**	**824**	**1.86**	**1732**
2700	**582**	**0.83**	**771**	**656**	**1.08**	**1008**	**721**	**1.35**	**1263**	**781**	**1.65**	**1535**	**835**	**1.95**	**1823**
2800	**597**	**0.90**	**842**	**670**	**1.16**	**1086**	**734**	**1.44**	**1347**	**793**	**1.74**	**1625**	**847**	**2.06**	**1917**
2900	**613**	**0.98**	**918**	**684**	**1.25**	**1169**	**748**	**1.54**	**1436**	**805**	**1.84**	**1720**	**859**	**2.16**	**2019**
3000	**629**	**1.07**	**999**	**699**	**1.35**	**1256**	**761**	**1.64**	**1530**	**818**	**1.95**	**1820**	871	2.28	2125
3100	**645**	**1.16**	**1085**	**713**	**1.45**	**1349**	**775**	**1.75**	**1630**	**831**	**2.06**	**1925**	883	2.40	2235
3200	**662**	**1.26**	**1176**	**728**	**1.55**	**1448**	**788**	**1.86**	**1734**	**844**	**2.18**	**2036**	895	2.52	2352
3300	**678**	**1.36**	**1272**	**743**	**1.66**	**1551**	**802**	**1.98**	**1845**	**857**	**2.31**	**2152**	908	2.65	2475
3400	**694**	**1.47**	**1374**	**758**	**1.78**	**1660**	**816**	**2.10**	**1961**	870	2.44	2275	920	2.79	2603
3500	**711**	**1.59**	**1482**	**773**	**1.90**	**1775**	**831**	**2.23**	**2082**	884	2.58	2402	933	2.93	2737
3600	**727**	**1.71**	**1596**	**789**	**2.03**	**1896**	**845**	**2.37**	**2210**	897	2.72	2537	946	3.09	2877
3700	**744**	**1.84**	**1716**	**804**	**2.17**	**2023**	860	2.51	2343	911	2.87	2677	959	3.24	3023
3750	**752**	**1.91**	**1778**	**812**	**2.24**	**2089**	867	2.59	2413	918	2.95	2750	966	3.32	3100

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**839**	**1.86**	**1735**	889	2.18	2032	935	2.52	2345	980	2.87	2673	1022	3.23	3015
2300	**844**	**1.90**	**1773**	893	2.22	2073	940	2.56	2389	984	2.91	2718	1027	3.28	3062
2400	**854**	**1.99**	**1855**	903	2.32	2159	950	2.66	2478	993	3.02	2812	1035	3.39	3159
2500	865	2.08	1940	913	2.41	2249	959	2.76	2573	1003	3.12	2911	1044	3.50	3261
2550	870	2.13	1985	918	2.46	2296	964	2.81	2622	1008	3.18	2962	1049	3.55	3315
2600	875	2.18	2031	923	2.51	2344	969	2.87	2673	1012	3.23	3014	1054	3.61	3370
2700	886	2.28	2126	934	2.62	2445	979	2.98	2777	1022	3.35	3123	—	—	—
2800	897	2.39	2227	944	2.73	2550	989	3.10	2888	1032	3.47	3238	—	—	—
2900	908	2.50	2333	955	2.85	2661	1000	3.22	3003	1042	3.60	3358	—	—	—
3000	920	2.62	2443	966	2.98	2777	1010	3.35	3123	—	—	—	—	—	—
3100	931	2.75	2560	977	3.11	2899	1021	3.49	3250	—	—	—	—	—	—
3200	943	2.88	2682	989	3.25	3026	1032	3.63	3383	—	—	—	—	—	—
3300	955	3.01	2810	1000	3.39	3159	—	—	—	—	—	—	—	—	—
3400	967	3.16	2945	1012	3.54	3299	—	—	—	—	—	—	—	—	—
3500	980	3.31	3084	1024	3.69	3445	—	—	—	—	—	—	—	—	—
3600	992	3.46	3230	—	—	—	—	—	—	—	—	—	—	—	—
3700	1005	3.63	3383	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 860 to 1080 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 32 for General Fan Performance Notes.

Table 18 — Fan Performance 48TF009 — Vertical Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	**559**	**0.79**	**736**	**634**	**0.98**	**916**	700	1.18	1104	760	1.39	1301	815	1.61	1506
2600	**567**	**0.83**	**773**	**640**	**1.03**	**956**	706	1.23	1147	766	1.44	1346	821	1.67	1554
2700	**582**	**0.91**	**851**	**655**	**1.12**	**1040**	719	1.33	1237	778	1.55	1441	832	1.77	1654
2800	**598**	**1.00**	**935**	**669**	**1.21**	**1130**	732	1.43	1333	790	1.65	1543	844	1.89	1761
2900	**614**	**1.10**	**1024**	**683**	**1.31**	**1225**	745	1.54	1434	802	1.77	1650	855	2.01	1873
3000	**630**	**1.20**	**1119**	698	1.42	1327	759	1.65	1542	815	1.89	1763	867	2.14	1992
3100	**647**	**1.31**	**1220**	713	1.54	1435	773	1.78	1655	828	2.02	1883	879	2.27	2117
3200	**663**	**1.42**	**1328**	728	1.66	1549	787	1.90	1776	841	2.15	2008	—	—	—
3300	**680**	**1.55**	**1442**	743	1.79	1669	801	2.04	1902	854	2.30	2141	—	—	—
3400	696	1.68	1563	758	1.93	1797	815	2.18	2036	—	—	—	—	—	—
3500	713	1.81	1690	774	2.07	1931	829	2.33	2177	—	—	—	—	—	—
3600	730	1.96	1825	789	2.22	2073	—	—	—	—	—	—	—	—	—
3700	747	2.11	1967	805	2.38	2221	—	—	—	—	—	—	—	—	—
3750	755	2.19	2041	—	—	—	—	—	—	—	—	—	—	—	—
3800	764	2.27	2117	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	867	1.84	1719	916	2.08	1941	**962**	**2.33**	**2173**	—	—	—	—	—	—
2600	872	1.90	1770	921	2.14	1995	**966**	**2.39**	**2227**	—	—	—	—	—	—
2700	883	2.01	1875	931	2.26	2104	—	—	—	—	—	—	—	—	—
2800	894	2.13	1986	**941**	**2.38**	**2220**	—	—	—	—	—	—	—	—	—
2900	905	2.26	2104	—	—	—	—	—	—	—	—	—	—	—	—
3000	916	2.39	2228	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 685 to 935 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 19 — Fan Performance 48TF009 — Vertical Discharge Units; High-Static Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	**559**	**0.79**	**736**	**634**	**0.98**	**916**	**700**	**1.18**	**1104**	**760**	**1.39**	**1301**	**815**	**1.61**	**1506**
2600	**567**	**0.83**	**773**	**640**	**1.03**	**956**	**706**	**1.23**	**1147**	**766**	**1.44**	**1346**	**821**	**1.67**	**1554**
2700	**582**	**0.91**	**851**	**655**	**1.12**	**1040**	**719**	**1.33**	**1237**	**778**	**1.55**	**1441**	**832**	**1.77**	**1654**
2800	**598**	**1.00**	**935**	**669**	**1.21**	**1130**	**732**	**1.43**	**1333**	**790**	**1.65**	**1543**	**844**	**1.89**	**1761**
2900	**614**	**1.10**	**1024**	**683**	**1.31**	**1225**	**745**	**1.54**	**1434**	**802**	**1.77**	**1650**	**855**	**2.01**	**1873**
3000	**630**	**1.20**	**1119**	**698**	**1.42**	**1327**	**759**	**1.65**	**1542**	**815**	**1.89**	**1763**	867	2.14	1992
3100	**647**	**1.31**	**1220**	**713**	**1.54**	**1435**	**773**	**1.78**	**1655**	**828**	**2.02**	**1883**	879	2.27	2117
3200	**663**	**1.42**	**1328**	**728**	**1.66**	**1549**	**787**	**1.90**	**1776**	**841**	**2.15**	**2008**	892	2.41	2248
3300	**680**	**1.55**	**1442**	**743**	**1.79**	**1669**	**801**	**2.04**	**1902**	**854**	**2.30**	**2141**	904	2.56	2386
3400	**696**	**1.68**	**1563**	**758**	**1.93**	**1797**	**815**	**2.18**	**2036**	868	2.45	2281	917	2.71	2532
3500	**713**	**1.81**	**1690**	**774**	**2.07**	**1931**	**829**	**2.33**	**2177**	881	2.60	2427	930	2.88	2684
3600	**730**	**1.96**	**1825**	**789**	**2.22**	**2073**	**844**	**2.49**	**2324**	895	2.77	2581	943	3.05	2843
3700	**747**	**2.11**	**1967**	**805**	**2.38**	**2221**	**859**	**2.66**	**2479**	909	2.94	2742	956	3.23	3010
3750	**755**	**2.19**	**2041**	**813**	**2.46**	**2298**	866	2.74	2559	916	3.03	2825	963	3.32	3097
3800	**764**	**2.27**	**2117**	**821**	**2.55**	**2377**	873	2.83	2642	923	3.12	2911	970	3.42	3185
3900	**781**	**2.44**	**2274**	**836**	**2.73**	**2541**	888	3.02	2812	937	3.31	3087	983	3.61	3367
4000	**798**	**2.62**	**2440**	**852**	**2.91**	**2713**	904	3.21	2991	952	3.51	3272	—	—	—
4100	**815**	**2.80**	**2613**	868	3.10	2893	919	3.41	3177	—	—	—	—	—	—
4200	**832**	**3.00**	**2795**	885	3.30	3082	934	3.62	3372	—	—	—	—	—	—
4250	**841**	**3.10**	**2889**	893	3.41	3179	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	867	1.84	1719	916	2.08	1941	962	2.33	2173	1005	2.59	2412	1047	2.85	2658
2600	872	1.90	1770	921	2.14	1995	966	2.39	2227	1010	2.65	2468	1052	2.91	2717
2700	883	2.01	1875	931	2.26	2104	976	2.51	2342	1019	2.77	2586	1061	3.04	2839
2800	894	2.13	1986	941	2.38	2220	986	2.64	2462	1029	2.91	2711	1070	3.18	2968
2900	905	2.26	2104	952	2.51	2343	996	2.78	2588	1039	3.05	2842	1080	3.33	3103
3000	916	2.39	2228	963	2.65	2471	1007	2.92	2722	1049	3.20	2980	**1090**	**3.48**	**3245**
3100	928	2.53	2358	974	2.79	2606	1018	3.07	2861	1059	3.35	3124	**1100**	**3.64**	**3394**
3200	940	2.68	2495	985	2.95	2748	1028	3.23	3008	1070	3.51	3276	—	—	—
3300	952	2.83	2638	997	3.11	2897	1040	3.39	3162	**1081**	**3.68**	**3434**	—	—	—
3400	964	2.99	2789	1008	3.27	3052	1051	3.56	3323	—	—	—	—	—	—
3500	976	3.16	2946	1020	3.45	3216	—	—	—	—	—	—	—	—	—
3600	989	3.34	3112	1032	3.63	3386	—	—	—	—	—	—	—	—	—
3700	1002	3.52	3284	—	—	—	—	—	—	—	—	—	—	—	—
3750	1008	3.62	3374	—	—	—	—	—	—	—	—	—	—	—	—
3800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 860 to 1080 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 32 for General Fan Performance Notes.

Table 20 — Fan Performance 48TM009 — Vertical Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	**558**	**0.72**	**673**	**635**	**0.97**	**900**	702	1.23	1146	763	1.51	1409	818	1.81	1689
2600	**566**	**0.76**	**705**	**642**	**1.00**	**935**	709	1.27	1183	769	1.55	1450	824	1.86	1732
2700	**582**	**0.83**	**771**	**656**	**1.08**	**1008**	721	1.35	1263	781	1.65	1535	835	1.95	1823
2800	**597**	**0.90**	**842**	**670**	**1.16**	**1086**	734	1.44	1347	793	1.74	1625	847	2.06	1917
2900	**613**	**0.98**	**918**	**684**	**1.25**	**1169**	748	1.54	1436	805	1.84	1720	859	2.16	2019
3000	**629**	**1.07**	**999**	699	1.35	1256	761	1.64	1530	818	1.95	1820	871	2.28	2125
3100	**645**	**1.16**	**1085**	713	1.45	1349	775	1.75	1630	831	2.06	1925	883	2.40	2235
3200	**662**	**1.26**	**1176**	728	1.55	1448	788	1.86	1734	844	2.18	2036	—	—	—
3300	**678**	**1.36**	**1272**	743	1.66	1551	802	1.98	1845	857	2.31	2152	—	—	—
3400	694	1.47	1374	758	1.78	1660	816	2.10	1961	—	—	—	—	—	—
3500	711	1.59	1482	773	1.90	1775	831	2.23	2082	—	—	—	—	—	—
3600	727	1.71	1596	789	2.03	1896	845	2.37	2210	—	—	—	—	—	—
3700	744	1.84	1716	804	2.17	2023	—	—	—	—	—	—	—	—	—
3750	752	1.91	1778	812	2.24	2089	—	—	—	—	—	—	—	—	—
3800	761	1.98	1842	820	2.31	2156	—	—	—	—	—	—	—	—	—
3900	777	2.12	1974	—	—	—	—	—	—	—	—	—	—	—	—
4000	794	2.27	2113	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	870	2.13	1985	—	—	—	—	—	—	—	—	—	—	—	—
2600	875	2.18	2031	—	—	—	—	—	—	—	—	—	—	—	—
2700	886	2.28	2126	—	—	—	—	—	—	—	—	—	—	—	—
2800	897	2.39	2227	—	—	—	—	—	—	—	—	—	—	—	—
2900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 685 to 935 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 21 — Fan Performance 48TM009 — Vertical Discharge Units; High-Static Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	**558**	**0.72**	**673**	**635**	**0.97**	**900**	**702**	**1.23**	**1146**	**763**	**1.51**	**1409**	**818**	**1.81**	**1689**
2600	**566**	**0.76**	**705**	**642**	**1.00**	**935**	**709**	**1.27**	**1183**	**769**	**1.55**	**1450**	**824**	**1.86**	**1732**
2700	**582**	**0.83**	**771**	**656**	**1.08**	**1008**	**721**	**1.35**	**1263**	**781**	**1.65**	**1535**	**835**	**1.95**	**1823**
2800	**597**	**0.90**	**842**	**670**	**1.16**	**1086**	**734**	**1.44**	**1347**	**793**	**1.74**	**1625**	**847**	**2.06**	**1917**
2900	**613**	**0.98**	**918**	**684**	**1.25**	**1169**	**748**	**1.54**	**1436**	**805**	**1.84**	**1720**	**859**	**2.16**	**2019**
3000	**629**	**1.07**	**999**	**699**	**1.35**	**1256**	**761**	**1.64**	**1530**	**818**	**1.95**	**1820**	871	2.28	2125
3100	**645**	**1.16**	**1085**	**713**	**1.45**	**1349**	**775**	**1.75**	**1630**	**831**	**2.06**	**1925**	883	2.40	2235
3200	**662**	**1.26**	**1176**	**728**	**1.55**	**1448**	**788**	**1.86**	**1734**	**844**	**2.18**	**2036**	895	2.52	2352
3300	**678**	**1.36**	**1272**	**743**	**1.66**	**1551**	**802**	**1.98**	**1845**	**857**	**2.31**	**2152**	908	2.65	2475
3400	**694**	**1.47**	**1374**	**758**	**1.78**	**1660**	**816**	**2.10**	**1961**	870	2.44	2275	920	2.79	2603
3500	**711**	**1.59**	**1482**	**773**	**1.90**	**1775**	**831**	**2.23**	**2082**	884	2.58	2402	933	2.93	2737
3600	**727**	**1.71**	**1596**	**789**	**2.03**	**1896**	**845**	**2.37**	**2210**	897	2.72	2537	946	3.09	2877
3700	**744**	**1.84**	**1716**	**804**	**2.17**	**2023**	860	2.51	2343	911	2.87	2677	959	3.24	3023
3750	**752**	**1.91**	**1778**	**812**	**2.24**	**2089**	867	2.59	2413	918	2.95	2750	966	3.32	3100
3800	**761**	**1.98**	**1842**	**820**	**2.31**	**2156**	874	2.66	2484	925	3.03	2824	973	3.41	3177
3900	**777**	**2.12**	**1974**	**835**	**2.46**	**2296**	889	2.82	2630	939	3.19	2977	986	3.58	3336
4000	**794**	**2.27**	**2113**	**851**	**2.62**	**2442**	904	2.99	2784	953	3.36	3137	—	—	—
4100	**811**	**2.42**	**2259**	867	2.78	2595	919	3.16	2944	968	3.54	3304	—	—	—
4200	**828**	**2.59**	**2412**	883	2.95	2755	934	3.34	3110	—	—	—	—	—	—
4250	**837**	**2.67**	**2490**	891	3.04	2838	942	3.43	3197	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	870	2.13	1985	918	2.46	2296	964	2.81	2622	1008	3.18	2962	1049	3.55	3315
2600	875	2.18	2031	923	2.51	2344	969	2.87	2673	1012	3.23	3014	1054	3.61	3370
2700	886	2.28	2126	934	2.62	2445	979	2.98	2777	1022	3.35	3123	—	—	—
2800	897	2.39	2227	944	2.73	2550	989	3.10	2888	1032	3.47	3238	—	—	—
2900	908	2.50	2333	955	2.85	2661	1000	3.22	3003	1042	3.60	3358	—	—	—
3000	920	2.62	2443	966	2.98	2777	1010	3.35	3123	—	—	—	—	—	—
3100	931	2.75	2560	977	3.11	2899	1021	3.49	3250	—	—	—	—	—	—
3200	943	2.88	2682	989	3.25	3026	1032	3.63	3383	—	—	—	—	—	—
3300	955	3.01	2810	1000	3.39	3159	—	—	—	—	—	—	—	—	—
3400	967	3.16	2945	1012	3.54	3299	—	—	—	—	—	—	—	—	—
3500	980	3.31	3084	1024	3.69	3445	—	—	—	—	—	—	—	—	—
3600	992	3.46	3230	—	—	—	—	—	—	—	—	—	—	—	—
3700	1005	3.63	3383	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 860 to 1080 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 32 for General Fan Performance Notes.

Table 22 — Fan Performance 48TF,TM012 — Vertical Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	**555**	**0.72**	**630**	**629**	**0.87**	**765**	696	1.03	904	757	1.19	1048	814	1.36	1198
3100	**568**	**0.78**	**686**	**641**	**0.94**	**825**	706	1.10	968	766	1.27	1115	823	1.45	1269
3200	**582**	**0.85**	**745**	**652**	**1.01**	**888**	717	1.18	1035	776	1.35	1186	832	1.53	1343
3300	**595**	**0.92**	**808**	**664**	**1.09**	**955**	728	1.26	1106	786	1.44	1261	841	1.62	1421
3400	**609**	**1.00**	**874**	**677**	**1.17**	**1026**	739	1.35	1181	797	1.53	1340	851	1.71	1503
3500	**623**	**1.08**	**945**	689	1.25	1100	750	1.43	1259	807	1.62	1422	860	1.81	1589
3600	**636**	**1.16**	**1019**	702	1.34	1179	762	1.53	1341	817	1.72	1508	870	1.91	1679
3700	**650**	**1.25**	**1097**	714	1.44	1261	773	1.63	1428	828	1.82	1598	880	2.02	1772
3800	**664**	**1.34**	**1179**	727	1.54	1347	785	1.73	1518	839	1.93	1693	890	2.13	1870
3900	**678**	**1.44**	**1266**	740	1.64	1438	797	1.84	1613	850	2.04	1791	901	2.25	1973
4000	693	1.55	1356	753	1.75	1533	809	1.95	1712	861	2.16	1894	911	2.37	2080
4100	707	1.65	1451	766	1.86	1632	821	2.07	1816	873	2.28	2002	—	—	—
4200	721	1.77	1551	779	1.98	1736	833	2.19	1924	—	—	—	—	—	—
4300	735	1.89	1656	792	2.10	1845	846	2.32	2037	—	—	—	—	—	—
4400	750	2.01	1764	806	2.23	1958	—	—	—	—	—	—	—	—	—
4500	764	2.14	1879	819	2.37	2077	—	—	—	—	—	—	—	—	—
4600	779	2.28	1998	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	867	1.54	1353	918	1.72	1513	**966**	**1.91**	**1680**	**1012**	**2.11**	**1852**	**1056**	**2.31**	**2029**
3100	876	1.63	1427	926	1.81	1590	**973**	**2.00**	**1760**	**1019**	**2.20**	**1934**	—	—	—
3200	884	1.71	1504	934	1.90	1671	**981**	**2.10**	**1843**	**1026**	**2.30**	**2020**	—	—	—
3300	893	1.81	1586	**942**	**2.00**	**1755**	**988**	**2.20**	**1931**	**1033**	**2.40**	**2111**	—	—	—
3400	902	1.90	1671	**950**	**2.10**	**1844**	**996**	**2.30**	**2022**	—	—	—	—	—	—
3500	911	2.01	1760	**959**	**2.21**	**1937**	—	—	—	—	—	—	—	—	—
3600	920	2.11	1854	**967**	**2.32**	**2033**	—	—	—	—	—	—	—	—	—
3700	929	2.22	1951	—	—	—	—	—	—	—	—	—	—	—	—
3800	**939**	**2.34**	**2053**	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 685 to 935 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 23 — Fan Performance 48TF,TM012 — Vertical Discharge Units; Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	**592**	**0.77**	**672**	**658**	**0.93**	**817**	**719**	**1.10**	**961**	**775**	**1.26**	**1105**	**828**	**1.42**	**1249**
3100	**607**	**0.83**	**731**	**672**	**1.00**	**881**	**731**	**1.17**	**1030**	**787**	**1.34**	**1179**	839	1.51	1328
3200	**623**	**0.90**	**794**	**686**	**1.08**	**949**	**744**	**1.26**	**1103**	**798**	**1.43**	**1257**	850	1.61	1410
3300	**638**	**0.98**	**860**	**700**	**1.16**	**1020**	**757**	**1.34**	**1179**	**810**	**1.52**	**1338**	861	1.71	1496
3400	**653**	**1.06**	**931**	**714**	**1.25**	**1095**	**770**	**1.44**	**1260**	**822**	**1.62**	**1423**	872	1.81	1586
3500	**669**	**1.15**	**1005**	**728**	**1.34**	**1175**	**783**	**1.53**	**1344**	835	1.72	1512	884	1.91	1680
3600	**685**	**1.23**	**1084**	**742**	**1.43**	**1258**	**796**	**1.63**	**1432**	847	1.83	1606	895	2.03	1778
3700	**700**	**1.33**	**1167**	**757**	**1.53**	**1346**	**810**	**1.74**	**1524**	860	1.94	1703	907	2.14	1881
3800	**716**	**1.43**	**1254**	**771**	**1.64**	**1438**	**823**	**1.85**	**1621**	873	2.06	1805	919	2.26	1987
3900	**732**	**1.53**	**1345**	**786**	**1.75**	**1534**	837	1.96	1722	886	2.18	1911	932	2.39	2099
4000	**748**	**1.64**	**1441**	**801**	**1.86**	**1635**	851	2.08	1828	899	2.30	2022	944	2.52	2214
4100	**764**	**1.76**	**1542**	**816**	**1.98**	**1741**	865	2.21	1939	912	2.43	2137	957	2.66	2334
4200	**780**	**1.88**	**1648**	**831**	**2.11**	**1851**	879	2.34	2054	925	2.57	2257	969	2.80	2460
4300	**796**	**2.00**	**1758**	846	2.24	1966	894	2.48	2175	939	2.71	2382	—	—	—
4400	**812**	**2.13**	**1874**	861	2.38	2087	908	2.62	2299	952	2.86	2512	—	—	—
4500	**828**	**2.27**	**1994**	877	2.52	2212	922	2.77	2430	—	—	—	—	—	—
4600	845	2.42	2120	892	2.67	2343	—	—	—	—	—	—	—	—	—
4700	861	2.57	2251	907	2.82	2479	—	—	—	—	—	—	—	—	—
4800	877	2.72	2388	—	—	—	—	—	—	—	—	—	—	—	—
4900	894	2.88	2531	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	878	1.59	1391	925	1.75	1534	970	1.91	1676	1014	2.07	1817	1055	2.23	1958
3100	888	1.68	1475	935	1.85	1623	979	2.02	1769	1022	2.18	1916	1063	2.35	2062
3200	898	1.78	1563	944	1.95	1715	988	2.13	1867	1031	2.30	2018	1072	2.47	2169
3300	909	1.88	1654	954	2.06	1811	998	2.24	1968	1040	2.42	2124	1080	2.60	2280
3400	919	1.99	1749	964	2.18	1911	1007	2.36	2073	1049	2.55	2234	**1089**	**2.73**	**2395**
3500	930	2.11	1848	975	2.30	2015	1017	2.49	2182	1058	2.68	2348	**1098**	**2.86**	**2514**
3600	941	2.22	1951	985	2.42	2123	1027	2.61	2295	1068	2.81	2466	—	—	—
3700	952	2.35	2058	996	2.55	2236	1038	2.75	2412	—	—	—	—	—	—
3800	964	2.47	2170	1007	2.68	2352	1048	2.89	2534	—	—	—	—	—	—
3900	976	2.60	2286	1018	2.82	2473	—	—	—	—	—	—	—	—	—
4000	987	2.74	2407	—	—	—	—	—	—	—	—	—	—	—	—
4100	999	2.88	2532	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 835 to 1085 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.90.
3. See page 32 for General Fan Performance Notes.

Table 24 — Fan Performance 48TF,TM012 — Vertical Discharge Units; High-Static Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	**592**	**0.77**	**672**	**658**	**0.93**	**817**	**719**	**1.10**	**961**	**775**	**1.26**	**1105**	**828**	**1.42**	**1249**
3100	**607**	**0.83**	**731**	**672**	**1.00**	**881**	**731**	**1.17**	**1030**	**787**	**1.34**	**1179**	839	1.51	1328
3200	**623**	**0.90**	**794**	**686**	**1.08**	**949**	**744**	**1.26**	**1103**	**798**	**1.43**	**1257**	850	1.61	1410
3300	**638**	**0.98**	**860**	**700**	**1.16**	**1020**	**757**	**1.34**	**1179**	**810**	**1.52**	**1338**	861	1.71	1496
3400	**653**	**1.06**	**931**	**714**	**1.25**	**1095**	**770**	**1.44**	**1260**	**822**	**1.62**	**1423**	872	1.81	1586
3500	**669**	**1.15**	**1005**	**728**	**1.34**	**1175**	**783**	**1.53**	**1344**	835	1.72	1512	884	1.91	1680
3600	**685**	**1.23**	**1084**	**742**	**1.43**	**1258**	**796**	**1.63**	**1432**	847	1.83	1606	895	2.03	1778
3700	**700**	**1.33**	**1167**	**757**	**1.53**	**1346**	**810**	**1.74**	**1524**	860	1.94	1703	907	2.14	1881
3800	**716**	**1.43**	**1254**	**771**	**1.64**	**1438**	**823**	**1.85**	**1621**	873	2.06	1805	919	2.26	1987
3900	**732**	**1.53**	**1345**	**786**	**1.75**	**1534**	837	1.96	1722	886	2.18	1911	932	2.39	2099
4000	**748**	**1.64**	**1441**	**801**	**1.86**	**1635**	851	2.08	1828	899	2.30	2022	944	2.52	2214
4100	**764**	**1.76**	**1542**	**816**	**1.98**	**1741**	865	2.21	1939	912	2.43	2137	957	2.66	2334
4200	**780**	**1.88**	**1648**	831	2.11	1851	879	2.34	2054	925	2.57	2257	969	2.80	2460
4300	**796**	**2.00**	**1758**	846	2.24	1966	894	2.48	2175	939	2.71	2382	982	2.95	2589
4400	**812**	**2.13**	**1874**	861	2.38	2087	908	2.62	2299	952	2.86	2512	995	3.10	2725
4500	**828**	**2.27**	**1994**	877	2.52	2212	922	2.77	2430	966	3.02	2648	1008	3.26	2865
4600	845	2.42	2120	892	2.67	2343	937	2.92	2566	980	3.18	2788	1022	3.43	3010
4700	861	2.57	2251	907	2.82	2479	952	3.08	2706	994	3.34	2934	1035	3.60	3161
4800	877	2.72	2388	923	2.99	2621	966	3.25	2853	1008	3.52	3086	1049	3.78	3317
4900	894	2.88	2531	938	3.15	2768	981	3.42	3005	1022	3.69	3242	1062	3.96	3479
5000	910	3.05	2679	954	3.33	2921	996	3.60	3163	1037	3.88	3405	1076	4.15	3647

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	878	1.59	1391	925	1.75	1534	970	1.91	1676	1014	2.07	1817	1055	2.23	1958
3100	888	1.68	1475	935	1.85	1623	979	2.02	1769	1022	2.18	1916	1063	2.35	2062
3200	898	1.78	1563	944	1.95	1715	988	2.13	1867	1031	2.30	2018	1072	2.47	2169
3300	909	1.88	1654	954	2.06	1811	998	2.24	1968	1040	2.42	2124	1080	2.60	2280
3400	919	1.99	1749	964	2.18	1911	1007	2.36	2073	1049	2.55	2234	1089	2.73	2395
3500	930	2.11	1848	975	2.30	2015	1017	2.49	2182	1058	2.68	2348	1098	2.86	2514
3600	941	2.22	1951	985	2.42	2123	1027	2.61	2295	1068	2.81	2466	1107	3.00	2637
3700	952	2.35	2058	996	2.55	2236	1038	2.75	2412	1078	2.95	2588	1117	3.15	2764
3800	964	2.47	2170	1007	2.68	2352	1048	2.89	2534	1088	3.09	2715	1126	3.30	2895
3900	976	2.60	2286	1018	2.82	2473	1059	3.03	2660	1098	3.24	2846	**1136**	**3.45**	**3031**
4000	987	2.74	2407	1029	2.96	2598	1069	3.18	2790	1108	3.40	2981	**1146**	**3.61**	**3171**
4100	999	2.88	2532	1041	3.11	2729	1080	3.33	2925	1119	3.56	3121	**1156**	**3.78**	**3316**
4200	1012	3.03	2662	1052	3.26	2863	1092	3.49	3065	1130	3.72	3266	**1167**	**3.95**	**3466**
4300	1024	3.19	2796	1064	3.42	3003	1103	3.66	3210	**1141**	**3.89**	**3415**	**1177**	**4.13**	**3621**
4400	1036	3.35	2937	1076	3.59	3148	1114	3.83	3359	**1152**	**4.07**	**3570**	**1188**	**4.31**	**3781**
4500	1049	3.51	3082	1088	3.76	3298	1126	4.00	3514	**1163**	**4.25**	**3730**	**1199**	**4.50**	**3945**
4600	1062	3.68	3232	1100	3.94	3454	**1138**	**4.19**	**3675**	**1174**	**4.44**	**3895**	**1210**	**4.69**	**4116**
4700	1075	3.86	3387	1113	4.12	3614	**1150**	**4.38**	**3840**	**1186**	**4.63**	**4065**	**1221**	**4.89**	**4291**
4800	1088	4.04	3549	1125	4.31	3780	**1162**	**4.57**	**4011**	**1198**	**4.83**	**4241**	—	—	—
4900	1101	4.23	3716	**1138**	**4.50**	**3951**	**1174**	**4.77**	**4188**	—	—	—	—	—	—
5000	1114	4.43	3888	**1151**	**4.70**	**4129**	**1187**	**4.98**	**4370**	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 830 to 1130 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 5.25.
3. See page 32 for General Fan Performance Notes.

Table 25 — Fan Performance 48TF,TM014 — Vertical Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3700	**728**	**1.36**	**1266**	**789**	**1.58**	**1473**	**848**	**1.81**	**1686**	904	2.04	1906	957	2.29	2132
3800	**744**	**1.46**	**1361**	**804**	**1.69**	**1572**	861	1.92	1790	916	2.16	2015	969	2.41	2246
3900	**760**	**1.57**	**1460**	**819**	**1.80**	**1676**	875	2.04	1899	929	2.28	2128	981	2.53	2364
4000	**777**	**1.68**	**1563**	**834**	**1.91**	**1785**	889	2.16	2012	942	2.41	2247	993	2.67	2487
4100	**793**	**1.79**	**1672**	**850**	**2.04**	**1899**	904	2.29	2132	956	2.54	2371	1006	2.80	2615
4200	**810**	**1.92**	**1786**	865	2.16	2018	918	2.42	2255	969	2.68	2499	1018	2.95	2748
4300	**826**	**2.04**	**1906**	880	2.30	2142	932	2.56	2385	983	2.82	2633	1031	3.10	2888
4400	**843**	**2.18**	**2031**	896	2.44	2272	947	2.70	2520	996	2.97	2773	1044	3.25	3032
4500	860	2.32	2161	912	2.58	2408	962	2.85	2660	1010	3.13	2918	1057	3.41	3182
4600	876	2.46	2297	927	2.73	2549	977	3.01	2807	1024	3.29	3070	1070	3.58	3338
4700	893	2.62	2439	943	2.89	2696	992	3.17	2958	1038	3.46	3226	—	—	—
4800	910	2.77	2587	959	3.06	2849	1007	3.34	3116	1053	3.63	3390	—	—	—
4900	927	2.94	2741	975	3.23	3008	1022	3.52	3280	—	—	—	—	—	—
5000	944	3.11	2901	991	3.40	3173	1037	3.70	3451	—	—	—	—	—	—
5100	961	3.29	3068	1007	3.59	3345	—	—	—	—	—	—	—	—	—
5200	978	3.48	3241	—	—	—	—	—	—	—	—	—	—	—	—
5300	995	3.67	3420	—	—	—	—	—	—	—	—	—	—	—	—
5400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3700	1008	2.54	2364	1058	2.79	2602	**1106**	**3.05**	**2846**	**1152**	**3.32**	**3094**	**1198**	**3.59**	**3348**
3800	1019	2.66	2482	1068	2.92	2725	**1116**	**3.19**	**2972**	**1162**	**3.46**	**3226**	—	—	—
3900	1031	2.79	2605	1079	3.06	2852	**1126**	**3.33**	**3104**	**1171**	**3.61**	**3362**	—	—	—
4000	1042	2.93	2733	**1090**	**3.20**	**2984**	**1136**	**3.48**	**3241**	—	—	—	—	—	—
4100	1054	3.07	2866	**1101**	**3.35**	**3122**	**1146**	**3.63**	**3383**	—	—	—	—	—	—
4200	1066	3.22	3004	**1112**	**3.50**	**3264**	—	—	—	—	—	—	—	—	—
4300	1078	3.38	3148	**1123**	**3.66**	**3413**	—	—	—	—	—	—	—	—	—
4400	**1090**	**3.54**	**3297**	—	—	—	—	—	—	—	—	—	—	—	—
4500	**1103**	**3.70**	**3451**	—	—	—	—	—	—	—	—	—	—	—	—
4600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 860 to 1080 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 32 for General Fan Performance Notes.

Table 26 — Fan Performance 48TF,TM014 — Vertical Discharge Units; Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3700	**728**	**1.36**	**1266**	**789**	**1.58**	**1473**	848	1.81	1686	904	2.04	1906	957	2.29	2132
3800	**744**	**1.46**	**1361**	**804**	**1.69**	**1572**	861	1.92	1790	916	2.16	2015	969	2.41	2246
3900	**760**	**1.57**	**1460**	**819**	**1.80**	**1676**	875	2.04	1899	929	2.28	2128	981	2.53	2364
4000	**777**	**1.68**	**1563**	834	1.91	1785	889	2.16	2012	942	2.41	2247	993	2.67	2487
4100	**793**	**1.79**	**1672**	850	2.04	1899	904	2.29	2132	956	2.54	2371	1006	2.80	2615
4200	**810**	**1.92**	**1786**	865	2.16	2018	918	2.42	2255	969	2.68	2499	1018	2.95	2748
4300	**826**	**2.04**	**1906**	880	2.30	2142	932	2.56	2385	983	2.82	2633	1031	3.10	2888
4400	843	2.18	2031	896	2.44	2272	947	2.70	2520	996	2.97	2773	1044	3.25	3032
4500	860	2.32	2161	912	2.58	2408	962	2.85	2660	1010	3.13	2918	1057	3.41	3182
4600	876	2.46	2297	927	2.73	2549	977	3.01	2807	1024	3.29	3070	1070	3.58	3338
4700	893	2.62	2439	943	2.89	2696	992	3.17	2958	1038	3.46	3226	1084	3.75	3500
4800	910	2.77	2587	959	3.06	2849	1007	3.34	3116	1053	3.63	3390	1098	3.93	3668
4900	927	2.94	2741	975	3.23	3008	1022	3.52	3280	1067	3.82	3558	1111	4.12	3841
5000	944	3.11	2901	991	3.40	3173	1037	3.70	3451	1082	4.00	3733	1125	4.31	4021
5100	961	3.29	3068	1007	3.59	3345	1053	3.89	3627	1096	4.20	3915	**1139**	**4.51**	**4208**
5200	978	3.48	3241	1024	3.78	3523	1068	4.09	3811	1111	4.40	4103	**1153**	**4.72**	**4400**
5300	995	3.67	3420	1040	3.98	3707	1084	4.29	4000	1126	4.61	4298	**1168**	**4.93**	**4600**
5400	1012	3.87	3606	1056	4.18	3899	1099	4.50	4196	**1141**	**4.82**	**4499**	**1182**	**5.15**	**4806**
5500	1029	4.07	3799	1073	4.39	4097	1115	4.72	4400	**1156**	**5.05**	**4707**	—	—	—
5600	1046	4.29	3999	1089	4.61	4302	**1131**	**4.94**	**4610**	—	—	—	—	—	—
5700	1063	4.51	4207	1105	4.84	4515	**1146**	**5.18**	**4827**	—	—	—	—	—	—
5800	1080	4.74	4420	1122	5.08	4734	—	—	—	—	—	—	—	—	—
5900	1098	4.98	4642	—	—	—	—	—	—	—	—	—	—	—	—
6000	1115	5.22	4872	—	—	—	—	—	—	—	—	—	—	—	—
6100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3700	1008	2.54	2364	1058	2.79	2602	1106	3.05	2846	**1152**	**3.32**	**3094**	**1198**	**3.59**	**3348**
3800	1019	2.66	2482	1068	2.92	2725	1116	3.19	2972	**1162**	**3.46**	**3226**	**1206**	**3.74**	**3484**
3900	1031	2.79	2605	1079	3.06	2852	1126	3.33	3104	**1171**	**3.61**	**3362**	**1215**	**3.89**	**3624**
4000	1042	2.93	2733	1090	3.20	2984	**1136**	**3.48**	**3241**	**1180**	**3.76**	**3503**	**1224**	**4.04**	**3770**
4100	1054	3.07	2866	1101	3.35	3122	**1146**	**3.63**	**3383**	**1190**	**3.91**	**3649**	**1233**	**4.20**	**3921**
4200	1066	3.22	3004	1112	3.50	3264	**1157**	**3.79**	**3530**	**1200**	**4.08**	**3801**	**1243**	**4.37**	**4077**
4300	1078	3.38	3148	1123	3.66	3413	**1167**	**3.95**	**3683**	**1210**	**4.24**	**3958**	**1252**	**4.54**	**4238**
4400	1090	3.54	3297	**1135**	**3.82**	**3566**	**1179**	**4.12**	**3841**	**1221**	**4.42**	**4121**	**1262**	**4.72**	**4405**
4500	1103	3.70	3451	**1147**	**4.00**	**3726**	**1190**	**4.29**	**4005**	**1232**	**4.60**	**4289**	**1273**	**4.91**	**4578**
4600	1115	3.87	3612	**1159**	**4.17**	**3891**	**1201**	**4.48**	**4175**	**1243**	**4.79**	**4464**	**1283**	**5.10**	**4757**
4700	1128	4.05	3778	**1171**	**4.36**	**4062**	**1213**	**4.67**	**4350**	**1254**	**4.98**	**4644**	—	—	—
4800	**1141**	**4.24**	**3951**	**1183**	**4.55**	**4239**	**1225**	**4.86**	**4532**	**1265**	**5.18**	**4830**	—	—	—
4900	**1154**	**4.43**	**4130**	**1196**	**4.74**	**4422**	**1237**	**5.06**	**4720**	—	—	—	—	—	—
5000	**1167**	**4.63**	**4314**	**1209**	**4.95**	**4611**	—	—	—	—	—	—	—	—	—
5100	**1181**	**4.83**	**4505**	**1221**	**5.16**	**4808**	—	—	—	—	—	—	—	—	—
5200	**1194**	**5.04**	**4703**	—	—	—	—	—	—	—	—	—	—	—	—
5300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 830 to 1130 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 5.25.
3. See page 32 for General Fan Performance Notes.

Table 27 — Fan Performance 48TF008 — Horizontal Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**505**	**0.57**	**527**	**586**	**0.74**	**687**	658	0.92	859	723	1.12	1044	783	1.33	1242
2300	**513**	**0.60**	**556**	592	0.77	718	663	0.96	893	728	1.16	1080	787	1.37	1280
2400	**528**	**0.66**	**617**	605	0.84	785	675	1.03	965	738	1.24	1156	797	1.46	1360
2500	**543**	**0.73**	**683**	618	0.92	857	686	1.12	1041	749	1.33	1238	806	1.55	1445
2550	**550**	**0.77**	**718**	625	0.96	894	692	1.16	1082	754	1.37	1280	811	1.60	1490
2600	**558**	**0.81**	**754**	632	1.00	933	698	1.20	1123	760	1.42	1324	816	1.65	1536
2700	**574**	**0.89**	**830**	646	1.09	1015	711	1.30	1210	771	1.52	1416	827	1.75	1633
2800	**589**	**0.98**	**912**	660	1.18	1103	723	1.40	1303	782	1.62	1514	838	1.86	1735
2900	605	1.07	999	674	1.28	1196	736	1.50	1401	794	1.73	1617	**848**	**1.98**	**1843**
3000	621	1.17	1092	688	1.39	1295	749	1.61	1506	806	1.85	1727	**860**	**2.10**	**1957**
3100	637	1.28	1191	702	1.50	1400	763	1.73	1617	819	1.98	1842	**871**	**2.23**	**2077**
3200	653	1.39	1297	717	1.62	1511	776	1.86	1733	831	2.11	1964	**883**	**2.36**	**2204**
3300	670	1.51	1408	732	1.75	1629	790	1.99	1857	**844**	**2.24**	**2093**	—	—	—
3400	686	1.64	1526	747	1.88	1753	804	2.13	1987	**857**	**2.39**	**2228**	—	—	—
3500	703	1.77	1652	762	2.02	1884	818	2.28	2123	—	—	—	—	—	—
3600	719	1.91	1783	777	2.17	2022	—	—	—	—	—	—	—	—	—
3700	736	2.06	1923	793	2.32	2167	—	—	—	—	—	—	—	—	—
3750	744	2.14	1995	801	2.40	2243	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	838	1.56	1451	**891**	**1.79**	**1673**	**941**	**2.04**	**1906**	**988**	**2.31**	**2150**	—	—	—
2300	**843**	**1.60**	**1492**	**895**	**1.84**	**1715**	**944**	**2.09**	**1949**	**991**	**2.35**	**2195**	—	—	—
2400	**851**	**1.69**	**1575**	**903**	**1.93**	**1801**	**952**	**2.19**	**2039**	—	—	—	—	—	—
2500	**860**	**1.78**	**1664**	**911**	**2.03**	**1894**	**960**	**2.29**	**2135**	—	—	—	—	—	—
2550	**865**	**1.83**	**1711**	**916**	**2.08**	**1943**	**964**	**2.34**	**2185**	—	—	—	—	—	—
2600	**870**	**1.89**	**1759**	**920**	**2.14**	**1993**	**968**	**2.40**	**2237**	—	—	—	—	—	—
2700	**879**	**1.99**	**1859**	**929**	**2.25**	**2097**	—	—	—	—	—	—	—	—	—
2800	**889**	**2.11**	**1966**	**939**	**2.37**	**2207**	—	—	—	—	—	—	—	—	—
2900	**900**	**2.23**	**2078**	—	—	—	—	—	—	—	—	—	—	—	—
3000	**910**	**2.36**	**2197**	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 590 to 840 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 28 — Fan Performance 48TF008 — Horizontal Discharge Units; Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**505**	**0.57**	**527**	**586**	**0.74**	**687**	**658**	**0.92**	**859**	723	1.12	1044	783	1.33	1242
2300	**513**	**0.60**	**556**	**592**	**0.77**	**718**	**663**	**0.96**	**893**	728	1.16	1080	787	1.37	1280
2400	**528**	**0.66**	**617**	**605**	**0.84**	**785**	**675**	**1.03**	**965**	738	1.24	1156	797	1.46	1360
2500	**543**	**0.73**	**683**	**618**	**0.92**	**857**	686	1.12	1041	749	1.33	1238	806	1.55	1445
2550	**550**	**0.77**	**718**	**625**	**0.96**	**894**	692	1.16	1082	754	1.37	1280	811	1.60	1490
2600	**558**	**0.81**	**754**	**632**	**1.00**	**933**	698	1.20	1123	760	1.42	1324	816	1.65	1536
2700	**574**	**0.89**	**830**	**646**	**1.09**	**1015**	711	1.30	1210	771	1.52	1416	827	1.75	1633
2800	**589**	**0.98**	**912**	**660**	**1.18**	**1103**	723	1.40	1303	782	1.62	1514	838	1.86	1735
2900	**605**	**1.07**	**999**	**674**	**1.28**	**1196**	736	1.50	1401	794	1.73	1617	848	1.98	1843
3000	**621**	**1.17**	**1092**	688	1.39	1295	749	1.61	1506	806	1.85	1727	860	2.10	1957
3100	**637**	**1.28**	**1191**	702	1.50	1400	763	1.73	1617	819	1.98	1842	871	2.23	2077
3200	**653**	**1.39**	**1297**	717	1.62	1511	776	1.86	1733	831	2.11	1964	883	2.36	2204
3300	**670**	**1.51**	**1408**	732	1.75	1629	790	1.99	1857	844	2.24	2093	—	—	—
3400	686	1.64	1526	747	1.88	1753	804	2.13	1987	857	2.39	2228	—	—	—
3500	703	1.77	1652	762	2.02	1884	818	2.28	2123	—	—	—	—	—	—
3600	719	1.91	1783	777	2.17	2022	—	—	—	—	—	—	—	—	—
3700	736	2.06	1923	793	2.32	2167	—	—	—	—	—	—	—	—	—
3750	744	2.14	1995	801	2.40	2243	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	838	1.56	1451	891	1.79	1673	**941**	**2.04**	**1906**	**988**	**2.31**	**2150**	—	—	—
2300	843	1.60	1492	895	1.84	1715	**944**	**2.09**	**1949**	**991**	**2.35**	**2195**	—	—	—
2400	851	1.69	1575	903	1.93	1801	**952**	**2.19**	**2039**	—	—	—	—	—	—
2500	860	1.78	1664	911	2.03	1894	**960**	**2.29**	**2135**	—	—	—	—	—	—
2550	865	1.83	1711	916	2.08	1943	**964**	**2.34**	**2185**	—	—	—	—	—	—
2600	870	1.89	1759	920	2.14	1993	**968**	**2.40**	**2237**	—	—	—	—	—	—
2700	879	1.99	1859	929	2.25	2097	—	—	—	—	—	—	—	—	—
2800	889	2.11	1966	**939**	**2.37**	**2207**	—	—	—	—	—	—	—	—	—
2900	900	2.23	2078	—	—	—	—	—	—	—	—	—	—	—	—
3000	910	2.36	2197	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 685 to 935 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 29 — Fan Performance 48TF008 — Horizontal Discharge Units; High-Static Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**505**	**0.57**	**527**	**586**	**0.74**	**687**	**658**	**0.92**	**859**	**723**	**1.12**	**1044**	**783**	**1.33**	**1242**
2300	**513**	**0.60**	**556**	**592**	**0.77**	**718**	**663**	**0.96**	**893**	**728**	**1.16**	**1080**	**787**	**1.37**	**1280**
2400	**528**	**0.66**	**617**	**605**	**0.84**	**785**	**675**	**1.03**	**965**	**738**	**1.24**	**1156**	**797**	**1.46**	**1360**
2500	**543**	**0.73**	**683**	**618**	**0.92**	**857**	**686**	**1.12**	**1041**	**749**	**1.33**	**1238**	**806**	**1.55**	**1445**
2550	**550**	**0.77**	**718**	**625**	**0.96**	**894**	**692**	**1.16**	**1082**	**754**	**1.37**	**1280**	**811**	**1.60**	**1490**
2600	**558**	**0.81**	**754**	**632**	**1.00**	**933**	**698**	**1.20**	**1123**	**760**	**1.42**	**1324**	**816**	**1.65**	**1536**
2700	**574**	**0.89**	**830**	**646**	**1.09**	**1015**	**711**	**1.30**	**1210**	**771**	**1.52**	**1416**	**827**	**1.75**	**1633**
2800	**589**	**0.98**	**912**	**660**	**1.18**	**1103**	**723**	**1.40**	**1303**	**782**	**1.62**	**1514**	**838**	**1.86**	**1735**
2900	**605**	**1.07**	**999**	**674**	**1.28**	**1196**	**736**	**1.50**	**1401**	**794**	**1.73**	**1617**	**848**	**1.98**	**1843**
3000	**621**	**1.17**	**1092**	**688**	**1.39**	**1295**	**749**	**1.61**	**1506**	**806**	**1.85**	**1727**	860	2.10	1957
3100	**637**	**1.28**	**1191**	**702**	**1.50**	**1400**	**763**	**1.73**	**1617**	**819**	**1.98**	**1842**	871	2.23	2077
3200	**653**	**1.39**	**1297**	**717**	**1.62**	**1511**	**776**	**1.86**	**1733**	**831**	**2.11**	**1964**	883	2.36	2204
3300	**670**	**1.51**	**1408**	**732**	**1.75**	**1629**	**790**	**1.99**	**1857**	**844**	**2.24**	**2093**	895	2.51	2338
3400	**686**	**1.64**	**1526**	**747**	**1.88**	**1753**	**804**	**2.13**	**1987**	**857**	**2.39**	**2228**	907	2.66	2479
3500	**703**	**1.77**	**1652**	**762**	**2.02**	**1884**	**818**	**2.28**	**2123**	870	2.54	2370	919	2.82	2626
3600	**719**	**1.91**	**1783**	**777**	**2.17**	**2022**	**832**	**2.43**	**2267**	883	2.70	2520	932	2.98	2780
3700	**736**	**2.06**	**1923**	**793**	**2.32**	**2167**	**846**	**2.59**	**2418**	897	2.87	2676	945	3.16	2942
3750	**744**	**2.14**	**1995**	**801**	**2.40**	**2243**	**854**	**2.68**	**2497**	904	2.96	2757	951	3.24	3026

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**838**	**1.56**	**1451**	891	1.79	1673	941	2.04	1906	988	2.31	2150	1033	2.58	2405
2300	**843**	**1.60**	**1492**	895	1.84	1715	944	2.09	1949	991	2.35	2195	1037	2.63	2451
2400	**851**	**1.69**	**1575**	903	1.93	1801	952	2.19	2039	999	2.45	2287	1043	2.73	2546
2500	860	1.78	1664	911	2.03	1894	960	2.29	2135	1006	2.56	2386	1050	2.84	2647
2550	865	1.83	1711	916	2.08	1943	964	2.34	2185	1010	2.61	2438	1054	2.90	2701
2600	870	1.89	1759	920	2.14	1993	968	2.40	2237	1014	2.67	2491	1058	2.95	2755
2700	879	1.99	1859	929	2.25	2097	977	2.51	2344	1022	2.79	2602	1066	3.08	2869
2800	889	2.11	1966	939	2.37	2207	986	2.64	2459	1031	2.92	2720	1074	3.21	2990
2900	900	2.23	2078	948	2.49	2324	995	2.77	2579	1039	3.05	2843	**1082**	**3.34**	**3117**
3000	910	2.36	2197	958	2.62	2446	1004	2.90	2705	1048	3.19	2974	**1090**	**3.49**	**3251**
3100	921	2.49	2322	968	2.76	2576	1014	3.04	2839	1057	3.34	3111	**1099**	**3.64**	**3392**
3200	932	2.63	2454	979	2.91	2711	1024	3.19	2979	1067	3.49	3254	—	—	—
3300	943	2.78	2592	990	3.06	2854	1034	3.35	3126	1076	3.65	3405	—	—	—
3400	955	2.94	2737	1000	3.22	3004	1044	3.52	3280	—	—	—	—	—	—
3500	967	3.10	2890	1012	3.39	3161	1055	3.69	3441	—	—	—	—	—	—
3600	978	3.27	3049	1023	3.57	3325	—	—	—	—	—	—	—	—	—
3700	991	3.45	3216	—	—	—	—	—	—	—	—	—	—	—	—
3750	997	3.54	3302	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 860 to 1080 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 32 for General Fan Performance Notes.

Table 30 — Fan Performance 48TM008 — Horizontal Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**505**	**0.52**	**484**	**586**	**0.73**	**681**	657	0.97	901	722	1.22	1142	782	1.50	1403
2300	**513**	**0.55**	**509**	592	0.76	708	663	1.00	931	727	1.26	1174	787	1.54	1437
2400	**527**	**0.60**	**561**	605	0.82	766	674	1.07	993	738	1.33	1241	796	1.62	1508
2500	**543**	**0.66**	**617**	618	0.89	828	686	1.14	1060	748	1.41	1312	806	1.70	1583
2550	**550**	**0.69**	**647**	625	0.92	860	692	1.17	1095	754	1.45	1349	811	1.74	1623
2600	**558**	**0.73**	**677**	632	0.96	894	698	1.21	1131	759	1.49	1388	816	1.78	1664
2700	**574**	**0.80**	**742**	645	1.03	964	710	1.29	1207	770	1.58	1469	826	1.88	1749
2800	**589**	**0.87**	**811**	659	1.11	1039	723	1.38	1287	782	1.67	1554	837	1.97	1839
2900	605	0.95	885	673	1.20	1119	736	1.47	1372	794	1.76	1644	**848**	**2.07**	**1933**
3000	621	1.03	963	688	1.29	1204	749	1.57	1463	806	1.87	1740	**859**	**2.18**	**2033**
3100	637	1.12	1046	702	1.39	1293	762	1.67	1558	818	1.97	1840	**871**	**2.29**	**2139**
3200	654	1.22	1135	717	1.49	1388	776	1.78	1658	831	2.09	1946	—	—	—
3300	670	1.32	1228	732	1.60	1488	789	1.89	1764	**843**	**2.21**	**2057**	—	—	—
3400	686	1.42	1328	747	1.71	1593	803	2.01	1876	**856**	**2.33**	**2174**	—	—	—
3500	703	1.54	1433	762	1.83	1705	817	2.14	1993	—	—	—	—	—	—
3600	720	1.66	1543	777	1.95	1822	832	2.27	2116	—	—	—	—	—	—
3700	736	1.78	1660	793	2.09	1944	—	—	—	—	—	—	—	—	—
3750	745	1.85	1721	801	2.15	2008	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	838	1.81	1683	**891**	**2.12**	**1981**	—	—	—	—	—	—	—	—	—
2300	**842**	**1.84**	**1719**	**895**	**2.17**	**2019**	—	—	—	—	—	—	—	—	—
2400	**851**	**1.92**	**1793**	**903**	**2.25**	**2097**	—	—	—	—	—	—	—	—	—
2500	**860**	**2.01**	**1873**	**911**	**2.34**	**2180**	—	—	—	—	—	—	—	—	—
2550	**865**	**2.05**	**1914**	**916**	**2.38**	**2223**	—	—	—	—	—	—	—	—	—
2600	**869**	**2.10**	**1957**	—	—	—	—	—	—	—	—	—	—	—	—
2700	**879**	**2.19**	**2046**	—	—	—	—	—	—	—	—	—	—	—	—
2800	**889**	**2.29**	**2140**	—	—	—	—	—	—	—	—	—	—	—	—
2900	**899**	**2.40**	**2239**	—	—	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 590 to 840 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 31 — Fan Performance 48TM008 — Horizontal Discharge Units; Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**505**	**0.52**	**484**	**586**	**0.73**	**681**	**657**	**0.97**	**901**	722	1.22	1142	782	1.50	1403
2300	**513**	**0.55**	**509**	**592**	**0.76**	**708**	**663**	**1.00**	**931**	727	1.26	1174	787	1.54	1437
2400	**527**	**0.60**	**561**	**605**	**0.82**	**766**	**674**	**1.07**	**993**	738	1.33	1241	796	1.62	1508
2500	**543**	**0.66**	**617**	**618**	**0.89**	**828**	686	1.14	1060	748	1.41	1312	806	1.70	1583
2550	**550**	**0.69**	**647**	**625**	**0.92**	**860**	692	1.17	1095	754	1.45	1349	811	1.74	1623
2600	**558**	**0.73**	**677**	**632**	**0.96**	**894**	698	1.21	1131	759	1.49	1388	816	1.78	1664
2700	**574**	**0.80**	**742**	**645**	**1.03**	**964**	710	1.29	1207	770	1.58	1469	826	1.88	1749
2800	**589**	**0.87**	**811**	**659**	**1.11**	**1039**	723	1.38	1287	782	1.67	1554	837	1.97	1839
2900	**605**	**0.95**	**885**	**673**	**1.20**	**1119**	736	1.47	1372	794	1.76	1644	848	2.07	1933
3000	**621**	**1.03**	**963**	688	1.29	1204	749	1.57	1463	806	1.87	1740	859	2.18	2033
3100	**637**	**1.12**	**1046**	702	1.39	1293	762	1.67	1558	818	1.97	1840	871	2.29	2139
3200	**654**	**1.22**	**1135**	717	1.49	1388	776	1.78	1658	831	2.09	1946	—	—	—
3300	**670**	**1.32**	**1228**	732	1.60	1488	789	1.89	1764	843	2.21	2057	—	—	—
3400	686	1.42	1328	747	1.71	1593	803	2.01	1876	856	2.33	2174	—	—	—
3500	703	1.54	1433	762	1.83	1705	817	2.14	1993	—	—	—	—	—	—
3600	720	1.66	1543	777	1.95	1822	832	2.27	2116	—	—	—	—	—	—
3700	736	1.78	1660	793	2.09	1944	—	—	—	—	—	—	—	—	—
3750	745	1.85	1721	801	2.15	2008	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	838	1.81	1683	891	2.12	1981	—	—	—	—	—	—	—	—	—
2300	842	1.84	1719	895	2.17	2019	—	—	—	—	—	—	—	—	—
2400	851	1.92	1793	903	2.25	2097	—	—	—	—	—	—	—	—	—
2500	860	2.01	1873	911	2.34	2180	—	—	—	—	—	—	—	—	—
2550	865	2.05	1914	916	2.38	2223	—	—	—	—	—	—	—	—	—
2600	869	2.10	1957	—	—	—	—	—	—	—	—	—	—	—	—
2700	879	2.19	2046	—	—	—	—	—	—	—	—	—	—	—	—
2800	889	2.29	2140	—	—	—	—	—	—	—	—	—	—	—	—
2900	899	2.40	2239	—	—	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 685 to 935 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 32 — Fan Performance 48TM008 — Horizontal Discharge Units; High-Static Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**505**	**0.52**	**484**	**586**	**0.73**	**681**	**657**	**0.97**	**901**	**722**	**1.22**	**1142**	**782**	**1.50**	**1403**
2300	**513**	**0.55**	**509**	**592**	**0.76**	**708**	**663**	**1.00**	**931**	**727**	**1.26**	**1174**	**787**	**1.54**	**1437**
2400	**527**	**0.60**	**561**	**605**	**0.82**	**766**	**674**	**1.07**	**993**	**738**	**1.33**	**1241**	**796**	**1.62**	**1508**
2500	**543**	**0.66**	**617**	**618**	**0.89**	**828**	**686**	**1.14**	**1060**	**748**	**1.41**	**1312**	**806**	**1.70**	**1583**
2550	**550**	**0.69**	**647**	**625**	**0.92**	**860**	**692**	**1.17**	**1095**	**754**	**1.45**	**1349**	**811**	**1.74**	**1623**
2600	**558**	**0.73**	**677**	**632**	**0.96**	**894**	**698**	**1.21**	**1131**	**759**	**1.49**	**1388**	**816**	**1.78**	**1664**
2700	**574**	**0.80**	**742**	**645**	**1.03**	**964**	**710**	**1.29**	**1207**	**770**	**1.58**	**1469**	**826**	**1.88**	**1749**
2800	**589**	**0.87**	**811**	**659**	**1.11**	**1039**	**723**	**1.38**	**1287**	**782**	**1.67**	**1554**	**837**	**1.97**	**1839**
2900	**605**	**0.95**	**885**	**673**	**1.20**	**1119**	**736**	**1.47**	**1372**	**794**	**1.76**	**1644**	**848**	**2.07**	**1933**
3000	**621**	**1.03**	**963**	**688**	**1.29**	**1204**	**749**	**1.57**	**1463**	**806**	**1.87**	**1740**	**859**	**2.18**	**2033**
3100	**637**	**1.12**	**1046**	**702**	**1.39**	**1293**	**762**	**1.67**	**1558**	**818**	**1.97**	**1840**	871	2.29	2139
3200	**654**	**1.22**	**1135**	**717**	**1.49**	**1388**	**776**	**1.78**	**1658**	**831**	**2.09**	**1946**	882	2.41	2249
3300	**670**	**1.32**	**1228**	**732**	**1.60**	**1488**	**789**	**1.89**	**1764**	**843**	**2.21**	**2057**	894	2.54	2365
3400	**686**	**1.42**	**1328**	**747**	**1.71**	**1593**	**803**	**2.01**	**1876**	**856**	**2.33**	**2174**	907	2.67	2488
3500	**703**	**1.54**	**1433**	**762**	**1.83**	**1705**	**817**	**2.14**	**1993**	870	2.46	2297	919	2.81	2616
3600	**720**	**1.66**	**1543**	**777**	**1.95**	**1822**	**832**	**2.27**	**2116**	883	2.60	2425	932	2.95	2750
3700	**736**	**1.78**	**1660**	**793**	**2.09**	**1944**	**846**	**2.41**	**2245**	896	2.75	2560	944	3.10	2889
3750	**745**	**1.85**	**1721**	**801**	**2.15**	**2008**	**853**	**2.48**	**2312**	903	2.82	2630	951	3.18	2962

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	**838**	**1.81**	**1683**	891	2.12	1981	941	2.46	2297	988	2.82	2629	1033	3.19	2976
2300	**842**	**1.84**	**1719**	895	2.17	2019	944	2.51	2336	992	2.86	2669	1037	3.24	3018
2400	**851**	**1.92**	**1793**	903	2.25	2097	952	2.59	2416	999	2.95	2752	1043	3.33	3104
2500	860	2.01	1873	911	2.34	2180	960	2.68	2502	1006	3.05	2842	1051	3.43	3196
2550	865	2.05	1914	916	2.38	2223	964	2.73	2547	1010	3.10	2888	1054	3.48	3243
2600	869	2.10	1957	920	2.43	2267	968	2.78	2593	1014	3.15	2935	1058	3.53	3292
2700	879	2.19	2046	929	2.53	2360	976	2.88	2689	1022	3.25	3035	1066	3.64	3395
2800	889	2.29	2140	938	2.64	2458	985	2.99	2791	1030	3.37	3140	—	—	—
2900	899	2.40	2239	948	2.75	2561	994	3.11	2898	1039	3.49	3250	—	—	—
3000	910	2.51	2343	958	2.86	2670	1004	3.23	3011	1048	3.61	3366	—	—	—
3100	921	2.63	2453	968	2.98	2783	1013	3.35	3128	—	—	—	—	—	—
3200	932	2.75	2569	978	3.11	2903	1023	3.49	3252	—	—	—	—	—	—
3300	943	2.88	2690	989	3.25	3029	1033	3.63	3382	—	—	—	—	—	—
3400	954	3.02	2816	1000	3.39	3159	—	—	—	—	—	—	—	—	—
3500	966	3.16	2950	1011	3.54	3297	—	—	—	—	—	—	—	—	—
3600	978	3.31	3088	1022	3.69	3442	—	—	—	—	—	—	—	—	—
3700	990	3.47	3233	—	—	—	—	—	—	—	—	—	—	—	—
3750	996	3.55	3308	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 860 to 1080 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 32 for General Fan Performance Notes.

Table 33 — Fan Performance 48TF009 — Horizontal Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	**550**	**0.77**	**718**	**625**	**0.96**	**894**	692	1.16	1082	754	1.37	1280	811	1.60	1490
2600	**558**	**0.81**	**754**	**632**	**1.00**	**933**	698	1.20	1123	760	1.42	1324	816	1.65	1536
2700	**574**	**0.89**	**830**	**646**	**1.09**	**1015**	711	1.30	1210	771	1.52	1416	827	1.75	1633
2800	**589**	**0.98**	**912**	**660**	**1.18**	**1103**	723	1.40	1303	782	1.62	1514	838	1.86	1735
2900	**605**	**1.07**	**999**	**674**	**1.28**	**1196**	736	1.50	1401	794	1.73	1617	848	1.98	1843
3000	**621**	**1.17**	**1092**	688	1.39	1295	749	1.61	1506	806	1.85	1727	860	2.10	1957
3100	**637**	**1.28**	**1191**	702	1.50	1400	763	1.73	1617	819	1.98	1842	871	2.23	2077
3200	**653**	**1.39**	**1297**	717	1.62	1511	776	1.86	1733	831	2.11	1964	883	2.36	2204
3300	**670**	**1.51**	**1408**	732	1.75	1629	790	1.99	1857	844	2.24	2093	—	—	—
3400	686	1.64	1526	747	1.88	1753	804	2.13	1987	857	2.39	2228	—	—	—
3500	703	1.77	1652	762	2.02	1884	818	2.28	2123	—	—	—	—	—	—
3600	719	1.91	1783	777	2.17	2022	—	—	—	—	—	—	—	—	—
3700	736	2.06	1923	793	2.32	2167	—	—	—	—	—	—	—	—	—
3750	744	2.14	1995	801	2.40	2243	—	—	—	—	—	—	—	—	—
3800	753	2.22	2069	—	—	—	—	—	—	—	—	—	—	—	—
3900	770	2.38	2224	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	865	1.83	1711	916	2.08	1943	**964**	**2.34**	**2185**	—	—	—	—	—	—
2600	870	1.89	1759	920	2.14	1993	**968**	**2.40**	**2237**	—	—	—	—	—	—
2700	879	1.99	1859	929	2.25	2097	—	—	—	—	—	—	—	—	—
2800	889	2.11	1966	**939**	**2.37**	**2207**	—	—	—	—	—	—	—	—	—
2900	900	2.23	2078	—	—	—	—	—	—	—	—	—	—	—	—
3000	910	2.36	2197	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 685 to 935 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 34 — Fan Performance 48TF009 — Horizontal Discharge Units; High-Static Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	**550**	**0.77**	**718**	**625**	**0.96**	**894**	**692**	**1.16**	**1082**	**754**	**1.37**	**1280**	**811**	**1.60**	**1490**
2600	**558**	**0.81**	**754**	**632**	**1.00**	**933**	**698**	**1.20**	**1123**	**760**	**1.42**	**1324**	**816**	**1.65**	**1536**
2700	**574**	**0.89**	**830**	**646**	**1.09**	**1015**	**711**	**1.30**	**1210**	**771**	**1.52**	**1416**	**827**	**1.75**	**1633**
2800	**589**	**0.98**	**912**	**660**	**1.18**	**1103**	**723**	**1.40**	**1303**	**782**	**1.62**	**1514**	**838**	**1.86**	**1735**
2900	**605**	**1.07**	**999**	**674**	**1.28**	**1196**	**736**	**1.50**	**1401**	**794**	**1.73**	**1617**	**848**	**1.98**	**1843**
3000	**621**	**1.17**	**1092**	**688**	**1.39**	**1295**	**749**	**1.61**	**1506**	**806**	**1.85**	**1727**	860	2.10	1957
3100	**637**	**1.28**	**1191**	**702**	**1.50**	**1400**	**763**	**1.73**	**1617**	**819**	**1.98**	**1842**	871	2.23	2077
3200	**653**	**1.39**	**1297**	**717**	**1.62**	**1511**	**776**	**1.86**	**1733**	**831**	**2.11**	**1964**	883	2.36	2204
3300	**670**	**1.51**	**1408**	**732**	**1.75**	**1629**	**790**	**1.99**	**1857**	**844**	**2.24**	**2093**	895	2.51	2338
3400	**686**	**1.64**	**1526**	**747**	**1.88**	**1753**	**804**	**2.13**	**1987**	**857**	**2.39**	**2228**	907	2.66	2479
3500	**703**	**1.77**	**1652**	**762**	**2.02**	**1884**	**818**	**2.28**	**2123**	870	2.54	2370	919	2.82	2626
3600	**719**	**1.91**	**1783**	**777**	**2.17**	**2022**	**832**	**2.43**	**2267**	883	2.70	2520	932	2.98	2780
3700	**736**	**2.06**	**1923**	**793**	**2.32**	**2167**	**846**	**2.59**	**2418**	897	2.87	2676	945	3.16	2942
3750	**744**	**2.14**	**1995**	**801**	**2.40**	**2243**	**854**	**2.68**	**2497**	904	2.96	2757	951	3.24	3026
3800	**753**	**2.22**	**2069**	**808**	**2.49**	**2319**	861	2.76	2576	910	3.05	2841	958	3.34	3112
3900	**770**	**2.38**	**2224**	**824**	**2.66**	**2480**	875	2.94	2743	924	3.23	3012	971	3.53	3289
4000	**786**	**2.56**	**2385**	**840**	**2.84**	**2648**	890	3.13	2916	938	3.42	3192	—	—	—
4100	**803**	**2.74**	**2556**	**856**	**3.03**	**2824**	905	3.32	3099	952	3.62	3380	—	—	—
4200	**820**	**2.93**	**2733**	872	3.23	3009	920	3.53	3289	—	—	—	—	—	—
4250	**829**	**3.03**	**2826**	880	3.33	3104	928	3.63	3387	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	865	1.83	1711	916	2.08	1943	964	2.34	2185	1010	2.61	2438	1054	2.90	2701
2600	870	1.89	1759	920	2.14	1993	968	2.40	2237	1014	2.67	2491	1058	2.95	2755
2700	879	1.99	1859	929	2.25	2097	977	2.51	2344	1022	2.79	2602	1066	3.08	2869
2800	889	2.11	1966	939	2.37	2207	986	2.64	2459	1031	2.92	2720	1074	3.21	2990
2900	900	2.23	2078	948	2.49	2324	995	2.77	2579	1039	3.05	2843	**1082**	**3.34**	**3117**
3000	910	2.36	2197	958	2.62	2446	1004	2.90	2705	1048	3.19	2974	**1090**	**3.49**	**3251**
3100	921	2.49	2322	968	2.76	2576	1014	3.04	2839	1057	3.34	3111	**1099**	**3.64**	**3392**
3200	932	2.63	2454	979	2.91	2711	1024	3.19	2979	1067	3.49	3254	—	—	—
3300	943	2.78	2592	990	3.06	2854	1034	3.35	3126	1076	3.65	3405	—	—	—
3400	955	2.94	2737	1000	3.22	3004	1044	3.52	3280	—	—	—	—	—	—
3500	967	3.10	2890	1012	3.39	3161	1055	3.69	3441	—	—	—	—	—	—
3600	978	3.27	3049	1023	3.57	3325	—	—	—	—	—	—	—	—	—
3700	991	3.45	3216	—	—	—	—	—	—	—	—	—	—	—	—
3750	997	3.54	3302	—	—	—	—	—	—	—	—	—	—	—	—
3800	1003	3.64	3390	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 860 to 1080 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 32 for General Fan Performance Notes.

Table 35 — Fan Performance 48TM009 — Horizontal Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	**550**	**0.69**	**647**	**625**	**0.92**	**860**	692	1.17	1095	754	1.45	1349	811	1.74	1623
2600	**558**	**0.73**	**677**	**632**	**0.96**	**894**	698	1.21	1131	759	1.49	1388	816	1.78	1664
2700	**574**	**0.80**	**742**	**645**	**1.03**	**964**	710	1.29	1207	770	1.58	1469	826	1.88	1749
2800	**589**	**0.87**	**811**	**659**	**1.11**	**1039**	723	1.38	1287	782	1.67	1554	837	1.97	1839
2900	**605**	**0.95**	**885**	**673**	**1.20**	**1119**	736	1.47	1372	794	1.76	1644	848	2.07	1933
3000	**621**	**1.03**	**963**	688	1.29	1204	749	1.57	1463	806	1.87	1740	859	2.18	2033
3100	**637**	**1.12**	**1046**	702	1.39	1293	762	1.67	1558	818	1.97	1840	871	2.29	2139
3200	**654**	**1.22**	**1135**	717	1.49	1388	776	1.78	1658	831	2.09	1946	—	—	—
3300	**670**	**1.32**	**1228**	732	1.60	1488	789	1.89	1764	843	2.21	2057	—	—	—
3400	686	1.42	1328	747	1.71	1593	803	2.01	1876	856	2.33	2174	—	—	—
3500	703	1.54	1433	762	1.83	1705	817	2.14	1993	—	—	—	—	—	—
3600	720	1.66	1543	777	1.95	1822	832	2.27	2116	—	—	—	—	—	—
3700	736	1.78	1660	793	2.09	1944	—	—	—	—	—	—	—	—	—
3750	745	1.85	1721	801	2.15	2008	—	—	—	—	—	—	—	—	—
3800	753	1.91	1783	808	2.22	2074	—	—	—	—	—	—	—	—	—
3900	770	2.05	1912	824	2.37	2209	—	—	—	—	—	—	—	—	—
4000	787	2.20	2047	—	—	—	—	—	—	—	—	—	—	—	—
4100	804	2.35	2189	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	865	2.05	1914	916	2.38	2223	—	—	—	—	—	—	—	—	—
2600	869	2.10	1957	—	—	—	—	—	—	—	—	—	—	—	—
2700	879	2.19	2046	—	—	—	—	—	—	—	—	—	—	—	—
2800	889	2.29	2140	—	—	—	—	—	—	—	—	—	—	—	—
2900	899	2.40	2239	—	—	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 685 to 935 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 36 — Fan Performance 48TM009 — Horizontal Discharge Units; High-Static Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	**550**	**0.69**	**647**	**625**	**0.92**	**860**	**692**	**1.17**	**1095**	**754**	**1.45**	**1349**	**811**	**1.74**	**1623**
2600	**558**	**0.73**	**677**	**632**	**0.96**	**894**	**698**	**1.21**	**1131**	**759**	**1.49**	**1388**	**816**	**1.78**	**1664**
2700	**574**	**0.80**	**742**	**645**	**1.03**	**964**	**710**	**1.29**	**1207**	**770**	**1.58**	**1469**	**826**	**1.88**	**1749**
2800	**589**	**0.87**	**811**	**659**	**1.11**	**1039**	**723**	**1.38**	**1287**	**782**	**1.67**	**1554**	**837**	**1.97**	**1839**
2900	**605**	**0.95**	**885**	**673**	**1.20**	**1119**	**736**	**1.47**	**1372**	**794**	**1.76**	**1644**	**848**	**2.07**	**1933**
3000	**621**	**1.03**	**963**	**688**	**1.29**	**1204**	**749**	**1.57**	**1463**	**806**	**1.87**	**1740**	**859**	**2.18**	**2033**
3100	**637**	**1.12**	**1046**	**702**	**1.39**	**1293**	**762**	**1.67**	**1558**	**818**	**1.97**	**1840**	871	2.29	2139
3200	**654**	**1.22**	**1135**	**717**	**1.49**	**1388**	**776**	**1.78**	**1658**	**831**	**2.09**	**1946**	882	2.41	2249
3300	**670**	**1.32**	**1228**	**732**	**1.60**	**1488**	**789**	**1.89**	**1764**	**843**	**2.21**	**2057**	894	2.54	2365
3400	**686**	**1.42**	**1328**	**747**	**1.71**	**1593**	**803**	**2.01**	**1876**	**856**	**2.33**	**2174**	907	2.67	2488
3500	**703**	**1.54**	**1433**	**762**	**1.83**	**1705**	**817**	**2.14**	**1993**	870	2.46	2297	919	2.81	2616
3600	**720**	**1.66**	**1543**	**777**	**1.95**	**1822**	**832**	**2.27**	**2116**	883	2.60	2425	932	2.95	2750
3700	**736**	**1.78**	**1660**	**793**	**2.09**	**1944**	**846**	**2.41**	**2245**	896	2.75	2560	944	3.10	2889
3750	**745**	**1.85**	**1721**	**801**	**2.15**	**2008**	**853**	**2.48**	**2312**	903	2.82	2630	951	3.18	2962
3800	**753**	**1.91**	**1783**	**808**	**2.22**	**2074**	861	2.55	2380	910	2.90	2701	957	3.26	3036
3900	**770**	**2.05**	**1912**	**824**	**2.37**	**2209**	875	2.70	2522	924	3.05	2848	970	3.42	3189
4000	**787**	**2.20**	**2047**	**840**	**2.52**	**2351**	890	2.86	2669	938	3.22	3002	984	3.59	3348
4100	**804**	**2.35**	**2189**	**856**	**2.68**	**2499**	905	3.03	2824	952	3.39	3162	—	—	—
4200	**821**	**2.51**	**2338**	872	2.85	2655	920	3.20	2986	967	3.57	3331	—	—	—
4250	**829**	**2.59**	**2415**	880	2.93	2735	928	3.29	3069	974	3.66	3417	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2550	865	2.05	1914	916	2.38	2223	964	2.73	2547	1010	3.10	2888	1054	3.48	3243
2600	869	2.10	1957	920	2.43	2267	968	2.78	2593	1014	3.15	2935	1058	3.53	3292
2700	879	2.19	2046	929	2.53	2360	976	2.88	2689	1022	3.25	3035	1066	3.64	3395
2800	889	2.29	2140	938	2.64	2458	985	2.99	2791	1030	3.37	3140	—	—	—
2900	899	2.40	2239	948	2.75	2561	994	3.11	2898	1039	3.49	3250	—	—	—
3000	910	2.51	2343	958	2.86	2670	1004	3.23	3011	1048	3.61	3366	—	—	—
3100	921	2.63	2453	968	2.98	2783	1013	3.35	3128	—	—	—	—	—	—
3200	932	2.75	2569	978	3.11	2903	1023	3.49	3252	—	—	—	—	—	—
3300	943	2.88	2690	989	3.25	3029	1033	3.63	3382	—	—	—	—	—	—
3400	954	3.02	2816	1000	3.39	3159	—	—	—	—	—	—	—	—	—
3500	966	3.16	2950	1011	3.54	3297	—	—	—	—	—	—	—	—	—
3600	978	3.31	3088	1022	3.69	3442	—	—	—	—	—	—	—	—	—
3700	990	3.47	3233	—	—	—	—	—	—	—	—	—	—	—	—
3750	996	3.55	3308	—	—	—	—	—	—	—	—	—	—	—	—
3800	1002	3.63	3385	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 860 to 1080 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 32 for General Fan Performance Notes.

Table 37 — Fan Performance 48TF,TM012 — Horizontal Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	**555**	**0.72**	**630**	**629**	**0.87**	**765**	696	1.03	904	757	1.19	1048	814	1.36	1198
3100	**568**	**0.78**	**686**	**641**	**0.94**	**825**	706	1.10	968	766	1.27	1115	823	1.45	1269
3200	**582**	**0.85**	**745**	**652**	**1.01**	**888**	717	1.18	1035	776	1.35	1186	832	1.53	1343
3300	**595**	**0.92**	**808**	**664**	**1.09**	**955**	728	1.26	1106	786	1.44	1261	841	1.62	1421
3400	**609**	**1.00**	**874**	**677**	**1.17**	**1026**	739	1.35	1181	797	1.53	1340	851	1.71	1503
3500	**623**	**1.08**	**945**	689	1.25	1100	750	1.43	1259	807	1.62	1422	860	1.81	1589
3600	**636**	**1.16**	**1019**	702	1.34	1179	762	1.53	1341	817	1.72	1508	870	1.91	1679
3700	**650**	**1.25**	**1097**	714	1.44	1261	773	1.63	1428	828	1.82	1598	880	2.02	1772
3800	**664**	**1.34**	**1179**	727	1.54	1347	785	1.73	1518	839	1.93	1693	890	2.13	1870
3900	**678**	**1.44**	**1266**	740	1.64	1438	797	1.84	1613	850	2.04	1791	901	2.25	1973
4000	693	1.55	1356	753	1.75	1533	809	1.95	1712	861	2.16	1894	911	2.37	2080
4100	707	1.65	1451	766	1.86	1632	821	2.07	1816	873	2.28	2002	—	—	—
4200	721	1.77	1551	779	1.98	1736	833	2.19	1924	—	—	—	—	—	—
4300	735	1.89	1656	792	2.10	1845	846	2.32	2037	—	—	—	—	—	—
4400	750	2.01	1764	806	2.23	1958	—	—	—	—	—	—	—	—	—
4500	764	2.14	1879	819	2.37	2077	—	—	—	—	—	—	—	—	—
4600	779	2.28	1998	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	867	1.54	1353	918	1.72	1513	**966**	**1.91**	**1680**	**1012**	**2.11**	**1852**	**1056**	**2.31**	**2029**
3100	876	1.63	1427	926	1.81	1590	**973**	**2.00**	**1760**	**1019**	**2.20**	**1934**	—	—	—
3200	884	1.71	1504	934	1.90	1671	**981**	**2.10**	**1843**	**1026**	**2.30**	**2020**	—	—	—
3300	893	1.81	1586	**942**	**2.00**	**1755**	**988**	**2.20**	**1931**	**1033**	**2.40**	**2111**	—	—	—
3400	902	1.90	1671	**950**	**2.10**	**1844**	**996**	**2.30**	**2022**	—	—	—	—	—	—
3500	911	2.01	1760	**959**	**2.21**	**1937**	—	—	—	—	—	—	—	—	—
3600	920	2.11	1854	**967**	**2.32**	**2033**	—	—	—	—	—	—	—	—	—
3700	929	2.22	1951	—	—	—	—	—	—	—	—	—	—	—	—
3800	939	2.34	2053	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 685 to 935 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.40.
3. See page 32 for General Fan Performance Notes.

Table 38 — Fan Performance 48TF,TM012 — Horizontal Discharge Units; Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	**555**	**0.72**	**630**	**629**	**0.87**	**765**	**696**	**1.03**	**904**	**757**	**1.19**	**1048**	**814**	**1.36**	**1198**
3100	**568**	**0.78**	**686**	**641**	**0.94**	**825**	**706**	**1.10**	**968**	**766**	**1.27**	**1115**	**823**	**1.45**	**1269**
3200	**582**	**0.85**	**745**	**652**	**1.01**	**888**	**717**	**1.18**	**1035**	**776**	**1.35**	**1186**	**832**	**1.53**	**1343**
3300	**595**	**0.92**	**808**	**664**	**1.09**	**955**	**728**	**1.26**	**1106**	**786**	**1.44**	**1261**	841	1.62	1421
3400	**609**	**1.00**	**874**	**677**	**1.17**	**1026**	**739**	**1.35**	**1181**	**797**	**1.53**	**1340**	851	1.71	1503
3500	**623**	**1.08**	**945**	**689**	**1.25**	**1100**	**750**	**1.43**	**1259**	**807**	**1.62**	**1422**	860	1.81	1589
3600	**636**	**1.16**	**1019**	**702**	**1.34**	**1179**	**762**	**1.53**	**1341**	**817**	**1.72**	**1508**	870	1.91	1679
3700	**650**	**1.25**	**1097**	**714**	**1.44**	**1261**	**773**	**1.63**	**1428**	**828**	**1.82**	**1598**	880	2.02	1772
3800	**664**	**1.34**	**1179**	**727**	**1.54**	**1347**	**785**	**1.73**	**1518**	839	1.93	1693	890	2.13	1870
3900	**678**	**1.44**	**1266**	**740**	**1.64**	**1438**	**797**	**1.84**	**1613**	850	2.04	1791	901	2.25	1973
4000	**693**	**1.55**	**1356**	**753**	**1.75**	**1533**	**809**	**1.95**	**1712**	861	2.16	1894	911	2.37	2080
4100	**707**	**1.65**	**1451**	**766**	**1.86**	**1632**	**821**	**2.07**	**1816**	873	2.28	2002	922	2.50	2191
4200	**721**	**1.77**	**1551**	**779**	**1.98**	**1736**	**833**	**2.19**	**1924**	884	2.41	2114	933	2.63	2307
4300	**735**	**1.89**	**1656**	**792**	**2.10**	**1845**	846	2.32	2037	896	2.54	2231	944	2.77	2428
4400	**750**	**2.01**	**1764**	**806**	**2.23**	**1958**	858	2.45	2154	908	2.68	2352	—	—	—
4500	**764**	**2.14**	**1879**	**819**	**2.37**	**2077**	871	2.59	2276	920	2.82	2479	—	—	—
4600	**779**	**2.28**	**1998**	**833**	**2.51**	**2200**	883	2.74	2404	—	—	—	—	—	—
4700	**793**	**2.42**	**2121**	846	2.65	2328	896	2.89	2537	—	—	—	—	—	—
4800	**808**	**2.56**	**2251**	860	2.81	2462	—	—	—	—	—	—	—	—	—
4900	**822**	**2.72**	**2385**	—	—	—	—	—	—	—	—	—	—	—	—
5000	837	2.88	2525	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	867	1.54	1353	918	1.72	1513	966	1.91	1680	1012	2.11	1852	1056	2.31	2029
3100	876	1.63	1427	926	1.81	1590	973	2.00	1760	1019	2.20	1934	1062	2.41	2114
3200	884	1.71	1504	934	1.90	1671	981	2.10	1843	1026	2.30	2020	1069	2.51	2203
3300	893	1.81	1586	942	2.00	1755	988	2.20	1931	1033	2.40	2111	1076	2.62	2295
3400	902	1.90	1671	950	2.10	1844	996	2.30	2022	1041	2.51	2205	1083	2.73	2393
3500	911	2.01	1760	959	2.21	1937	1004	2.41	2118	1048	2.62	2303	**1091**	**2.84**	**2494**
3600	920	2.11	1854	967	2.32	2033	1013	2.53	2217	1056	2.74	2406	—	—	—
3700	929	2.22	1951	976	2.43	2134	1021	2.65	2322	1064	2.86	2513	—	—	—
3800	939	2.34	2053	985	2.55	2239	1030	2.77	2430	—	—	—	—	—	—
3900	949	2.46	2159	995	2.68	2349	1039	2.90	2543	—	—	—	—	—	—
4000	959	2.59	2269	1004	2.81	2462	—	—	—	—	—	—	—	—	—
4100	969	2.72	2384	—	—	—	—	—	—	—	—	—	—	—	—
4200	979	2.85	2504	—	—	—	—	—	—	—	—	—	—	—	—
4300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 835 to 1085 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.90.
3. See page 32 for General Fan Performance Notes.

Table 39 — Fan Performance 48TF,TM012 — Horizontal Discharge Units; High-Static Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	**555**	**0.72**	**630**	**629**	**0.87**	**765**	**696**	**1.03**	**904**	**757**	**1.19**	**1048**	**814**	**1.36**	**1198**
3100	**568**	**0.78**	**686**	**641**	**0.94**	**825**	**706**	**1.10**	**968**	**766**	**1.27**	**1115**	**823**	**1.45**	**1269**
3200	**582**	**0.85**	**745**	**652**	**1.01**	**888**	**717**	**1.18**	**1035**	**776**	**1.35**	**1186**	832	1.53	1343
3300	**595**	**0.92**	**808**	**664**	**1.09**	**955**	**728**	**1.26**	**1106**	**786**	**1.44**	**1261**	841	1.62	1421
3400	**609**	**1.00**	**874**	**677**	**1.17**	**1026**	**739**	**1.35**	**1181**	**797**	**1.53**	**1340**	851	1.71	1503
3500	**623**	**1.08**	**945**	**689**	**1.25**	**1100**	**750**	**1.43**	**1259**	**807**	**1.62**	**1422**	860	1.81	1589
3600	**636**	**1.16**	**1019**	**702**	**1.34**	**1179**	**762**	**1.53**	**1341**	**817**	**1.72**	**1508**	870	1.91	1679
3700	**650**	**1.25**	**1097**	**714**	**1.44**	**1261**	**773**	**1.63**	**1428**	**828**	**1.82**	**1598**	880	2.02	1772
3800	**664**	**1.34**	**1179**	**727**	**1.54**	**1347**	**785**	**1.73**	**1518**	839	1.93	1693	890	2.13	1870
3900	**678**	**1.44**	**1266**	**740**	**1.64**	**1438**	**797**	**1.84**	**1613**	850	2.04	1791	901	2.25	1973
4000	**693**	**1.55**	**1356**	**753**	**1.75**	**1533**	**809**	**1.95**	**1712**	861	2.16	1894	911	2.37	2080
4100	**707**	**1.65**	**1451**	**766**	**1.86**	**1632**	**821**	**2.07**	**1816**	873	2.28	2002	922	2.50	2191
4200	**721**	**1.77**	**1551**	**779**	**1.98**	**1736**	833	2.19	1924	884	2.41	2114	933	2.63	2307
4300	**735**	**1.89**	**1656**	**792**	**2.10**	**1845**	846	2.32	2037	896	2.54	2231	944	2.77	2428
4400	**750**	**2.01**	**1764**	**806**	**2.23**	**1958**	858	2.45	2154	908	2.68	2352	955	2.91	2553
4500	**764**	**2.14**	**1879**	**819**	**2.37**	**2077**	871	2.59	2276	920	2.82	2479	966	3.06	2684
4600	**779**	**2.28**	**1998**	833	2.51	2200	883	2.74	2404	932	2.97	2611	978	3.21	2820
4700	**793**	**2.42**	**2121**	846	2.65	2328	896	2.89	2537	944	3.13	2747	989	3.37	2960
4800	**808**	**2.56**	**2251**	860	2.81	2462	909	3.05	2674	956	3.29	2889	1001	3.54	3106
4900	**822**	**2.72**	**2385**	873	2.96	2601	922	3.21	2818	968	3.46	3037	1013	3.71	3258
5000	837	2.88	2525	887	3.13	2745	935	3.38	2966	981	3.63	3189	1024	3.89	3414

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	867	1.54	1353	918	1.72	1513	966	1.91	1680	1012	2.11	1852	1056	2.31	2029
3100	876	1.63	1427	926	1.81	1590	973	2.00	1760	1019	2.20	1934	1062	2.41	2114
3200	884	1.71	1504	934	1.90	1671	981	2.10	1843	1026	2.30	2020	1069	2.51	2203
3300	893	1.81	1586	942	2.00	1755	988	2.20	1931	1033	2.40	2111	1076	2.62	2295
3400	902	1.90	1671	950	2.10	1844	996	2.30	2022	1041	2.51	2205	1083	2.73	2393
3500	911	2.01	1760	959	2.21	1937	1004	2.41	2118	1048	2.62	2303	1091	2.84	2494
3600	920	2.11	1854	967	2.32	2033	1013	2.53	2217	1056	2.74	2406	1098	2.96	2600
3700	929	2.22	1951	976	2.43	2134	1021	2.65	2322	1064	2.86	2513	1106	3.09	2710
3800	939	2.34	2053	985	2.55	2239	1030	2.77	2430	1073	2.99	2625	1114	3.22	2824
3900	949	2.46	2159	995	2.68	2349	1039	2.90	2543	1081	3.12	2741	1122	3.35	2943
4000	959	2.59	2269	1004	2.81	2462	1048	3.03	2660	1090	3.26	2861	1130	3.49	3067
4100	969	2.72	2384	1014	2.94	2581	1057	3.17	2782	1098	3.40	2987	**1139**	**3.64**	**3195**
4200	979	2.85	2504	1024	3.08	2705	1066	3.31	2909	1107	3.55	3117	**1147**	**3.79**	**3329**
4300	990	3.00	2629	1034	3.23	2833	1076	3.46	3040	1117	3.71	3252	**1156**	**3.95**	**3467**
4400	1000	3.14	2758	1044	3.38	2966	1085	3.62	3177	1126	3.87	3392	**1165**	**4.11**	**3611**
4500	1011	3.30	2892	1054	3.54	3104	1095	3.78	3319	**1135**	**4.03**	**3537**	**1174**	**4.28**	**3759**
4600	1022	3.45	3032	1064	3.70	3247	1105	3.95	3466	**1145**	**4.20**	**3688**	**1183**	**4.46**	**3913**
4700	1033	3.62	3176	1075	3.87	3395	1115	4.12	3618	**1155**	**4.38**	**3843**	**1193**	**4.64**	**4072**
4800	1044	3.79	3326	1085	4.04	3549	1126	4.30	3775	**1164**	**4.56**	**4004**	**1202**	**4.83**	**4237**
4900	1055	3.97	3482	1096	4.22	3708	**1136**	**4.49**	**3938**	**1174**	**4.75**	**4171**	**1212**	**5.02**	**4406**
5000	1066	4.15	3642	1107	4.41	3873	**1146**	**4.68**	**4106**	**1184**	**4.95**	**4342**	**1221**	**5.22**	**4582**

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 830 to 1130 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 5.25.
3. See page 32 for General Fan Performance Notes.

Table 40 — Fan Performance 48TF,TM014 — Horizontal Discharge Units; Standard Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3700	**676**	**1.19**	**1106**	**747**	**1.42**	**1328**	**811**	**1.66**	**1552**	871	1.91	1779	927	2.15	2008
3800	**690**	**1.27**	**1185**	**760**	**1.52**	**1414**	**823**	**1.76**	**1644**	882	2.01	1876	938	2.26	2111
3900	**705**	**1.36**	**1269**	**773**	**1.61**	**1503**	**835**	**1.86**	**1739**	894	2.12	1977	948	2.38	2217
4000	**719**	**1.45**	**1357**	**786**	**1.71**	**1597**	**848**	**1.97**	**1838**	905	2.23	2082	959	2.50	2328
4100	**734**	**1.55**	**1449**	**799**	**1.82**	**1695**	860	2.08	1942	917	2.35	2192	970	2.62	2443
4200	**748**	**1.66**	**1545**	**813**	**1.93**	**1797**	872	2.20	2050	928	2.47	2305	981	2.75	2562
4300	**763**	**1.76**	**1646**	**826**	**2.04**	**1903**	885	2.32	2162	940	2.60	2423	992	2.88	2686
4400	**778**	**1.88**	**1751**	**840**	**2.16**	**2014**	898	2.44	2279	952	2.73	2546	1004	3.02	2814
4500	**792**	**1.99**	**1860**	**853**	**2.28**	**2130**	910	2.57	2401	964	2.87	2673	1015	3.16	2947
4600	**807**	**2.12**	**1975**	867	2.41	2250	923	2.71	2527	976	3.01	2805	1027	3.31	3085
4700	**822**	**2.25**	**2094**	881	2.55	2375	936	2.85	2658	989	3.15	2942	1038	3.46	3227
4800	**837**	**2.38**	**2218**	895	2.69	2505	949	3.00	2794	1001	3.31	3083	1050	3.62	3375
4900	**852**	**2.52**	**2347**	909	2.83	2640	963	3.15	2935	1014	3.46	3230	—	—	—
5000	867	2.66	2482	923	2.98	2781	976	3.30	3081	1026	3.63	3383	—	—	—
5100	882	2.81	2622	937	3.14	2926	989	3.47	3232	—	—	—	—	—	—
5200	897	2.97	2766	951	3.30	3077	1003	3.63	3389	—	—	—	—	—	—
5300	912	3.13	2917	966	3.47	3233	—	—	—	—	—	—	—	—	—
5400	927	3.30	3073	980	3.64	3395	—	—	—	—	—	—	—	—	—
5500	943	3.47	3234	—	—	—	—	—	—	—	—	—	—	—	—
5600	958	3.65	3402	—	—	—	—	—	—	—	—	—	—	—	—
5700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3700	981	2.40	2240	1031	2.65	2473	1079	2.91	2709	**1125**	**3.16**	**2948**	**1169**	**3.42**	**3189**
3800	990	2.52	2348	1040	2.77	2587	**1088**	**3.03**	**2828**	**1133**	**3.30**	**3073**	**1177**	**3.56**	**3319**
3900	1000	2.64	2459	1050	2.90	2705	**1097**	**3.17**	**2951**	**1142**	**3.43**	**3201**	**1186**	**3.70**	**3452**
4000	1011	2.76	2576	1059	3.03	2826	**1106**	**3.30**	**3079**	**1151**	**3.58**	**3334**	—	—	—
4100	1021	2.89	2697	1069	3.17	2953	**1116**	**3.44**	**3210**	—	—	—	—	—	—
4200	1031	3.03	2822	1079	3.31	3083	**1125**	**3.59**	**3347**	—	—	—	—	—	—
4300	1042	3.16	2951	**1089**	**3.45**	**3218**	—	—	—	—	—	—	—	—	—
4400	1053	3.31	3085	**1100**	**3.60**	**3357**	—	—	—	—	—	—	—	—	—
4500	1064	3.46	3224	—	—	—	—	—	—	—	—	—	—	—	—
4600	1075	3.61	3367	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 860 to 1080 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 32 for General Fan Performance Notes.

Table 41 — Fan Performance 48TF,TM014 — Horizontal Discharge Units; Alternate Motor (Belt Drive)*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3700	**676**	**1.19**	**1106**	**747**	**1.42**	**1328**	**811**	**1.66**	**1552**	871	1.91	1779	927	2.15	2008
3800	**690**	**1.27**	**1185**	**760**	**1.52**	**1414**	**823**	**1.76**	**1644**	882	2.01	1876	938	2.26	2111
3900	**705**	**1.36**	**1269**	**773**	**1.61**	**1503**	835	1.86	1739	894	2.12	1977	948	2.38	2217
4000	**719**	**1.45**	**1357**	**786**	**1.71**	**1597**	848	1.97	1838	905	2.23	2082	959	2.50	2328
4100	**734**	**1.55**	**1449**	**799**	**1.82**	**1695**	860	2.08	1942	917	2.35	2192	970	2.62	2443
4200	**748**	**1.66**	**1545**	**813**	**1.93**	**1797**	872	2.20	2050	928	2.47	2305	981	2.75	2562
4300	**763**	**1.76**	**1646**	**826**	**2.04**	**1903**	885	2.32	2162	940	2.60	2423	992	2.88	2686
4400	**778**	**1.88**	**1751**	840	2.16	2014	898	2.44	2279	952	2.73	2546	1004	3.02	2814
4500	**792**	**1.99**	**1860**	853	2.28	2130	910	2.57	2401	964	2.87	2673	1015	3.16	2947
4600	**807**	**2.12**	**1975**	867	2.41	2250	923	2.71	2527	976	3.01	2805	1027	3.31	3085
4700	**822**	**2.25**	**2094**	881	2.55	2375	936	2.85	2658	989	3.15	2942	1038	3.46	3227
4800	837	2.38	2218	895	2.69	2505	949	3.00	2794	1001	3.31	3083	1050	3.62	3375
4900	852	2.52	2347	909	2.83	2640	963	3.15	2935	1014	3.46	3230	1062	3.78	3528
5000	867	2.66	2482	923	2.98	2781	976	3.30	3081	1026	3.63	3383	1074	3.95	3685
5100	882	2.81	2622	937	3.14	2926	989	3.47	3232	1039	3.80	3540	1086	4.13	3849
5200	897	2.97	2766	951	3.30	3077	1003	3.63	3389	1052	3.97	3702	1099	4.31	4017
5300	912	3.13	2917	966	3.47	3233	1016	3.81	3551	1065	4.15	3870	1111	4.49	4191
5400	927	3.30	3073	980	3.64	3395	1030	3.99	3719	1078	4.34	4044	1123	4.69	4370
5500	943	3.47	3234	994	3.82	3563	1044	4.17	3892	1091	4.53	4223	**1136**	**4.88**	**4555**
5600	958	3.65	3402	1009	4.01	3736	1057	4.37	4071	1104	4.73	4408	**1149**	**5.09**	**4746**
5700	973	3.83	3575	1023	4.20	3915	1071	4.56	4256	1117	4.93	4599	—	—	—
5800	988	4.03	3754	1038	4.40	4100	1085	4.77	4447	1130	5.14	4796	—	—	—
5900	1004	4.22	3939	1052	4.60	4292	1099	4.98	4645	—	—	—	—	—	—
6000	1019	4.43	4131	1067	4.81	4489	1113	5.20	4848	—	—	—	—	—	—
6100	1034	4.64	4329	1082	5.03	4693	—	—	—	—	—	—	—	—	—
6200	1050	4.86	4533	—	—	—	—	—	—	—	—	—	—	—	—
6300	1065	5.09	4744	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3700	981	2.40	2240	1031	2.65	2473	1079	2.91	2709	1125	3.16	2948	**1169**	**3.42**	**3189**
3800	990	2.52	2348	1040	2.77	2587	1088	3.03	2828	**1133**	**3.30**	**3073**	**1177**	**3.56**	**3319**
3900	1000	2.64	2459	1050	2.90	2705	1097	3.17	2951	**1142**	**3.43**	**3201**	**1186**	**3.70**	**3452**
4000	1011	2.76	2576	1059	3.03	2826	1106	3.30	3079	**1151**	**3.58**	**3334**	**1194**	**3.85**	**3591**
4100	1021	2.89	2697	1069	3.17	2953	1116	3.44	3210	**1160**	**3.72**	**3471**	**1203**	**4.00**	**3733**
4200	1031	3.03	2822	1079	3.31	3083	1125	3.59	3347	**1169**	**3.87**	**3612**	**1212**	**4.16**	**3880**
4300	1042	3.16	2951	1089	3.45	3218	**1135**	**3.74**	**3487**	**1179**	**4.03**	**3758**	**1221**	**4.32**	**4031**
4400	1053	3.31	3085	1100	3.60	3357	**1145**	**3.90**	**3632**	**1188**	**4.19**	**3909**	**1230**	**4.49**	**4187**
4500	1064	3.46	3224	1110	3.76	3502	**1155**	**4.06**	**3782**	**1198**	**4.36**	**4064**	**1239**	**4.66**	**4348**
4600	1075	3.61	3367	1121	3.91	3650	**1165**	**4.22**	**3937**	**1208**	**4.53**	**4224**	**1249**	**4.84**	**4514**
4700	1086	3.77	3515	**1131**	**4.08**	**3805**	**1175**	**4.39**	**4096**	**1217**	**4.71**	**4389**	**1258**	**5.02**	**4684**
4800	1097	3.93	3668	**1142**	**4.25**	**3963**	**1186**	**4.57**	**4260**	**1228**	**4.89**	**4559**	**1268**	**5.21**	**4860**
4900	1109	4.10	3826	**1153**	**4.43**	**4128**	**1196**	**4.75**	**4430**	**1238**	**5.08**	**4734**	—	—	—
5000	1120	4.28	3990	**1164**	**4.61**	**4296**	**1207**	**4.94**	**4604**	—	—	—	—	—	—
5100	**1132**	**4.46**	**4159**	**1175**	**4.79**	**4471**	**1218**	**5.13**	**4784**	—	—	—	—	—	—
5200	**1144**	**4.65**	**4333**	**1187**	**4.99**	**4651**	—	—	—	—	—	—	—	—	—
5300	**1155**	**4.84**	**4512**	**1198**	**5.19**	**4836**	—	—	—	—	—	—	—	—	—
5400	**1167**	**5.04**	**4697**	—	—	—	—	—	—	—	—	—	—	—	—
5500	**1179**	**5.24**	**4889**	—	—	—	—	—	—	—	—	—	—	—	—
5600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan
Watts — Input Watts to Motor

*Motor drive range: 830 to 1130 rpm. All other rpms require field-supplied drive.

NOTES:
1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 5.25.
3. See page 32 for General Fan Performance Notes.

PRE-START-UP

⚠ WARNING

Failure to observe the following warnings could result in serious personal injury.

1. Follow recognized safety practices and wear protective goggles when checking or the servicing refrigerant system.
2. Do not operate the compressor or provide any electric power to the unit unless the compressor terminal cover is in place and secured.
3. Do not remove the compressor terminal cover until all electrical sources are disconnected.
4. 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.
5. Never attempt to repair a soldered connection while the refrigerant system is under pressure.
6. 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:
   a. Shut off gas and then electrical power to the unit. Install lockout tag.
   b. Relieve all pressure from the system using both high-pressure and low-pressure ports.
   c. Cut the component connection tubing with a tubing cutter, and remove the component from the unit.
   d. 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 on page 68 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 these installation instructions and applicable codes. Make sure that Start-Up Checklist, located on back page of this booklet, has been completed and filled out.

Return-Air Filters — Make sure correct filters are installed in filter tracks (see Tables 1A and 1B). Do not operate unit without return-air filters.

Outdoor-Air Inlet Screens — Outdoor-air inlet screens must be in place before operating unit.

Compressor Mounting — Compressors are internally spring mounted. Do not loosen or remove compressor hold-down bolts. On 48TF,TM014 units, remove the tiedown bands that hold the compressors together.

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

Gas Piping — Check gas piping for leaks.

⚠ WARNING

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

Refrigerant Service Ports — To service refrigerant service ports, remove compressor access panel. Each unit system has 3 Schrader-type service gage ports: one on the suction line, one on the liquid line, and one on the compressor discharge line. Be sure that caps on the ports are tight. The Schrader-type valve on the discharge line is located under the low-pressure switch. Another valve is located on the discharge line underneath the high-pressure switch. It is screwed on a Schrader fitting but there is no Schrader core.

High Flow Valves — Located on the compressor hot gas and suction tubes are High Flow Valves. Large black plastic caps distinguish these valves with O-rings located inside the caps. These valves can not be accessed for service in the field. Ensure the plastic caps are in place and tight or the possibility of refrigerant leakage could occur.

Compressor Rotation — On 3-phase units with scroll compressors, it is important to be certain compressor is rotating in the proper direction. To determine whether or not compressor is rotating in the proper direction:

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

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

1. Note that the evaporator fan is probably also rotating in the wrong direction.
2. Turn off power to the unit and install lockout tag.
3. Reverse any two of the unit power leads.
4. Reapply power to unit. Reenergize compressor.

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

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

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, indoor and outdoor fans start on closure of contactors.

Check unit charge. Refer to Checking and Adjusting Refrigerant Charge section, page 68. Unit must operate a minimum of 10 minutes before adjusting charge.

Reset thermostat at a position above room temperature. Compressor and outdoor fans will shut off. Evaporator fan will shut off after 30-second delay.

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

Main Burners — Main burners are factory set and should require no adjustment.

TO CHECK ignition of main burners and heating controls, move thermostat set point above room temperature and verify that the burners light and evaporator fan is energized. After ensuring that the unit continues to heat the building, lower the thermostat setting below the room temperature and verify that the burners and evaporator fan turn off (fan will turn off only if fan selector switch is in the AUTO. position). Refer to Table 42 for the correct orifice to use at high altitudes.

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

ADJUST GAS INPUT — The gas input to the unit is determined by measuring the gas flow at the meter or by measuring the manifold pressure. Manifold pressure should be 3.5 in. wg.

NOTE: On units that use a 2-stage gas valve there is no need to adjust the "Low Fire" manifold pressure.

Measure Gas Flow (Natural Gas Units) — Minor adjustment to the gas flow can be made by changing the manifold pressure. The manifold pressure must be 3.5 in wg. Normal manifold pressure is 3.5 in. wg in high fire (W1 and W2 inputs to gas valve).

Proceed as follows:

1. Turn off gas supply to unit.
2. Remove pipe plug on manifold then connect manometer at this point. Turn on gas to unit. Ensure gas valve is in high fire operation.

Observe manifold pressure and proceed as follows to adjust gas input:

1. Remove cover screw over regulator adjustment screw on gas valve. Ensure gas valve is operating in high fire mode.
2. Turn regulator adjustment screw clockwise to increase gas input, or turn regulator adjustment screw counterclockwise to decrease input. High fire manifold pressure must be 3.5 in. wg.

⚠ WARNING

Unsafe operation of the unit may result if manifold pressure is outside 3.4 to 3.6 in. wg range. Personal injury or unit damage may result.

3. Replace cover screw cap on gas valve.
4. Turn off gas supply to unit. Remove manometer from pressure tap and replace pipe plug on gas valve. Turn on gas to unit and check for leaks.

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, purging heat exchangers.
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 ignition 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 motor will turn on 45 seconds after the burners are ignited.
7. The evaporator-fan motor 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 in Tables 1A and 1B.

Table 42 — Altitude Compensation*

ELEVATION (Ft)	125,000, 180,000, AND 220,000 BTUH NOMINAL INPUT		250,000 BTUH NOMINAL INPUT	
	Natural Gas Orifice Size†	Liquid Propane Orifice Size†	Natural Gas Orifice Size†	Liquid Propane Orifice Size†
0-2,000	31	41	30	38
2,000	32	42	30	39
3,000	32	42	31	40
4,000	32	42	32	41
5,000	33	43	33	42
6,000	34	43	34	43
7,000	35	44	35	43
8,000	36	44	36	44
9,000	37	45	37	44
10,000	38	46	38	45
11,000	39	47	39	45
12,000	40	47	40	46
13,000	41	48	41	47
14,000	42	48	42	47

*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.
†Orifice available through your local distributor.

Integrated Gas Controller (IGC) Operation

NOTE: The default value for the evaporator-fan motor ON and OFF delay is 45 seconds. The Integrated Gas 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 (light-emitting diode) 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 on the next cycle. 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 shut unit off temporarily 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 (evaporator) fan contactor (IFC), compressor contactor no. 1 (C1) and outdoor-fan contactor (OFC) are energized, and evaporator-fan motor, compressor no. 1, and both condenser fans start. The condenser-fan motors run continuously while unit is cooling. If the thermostat calls for a second stage of cooling by energizing Y2, compressor contactor no. 2 (C2) is energized and compressor no. 2 starts.

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

HEATING, UNITS WITHOUT ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. In order to prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor (IDM) is then energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 and W2 are deenergized, the IFM stops after a 45-second time-off delay.

COOLING, UNITS WITH 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 supply-air temperature into the zone. As the supply-air temperature fluctuates above 55 or below 50 F, the dampers will be modulated (open or close) to bring the supply-air temperature back within the set point limits.

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

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

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

If field-installed accessory CO_2 sensors are connected to the 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. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed. Damper position will follow the higher demand condition from DCV mode or free cooling mode.

Damper movement from full closed to full open (or vice versa) will take between $1^1/_2$ and $2^1/_2$ minutes.

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

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

HEATING, UNITS WITH ECONOMI$ER IV — When the room temperature calls for heat, the heating controls are energized as described in the Heating, Units Without Economizer section. When the thermostat is satisfied, the economizer damper moves to the minimum position.

COOLING, UNITS WITH ECONOMI$ER2, PREMIERLINK™ CONTROL AND A THERMOSTAT — When free cooling is not available, the compressors will be controlled by the PremierLink control in response to the Y1 and Y2 inputs from the thermostat.

The PremierLink control will use the following information to determine if free cooling is available:

- Indoor fan has been on for at least 30 seconds.
- The SPT, SAT, and OAT inputs must have valid readings.
- OAT must be less than 75 F.
- OAT must be less than SPT.
- Enthalpy must be LOW (may be jumpered if an enthalpy sensor not available).
- Economizer position is NOT forced.

Pre-cooling occurs when the is no call from the thermostat except G. Pre-cooling is defined as the economizer modulates to provide 70 F supply air.

When free cooling is available the PremierLink control will control the compressors and economizer to provide a supply-air temperature determined to meet the Y1 and Y2 calls from the thermostat using the following three routines. The three control routines are based on OAT.

The 3 routines are based on OAT where:

SASP = Supply Air Set Point

DXCTLO = Direct Expansion Cooling Lockout Set Point

PID = Proportional Integral

Routine 1 (OAT < DXCTLO)

- Y1 energized – economizer maintains a SASP = (SATLO1 + 3).
- Y2 energized – economizer maintains a SASP = (SATLO2 + 3).

Routine 2 (DXCTLO < OAT < 68 F)

- If only Y1 energized, the economizer maintains a SASP = (SATLO1 + 3).
- If SAT > SASP + 5 and economizer position > 80%, economizer will go to minimum position for 3 minutes or until SAT > 68 F.
- First stage of mechanical cooling will be energized.
- Integrator resets.
- Economizer opens again and controls to current SASP after stage one on for 90 seconds.
- With Y1 and Y2 energized economizer maintains an SASP = SATLO2 + 3.
- If SAT > SASP + 5 and economizer position >80%, economizer will go to minimum position for 3 minutes or until SAT > 68 F.
- If compressor one is on then second stage of mechanical cooling will be energized. Otherwise the first stage will be energized.
- Integrator resets.
- Economizer opens again and controls to SASP after stage one on for 90 seconds.

Routine 3 (OAT > 68)

- Economizer is opened 100%.
- Compressors 1 and 2 are cycled based on Y1 and Y2 using minimum on and off times and watching the supply air temperature as compared to SATLO1 and SATLO2 set points.

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

If field-installed accessory CO_2 sensors are connected to the PremierLink™ control, a PID-controlled demand ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 set point, the minimum position of the damper will be increased proportionally. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed.

HEATING, UNITS WITH ECONOMI$ER2, PREMIERLINK CONTROL AND A THERMOSTAT — When the thermostat calls for heating, terminal W1 is energized. The PremierLink control will move the economizer damper to the minimum position if there is a call for G and closed if there is a call for W1 without G. In order to prevent thermostat from short cycling, the unit is locked into the heating mode for at least 10 minutes when W1 is energized. The induced-draft motor is then energized and the burner ignition sequence begins.

On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45-second time-off delay unless G is still maintained.

COOLING, UNITS WITH ECONOMI$ER2, PREMIERLINK CONTROL AND A ROOM SENSOR — When free cooling is not available, the compressors will be controlled by the PremierLink controller using a PID Error reduction calculation as indicated by Fig 43.

The PremierLink controller will use the following information to determine if free cooling is available:

- Indoor fan has been on for at least 30 seconds.
- The SPT, SAT, and OAT inputs must have valid readings.
- OAT must be less than 75 F.
- OAT must be less than SPT.
- Enthalpy must be LOW (may be jumpered if and enthalpy sensor is not available).
- Economizer position is NOT forced.

When free cooling is available, the outdoor-air damper is positioned through the use of a Proportional Integral (PID) control process to provide a calculated supply-air temperature into the zone. The supply air will maintain the space temperature between the heating and cooling set points as indicated in Fig. 44.

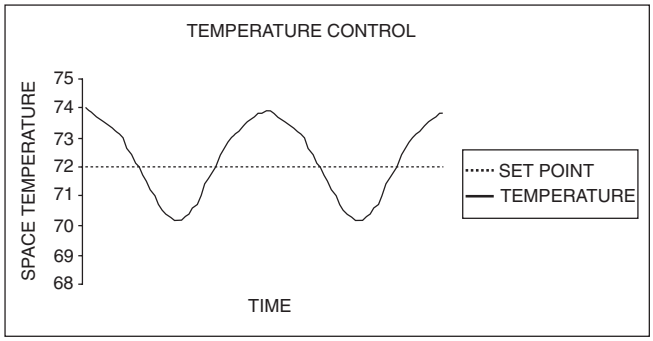
The PremierLink will integrate the compressors stages with the economizer based on similar logic as the three routines listed in the previous section. The SASP will float up and down based on the error reduction calculations that compare space temperature and space set point.

When outdoor-air temperature conditions require the economizer to close for a compressor stage-up sequence, the economizer control integrator is reset to zero after the stage-up sequence is completed. This prevents the supply-air temperature from dropping too quickly and creating a freeze condition that would make the compressor turn off prematurely.

The high space set point is used for DX (direct expansion) cooling control, while the economizer space set point is a calculated value between the heating and cooling set points. The economizer set point will always be at least one degree below the cooling set point, allowing for a smooth transition from mechanical cooling with economizer assist, back to economizer cooling as the cooling set point is achieved. The compressors may be used for initial cooling then the PremierLink controller will modulate the economizer using an error reduction calculation to hold the space temperature between the heating and cooling set points. See Fig. 44.

The controller uses the following conditions to determine economizer cooling:

- Enthalpy is Low
- SAT reading is available
- OAT reading is available
- SPT reading is available
- OAT ≤ SPT
- Economizer Position is NOT forced



NOTE: PremierLink control performs smart staging of 2 stages of DX cooling and up to 3 stages of heat.

Fig. 43 — DX Cooling Temperature Control Example

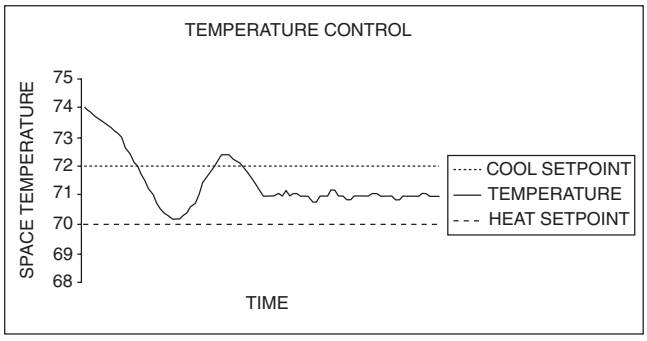


Fig. 44 — Economizer Temperature Control Example

If any of the above conditions are **not** met, the economizer submaster reference (ECSR) is set to maximum limit and the damper moves to minimum position. The operating sequence is complete. The ECSR is recalculated every 30 seconds.

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

If field-installed accessory CO_2 sensors are connected to the PremierLink™ control, a PID-controlled demand ventilation strategy will begin to operate. As the CO_2 level in the zone increases above the CO_2 set point, the minimum position of the damper will be increased proportionally. As the CO_2 level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed.

HEATING, UNIT WITH ECONOMI$ER2, PREMIERLINK CONTROL AND A ROOM SENSOR — Every 40 seconds the controller will calculate the required heat stages (maximum of 3) to maintain supply air temperature (SAT) if the following qualifying conditions are met:

- Indoor fan has been on for at least 30 seconds.
- COOL mode is not active.
- OCCUPIED, TEMP.COMPENSATED START or HEAT mode is active.
- SAT reading is available.
- Fire shutdown mode is not active.

If all of the above conditions are met, the number of heat stages is calculated; otherwise the required number of heat stages will be set to 0.

If the PremierLink controller determines that heat stages are required, the economizer damper will be moved to minimum position if occupied and closed if unoccupied.

Staging should be as follows:

If Heating PID STAGES=2

- HEAT STAGES=1 (50% capacity) will energize HS1
- HEAT STAGES=2 (100% capacity) will energize HS2

If Heating PID STAGES=3 and AUXOUT = HS3

- HEAT STAGES=1 (33% capacity) will energize HS1
- HEAT STAGES=2 (66% capacity) will energize HS2
- HEAT STAGES=3 (100% capacity) will energize HS3

In order to prevent short cycling, the unit is locked into the Heating mode for at least 10 minutes when HS1 is deenergized. When HS1 is energized the induced-draft motor is then energized and the burner ignition sequence begins. On units equipped for two stages of heat, when additional heat is needed, HS2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the space condition is satisfied and HS1 is deenergized the IFM stops after a 45-second time-off delay unless in the occupied mode. The fan will run continuously in the occupied mode as required by national energy and fresh air standards.

SERVICE

⚠ CAUTION

When servicing unit, shut off all electrical power to unit and tag disconnect to avoid shock hazard or injury from rotating parts.

Cleaning — Inspect unit interior at the beginning of each heating and cooling season or more frequently as operating conditions require.

EVAPORATOR COIL — Clean coil as required. Inspect coil at beginning of heating and cooling seasons.

1. Turn unit power off and install lockout tag. Remove evaporator coil access panel.
2. If economizer is installed, remove economizer by disconnecting Molex plug and removing economizer mounting screws. Refer to Accessory Economizer Installation Instructions for more details.
3. Remove filters from unit.
4. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister. Wash both sides of coil and flush with clean water. For best results, backflush toward return-air section to remove foreign material. Caution should be taken as to not overflow the evaporator drain condensate pan.
5. Flush condensate pan after completion.
6. Reinstall economizer and filters.
7. Reconnect wiring.
8. Replace access panels.

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

One-Row Coils — Wash coil with commercial cleaner. Clean outer surfaces with a stiff brush in the normal manner. It is not necessary to remove top panel.

2-Row Coils — Clean coil as follows:

1. Turn off unit power and tag disconnect.
2. Remove top panel screws on condenser end of unit.
3. Remove condenser coil corner post. See Fig. 45. To hold top panel open, place coil corner post between top panel and center post. See Fig. 46.
4. Remove screws securing coil to center post.
5. Remove fastener holding coil sections together at return end of condenser coil. Carefully separate the outer coil section 3 to 4 in. from the inner coil section. See Fig. 47.
6. Use a water hose or other suitable equipment to flush down between the 2 coil sections to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.
7. Secure inner and outer coil rows together with a field-supplied fastener.
8. Reposition the outer coil section and remove the coil corner post from between the top panel and center post.
9. Reinstall the coil corner post and replace all screws.

CONDENSATE DRAIN — Check and clean each year at start of cooling season. In winter, keep drain dry or protect against freeze-up.

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

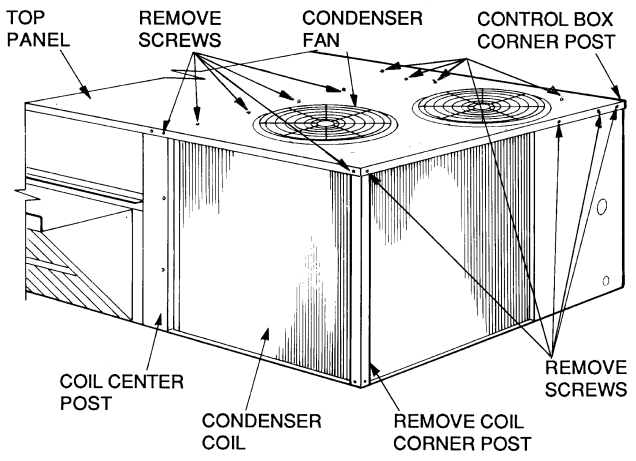


Fig. 45 — Cleaning Condenser Coil

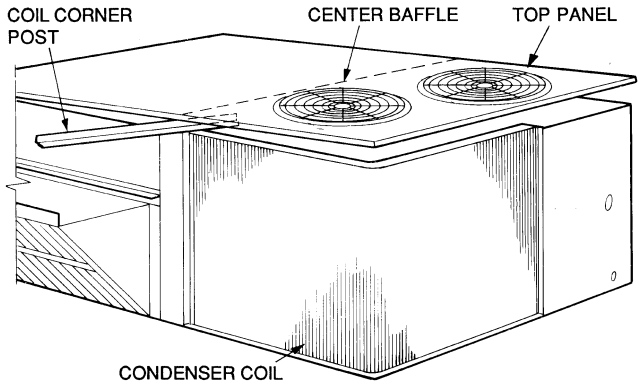


Fig. 46 — Propping Up Top Panel

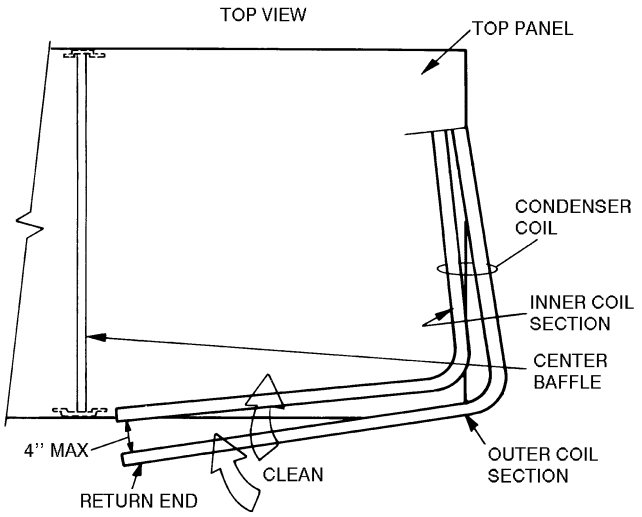


Fig. 47 — Separating Coil Sections

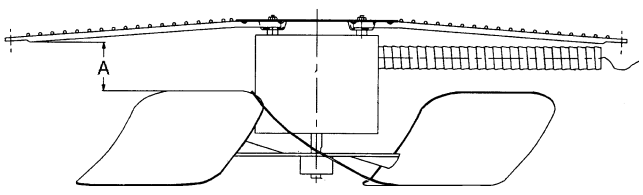
Lubrication

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

FAN-MOTOR BEARINGS — *Fan-motor bearings are of the permanently lubricated type. No further lubrication is required.* No lubrication of condenser-fan or evaporator-fan motors is required.

Condenser-Fan Adjustment (Fig. 48)

1. Shut off unit power supply and tag disconnect.
2. Remove condenser-fan assembly (grille, motor, motor cover, and fan) and loosen fan hub setscrews.
3. Adjust fan height as shown in Fig. 48.
4. Tighten setscrews and replace condenser-fan assembly.



48TF,TM UNIT VOLTAGE	FAN HEIGHT "A" (in.)
208/230 V	2.75
460 V and 575 V	3.50

Fig. 48 — Condenser-Fan Adjustment

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

Refer to Step 9 — Adjust Evaporator Fan Speed on page 30 for adjustment and alignment procedures.

Manual Outdoor-Air Damper — If outdoor-air damper blade is required, see Manual Outdoor-Air Damper section on page 18.

Economizer Adjustment — Refer to the Optional EconoMi$er IV and EconoMi$er2 section on page 22.

Condenser Coil Grille — Condenser coil grille is shipped factory-installed. No adjustments are required.

High-Pressure Switch — Located on the compressor hot gas line is a high-pressure switch. This switch opens at 428 psig and closes at 320 psig. No adjustment is necessary. Refer to Tables 1A and 1B.

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

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

Checking and Adjusting Refrigerant Charge — The refrigerant system is fully charged with R-22 refrigerant, tested, and factory-sealed. Unit must operate in Cooling mode a minimum of 10 minutes before checking charge.

NOTE: Adjustment of the refrigerant charge is not required unless the unit is suspected of not having the proper R-22 charge.

A superheat charging chart is attached to the outside of the service access panel. The chart includes the required suction line temperature at given suction line pressures and outdoor ambient temperatures.

An accurate superheat, thermocouple-type or thermistor-type thermometer, and a gage manifold are required when using the superheat charging method for evaluating the unit charge. *Do not use mercury or small dial-type thermometers because they are not adequate for this type of measurement.*

⚠ CAUTION

When evaluating the refrigerant charge, an indicated adjustment to the specified factory charge must always be very minimal. If a substantial adjustment is indicated, an abnormal condition exists somewhere in the cooling system, such as insufficient airflow across either coil or both coils.

Proceed as follows:

1. Remove caps from low-pressure and high-pressure Schrader valve fittings.
2. Using hoses with valve core depressors, attach low- and high-pressure gage hoses to low-pressure and high-pressure service fittings, respectively.
3. Start unit in Cooling mode and let unit run until system pressure stabilize.
4. Measure and record the following:
   a. Outdoor ambient-air temperature (F db).
   b. Evaporator inlet-air temperature (F wb).
   c. Suction-tube temperature (F) at low-side service fitting.
   d. Suction (low-side) pressure (psig).

5. Using “Cooling Charging Charts” compare outdoor-air temperature (F db) with the suction line pressure (psig) to determine desired system operating suction line temperature. See Fig. 49-56.
6. Compare measured suction-tube temperature with desired suction-tube temperature. Using a tolerance of ± 3° F, add refrigerant if measured temperature is more than 3° F higher than proper suction-tube temperature, or remove refrigerant if actual temperature is more than 3° F lower than required suction-tube temperature.

TO USE COOLING CHARGING CHART — This method is to be used in Cooling mode only. Take the outdoor ambient temperature and read the suction pressure gage. Refer to appropriate chart to determine what suction temperature should be. If suction temperature is high, add refrigerant. If suction temperature is low, carefully recover some of the charge. Recheck the suction pressure as charge is adjusted. Example (Fig. 52, Circuit 2):

Outdoor Temperature. . . . . .85 F
Suction Pressure. . . . . 74 psig
Suction Temperature should be. . . . . .56 F
(Suction temperature may vary ± 3 F.)

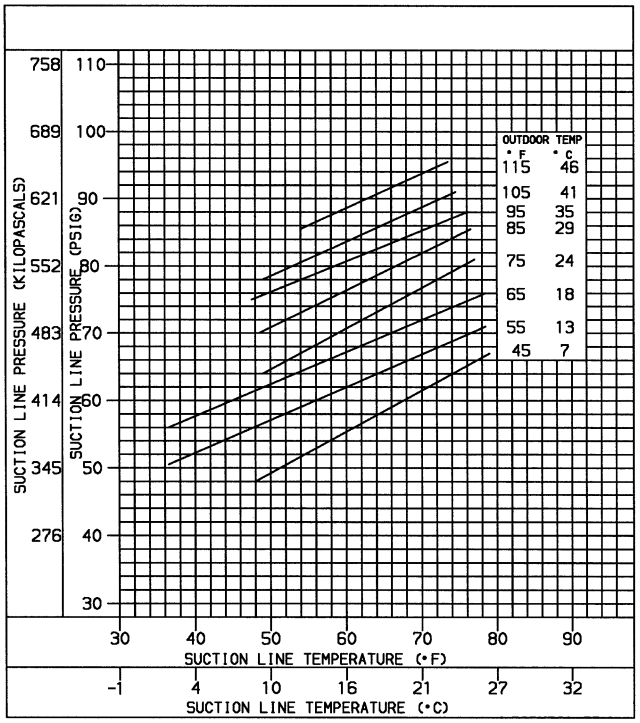


Fig. 49 — Cooling Charging Chart; 48TF008

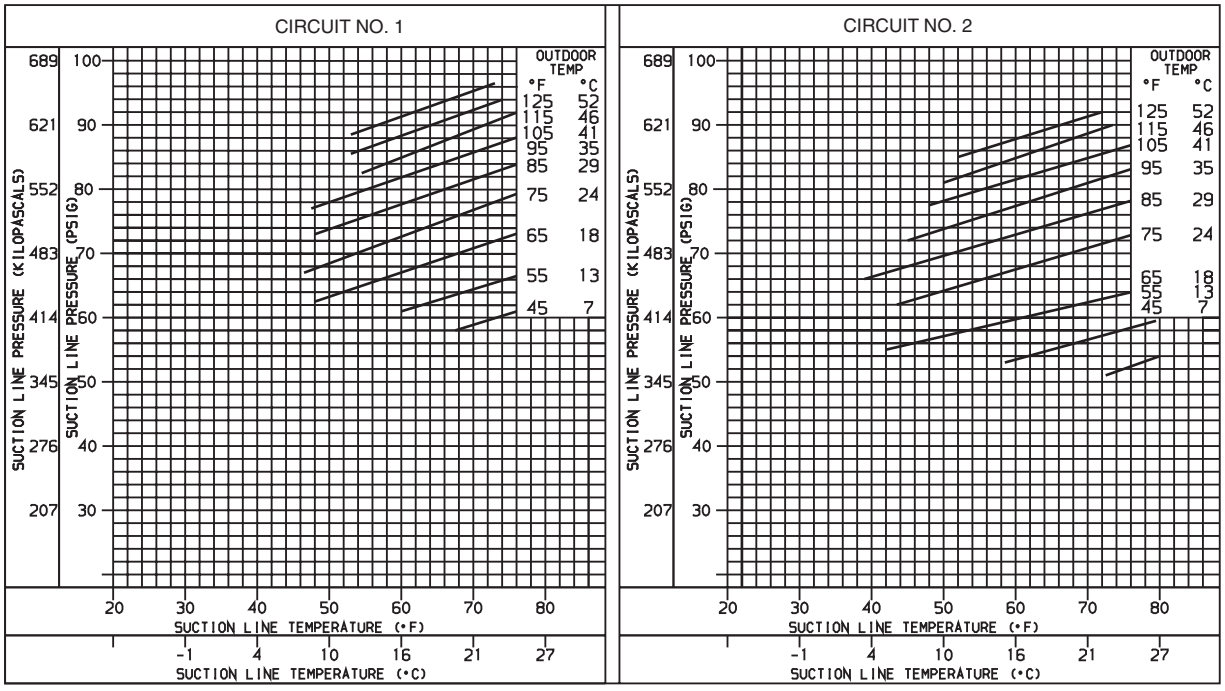


Fig. 50 — Cooling Charging Chart; 48TF009

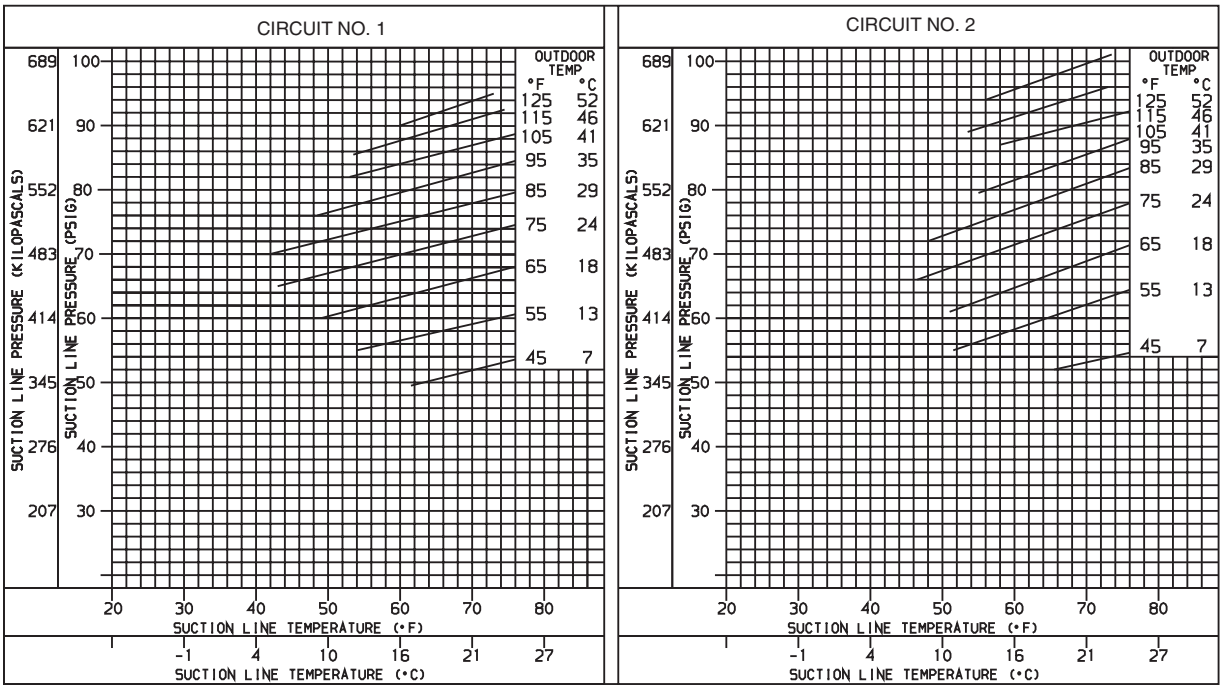


Fig. 51 — Cooling Charging Chart; 48TF012

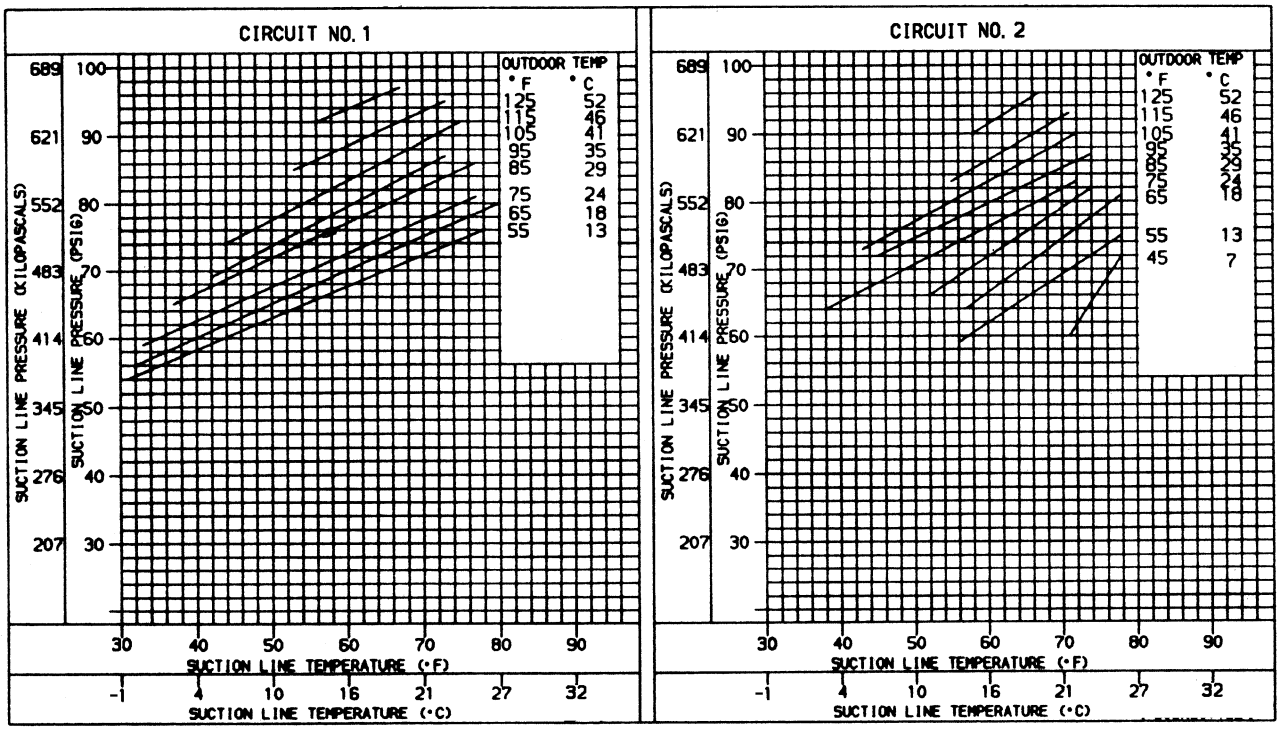


Fig. 52 — Cooling Charging Chart; 48TF014

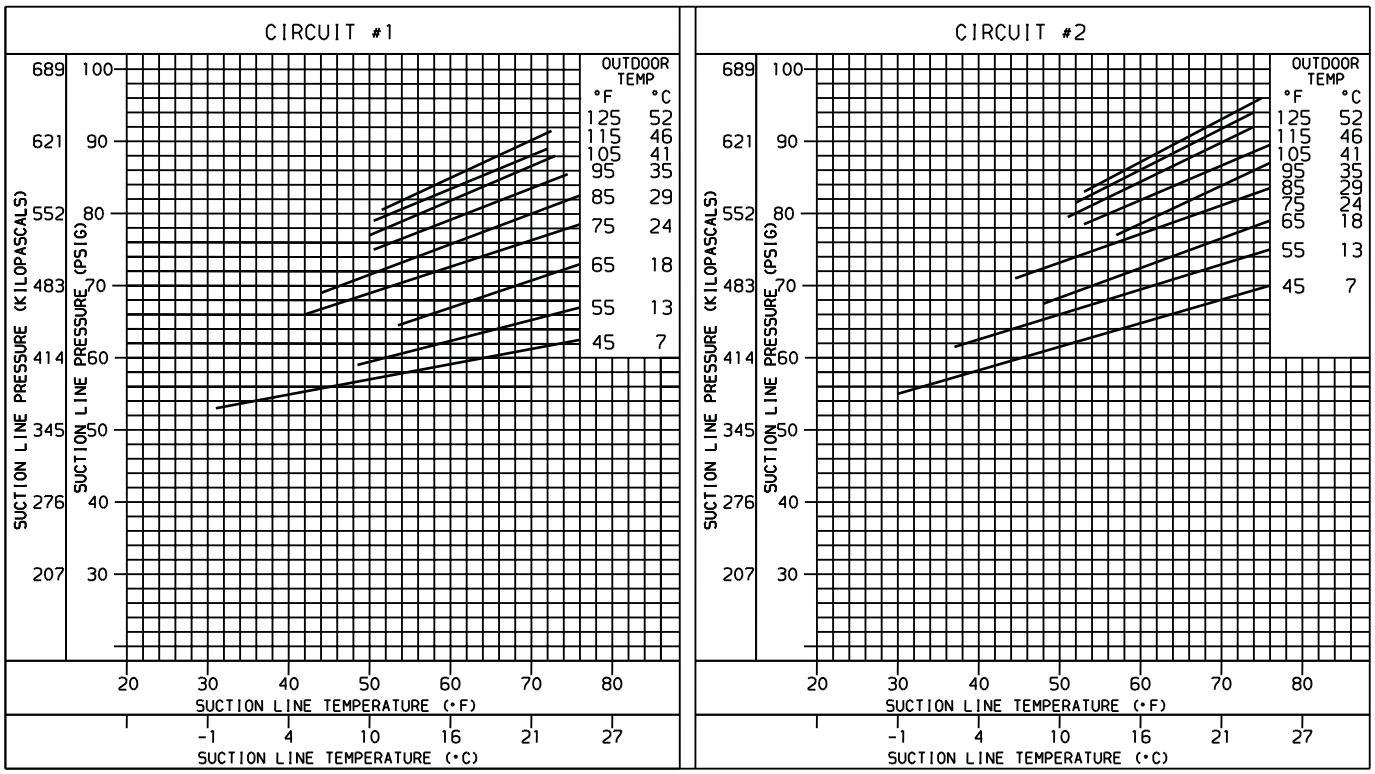


Fig. 53 — Cooling Charging Chart; 48TM008

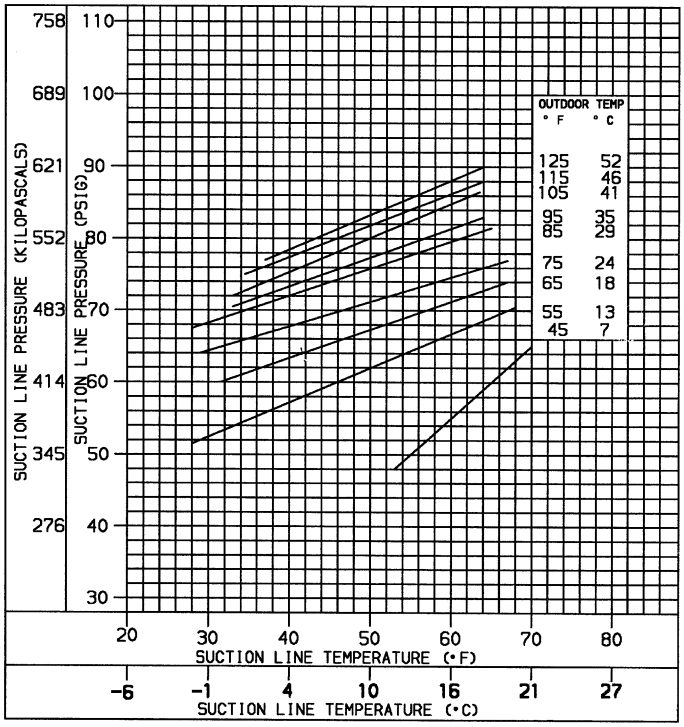


Fig. 54 — Cooling Charging Chart; 48TM009

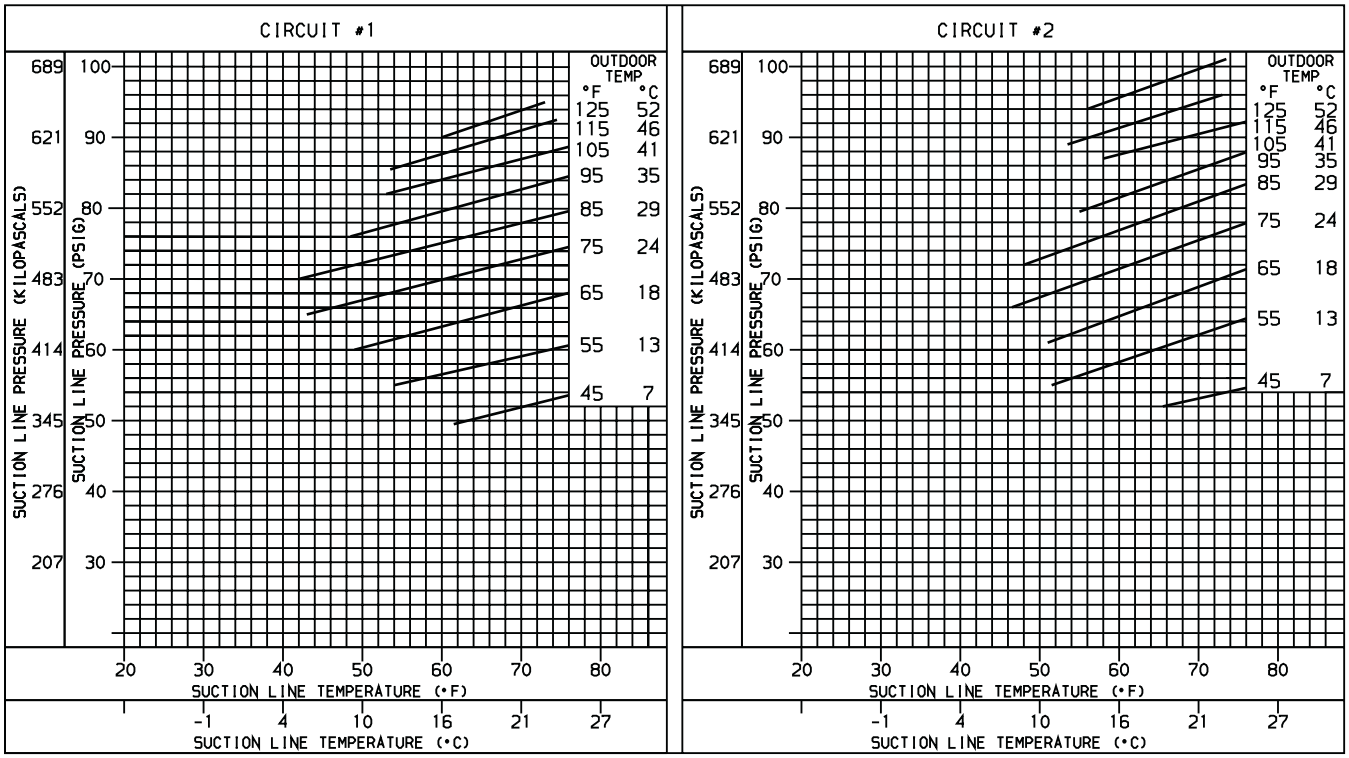


Fig. 55 — Cooling Charging Chart; 48TM012

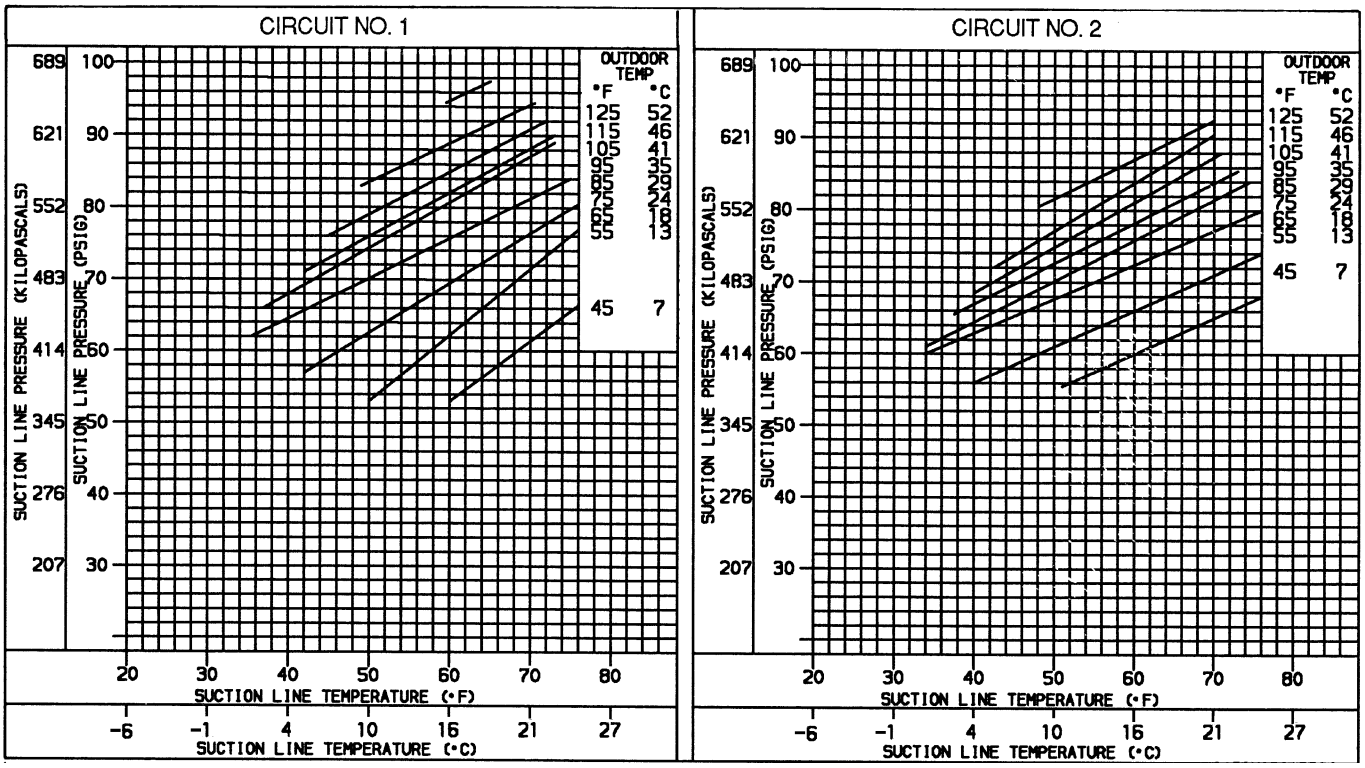


Fig. 56 — Cooling Charging Chart; 48TM014

Flue Gas Passageways — To inspect the flue collector box and upper areas of the heat exchanger:

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

Combustion-Air Blower — Clean seasonally to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bimonthly to determine proper cleaning frequency.

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

1. Slide burner access panel out.
2. Remove the 6 screws that attach induced-draft motor housing to vestibule plate (Fig. 57).
3. The blower wheel can be cleaned at this point. If additional cleaning is required, continue with Steps 4 and 5.
4. To remove blower from the motor shaft, remove 2 setscrews.
5. To remove motor, remove the 4 screws that hold blower housing to mounting plate. Remove the motor cooling fan by removing one setscrew. Then remove nuts that hold motor to mounting plate.
6. To reinstall, reverse the procedure outlined above.

Limit Switch — Remove blower access panel (Fig. 7A and 7B). Limit switch is located on the fan deck. Verify operation of limit by temporarily blocking return air until limit trips.

Burner Ignition — Unit is equipped with a direct spark ignition 100% lockout system. Integrated Gas Unit Controller (IGC) is located in the control box (Fig. 12). Module contains a self-diagnostic LED. A single LED on the IGC provides a visual display of operational or sequential problems when the power supply is interrupted. When a break in power occurs, the module will be reset (resulting in a loss of fault history) and the indoor (evaporator) fan ON/OFF times will be reset. For additional information, refer to the Start-Up, Heating section on page 64. The LED error code can be observed through the viewport. See Fig. 12. During servicing refer to the label on the control box cover or Table 43 for an explanation of LED error code descriptions.

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

Main Burners — At the beginning of each heating season, inspect for deterioration, blockage due to corrosion or other causes. Observe the main burner flames and replace burners if necessary.

⚠ CAUTION

When working on gas train, do not hit or plug orifice spuds.

REMOVAL AND REPLACEMENT OF GAS TRAIN (Fig. 57 and 58)

1. Shut off manual gas valve.
2. Shut off power to unit and install lockout tag.
3. Slide out burner section side panel (not shown).
4. Disconnect gas piping at unit gas valve using backup wrench on the flats of the valve body where the gas pipe enters the gas valve. See Fig. 57.
5. Remove wires connected to gas valve. Mark each wire.
6. Remove wires from ignitor and sensor wires at the Integrated Gas Unit Controller (IGC).
7. Remove the 2 screws that attach the burner rack to the vestibule plate.
8. Slide the burner tray out of the unit (Fig. 58).
9. To reinstall, reverse the procedure outlined above.

CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described in Removal and Replacement of Gas Train section, above.
2. Inspect burners; if dirty, remove burners from rack.
3. Using a soft brush, clean burners and cross-over port as required.
4. Adjust spark gap. See Fig. 59.
5. Reinstall burners on rack.
6. Reinstall burner rack as described in Removal and Replacement of Gas Train section, this page.

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

Table 43 — LED Error Code Description*

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

LEGEND

LED — Light-Emitting Diode

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

†Indicates a code that is not an error. The unit will continue to operate when this code is displayed.

IMPORTANT: Refer to Troubleshooting Tables 44 and 45 for additional information.

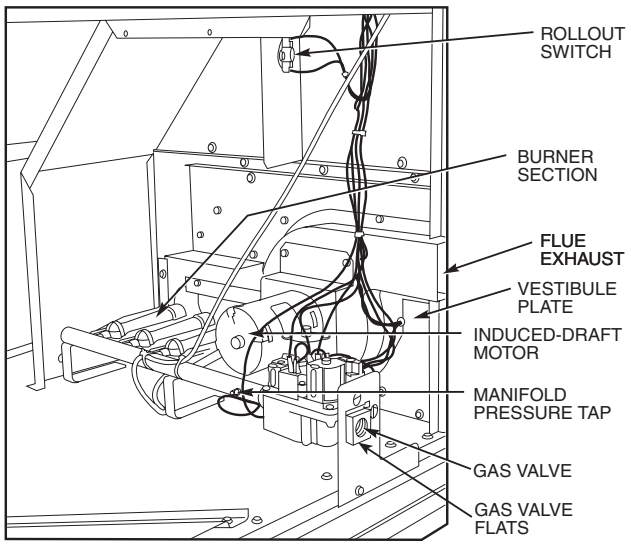


Fig. 57 — Burner Section Details

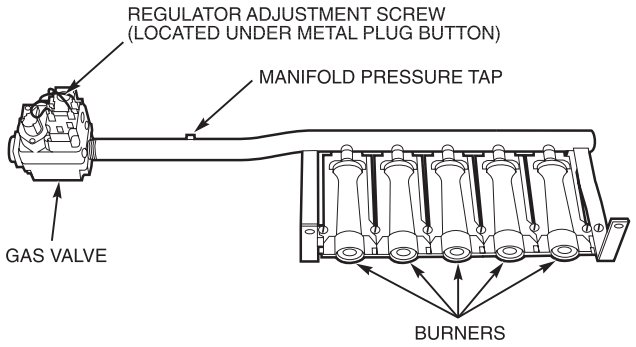
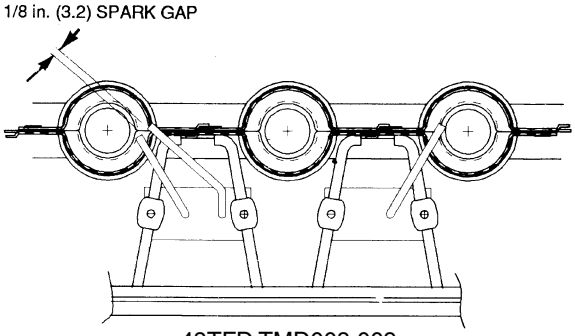
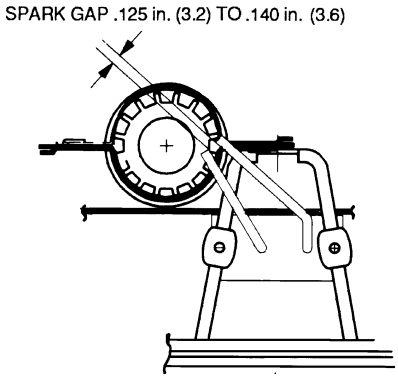


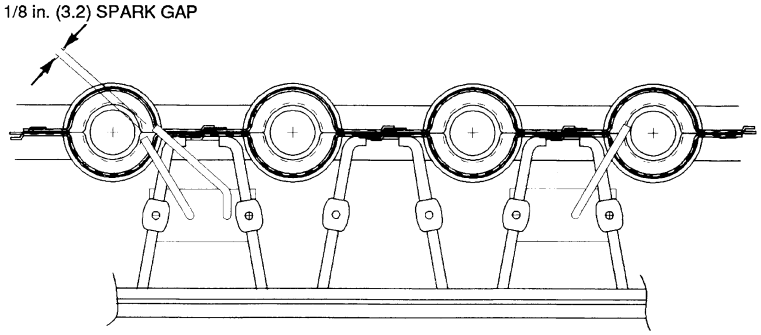
Fig. 58 — Burner Tray Details



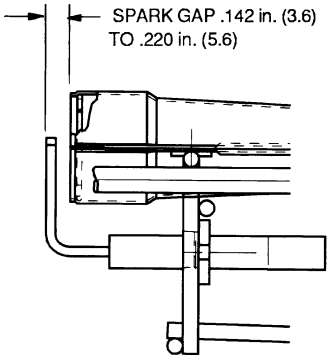
48TFD,TMD008,009
125,000 BTUH INPUT

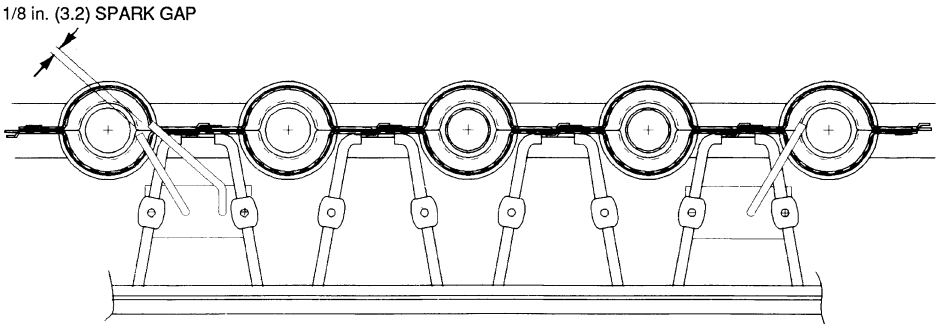


NOTE: Dimensions in ( ) are millimeters.



48TFD,TMD012, 48TFE,TME008,009
180,000 BTUH INPUT





48TFD,TMD014, 48TFE,TME012, 48TFF,TMF008,009, 48TFE,TME014, 48TFF,TMF012
220,000 BTUH INPUT
250,000 BTUH INPUT

Fig. 59 — Spark Gap Adjustment

TROUBLESHOOTING

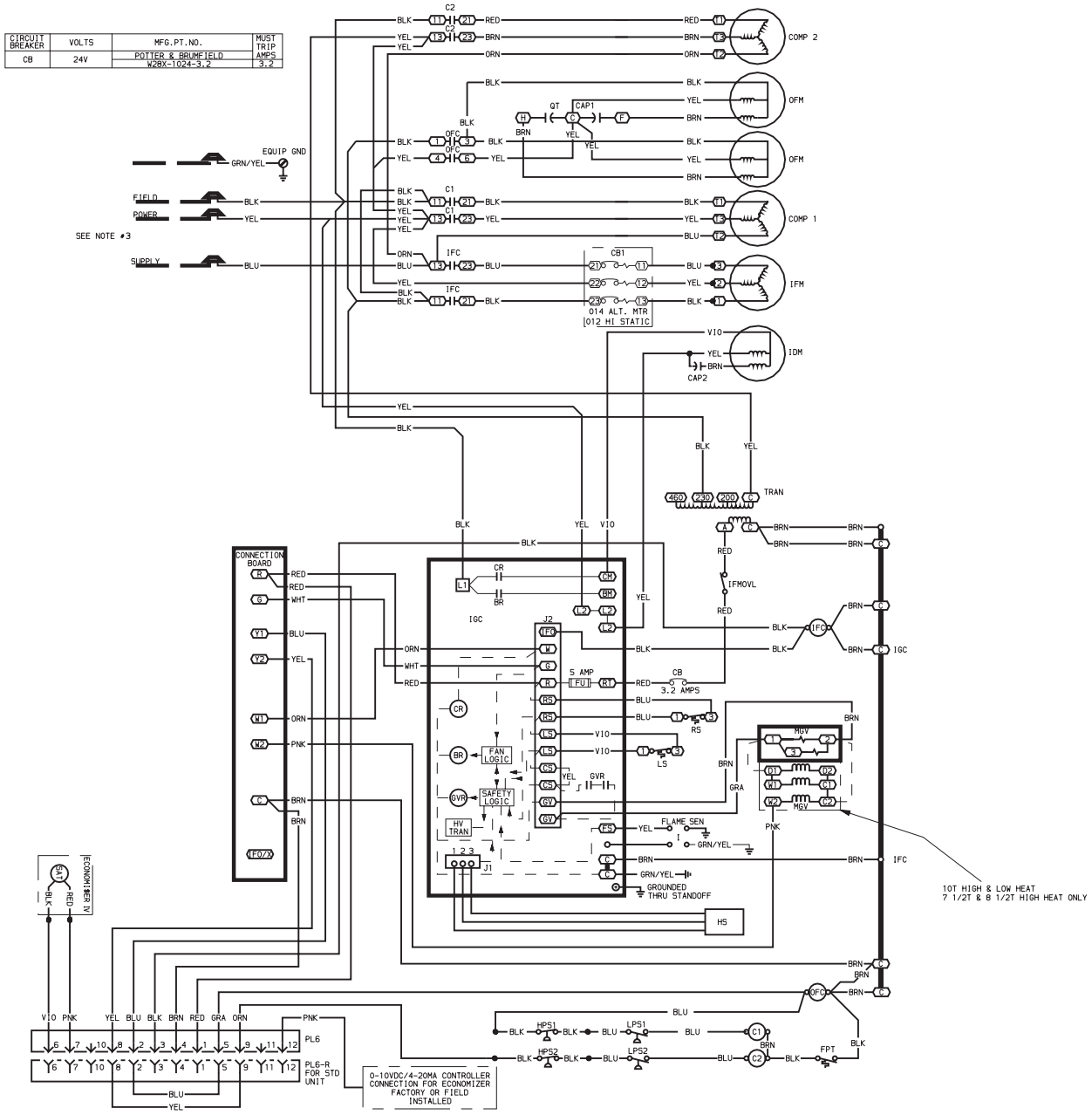
Unit Troubleshooting — Refer to Tables 44 and 45 and Fig. 60 for unit troubleshooting.

Table 44 — Cooling Service Troubleshooting

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, or 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 Makes Excessive Noise (Scroll Compressors Only).	Compressor rotating in wrong direction.	Reverse the 3-phase power leads as described on page 63.
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.	Remove 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.
	Field-installed filter drier restricted.	Replace.
Compressor No. 2 will not Run.	Unit in economizer mode.	Proper operation; no remedy necessary.

Table 45 — Heating Service Troubleshooting

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 overturerent protection require a cool down period before resetting.
	Miswired or loose connections.	Check all wiring and wirenut connections.
	Burned-out heat anticipator in thermostat.	Replace thermostat.
	Broken thermostat wires.	Run continuity check. Replace wires, if necessary.
Inadequate Heating.	Dirty air filter.	Clean or replace filter as necessary.
	Gas input to unit too low.	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure, or replace with correct orifices.
	Unit undersized for application.	Replace with proper unit or add additional unit.
	Restricted airflow.	Clean filter, replace filter, or remove any restrictions.
	Blower speed too low.	Use high speed tap, increase fan speed, or install optional blower, as suitable for individual units.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
	Too much outdoor air.	Adjust minimum position.
		Check economizer operation.
Poor Flame Characteristics.	Incomplete combustion (lack of combustion air) results in:	Check all screws around flue outlets and burner compartment. Tighten as necessary.
	Aldehyde odors, CO, sooting flame, or floating flame.	Cracked heat exchanger.
		Overfired unit — reduce input, change orifices, or adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary.
		Check orifice to burner alignment.
Burners will not Turn Off.	Unit is locked into Heating mode for a one minute minimum.	Wait until mandatory one minute time period has elapsed or power to unit.



NOTES:
1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Three phase motors are protected under primary single phasing conditions.
3. Use copper conductors only.
4. TRAN is wired for 230 v unit. If unit is to be run with 208 v power supply, disconnect BLK wire from 230 v tap (ORN) and connect to 200 v tap (RED). Insulate end of 230 v tap.

LEGEND

C	—	Contactor, Compressor
CAP	—	Capacitor
CB	—	Circuit Breaker
COMP	—	Compressor Motor
EQUIP	—	Equipment
FPT	—	Freeze Up Protection Thermostat
GND	—	Ground
HPS	—	High-Pressure Switch
HS	—	Hall-Effect Sensor
I	—	Ignitor
IDM	—	Induced-Draft Motor
IFC	—	Indoor Fan Contactor
IFM	—	Indoor Fan Motor
IFMOVL	—	Indoor Fan Motor Overload Switch
IGC	—	Integrated Gas Unit Controller
LPS	—	Low-Pressure Switch
LS	—	Limit Switch
MGV	—	Main Gas Valve
OFC	—	Outdoor Fan Contactor
OFM	—	Outdoor Fan Motor
P	—	Plug
PL	—	Plug Assembly
QT	—	Quadruple Terminal
RS	—	Rollout Switch
SAT	—	Supply Air Temperature Sensor
SEN	—	Sensor
TRAN	—	Transformer

Field Splice

X — Marked Wire

X — Terminal (Marked)

Terminal (Unmarked)

X — Terminal Block

Splice

Splice (Marked)

Factory Wiring

Field Control Wiring

Field Power Wiring

Accessory or Optional Wiring

To indicate common potential only; not to represent wiring.

Fig. 60 — Typical Unit Wiring Schematic Component Arrangement (208/230-3-60 Unit Shown)

**EconoMi$er IV Troubleshooting —** See Table 46 for EconoMi$er IV logic.

A functional view of the EconoMi$er IV is shown in Fig. 61. Typical settings, sensor ranges, and jumper positions are also shown. An EconoMi$er IV simulator program is available from Carrier to help with EconoMi$er IV training and troubleshooting.

ECONOMI$ER IV PREPARATION — This procedure is used to prepare the EconoMi$er IV for troubleshooting. No troubleshooting or testing is done by performing the following procedure.

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

SUPPLY-AIR INPUT — To check supply-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.

Table 46 — EconoMi$er IV Input/Output Logic

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

*For single enthalpy control, the module compares outdoor enthalpy to the ABCD set point.
†Power at N terminal determines Occupied/Unoccupied setting: 24 vac (Occupied), no power (Unoccupied).
**Modulation is based on the supply air sensor signal.
††Modulation is based on the DCV signal.
***Modulation is based on the greater of DCV and supply air sensor signals, between minimum position and either maximum position (DCV) or fully open (supply air signal).
†††Modulation is based on the greater of DCV and supply air sensor signals, between closed and either maximum position (DCV) or fully open (supply air signal).

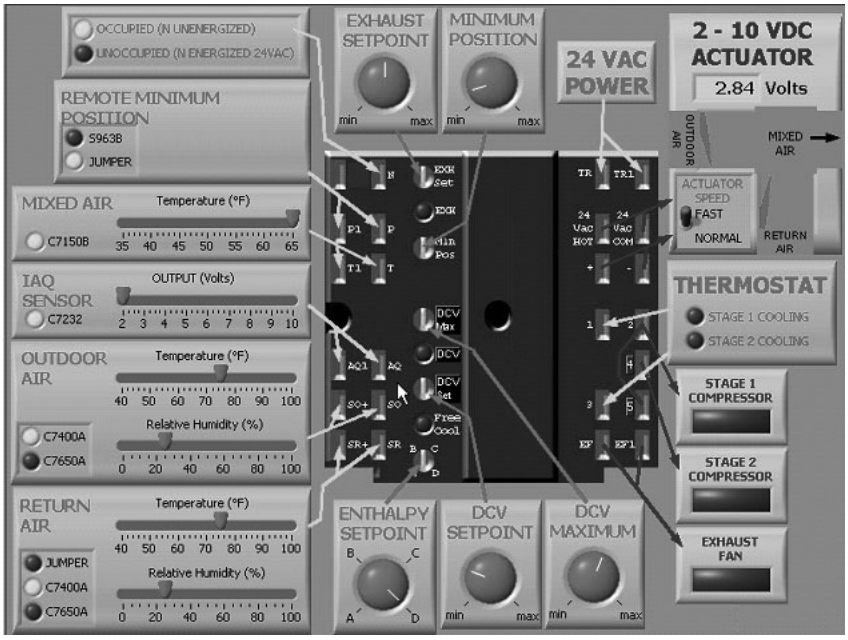


Fig. 61 — EconoMi$er IV Functional View

INDEX

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

I. PRELIMINARY INFORMATION

MODEL NO.:_____ SERIAL NO.: _____

DATE:_____ TECHNICIAN: _____

UNIT NO.: _____ JOB LOCATION: _____

JOB NAME: _____

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

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ REMOVE SHIPPING TIEDOWN BANDS ON COMPRESSOR (SIZE 014 ONLY) PER INSTALLATION INSTRUCTIONS
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTALLATION INSTRUCTIONS
- ☐ CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS
- ☐ CHECK GAS PIPING FOR LEAKS
- ☐ CHECK THAT INDOOR-AIR FILTERS ARE CLEAN AND IN PLACE
- ☐ VERIFY THAT UNIT INSTALLATION IS LEVEL
- ☐ CHECK FAN WHEELS AND PROPELLERS FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS
- ☐ ENSURE BELT TENSION IS CORRECT AND BLOWER PULLEYS ARE PROPERLY ALIGNED.
- ☐ VERIFY INSTALLATION OF ECONOMIZER HOOD (IF EQUIPPED).

III. START-UP

ELECTRICAL

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

TEMPERATURES AND PRESSURES

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

GAS INLET PRESSURE	_____	IN. WG		
GAS MANIFOLD PRESSURE	_____	IN. WG (HI FIRE)	_____	IN. WG (LO FIRE)
REFRIGERANT SUCTION PRESSURE	_____	PSIG — CIRCUIT NO. 1	_____	PSIG — CIRCUIT NO. 2
REFRIGERANT TEMP. (SUCTION) PRESSURE	_____	CIRCUIT NO. 1	_____	CIRCUIT NO. 2
REFRIGERANT DISCHARGE	_____	PSIG — CIRCUIT NO. 1	_____	PSIG — CIRCUIT NO. 2
DISCHARGE TEMPERATURE	_____	°F/C — CIRCUIT NO. 1	_____	°F/C — CIRCUIT NO. 2

- ☐ VERIFY REFRIGERANT CHARGE USING CHARGING TABLES
- ☐ VERIFY THAT 3-PHASE SCROLL COMPRESSOR ROTATING IN CORRECT DIRECTION (48TF014 AND 48TM009-014 ONLY)

GENERAL

- ☐ SET ECONOMIZER MINIMUM VENT POSITION AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS (IF EQUIPPED)

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE