



# Installation, Start-Up and Service Instructions

## CONTENTS

	Page
<b>SAFETY CONSIDERATIONS</b> .....	1
<b>INSTALLATION</b> .....	1-43
<b>Step 1 — Provide Unit Support</b> .....	1
• ROOF CURB	
• SLAB MOUNT	
• ALTERNATE UNIT SUPPORT	
<b>Step 2 — Field Fabricate Ductwork</b> .....	3
<b>Step 3 — Install Condensate Drain Line and External Trap</b> .....	3
<b>Step 4 — Rig and Place Unit</b> .....	3
• POSITIONING	
<b>Step 5 — Make Electrical Connections</b> .....	7
• FIELD POWER SUPPLY	
• FIELD CONTROL WIRING	
• DEFROST BOARD	
• HEAT ANTICIPATOR SETTINGS	
<b>Step 6 — Adjust Factory-Installed Options</b> .....	12
• DISCONNECT SWITCH	
• CONVENIENCE OUTLET	
• NOVAR CONTROLS	
• MANUAL OUTDOOR-AIR DAMPER	
• PREMIERLINK™ CONTROL	
• OPTIONAL ECONOMISER IV AND ECONOMISER2	
• ECONOMISER IV STANDARD SENSORS	
• ECONOMISER IV CONTROL MODES	
<b>Step 7 — Adjust Indoor-Fan Speed</b> .....	25
<b>PRE-START-UP</b> .....	44
<b>START-UP</b> .....	44-47
<b>SERVICE</b> .....	47-49
<b>TROUBLESHOOTING</b> .....	49-53
<b>INDEX</b> .....	54
<b>START-UP CHECKLIST</b> .....	CL-1

## 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 extinguisher available for all brazing operations.

### **▲ WARNING**

Before performing service or maintenance operations on unit, turn off main power switch to unit and 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 configuration. To convert to horizontal configuration, remove side duct opening covers. Using the same screws, install covers on vertical duct openings with the insulation-side down. Seals around duct openings must be tight.

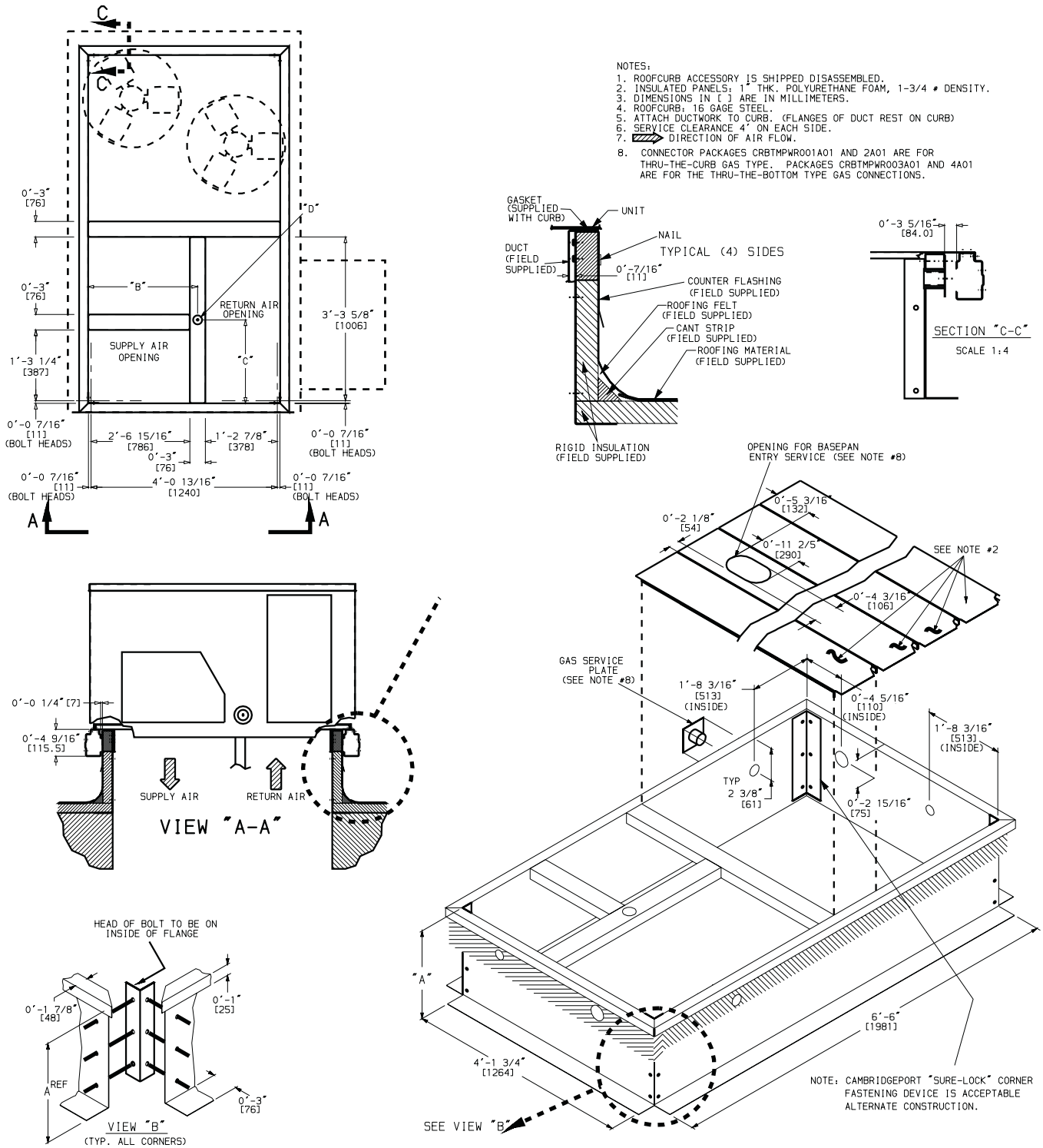
### Step 1 — Provide Unit Support

**ROOF CURB** — Assemble and install the accessory roof curb in accordance with instructions shipped with the curb. See Fig. 1. Install insulation, cant strips, roofing felt, and counter flashing as shown. *Ductwork must be attached to curb.* If electric or control power will be routed through the basepan, use the proper accessory kit listed in Fig. 1, available from your local distributor. Attach the accessory thru-the-bottom service connections to the basepan in accordance with the accessory installation instructions. Connections must be installed before the unit is set on the roof curb.

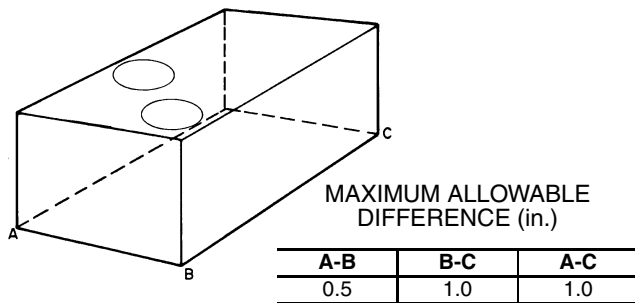
**IMPORTANT:** The gasketing of the unit to the roof curb is critical for a water-tight seal. Install gasket supplied with the roof curb as shown in Fig. 1. Improperly applied gasket can also result in air leaks and poor unit performance.

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

CONNECTOR PKG. ACC.	B	C	D ALT DRAIN HOLE	GAS	POWER	CONTROL	ACCESSORY PWR	ROOFCURB ACCESSORY	A	UNIT SIZE
CRBTMPWR001A01	2'-8 7/16" [827]	1'-10 15/16" [583]	1 3/4" [44.5]	3/4" [19]NPT	3/4" [19]NPT	1/2" [12.7]NPT	1/2" [12.7]NPT	CRRFCURB003A01	1'-2" [356]	50TFQ 008-012
CRBTMPWR002A01										
CRBTMPWR003A01				1/2" [12.7]NPT	3/4" [19]NPT					
CRBTMPWR004A01				3/4" [19]NPT	1 1/4" [31.7]			CRRFCURB004A01	2'-0" [610]	



**Fig. 1 — Roof Curb Details**



**Fig. 2 — Unit Leveling Tolerances**

**SLAB MOUNT (Horizontal Units Only)** — Provide a level concrete slab that extends a minimum of 6 in. beyond the unit cabinet on all sides. Install a gravel apron in front of the outdoor coil air inlet to prevent grass and foliage from obstructing airflow.

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

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

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

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

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

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

**Step 3 — Install Condensate Drain Line and External Trap** — Condensate drain connections are located at the bottom and end of the unit. Unit discharge connections do not determine the use of drain connections; either drain connection can be used in vertical or horizontal applications.

When using the standard end drain connection, make sure the plug 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 from the bottom connection to the end connection. The center drain plug looks like a star connection, but can be removed with a 1/2-in. socket drive extension. See Fig. 3. The piping for the condensate drain and external trap can be completed after the unit is in place.

All units must have an external trap for condensate drainage. Install a trap at least 4-in. deep and protect against freeze-up. If drain line is installed downstream from the external trap,

pitch the line away from the unit at 1/4-in. per ft of run. Do not use a pipe size smaller than the unit connection. See Fig. 4.

**Step 4 — Rig and Place Unit** — Inspect the unit for transportation damage. File any claim with the transportation agency. Keep the unit upright and do not drop it. Spreader bars are not required if top crating is left on the unit. Rollers may be used to move the unit across a roof. Level by using the unit frame as a reference. See Table 1 and Fig. 5 for additional information. Operating weight is shown in Table 1 and Fig. 5.

Lifting holes are provided in the base rails as shown in Fig. 5 and 6. Refer to rigging instructions on the unit.

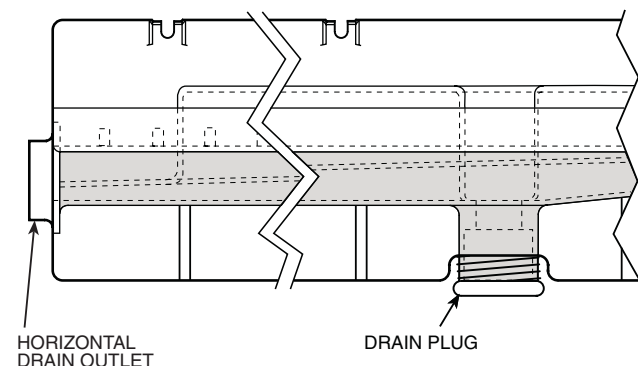
**POSITIONING** — Maintain clearance around and above the unit to provide proper airflow and service access. See Fig. 6.

Position the unit on the roof curb so that the following clearances are maintained: 1/4-in. clearance between the roof curb and base rails on each side and in front of the unit; 3<sup>5</sup>/<sub>16</sub>-in. clearance between the roof curb and the outdoor fan end of the unit (see Fig. 1, section C-C).

*Do not install the unit indoors.* Do not locate the unit air inlet near exhaust vents or other sources of contaminated air.

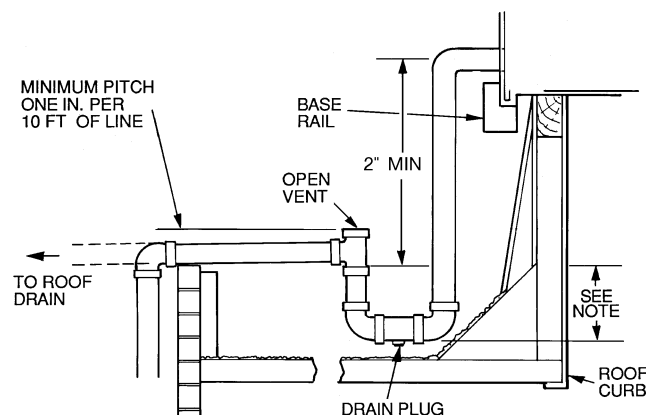
Although the unit is weatherproof, guard against water from higher level runoff and overhangs.

After the unit is in position, remove the polyethylene shipping wrapper and rigging skid.



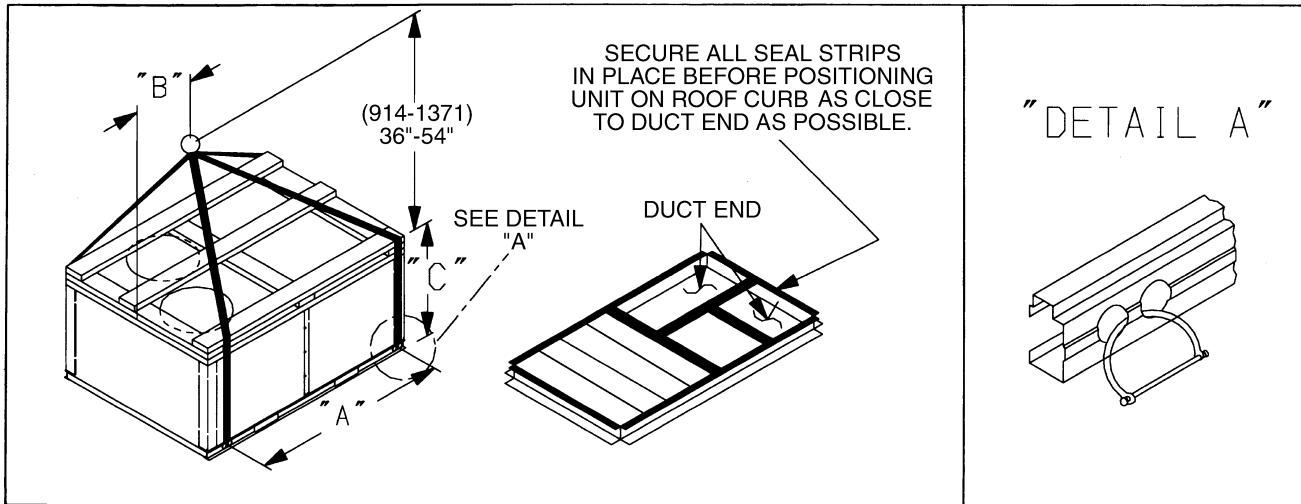
**NOTE:** Drain plug is shown in factory-installed position.

**Fig. 3 — Condensate Drain Pan (Side View)**



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

**Fig. 4 — 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. Unit weights do not include economizer. See Table 1 for economizer weights.

50TFQ	WEIGHT		A		B		C	
	Lb	Kg	in.	mm	in.	mm	in.	mm
008	940	426	77.42	1966.5	41.5	1054	42.12	1070
009	965	438	77.42	1966.5	41.5	1054	42.12	1070
012	1015	460	77.42	1966.5	41.5	1054	42.12	1070

**CAUTION**

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

**Fig. 5 — Rigging Details**

**Table 1 — Physical Data**

UNIT SIZE 50TFQ		008	009	012
NOMINAL CAPACITY (tons)		7½	8½	10
OPERATING WEIGHT (lb)				
Unit		940	965	1015
Economizer				
EconoMiser IV		75	75	75
Roof Curb*		143	143	143
COMPRESSOR (Hermetic)		Reciprocating		Scroll
Quantity		2	2	2
Oil (oz)		45 ea	54 ea	54 ea
REFRIGERANT TYPE		R-22		
Operating Charge (lb-oz)				
Circuit 1		5-14	8- 6	7-14
Circuit 2		5-13	8-13	8- 3
OUTDOOR COIL		Enhanced Copper Tubes, Aluminum Lanced Fins, Acutrol™ Feed Device		
Rows...Fins/in.		1...17	2...17	2...17
Total Face Area (sq ft)		20.50	18.00	18.30
OUTDOOR FAN		Propeller Type		
Nominal Cfm		6500	6500	6500
Quantity...Diameter (in.)		2...22	2...22	2...22
Motor Hp...Rpm		¼...1100	¼...1100	¼...1100
Watts Input (Total)		500	500	500
INDOOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Acutrol Feed Device		
Rows...Fins/in.		3...15	3...15	3...15
Total Face Area (sq ft)		8.0	8.0	11.1
INDOOR FAN		Centrifugal Type		
Quantity...Size (in.)	Std	1...15 x 15	1...15 x 15	1...15 x 15
	Alt	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
	Alt	Belt	—	Belt
	High-Static	Belt	Belt	Belt
Nominal Cfm		3000	3600	4000
Maximum Continuous Bhp	Std	2.40	2.40	2.40
	Alt	2.40	—	2.90
	High-Static	3.70	3.70	5.25
Motor Frame Size	Std	56	56	56
	Alt	56	—	56
	High-Static	56	56	56
Nominal Rpm	Std	—	—	—
	Alt	—	—	—
	High-Static	1725	1725	1725
Fan Rpm Range	Std	590- 840	685- 935	685- 935
	Alt	685- 935	—	835-1085
	High-Static	860-1080	860-1080	830-1130
Motor Bearing Type		Ball	Ball	Ball
Maximum Allowable Rpm		2100	2100	2100
Motor Pulley Pitch Diameter Min/Max (in.)	Std	2.4/3.4	2.8/3.8	2.8/3.8
	Alt	2.8/3.8	—	3.4/4.4
	High-Static	4.0/5.0	4.0/5.0	2.8/3.8
Nominal Motor Shaft Diameter (in.)	Std	⅝	⅝	⅝
	Alt	⅝	—	⅞
	High-Static	⅞	⅞	⅞
Fan Pulley Pitch Diameter (in.)	Std	7.0	7.0	7.0
	Alt	7.0	—	7.0
	High-Static	8.0	8.0	5.8
Belt, Quantity...Type...Length (in.)	Std	1...A...53	1...A...48	1...A...49
	Alt	1...A...49	—	1...A...51
	High-Static	1...A...65	1...A...53	1...BX...48
Pulley Center Line Distance (in.)	Std	16.75-19.25	16.75-19.25	15.85-17.50
	Alt	16.75-19.25	—	15.85-17.50
	High-Static	16.75-19.25	16.75-19.25	15.85-17.50
Speed Change per Full Turn of Moveable Pulley Flange (rpm)	Std	50	50	50
	Alt	50	—	50
	High-Static	60	60	60
Moveable Pulley Maximum Full Turns From Closed Position	Std	5	5	5
	Alt	5	—	5
	High-Static	5	5	6
Factory Setting	Std	5	5	5
	Alt	5	—	5
	High-Static	5	5	5
Factory Speed Setting (rpm)	Std	590	685	685
	Alt	685	—	835
	High-Static	860	880	887
Fan Shaft Diameter at Pulley (in.)		1	1	1
HIGH-PRESSURE SWITCH (psig)		Standard Compressor Internal Relief (Differential)		
Cutout		450 ± 50		
Reset (Auto.)		428		
LOSS-OF-CHARGE (LOW-PRESSURE) SWITCH (psig)		7 ± 3		
Cutout		22 ± 5		
Reset (Auto.)				
FREEZE PROTECTION THERMOSTAT (F)		30 ± 5		
Opens		45 ± 5		
Closes				
OUTDOOR-AIR INLET SCREENS		Cleanable.		
		Screen quantity and size vary based on options 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

LEGEND

Bhp — Brake Horsepower

\*Weight of 14-in. roof curb.

UNIT	STD. UNIT WEIGHT		ECONOMIZER IV WEIGHT		VERT. ECON IV W/P.E. WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		"H"		"J"		"K"				
	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	FT	-IN.	MM	FT	-IN.	MM	FT	-IN.	MM
50TF0008	940	426	75	34.1	145	65.9	207	94	178	81	254	115	301	136	2'-0	7/8"	632	3'-5	5/16"	1050	2'-9	11/16"	856
50TF0009	985	438	→	→	→	→	212	96	183	83	261	119	309	140	2'-10	7/8"	632	3'-5	5/16"	1050	2'-9	11/16"	856
50TF0012	1015	460	→	→	→	→	223	101	193	88	274	124	325	147	2'-10	7/8"	885	4'-1	5/16"	1253	3'-0	3/8"	924

THE BOTTOM POWER CHART USE WITH ACCESSORY PACKAGES - (CRETE/MODULAIR, 2401)

CONDUCTOR SIZE	WIRE	WIRE AREA (SQ. IN.)	RESISTANCE (OHMS/1000 FT.)
1/2"	ASC	7/8" (22.2)	1.0
3/4"	ASC	7/8" (22.2)	1.0
1"	ASC	7/8" (22.2)	1.0
1 1/4"	ASC	7/8" (22.2)	1.0
1 1/2"	ASC	7/8" (22.2)	1.0
2"	ASC	7/8" (22.2)	1.0
2 1/2"	ASC	7/8" (22.2)	1.0
3"	ASC	7/8" (22.2)	1.0
3 1/2"	ASC	7/8" (22.2)	1.0
4"	ASC	7/8" (22.2)	1.0
4 1/2"	ASC	7/8" (22.2)	1.0
5"	ASC	7/8" (22.2)	1.0
5 1/2"	ASC	7/8" (22.2)	1.0
6"	ASC	7/8" (22.2)	1.0
6 1/2"	ASC	7/8" (22.2)	1.0
7"	ASC	7/8" (22.2)	1.0
7 1/2"	ASC	7/8" (22.2)	1.0
8"	ASC	7/8" (22.2)	1.0
8 1/2"	ASC	7/8" (22.2)	1.0
9"	ASC	7/8" (22.2)	1.0
9 1/2"	ASC	7/8" (22.2)	1.0
10"	ASC	7/8" (22.2)	1.0
10 1/2"	ASC	7/8" (22.2)	1.0
11"	ASC	7/8" (22.2)	1.0
11 1/2"	ASC	7/8" (22.2)	1.0
12"	ASC	7/8" (22.2)	1.0
12 1/2"	ASC	7/8" (22.2)	1.0
13"	ASC	7/8" (22.2)	1.0
13 1/2"	ASC	7/8" (22.2)	1.0
14"	ASC	7/8" (22.2)	1.0
14 1/2"	ASC	7/8" (22.2)	1.0
15"	ASC	7/8" (22.2)	1.0
15 1/2"	ASC	7/8" (22.2)	1.0
16"	ASC	7/8" (22.2)	1.0
16 1/2"	ASC	7/8" (22.2)	1.0
17"	ASC	7/8" (22.2)	1.0
17 1/2"	ASC	7/8" (22.2)	1.0
18"	ASC	7/8" (22.2)	1.0
18 1/2"	ASC	7/8" (22.2)	1.0
19"	ASC	7/8" (22.2)	1.0
19 1/2"	ASC	7/8" (22.2)	1.0
20"	ASC	7/8" (22.2)	1.0
20 1/2"	ASC	7/8" (22.2)	1.0
21"	ASC	7/8" (22.2)	1.0
21 1/2"	ASC	7/8" (22.2)	1.0
22"	ASC	7/8" (22.2)	1.0
22 1/2"	ASC	7/8" (22.2)	1.0
23"	ASC	7/8" (22.2)	1.0
23 1/2"	ASC	7/8" (22.2)	1.0
24"	ASC	7/8" (22.2)	1.0
24 1/2"	ASC	7/8" (22.2)	1.0
25"	ASC	7/8" (22.2)	1.0
25 1/2"	ASC	7/8" (22.2)	1.0
26"	ASC	7/8" (22.2)	1.0
26 1/2"	ASC	7/8" (22.2)	1.0
27"	ASC	7/8" (22.2)	1.0
27 1/2"	ASC	7/8" (22.2)	1.0
28"	ASC	7/8" (22.2)	1.0
28 1/2"	ASC	7/8" (22.2)	1.0
29"	ASC	7/8" (22.2)	1.0
29 1/2"	ASC	7/8" (22.2)	1.0
30"	ASC	7/8" (22.2)	1.0
30 1/2"	ASC	7/8" (22.2)	1.0
31"	ASC	7/8" (22.2)	1.0
31 1/2"	ASC	7/8" (22.2)	1.0
32"	ASC	7/8" (22.2)	1.0
32 1/2"	ASC	7/8" (22.2)	1.0
33"	ASC	7/8" (22.2)	1.0
33 1/2"	ASC	7/8" (22.2)	1.0
34"	ASC	7/8" (22.2)	1.0
34 1/2"	ASC	7/8" (22.2)	1.0
35"	ASC	7/8" (22.2)	1.0
35 1/2"	ASC	7/8" (22.2)	1.0
36"	ASC	7/8" (22.2)	1.0
36 1/2"	ASC	7/8" (22.2)	1.0
37"	ASC	7/8" (22.2)	1.0
37 1/2"	ASC	7/8" (22.2)	1.0
38"	ASC	7/8" (22.2)	1.0
38 1/2"	ASC	7/8" (22.2)	1.0
39"	ASC	7/8" (22.2)	1.0
39 1/2"	ASC	7/8" (22.2)	1.0
40"	ASC	7/8" (22.2)	1.0
40 1/2"	ASC	7/8" (22.2)	1.0
41"	ASC	7/8" (22.2)	1.0
41 1/2"	ASC	7/8" (22.2)	1.0
42"	ASC	7/8" (22.2)	1.0
42 1/2"	ASC	7/8" (22.2)	1.0
43"	ASC	7/8" (22.2)	1.0
43 1/2"	ASC	7/8" (22.2)	1.0
44"	ASC	7/8" (22.2)	1.0
44 1/2"	ASC	7/8" (22.2)	1.0
45"	ASC	7/8" (22.2)	1.0
45 1/2"	ASC	7/8" (22.2)	1.0
46"	ASC	7/8" (22.2)	1.0
46 1/2"	ASC	7/8" (22.2)	1.0
47"	ASC	7/8" (22.2)	1.0
47 1/2"	ASC	7/8" (22.2)	1.0
48"	ASC	7/8" (22.2)	1.0
48 1/2"	ASC	7/8" (22.2)	1.0
49"	ASC	7/8" (22.2)	1.0
49 1/2"	ASC	7/8" (22.2)	1.0
50"	ASC	7/8" (22.2)	1.0

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

NOTE: DIMENSIONS IN [ ] ARE IN MILLIMETERS.

NOTE: CENTER OF GRAVITY.

NOTE: DIRECTION OF AIR FLOW.

NOTE: DUCTWORK TO BE ATTACHED TO ACCESSORY ROOF CURB ONLY.

NOTE: PREVIOUS CLEARANCE (LOCAL CODES OR JURISDICTION MAY VARY).

NOTE: BOTTOM TO COMBUSTIBLE SURFACES (WHEN NOT USING CURB) 0 INCHES, ON HORIZONTAL DISCHARGE UNITS WITH ELECTRIC HEAT 1 INCH CLEARANCE TO DUCTWORK FOR 1 FOOT.

NOTE: OUTDOOR COIL, FOR PROPER AIR FLOW, 36 INCHES ONE SIDE, 12 INCHES THE OTHER. THE SIDE GETTING THE GREATER CLEARANCE IS OPTIONAL.

NOTE: OVERHEAD, 60 INCHES TO ASSURE PROPER OUTDOOR FAN OPERATION.

NOTE: UNITS, CONTROL BOX SIDE, 42 IN. PER NEC BETWEEN UNIT AND UNGROUNDED SURFACES, CONTROL BOX SIDE 36 IN. PER NEC.

NOTE: BETWEEN UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES, CONTROL BOX SIDE, 42 IN. PER NEC.

NOTE: HORIZONTAL SUPPLY AND RETURN END, 0 INCHES WHEN THE ALTERNATE CONDENSATE DRAIN IS USED.

NOTE: WITH THE EXCEPTION OF THE CLEARANCE FOR THE OUTDOOR COIL AS STATED IN NOTES 5g, b, AND c, A REMOVABLE FENCE OR BARRICADE REQUIRES NO CLEARANCE.

NOTE: UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM WOOD OR CLASS A, B, OR C ROOF COVERING MATERIAL.

NOTE: THE VERTICAL CENTER OF GRAVITY IS 1'-7 1/2" FOR 008 & 009, 2'-0" (E610) FOR 012 UP FROM THE BOTTOM OF THE BASE RAIL.

NOTE: CONNECTION SIZES

A 1 3/8" DIA. (E35) FIELD POWER SUPPLY HOLE

B 1 1/2" DIA. (E64) POWER SUPPLY KNOCK-OUT

C 1 3/4" DIA. (E41) CHARGING PORT HOLE

D 7/8" DIA. (E21) FIELD CONTROL WIRING HOLE

E 3/4"-1 1/4" NPT CONDENSATE DRAIN

F 2" DIA. (E11) POWER SUPPLY KNOCK-OUT

NOTE: FILTER ACCESS PANEL (DISPOSABLE FILTERS)

NOTE: BLOCKOFF PANEL

NOTE: VIEW S-S

NOTE: FILTER ACCESS PANEL (DISPOSABLE FILTERS)

NOTE: BLOCKOFF PANEL

NOTE: VIEW S-S

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NOTE: FILTER ACCESS PANEL (DISPOSABLE FILTERS)

NOTE: BLOCKOFF PANEL

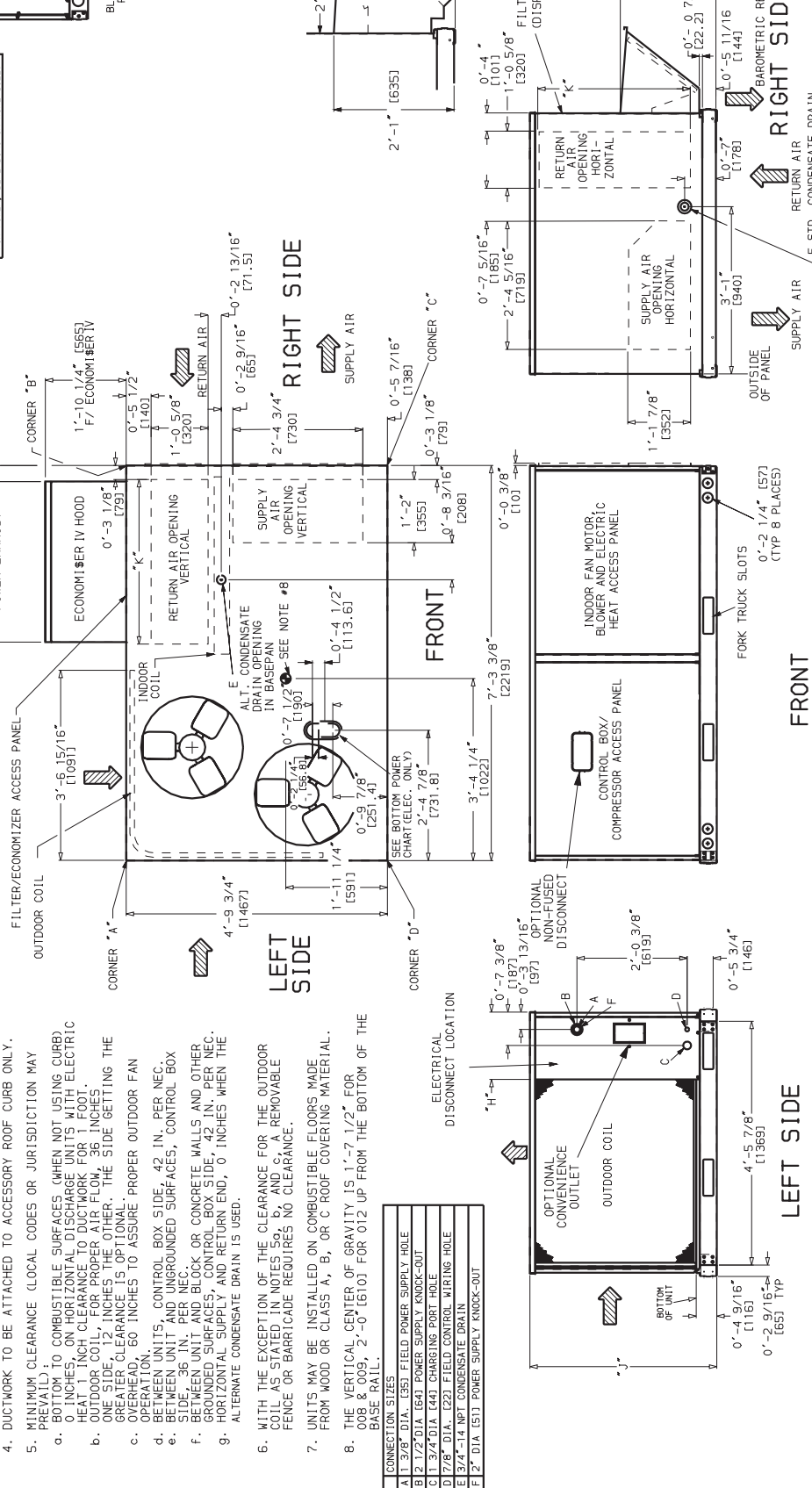


Fig. 6 — Base Unit Dimensions

## Step 5 — 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 (American National Standards Institute)/NFPA (National Fire Protection Association) 70 latest year and local electrical codes. Failure to follow this warning could result in the installer being liable for personal injury of others.

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

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

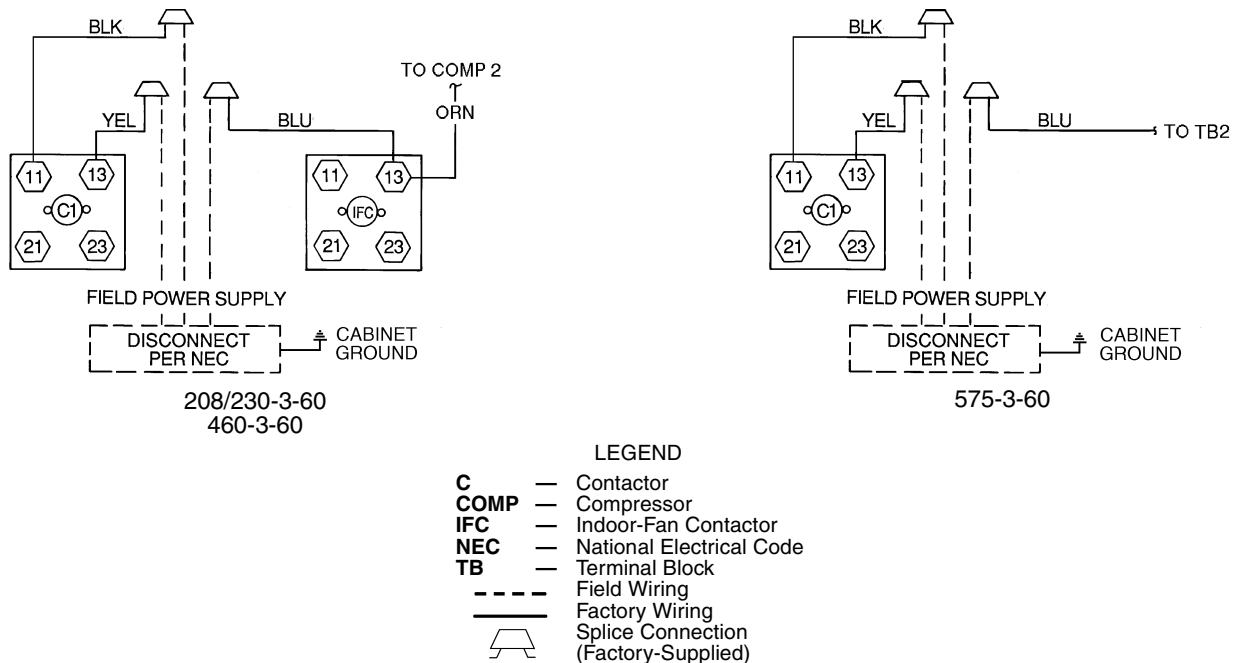
When installing units, provide a disconnect per the NEC.

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

Install field wiring as follows:

1. Install conduit through the side panel openings. For units without electric heat, install conduit between the disconnect and control box.
2. Install power lines to terminal connections as shown in Fig. 7.
3. For units with electric heat, refer to Table 2 and Accessory Installation Instructions.

During operation, voltage to compressor terminals must be within range indicated on unit nameplate (see Tables 3A and 3B). On 3-phase units, voltages between phases must be balanced within 2%, and the current within 10%. Use the formula shown in Tables 3A and 3B, Note 2 on page 11 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.



**Fig. 7 — Power Wiring Connections**

**Table 2 — Electric Heating Capacities**

50TFQ UNIT SIZE	UNIT VOLTAGE (60 Hz)	ACCESSORY kW	ELECTRIC HEATER PART NUMBER CRHEATER--A00	SINGLE POINT BOX PACKAGE NO. CRSINGLE--A00
008, 009	208/230/240 (3 phase)	7.8/ 9.6/10.4 12.0/14.7/16.0 18.6/22.8/24.8 24.0/29.4/32.0 31.8/39.0/42.4*	017 010 011 012 012 and 017	007 007 009 009 013
	460/480 (3 phase)	12.8/13.9 15.2/16.5 25.6/27.8 30.4/33.0 38.4/41.7*	016 013 014 015 014 and 016	006 006 008 008 010
	575 (3 phase)	17.0 34.0	018 019	006 006†
012	208/230/240 (3 phase)	7.8/ 9.6/10.4 12.0/14.7/16.0 24.0/29.4/32.0 31.8/39.0/42.4* 37.6/46.2/50.0*	017 010 012 012 and 017 010 and 012	012 012 015 017 017
	460/480 (3 phase)	15.2/16.5 25.6/27.8 30.4/33.0 38.4/41.7* 45.9/50.0*	013 014 015 014 and 016 013 and 015	011 014 014 016 016
	575 (3 phase)	17.0 34.0 51.0*	018 019 018 and 019	011 014 016

\*Two heater packages required to provide kW indicated.  
 †Use CRSINGLE008A00 for units with an electrical convenience outlet.

**NOTES:**

- The rated heater voltage is 240, 480, and 575 v. If power distribution voltage varies from rated heater voltage, heater kW will vary accordingly.
- To determine heater kW at voltages other than those shown in table, use the following formula:  
 Heater kW new = Heater kW rated x (unit power distribution voltage/rated heater voltage)<sup>2</sup>

As an example:  
 For a 16 kW heater rated at 240 v with a power distribution voltage of 215 v  
 kW new = 16 kW (215/240)<sup>2</sup>  
 kW new = 12.8 kW (rating at 215 v)

**Table 3A — Electrical Data (Units Without Electrical Convenience Outlet)**

50TFQ UNIT SIZE	NOMINAL V-PH-Hz	IFM TYPE	VOLTAGE RANGE		COMPRESSOR (each)		OFM FLA	IFM FLA	ELECTRIC HEAT*		POWER SUPPLY		DISCONNECT SIZE†					
			Min	Max	RLA	LRA			Nominal kW**	FLA	MCA	MOCP	FLA	LRA				
008 (7½ Tons)	208/230-3-60	STD	187	254	13.4	91.0	1.4	5.8	—	—	38.8/ 38.8	40/ 40††	41/ 41	229/229				
									7.8/10.4	21.7/ 25.0	65.9/ 70.0	70/ 70	66/ 69	251/254				
									12.0/16.0	33.3/ 38.5	80.4/ 86.9	90/ 90	79/ 85	262/268***				
									18.6/24.8	51.6/ 59.7	103.3/113.4	110/125	100/109	281/289***				
									24.0/32.0	66.6/ 77.0	122.0/135.0	125/150	117/129	296/306***				
									31.8/42.4	88.3/102.0	149.1/166.3	150/175	142/158	317/331***				
		HIGH-STATIC	187	254	13.4	91.0	1.4	10.6	—	—	43.6/ 43.6	45/ 45††	46/ 46	273/273				
									7.8/10.4	21.7/ 25.0	70.7/ 74.8	80/ 80	71/ 75	294/298				
									12.0/16.0	33.3/ 38.5	85.2/ 91.7	90/100	85/ 91	306/311***				
									18.6/24.8	51.6/ 59.7	108.1/118.2	110/125	106/115	324/332***				
									24.0/32.0	66.6/ 77.0	126.8/139.8	150/150	123/135	339/350***				
									31.8/42.4	88.3/102.0	153.9/171.1	175/175	148/164	361/375***				
	460-3-60	STD	414	508	6.7	42.0	0.7	2.6	—	—	19.1	20††	20	108				
									13.9	16.7	40.0	40††	39	124				
									16.5	19.8	43.8	45††	43	128				
									27.8	33.4	60.8	70	58	141				
									33.0	39.7	68.7	70	66	147				
									41.7	50.2	81.8	90	78	158				
		HIGH-STATIC	414	508	6.7	42.0	0.7	4.8	—	—	21.3	25††	23	130				
									13.9	16.7	42.2	45††	42	146				
									16.5	19.8	46.0	50††	45	149				
									27.8	33.4	63.0	70	61	163				
									33.0	39.7	70.9	80	68	169				
									41.7	50.2	84.0	90	80	180***				
575-3-60	STD	518	632	5.4	39.0	0.7	2.6	—	—	15.4	20††	16	97					
								17.0	17.1	36.7	40††	36	114					
								34.0	34.1	58.0	60††	55	131					
	HIGH-STATIC						518	632	5.4	39.0	0.7	4.8	—	—	17.1	20††	18	114
													17.0	17.1	38.5	40††	38	132
													34.0	34.1	59.7	60††	57	149

NOTE: Legend and Notes for Electrical Data are on page 11.



**Table 3A — Electrical Data (Units Without Electrical Convenience Outlet) (cont)**

50TFQ UNIT SIZE	NOMINAL V-PH-Hz	IFM TYPE	VOLTAGE RANGE		COMPRESSOR (each)		OFM FLA	IFM FLA	ELECTRIC HEAT*		POWER SUPPLY		DISCONNECT SIZE†	
			Min	Max	RLA	LRA			Nominal kW**	FLA	MCA	MOCP	FLA	LRA
009 (8½ Tons)	208/230-3-60	STD	187	254	16.0	137.0	1.4	5.8	—	—	44.6/ 44.6	45/ 45††	47/ 47	321/321
									7.8/10.4	21.7/ 25.0	71.7/ 75.9	80/ 80	72/ 75	343/346
									12.0/16.0	33.3/ 38.5	86.2/ 92.7	90/100	85/ 91	354/360***
									18.6/24.8	51.6/ 59.7	109.1/119.2	110/125	106/115	373/381***
									24.0/32.0	66.6/ 77.0	127.9/140.9	150/150	123/135	388/398***
									31.8/42.4	88.3/102.0	155.0/172.1	175/175	148/164	409/428***
		HIGH-STATIC	187	254	16.0	137.0	1.4	10.6	—	—	49.4/ 49.4	50/ 50††	52/ 52	365/365
									7.8/10.4	21.7/ 25.0	76.5/ 80.7	80/ 90	77/ 81	386/390***
									12.0/16.0	33.3/ 38.5	91.0/ 97.5	100/100	91/ 96	398/403***
									18.6/24.8	51.6/ 59.7	113.9/124.0	125/125	112/121	416/424***
									24.0/32.0	66.6/ 77.0	132.7/145.7	150/150	129/141	431/442***
									31.8/42.4	88.3/102.0	159.8/176.9	175/200	154/170	453/467***
	460-3-60	STD	414	508	8.3	69.0	0.7	2.6	—	—	22.7	25††	24	162
									13.9	16.7	43.6	45††	43	178
									16.5	19.8	47.4	50††	46	182
									27.8	33.4	64.4	70	62	195
									33.0	39.7	72.3	80	69	201
									41.7	50.2	85.4	90	81	212***
		HIGH-STATIC	414	508	8.3	69.0	0.7	4.8	—	—	24.9	25††	26	184
									13.9	16.7	45.8	50††	45	200
									16.5	19.8	49.6	50††	49	203
									27.8	33.4	66.6	70	65	217
									33.0	39.7	74.5	80	72	223
									41.7	50.2	87.6	90	84	234***
575-3-60	STD	518	632	6.4	58.0	0.7	2.6	—	—	17.6	20††	18	135	
								17.0	17.1	39.0	40††	38	152	
								34.0	34.1	60.2	70††	58	169	
	HIGH-STATIC	518	632	6.4	58.0	0.7	4.8	—	—	19.4	20††	20	152	
								17.0	17.1	40.7	45††	40	170	
								34.0	34.1	62.0	70	60	187	
012 (10 Tons)	208/230-3-60	STD	187	254	17.2	124.0	1.4	5.8	—	—	47.3/ 47.3	50/ 50††	49/ 49	295/295
									7.8/10.4	21.7/ 25.0	74.4/ 78.6	80/ 80	74/ 78	317/320
									12.0/16.0	33.3/ 38.5	88.9/ 95.4	90/100	88/ 94	328/334***
									24.0/32.0	66.6/ 77.0	130.6/143.6	150/150	126/138	362/372***
									31.8/42.4	88.3/102.0	157.7/174.8	175/175	151/167	383/397***
									37.6/50.0	104.4/120.3	177.8/167.6	200/175	170/188	399/415***
		ALT	187	254	17.2	124.0	1.4	7.5	—	—	49.0/ 49.0	50/ 50††	51/ 51	314/314
									7.8/10.4	21.7/ 25.0	76.1/ 80.8	80/ 90	76/ 80	336/389***
									12.0/16.0	33.3/ 38.5	90.6/ 97.1	100/100	90/ 96	347/353***
									24.0/32.0	66.6/ 77.0	132.3/145.3	150/150	128/140	381/391***
									31.8/42.4	88.3/102.0	159.4/176.5	175/200	153/169	402/416***
									37.6/50.0	104.4/120.3	179.5/169.3	200/200	171/190	418/434***
	HIGH-STATIC	187	254	17.2	124.0	1.4	15.0	—	—	56.5/ 56.5	60/ 60††	60/ 60	362/362	
								7.8/10.4	21.7/ 25.0	83.6/ 87.8	90/ 90	85/ 89	384/387***	
								12.0/16.0	33.3/ 38.5	98.1/104.6	100/110	98/104	395/401***	
								24.0/32.0	66.6/ 77.0	139.8/152.8	150/175	137/149	429/439***	
								31.8/42.4	88.3/102.0	166.9/184.0	175/200	162/177	450/464***	
								37.6/50.0	104.4/120.3	187.0/176.8	200/200	180/198	466/482***	
	460-3-60	STD	414	508	8.6	59.6	0.7	2.6	—	—	23.4	25††	24	143
									16.5	19.8	48.1	50††	47	163
									27.8	33.4	65.1	70	63	176
									33.0	39.7	73.0	80	70	183
									41.7	50.2	86.1	90	82	193***
									50.0	60.1	83.5	90	93	203***
ALT		414	508	8.6	59.6	0.7	3.4	—	—	24.2	25††	25	182	
								16.5	19.8	48.9	50††	48	202	
								27.8	33.4	65.9	70	64	216	
								33.0	39.7	73.8	80	71	222	
								41.7	50.2	86.9	90	83	233***	
								50.0	60.1	84.3	90	94	243***	
HIGH-STATIC	414	508	8.6	59.6	0.7	7.4	—	—	28.2	30††	30	176		
							16.5	19.8	52.9	60††	53	196		
							27.8	33.4	69.9	70	68	210		
							33.0	39.7	77.8	80	76	216		
							41.7	50.2	90.9	100	88	227***		
							50.0	60.1	88.3	100	99	237***		
575-3-60	STD	518	632	6.9	49.4	0.7	2.6	—	—	18.7	20††	20	118	
								17.0	17.1	40.1	45††	39	135	
								34.0	34.1	61.4	70	59	152	
	ALT	518	632	6.9	49.4	0.7	3.4	—	—	19.4	20††	20	149	
								17.0	17.1	40.7	45††	40	166	
								34.0	34.1	62.0	70	60	183	
	HIGH-STATIC	518	632	6.9	49.4	0.7	7.4	—	—	22.6	25††	24	145	
								17.0	17.1	43.9	45††	44	162	
								34.0	34.1	65.2	70	63	179	

NOTE: Legend and Notes for Electrical Data are on page 11.

**Table 3B — Electrical Data (Units With Electrical Convenience Outlet)**

50TFQ UNIT SIZE	NOMINAL V-PH-Hz	IFM TYPE	VOLTAGE RANGE		COMPRESSOR (each)		OFM FLA	IFM FLA	ELECTRIC HEAT*		POWER SUPPLY		DISCONNECT SIZE†	
			Min	Max	RLA	LRA			Nominal kW**	FLA	MCA	MOCP	FLA	LRA
008 (7½ Tons)	208/230-3-60	STD	187	254	13.4	91.0	1.4	5.8	—	—	43.6/ 43.6	45/ 45††	46/ 46	234/234
									7.8/10.4	21.7/ 25.0	70.7/ 74.8	80/ 80	71/ 75	256/259
									12.0/16.0	33.3/ 38.5	85.2/ 91.7	90/100	85/ 91	267/272***
									18.6/24.8	51.6/ 59.7	108.1/118.2	110/125	106/115	285/294***
									24.0/32.0	66.6/ 77.0	126.8/139.8	150/150	123/135	300/311***
									31.8/42.4	88.3/102.0	153.9/171.1	175/175	148/164	322/336***
		HIGH-STATIC	187	254	13.4	91.0	1.4	10.6	—	—	48.4/ 48.4	50/ 50††	52/ 52	277/277
									7.8/10.4	21.7/ 25.0	75.5/ 79.6	80/ 80	77/ 81	299/302***
									12.0/16.0	33.3/ 38.5	90.0/ 96.5	90/100	90/ 96	311/316***
									18.6/24.8	51.6/ 59.7	112.9/123.0	125/125	111/120	329/337***
									24.0/32.0	66.6/ 77.0	131.6/144.6	150/150	128/140	344/354***
									31.8/42.4	88.3/102.0	158.7/175.9	175/200	153/169	366/379***
	460-3-60	STD	414	508	6.7	42.0	0.7	2.6	—	—	21.3	25††	23	110
									13.9	16.7	42.1	45††	42	127
									16.5	19.8	46.0	50††	45	130
									27.8	33.4	63.0	70	61	143
									33.0	39.7	70.9	80	68	150
									41.7	50.2	84.0	90	80	160***
		HIGH-STATIC	414	508	6.7	42.0	0.7	4.8	—	—	23.5	25††	25	132
									13.9	16.7	44.3	45††	44	148
									16.5	19.8	48.2	50††	48	151
									27.8	33.4	65.2	70	63	165
									33.0	39.7	73.1	80	71	171
									41.7	50.2	86.2	90	83	182***
575-3-60	STD	518	632	5.4	39.0	0.7	2.6	—	—	17.1	20††	18	99	
								17.0	17.1	38.5	40††	38	116	
								34.0	34.1	59.7	60††	57	133	
	HIGH-STATIC	518	632	5.4	39.0	0.7	4.8	—	—	18.9	20††	20	116	
								17.0	17.1	40.2	45††	40	133	
								34.0	34.1	61.5	70	59	150	
009 (8½ Tons)	208/230-3-60	STD	187	254	16.0	137.0	1.4	5.8	—	—	49.4/ 49.4	50/ 50††	52/ 52	326/326
									7.8/10.4	21.7/ 25.0	76.5/ 80.7	80/ 90	77/ 81	348/351
									12.0/16.0	33.3/ 38.5	91.0/ 97.5	100/100	91/ 96	359/364
									18.6/24.8	51.6/ 59.7	113.9/124.0	125/125	112/121	377/386
									24.0/32.0	66.6/ 77.0	132.7/145.7	150/150	129/141	392/403
									31.8/42.4	88.3/102.0	154.8/176.9	175/200	154/170	414/428
		HIGH-STATIC	187	254	16.0	137.0	1.4	10.6	—	—	54.2/ 54.2	60/ 60††	58/ 58	369/369
									7.8/10.4	21.7/ 25.0	81.3/ 85.5	90/ 90	83/ 86	391/394***
									12.0/16.0	33.3/ 38.5	95.8/102.3	100/110	96/102	403/408***
									18.6/24.8	51.6/ 59.7	118.7/128.8	125/150	117/126	421/429***
									24.0/32.0	66.6/ 77.0	137.5/150.5	150/175	134/146	436/446***
									31.8/42.4	88.3/102.0	164.6/181.7	175/200	159/175	458/471***
	460-3-60	STD	414	508	8.3	69.0	0.7	2.6	—	—	24.9	25††	26	164
									13.9	16.7	45.7	50††	45	181
									16.5	19.8	49.6	50††	49	184
									27.8	33.4	66.6	70	65	197
									33.0	39.7	74.5	80	72	204
									41.7	50.2	87.6	90	84	214***
		HIGH-STATIC	414	508	8.3	69.0	0.7	4.8	—	—	27.1	30††	29	186
									13.9	16.7	47.9	50††	48	202
									16.5	19.8	51.8	60††	51	205
									27.8	33.4	68.8	70	67	219
									33.0	39.7	76.7	80	74	225
									41.7	50.2	89.8	90	86	236***
575-3-60	STD	518	632	6.4	58.0	0.7	2.6	—	—	19.3	20††	20	137	
								17.0	17.1	40.7	45††	40	154	
								34.0	34.1	62.0	70	60	171	
	HIGH-STATIC	518	632	6.4	58.0	0.7	4.8	—	—	21.1	25††	22	154	
								17.0	17.1	42.5	45††	42	171	
								34.0	34.1	63.7	70	62	188	

NOTE: Legend and Notes for Electrical Data are on page 11.

**Table 3B — Electrical Data (Units With Electrical Convenience Outlet) (cont)**

50TFQ UNIT SIZE	NOMINAL V-PH-Hz	IFM TYPE	VOLTAGE RANGE		COMPRESSOR (each)		OFM FLA	IFM FLA	ELECTRIC HEAT*		POWER SUPPLY		DISCONNECT SIZE†	
			Min	Max	RLA	LRA			Nominal kW**	FLA	MCA	MOCP	FLA	LRA
012 (10 Tons)	208/230-3-60	STD	187	254	17.2	124.0	1.4	5.8	—	—	52.1/ 52.1	60/ 60††	55/ 55	300/300
									7.8/10.4	21.7/ 25.0	79.2/ 83.4	80/ 90	80/ 84	322/325***
									12.0/16.0	33.3/ 38.5	93.7/100.2	100/110	93/ 99	333/338***
									24.0/32.0	66.6/ 77.0	135.4/148.4	150/150	132/144	366/377***
									31.8/42.4	88.3/102.0	162.5/179.6	175/200	157/172	388/402***
									37.6/50.0	104.4/120.3	182.6/172.4	200/200	175/193	404/420***
		ALT	187	254	17.2	124.0	1.4	7.5	—	—	53.8/ 53.8	60/ 60††	57/ 57	319/319
									7.8/10.4	21.7/ 25.0	80.9/ 85.1	90/ 90	82/ 86	341/344***
									12.0/16.0	33.3/ 38.5	95.4/101.9	100/110	95/101	352/357***
									24.0/32.0	66.6/ 77.0	137.1/150.1	150/175	134/145	385/396***
									31.8/42.4	88.3/102.0	164.2/181.3	175/200	158/174	407/421***
									37.6/50.0	104.4/120.3	184.3/174.1	200/200	177/195	423/439***
	HIGH-STATIC	187	254	17.2	124.0	1.4	15.0	—	—	61.3/ 61.3	70/ 70	66/ 66	367/367	
								7.8/10.4	21.7/ 25.0	88.4/ 92.6	90/100	91/ 94	389/392***	
								12.0/16.0	33.3/ 38.5	102.9/109.4	110/110	104/110	400/405***	
								24.0/32.0	66.6/ 77.0	144.6/157.6	150/175	142/154	433/444***	
								31.8/42.4	88.3/102.0	171.7/188.8	175/200	167/183	455/459***	
								37.6/50.0	104.4/120.3	191.8/181.6	200/200	186/204	471/487***	
	460-3-60	STD	414	508	8.6	59.6	0.7	2.6	—	—	25.5	30††	27	145
									16.5	19.8	50.3	60††	50	165
									27.8	33.4	67.3	70	65	178
									33.0	39.7	75.2	80	73	185
									41.7	50.2	88.3	90	85	195***
									50.0	60.1	85.6	90	96	205***
		ALT	414	508	8.6	59.6	0.7	3.4	—	—	26.3	30††	28	185
									16.5	19.8	51.1	60††	51	204
									27.8	33.4	68.1	70	66	214
									33.0	39.7	76.0	80	73	224
									41.7	50.2	89.1	90	86	235***
									50.0	60.1	86.4	90	97	245***
	HIGH-STATIC	414	508	8.6	59.6	0.7	7.4	—	—	30.3	35††	32	179	
								16.5	19.8	55.1	60††	55	198	
								27.8	33.4	72.1	80	71	212	
								33.0	39.7	80.0	80	78	218	
								41.7	50.2	93.1	100	90	229***	
								50.0	60.1	90.4	100	102	239***	
575-3-60	STD	518	632	6.9	49.4	0.7	2.6	—	—	20.5	25††	22	120	
								17.0	17.1	41.8	45††	41	137	
								34.0	34.1	63.1	70	61	154	
								51.0	51.2	71.7	80	80	171***	
								—	—	21.1	25††	22	151	
								17.0	17.1	42.5	45††	42	168	
	ALT	518	632	6.9	49.4	0.7	3.4	34.0	34.1	63.7	70	62	185	
								51.0	51.2	72.3	80	81	202***	
								—	—	24.3	25††	26	146	
								17.0	17.1	45.7	50††	46	163	
								34.0	34.1	66.9	70	65	180	
								51.0	51.2	75.5	80	85	198***	

**LEGEND**

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



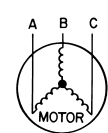
- \*Heaters are field installed only.
- †Used to determine minimum disconnect size per NEC.
- \*\*Heater capacity (kW) is based on heater voltage of 208 v, 240 v, 480 v, and 575 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.
- ††Fuse or HACR circuit breaker.
- \*\*\*Optional disconnect switch is unavailable.

- NOTES:**
- 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.
  - 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

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

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.

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{7}{457} \\ &= 1.53\% \end{aligned}$$

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.

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

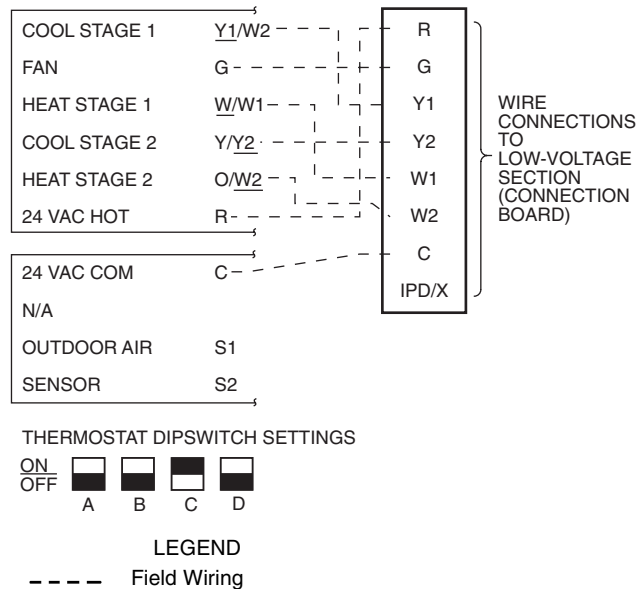
**NOTE:** If using a Carrier electronic thermostat, set the thermostat configuration for “non-heat pump operation.” This family of products does not require an O terminal to energize the reversing valve.

Route the thermostat cable or equivalent single leads of colored wire from the subbase terminals to the low-voltage connections on the unit (shown in Fig. 8A and 8B) as described in Steps 1 through 4 below.

**NOTE:** For wire runs up to 50 ft, use no. 18 AWG (American Wire Gage) insulated wire (35 C minimum). For 51 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.

1. If the unit is mounted on the roof curb and the accessory thru-the-curb service plate connection is used, route wire through the connection plate.
2. Pass control wires through the hole provided on the unit (see connection D in Connection Sizes table in Fig. 6).
3. Feed wire through the raceway built into the corner post to the 24-v barrier located on the left side of the control box. See Fig. 9. The raceway provides the UL required clearance between the high-voltage and low-voltage wiring.
4. Connect the thermostat wires to the screw terminals of the low-voltage connector (see Fig. 8A and 8B).

**NOTE:** If the unit is mounted on a roof curb and electrical power will be run up “thru-the-bottom,” use accessory kit number CRBTMPWR002A01. This kit, available from your local distributor, ensures a watertight seal. Refer to the accessory installation instructions for information on power wiring. Refer to Fig. 6 for drilling holes in basepan.



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

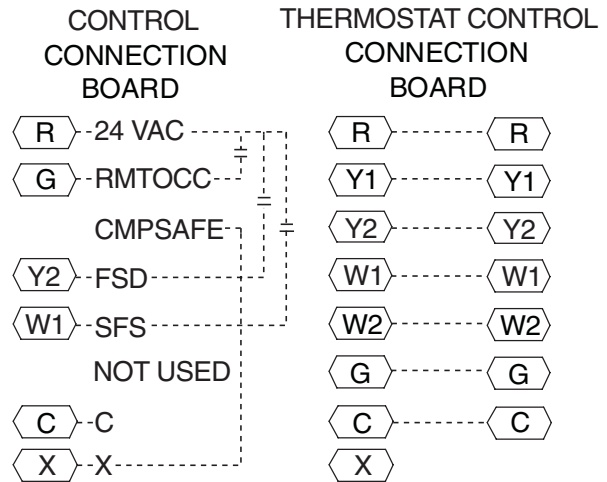
**Fig. 8A — Low-Voltage Connections With or Without Economizer or Two-Position Damper**

**DEFROST BOARD** — The defrost board timer cycle is set to 30 minutes. To change the cycle time, turn off power to the unit and install lockout tag. Remove the wire from defrost board connected to the 30 minute quick-connect. See Fig. 10. Connect the wire to the 50 or 90 minute quick-connects on the defrost board, depending on the desired defrost time.

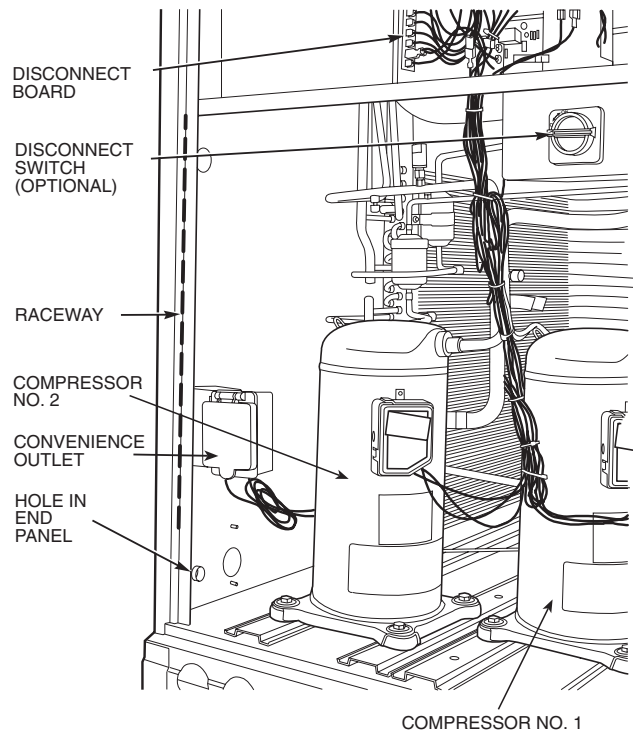
**HEAT ANTICIPATOR SETTINGS** — For units with electric heat, set heat anticipator settings as shown in Table 4.

**Step 6 — Adjust Factory-Installed Options**

**DISCONNECT SWITCH** — The optional disconnect switch is non-fused. The switch can be locked in place for safety purposes.



**Fig. 8B — Low Voltage Connections (Units with PremierLink™ Controls)**



**Fig. 9 — Typical Field Control Wiring Raceway**

**Table 4 — Heat Anticipator Settings**

UNIT	UNIT VOLTAGE											
	208/230				460				575			
	Heater kW*	Configuration			Heater kW*	Configuration			Heater kW*	Configuration		
		1-Stage	2-Stage			1-Stage	2-Stage			1-Stage	2-Stage	
		Stage 1	Stage 2			Stage 1	Stage 2			Stage 1	Stage 2	
50TFQ	10.4, 16.0	0.3	NA	NA	13.9, 16.5	0.3	NA	NA	17.0, 34.0	0.3	NA	NA
	24.8, 32.0	0.6	0.3	0.3	27.8, 33.0	0.6	0.3	0.3	51.0	0.6	0.3	0.3
	42.4, 50.0	0.9	0.6	0.3	41.7, 50.0	0.9	0.6	0.3				

\*kW is based on 240, 480, or 575 v.

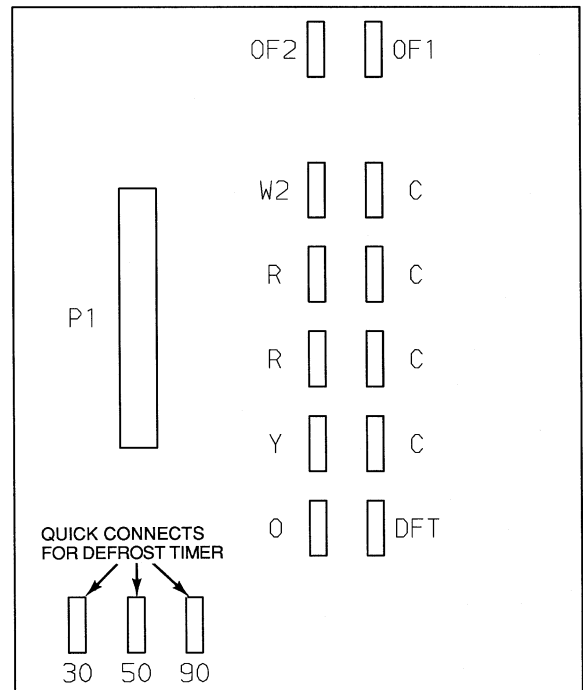
**CONVENIENCE OUTLET** — An optional convenience outlet provides power for rooftop use. For maintenance personnel safety, the convenience outlet power is off when the unit disconnect is off. Adjacent unit outlets may be used for service tools. An optional “Hot Outlet” is available from the factory as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

**NOVAR CONTROLS** — Optional Novar controls (ETM 3051) are available for replacement or new construction jobs.

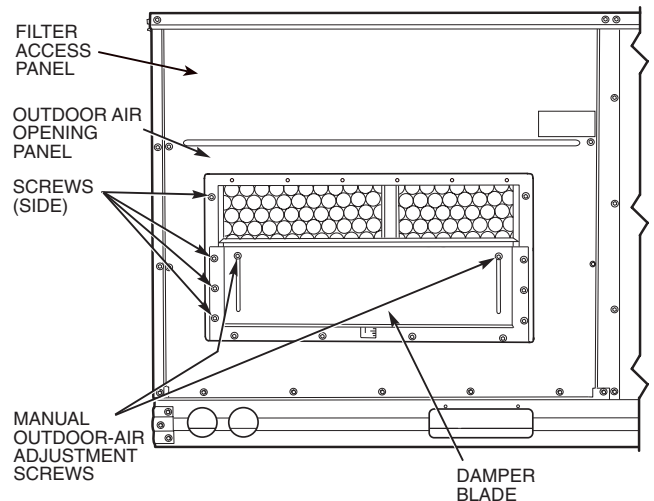
**MANUAL OUTDOOR-AIR DAMPER** — The outdoor-air hood and screen are attached to the basepan at the bottom of the unit (for shipping).

**Assembly:**

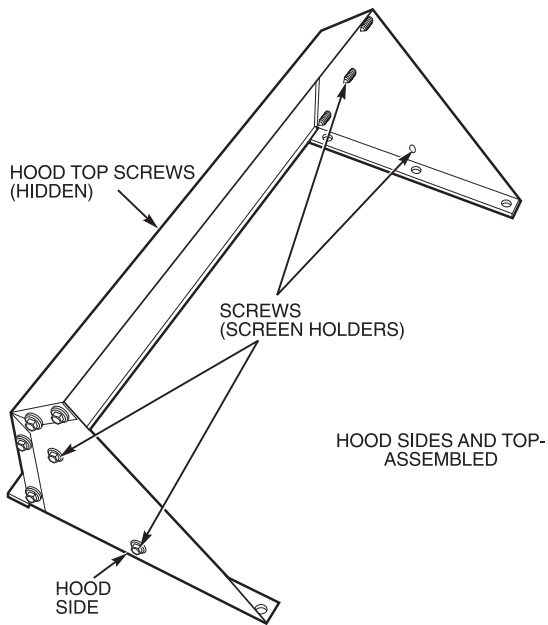
1. Determine the amount of ventilation required for building. Record the amount for use in Step 8.
2. Remove the filter access panel by raising the panel and swinging it outward. The panel is now disengaged from the track and can be removed. No tools are required to remove the filter access panel. Remove the outdoor-air opening panel. Save the panels and screws. See Fig. 11.
3. Separate the hood and screen from the basepan by removing the screws and brackets securing them. Save all screws and discard the brackets.
4. Replace the outdoor air opening panel.
5. Place the hood on the front of the outdoor air opening panel. See Fig. 12 for hood details. Secure the top of the hood with the 6 screws removed in Step 3. See Fig. 13.
6. Remove and save the 8 screws (4 on each side) from the sides of the manual outdoor-air damper.
7. Align the screw holes on the hood with the screw holes on the side of the manual outdoor-air damper. See Fig. 12 and 13. Secure the hood with the 8 screws from Step 6.
8. Adjust the minimum position setting of the damper blade by adjusting the manual outdoor-air adjustment screws on the front of the damper blade. See Fig. 11. Slide the blade vertically until it is in the appropriate position determined by Fig. 14. Tighten the screws.
9. Remove and save the screws currently on the sides of hood. Insert the screen. Secure the screen to the hood using the screws. See Fig. 13.
10. Replace the filter access panel. Ensure that the filter access panel slides along the tracks and is securely engaged.



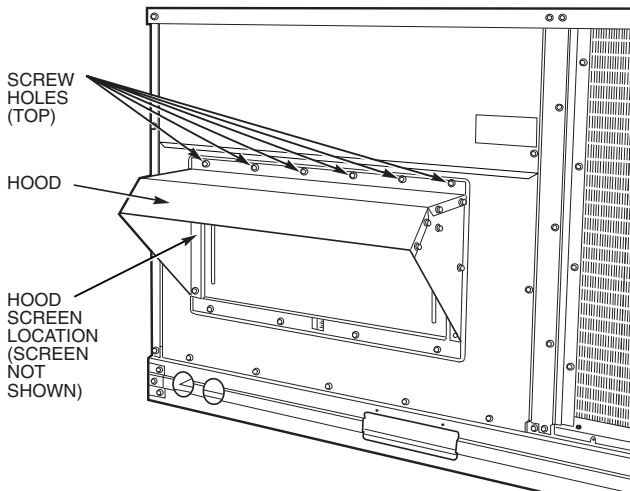
**Fig. 10 — Defrost Board**



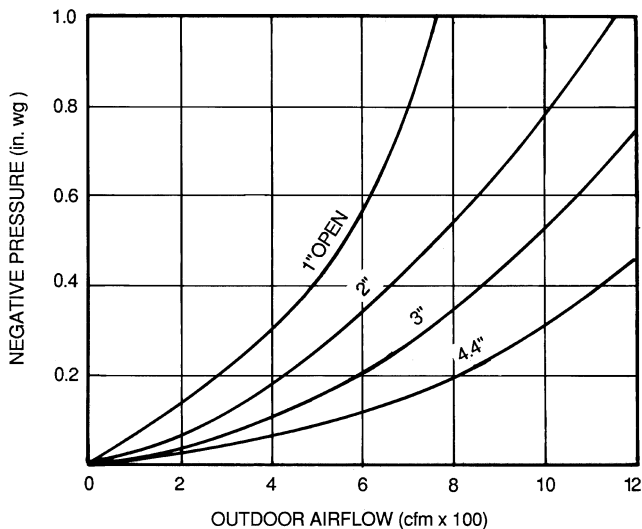
**Fig. 11 — Damper Panel with Manual Outdoor-Air Damper Installed**



**Fig. 12 — Outdoor-Air Hood Details**



**Fig. 13 — Optional Manual Outdoor-Air Damper with Hood Attached**



**Fig. 14 — 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™ module or Scrolling Marquee can be used with the PremierLink controller.

The PremierLink controller (see Fig. 15A and 15B) requires 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). Refer to Fig. 16. The PremierLink control may be mounted in the control panel or an area below the control panel.

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

The PremierLink control includes a supply-air temperature sensor (SAT) and an outdoor-air temperature sensor (OAT) as standard. An indoor-air quality (CO<sub>2</sub>) sensor can be added as an option. Refer to Table 5 for sensor usage.

**Install the Supply Air Temperature (SAT) Sensor** — 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 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 that the probe tip does not come in contact with any of the unit or heat surfaces.

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

**Install the Indoor Air Quality (CO<sub>2</sub>) Sensor** — Mount the optional indoor air quality (CO<sub>2</sub>) sensor according to manufacturer specifications.

A separate field-supplied transformer must be used to power the CO<sub>2</sub> sensor.

Wire the CO<sub>2</sub> 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.

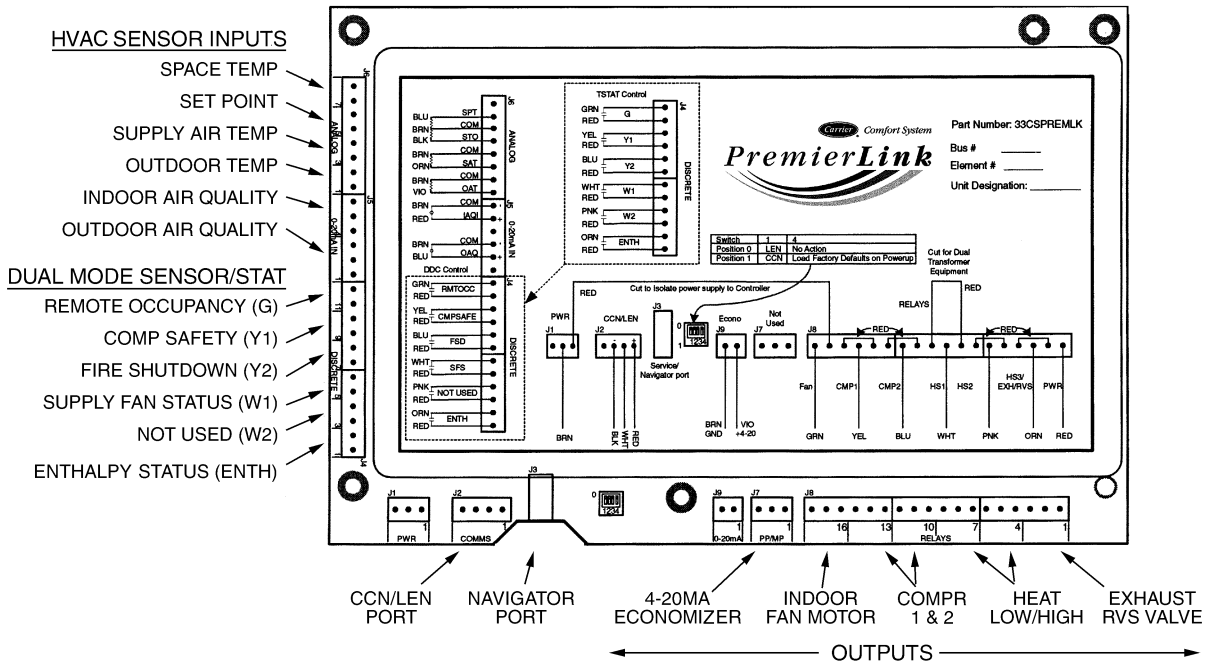
**Table 5 — PremierLink™ Sensor Usage**

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

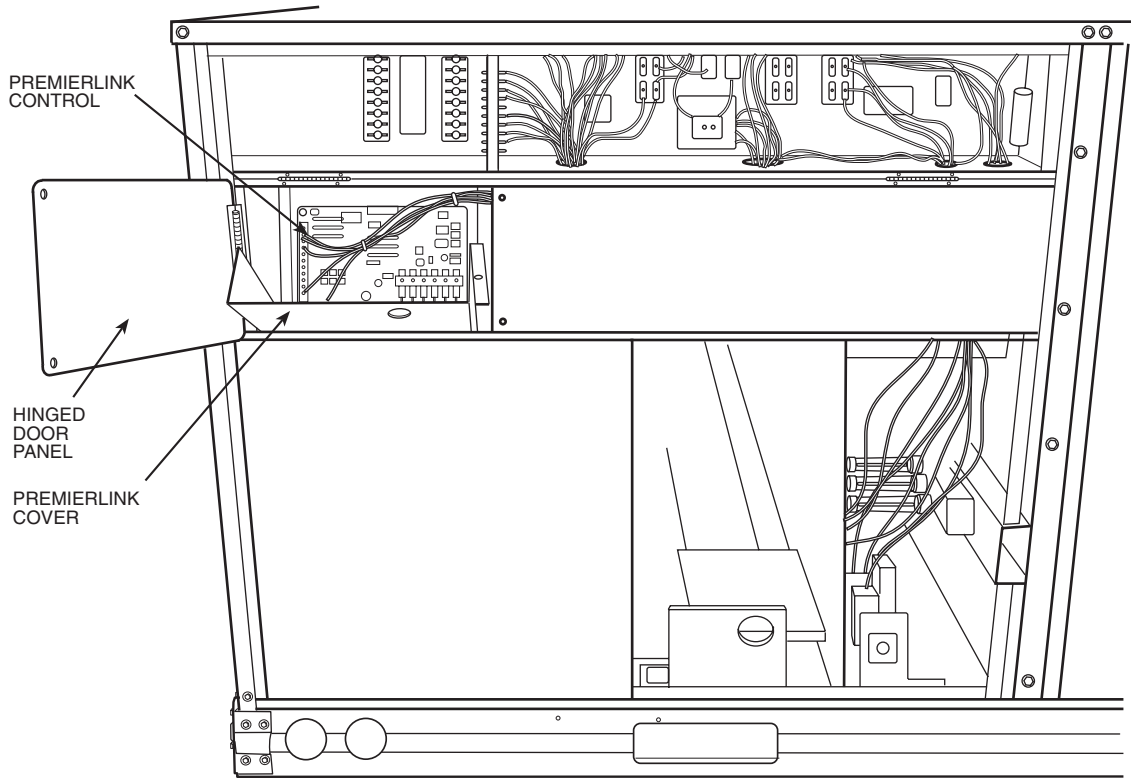
\*PremierLink control requires Supply Air Temperature sensor 33ZCSENSAT and Outdoor Air Temperature Sensor HH79NZ017 — Included with factory-installed PremierLink control; field-supplied and field-installed with field-installed PremierLink control.

**NOTES:**

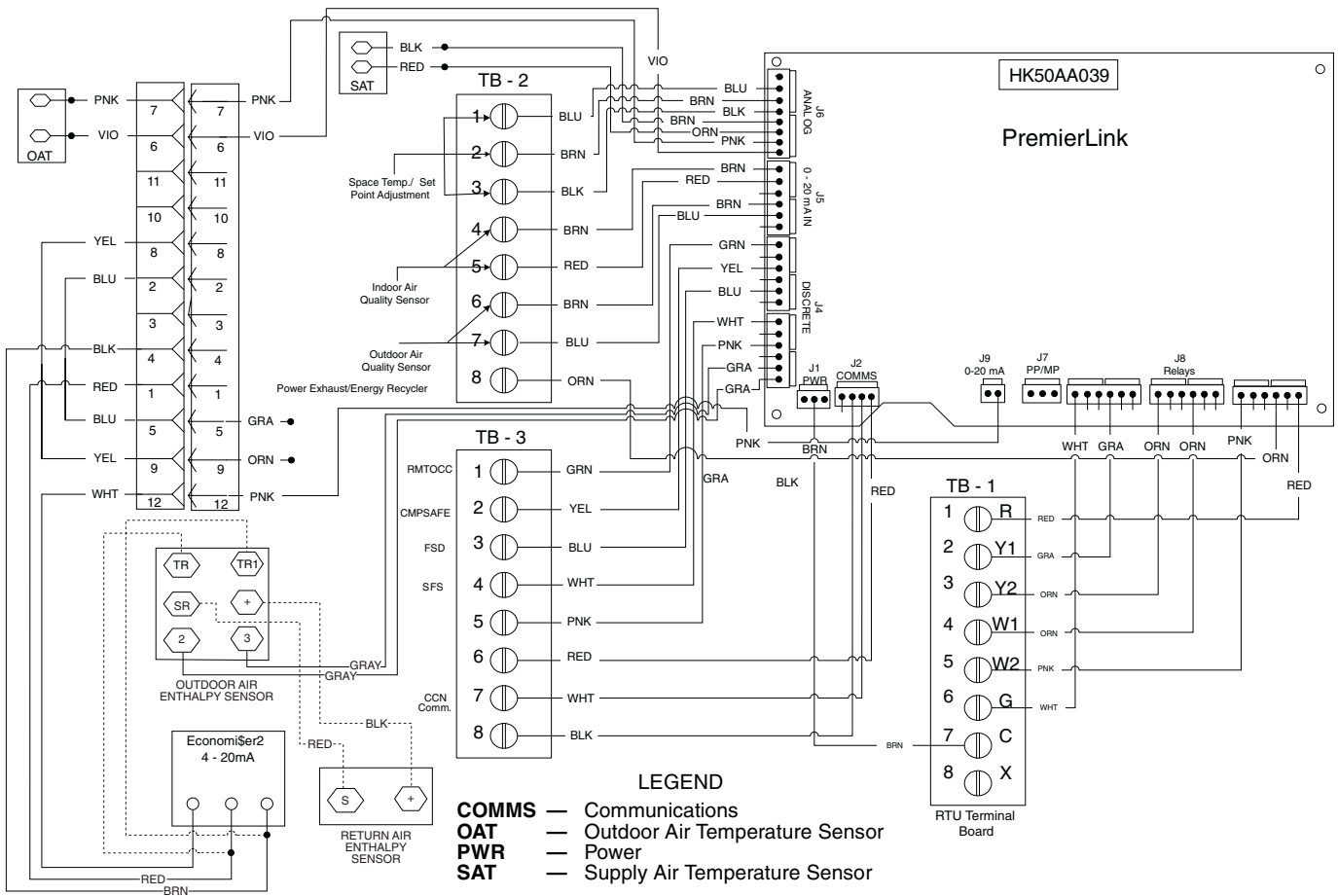
- CO<sub>2</sub> Sensors (Optional):
  - 33ZCSENSCO2 — Room sensor (adjustable). Aspirator box is required for duct mounting of the sensor.
  - 33ZCASPCO2 — Aspirator box used for duct-mounted CO<sub>2</sub> room sensor.
  - 33ZCT55CO2 — Space temperature and CO<sub>2</sub> room sensor with override.
  - 33ZCT56CO2 — Space temperature and CO<sub>2</sub> room sensor with override and set point.
- 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. 15A — PremierLink Controller**



**Fig. 15B — PremierLink™ Controller (Installed)**



**Fig. 16 — 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 air 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. 17 and 18):

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 Premier-Link controller and to terminal (3) on enthalpy sensor.
  - d. Connect the GRAY/RED wire to J4-1 on Premier-Link controller and to terminal (2) on enthalpy sensor.

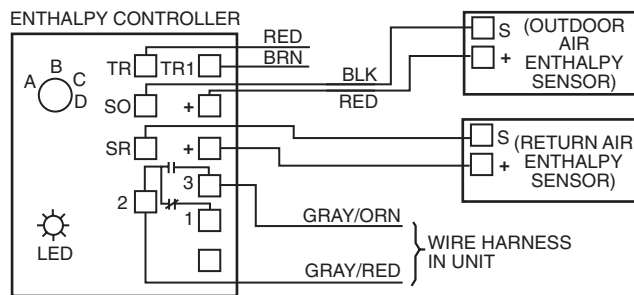
NOTE: If installing in a Carrier rooftop, use the two gray wires provided from the control section to the economizer to connect PremierLink controller to terminals 2 and 3 on enthalpy sensor.

If NOT using Carrier equipment, wires may need to be field supplied and installed.

**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. 17):

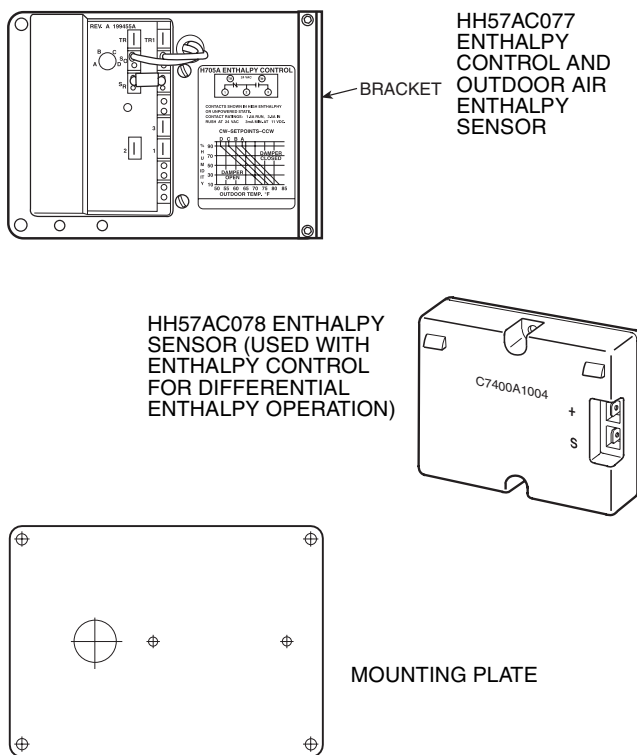
1. Use a 2-conductor, 18 or 20 AWG, twisted pair cable to connect the return air enthalpy sensor to the enthalpy controller.
2. At the enthalpy control remove the factory-installed resistor from the (SR) and (+) terminals.
3. Connect the field-supplied RED wire to (+) spade connector on the return air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



**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 outdoor airstream.

**Fig. 17 — Outdoor and Return Air Sensor Wiring Connections for Differential Enthalpy Control**



**Fig. 18 — Differential Enthalpy Control, Sensor and Mounting Plate (33AMKITENT006)**

**OPTIONAL ECONOMISER IV AND ECONOMISER2** — See Fig. 19 for EconoMiSer IV component locations. See Fig. 20 for EconoMiSer2 component locations.

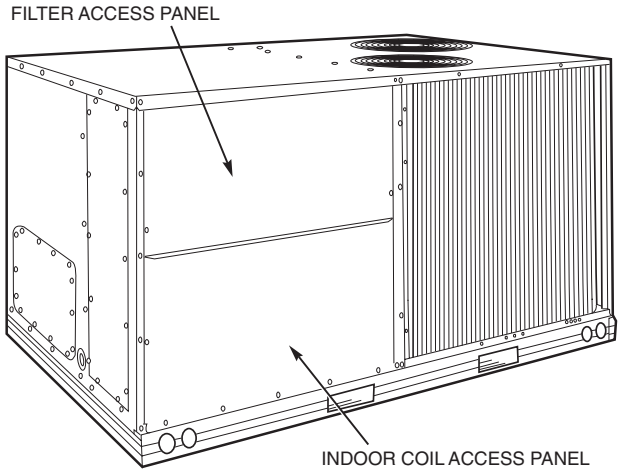
**NOTE:** These instructions are for installing the optional EconoMiSer IV and EconoMiSer2 only. Refer to the accessory EconoMiSer IV or EconoMiSer2 installation instructions when field installing an EconoMiSer IV or EconoMiSer2 accessory.

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. 21.
2. The box with the economizer hood components is shipped in the compartment behind the economizer. The EconoMiSer IV controller is mounted on top of the EconoMiSer IV in the position shown in Fig. 19. The optional EconoMiSer2 with 4 to 20 mA actuator signal control does not include the EconoMiSer 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. 22.

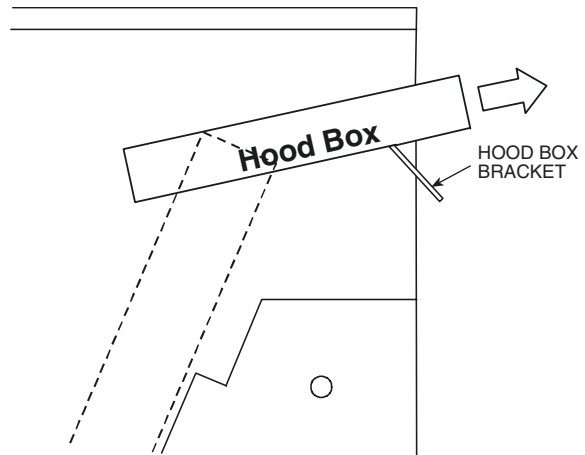
**IMPORTANT:** If the power exhaust accessory is to be installed on the unit, the hood shipped with the unit will not be used and must be discarded. **Save the aluminum filter for use in the power exhaust hood assembly.**

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. 23.

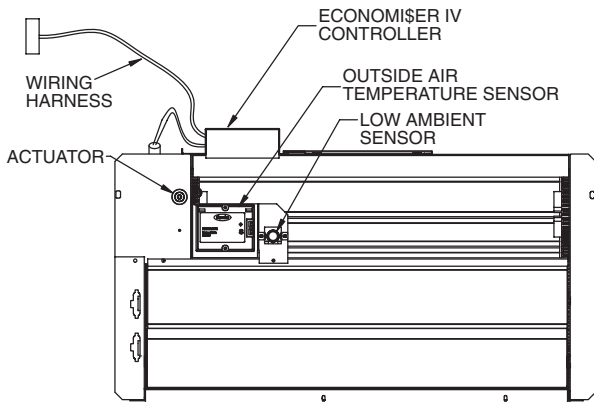
4. Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 24.
5. Remove the shipping tape holding the economizer barometric relief damper in place.



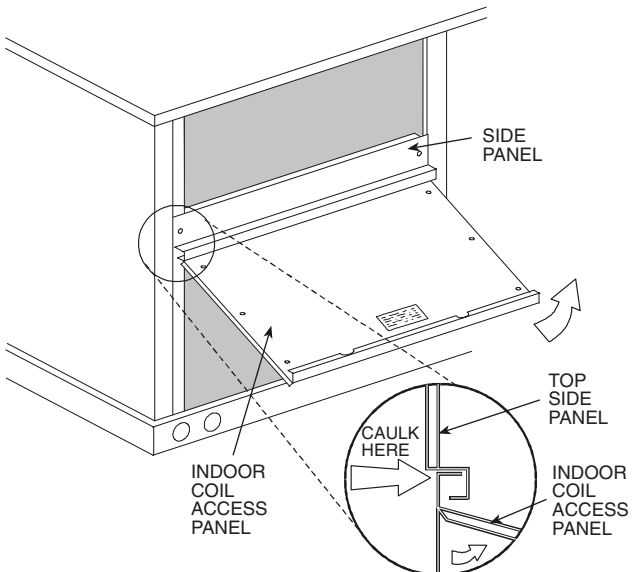
**Fig. 21 — Typical Access Panel Locations**



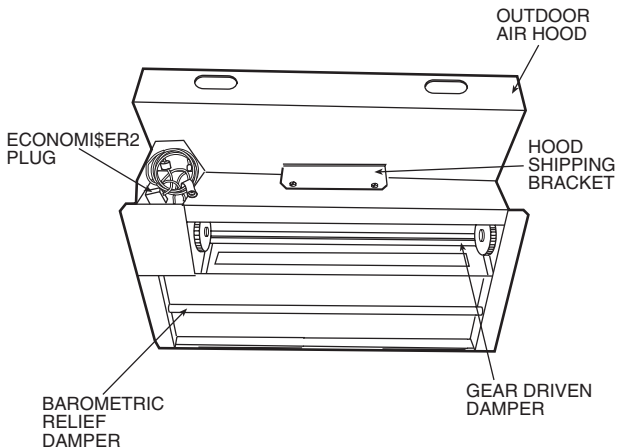
**Fig. 22 — Hood Box Removal**



**Fig. 19 — EconoMiSer IV Component Locations**

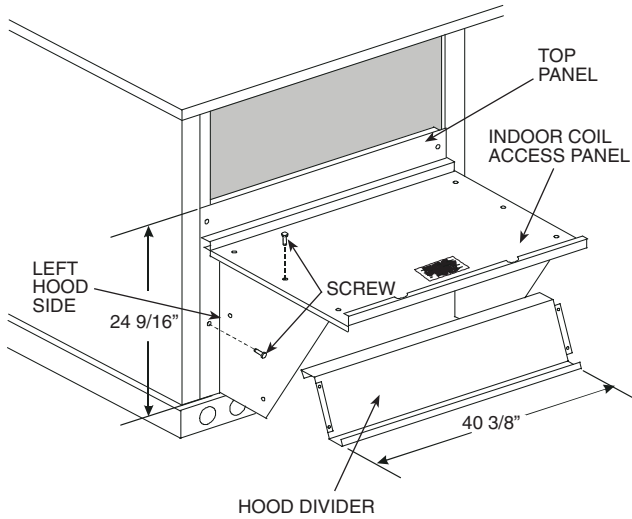


**Fig. 23 — Indoor Coil Access Panel Relocation**



**Fig. 20 — EconoMiSer2 Component Locations**

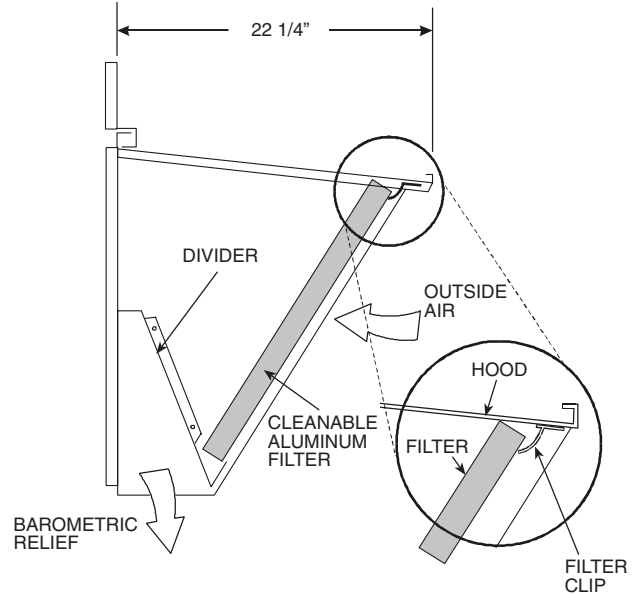
- Insert the hood divider between the hood sides. See Fig. 24 and 25. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.
- Open the filter clips which are located underneath the hood top. Insert the aluminum filter into 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. 25.



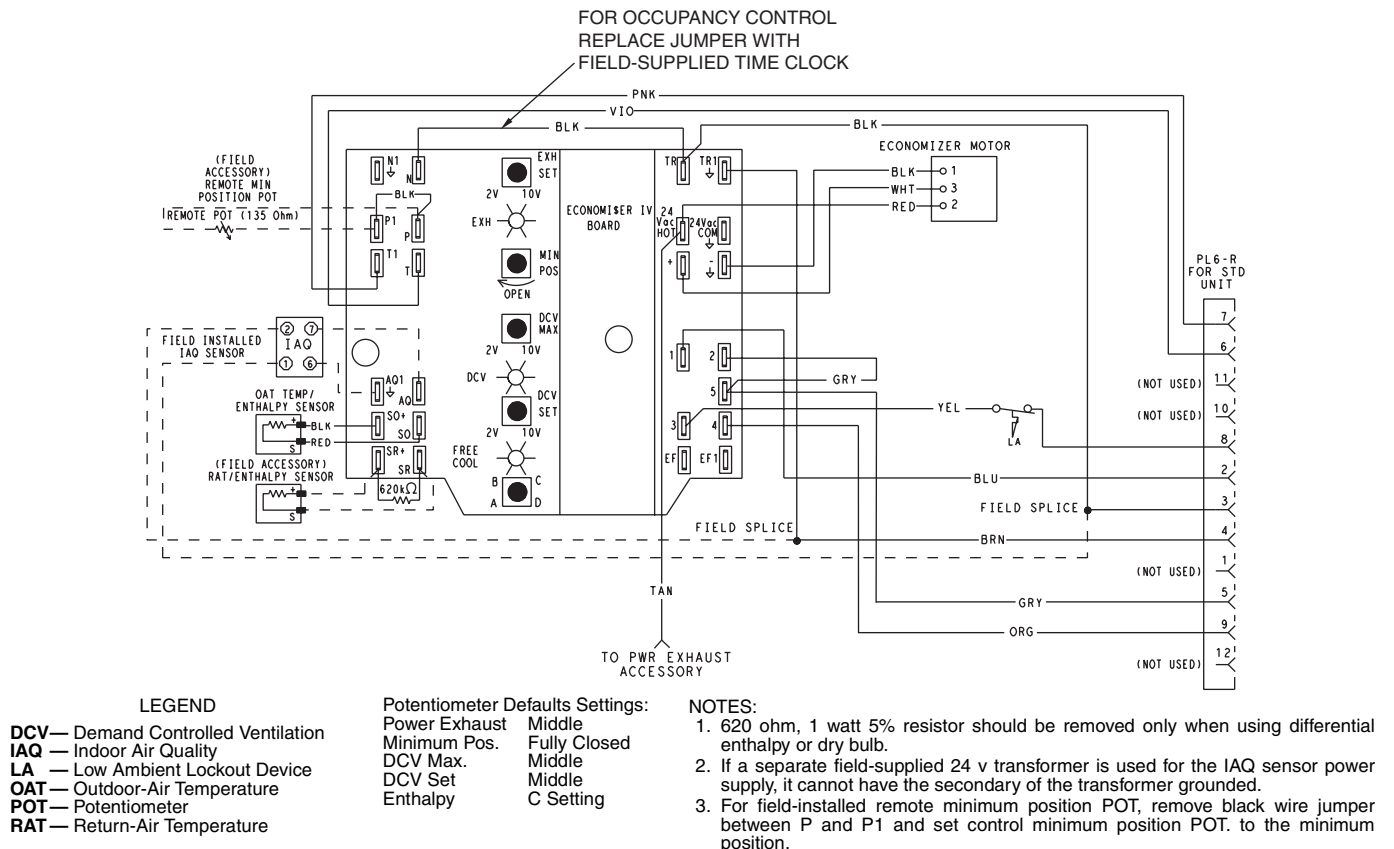
**Fig. 24 — Outdoor-Air Hood Construction**

- Caulk the ends of the joint between the unit top panel and the hood top. See Fig. 23.
- Replace the filter access panel.
- Install all EconoMi\$er IV accessories. EconoMi\$er IV wiring is shown in Fig. 26. EconoMi\$er2 wiring is shown in Fig. 27.

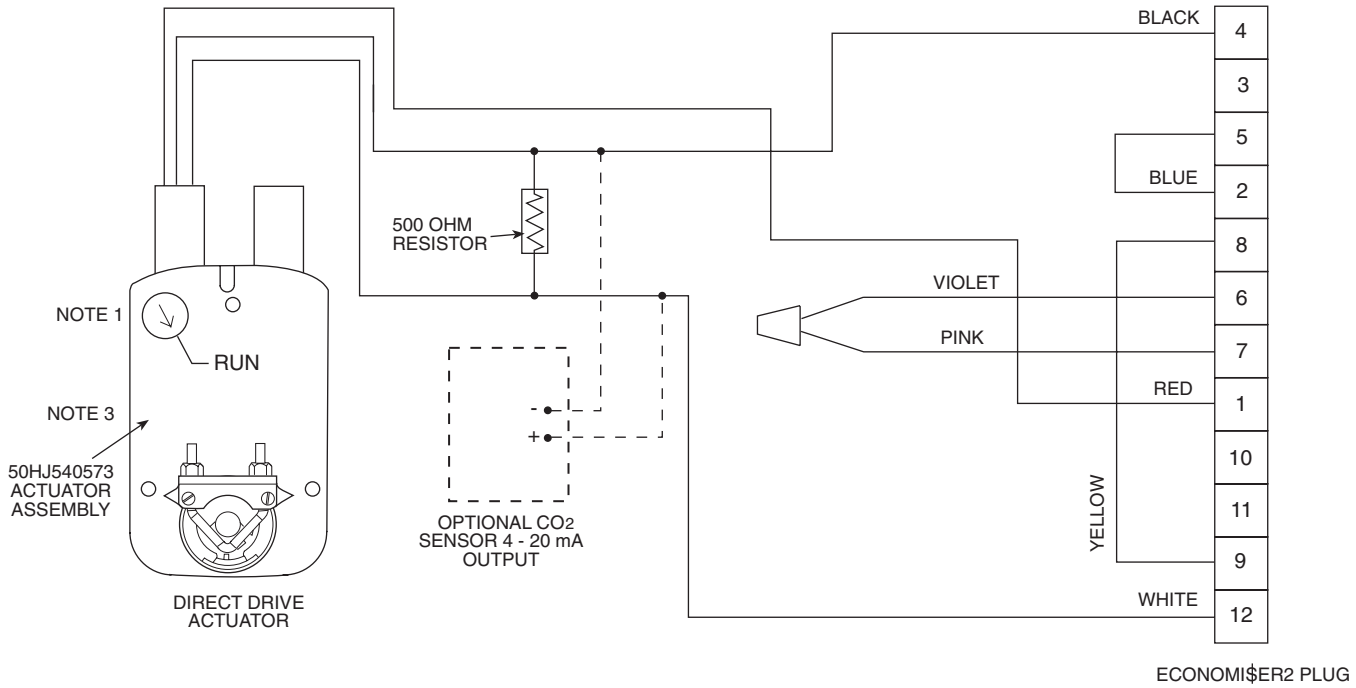
Barometric flow capacity is shown in Fig. 28. Outdoor air leakage is shown in Fig. 29. Return air pressure drop is shown in Fig. 30.



**Fig. 25 — Filter Installation**



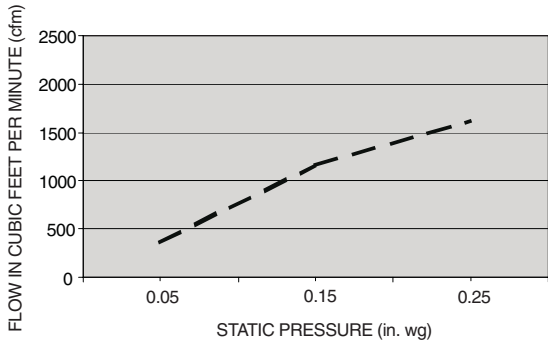
**Fig. 26 — EconoMi\$er IV Wiring**



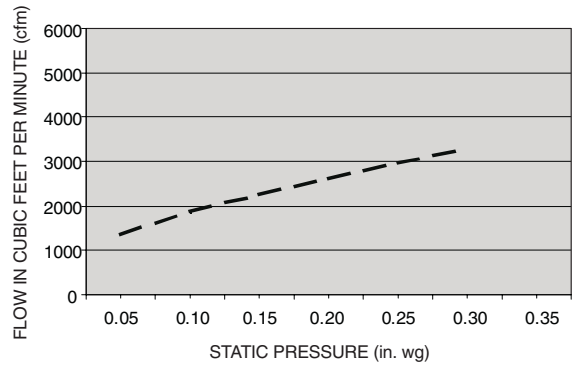
**NOTES:**

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.

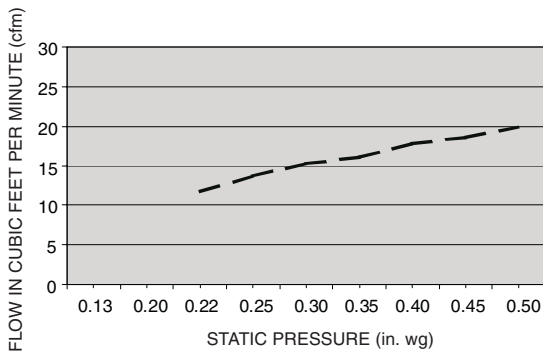
**Fig. 27 — EconoMi\$er2 with 4 to 20 mA Control Wiring**



**Fig. 28 — Barometric Flow Capacity**



**Fig. 30 — Return-Air Pressure Drop**



**Fig. 29 — Outdoor-Air Damper Leakage**

## ECONOMISER 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 EconoMiSer IV can be used for free cooling. The sensor is factory-installed on the EconoMiSer IV in the outdoor airstream. See Fig. 19. The operating range of temperature measurement is 40 to 100 F.

**Supply Air Temperature (SAT) Sensor** — The supply air temperature sensor is a 3 K thermistor located at the inlet of the indoor fan. See Fig. 31. This sensor is factory installed. The operating range of temperature measurement is 0° to 158 F. See Table 6 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 6 — 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

**Outdoor Air Lockout Sensor** — The EconoMiSer 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. 19.

## ECONOMISER IV CONTROL MODES

**IMPORTANT:** The optional EconoMiSer2 does not include a controller. The EconoMiSer2 is operated by a 4 to 20 mA signal from an existing field-supplied controller (such as PremierLink™ control). See Fig. 27 for wiring information.

Determine the EconoMiSer IV control mode before set up of the control. Some modes of operation may require different sensors. Refer to Table 7. The EconoMiSer IV is supplied from the factory with a supply air temperature sensor and an outdoor air temperature sensor. This allows for operation of the EconoMiSer 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 EconoMiSer IV and unit.

**Table 7 — EconoMiSer IV Sensor Usage**

APPLICATION	ECONOMISER 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 <sub>2</sub> for DCV Control using a Wall-Mounted CO <sub>2</sub> Sensor	33ZCSENCO2		
CO <sub>2</sub> for DCV Control using a Duct-Mounted CO <sub>2</sub> Sensor	33ZCSENCO2† and 33ZCASPCO2**	or	CRCBDIOX005A00††

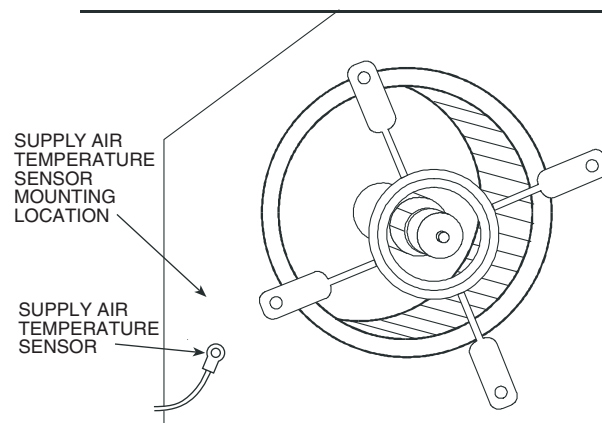
\*CRENTDIF004A00 and CRTEMPSN002A00 accessories are used on many different base units. As such, these kits may contain parts that will not be needed for installation.

†33ZCSENCO2 is an accessory CO<sub>2</sub> sensor.

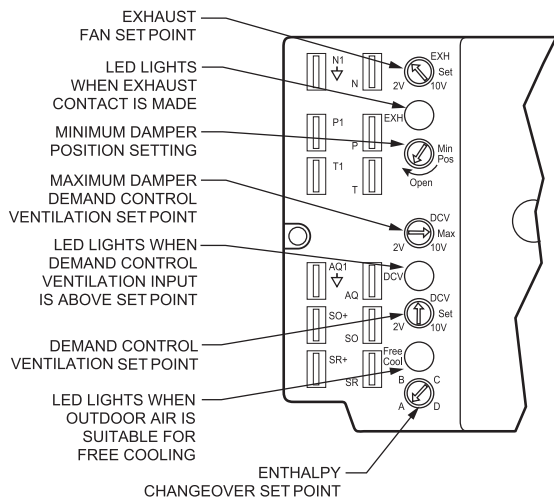
\*\*33ZCASPCO2 is an accessory aspirator box required for duct-mounted applications.

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

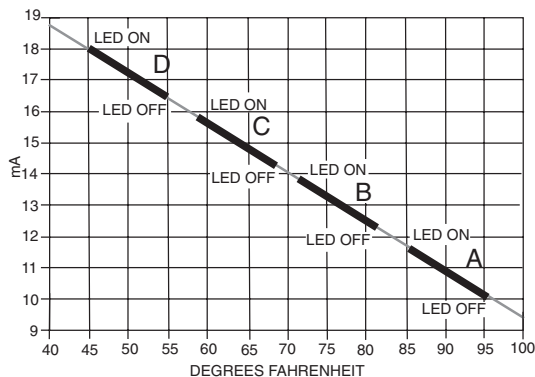
**Outdoor Dry Bulb Changeover** — The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air and supply air temperature sensors are included as standard. For this control mode, the outdoor temperature is compared to an adjustable set point selected on the control. If the outdoor-air temperature is above the set point, the EconoMiSer 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. 32. The scale on the potentiometer is A, B, C, and D. See Fig. 33 for the corresponding temperature changeover values.



**Fig. 31 — Supply Air Sensor Location**



**Fig. 32 — EconoMiSer IV Controller Potentiometer and LED Locations**



**Fig. 33 — Outside Air Temperature Changeover Set Points**

**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. 34. Wiring is provided in the EconoMiSer IV wiring harness. See Fig. 26.

In this mode of operation, the outdoor-air temperature is compared to the return-air temperature and the lower temperature airstream is used for cooling. When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting. See Fig. 32.

**Outdoor Enthalpy Changeover** — For enthalpy control, accessory enthalpy sensor (part number HH57AC078) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 19. 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 EconoMiSer IV controller. The set points are A, B, C, and D. See Fig. 35. The factory-installed 620-ohm jumper must be in place across terminals SR and SR+ on the EconoMiSer IV controller. See Fig. 19 and 36.

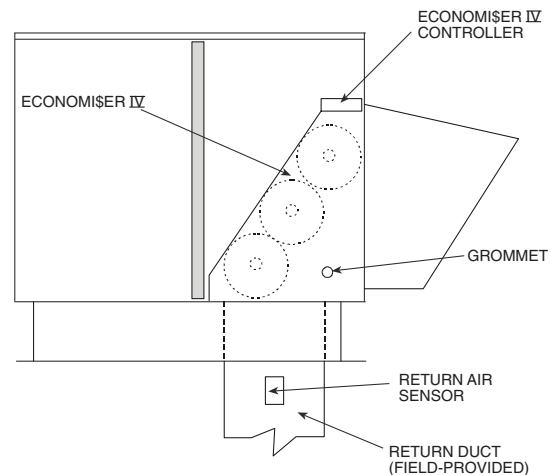
**Differential Enthalpy Control** — For differential enthalpy control, the EconoMiSer IV controller uses two enthalpy sensors (HH57AC078 and CRENTDIF004A00), one in the outside air and one in the return air duct. The EconoMiSer IV controller compares the outdoor air enthalpy to the return air enthalpy to determine EconoMiSer 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 EconoMiSer 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. 19. Mount the return air enthalpy sensor in the return air duct. See Fig. 34. Wiring is provided in the EconoMiSer IV wiring harness. See Fig. 26. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMiSer IV controller. When using this mode of changeover control, turn the enthalpy set-point potentiometer fully clockwise to the D setting.

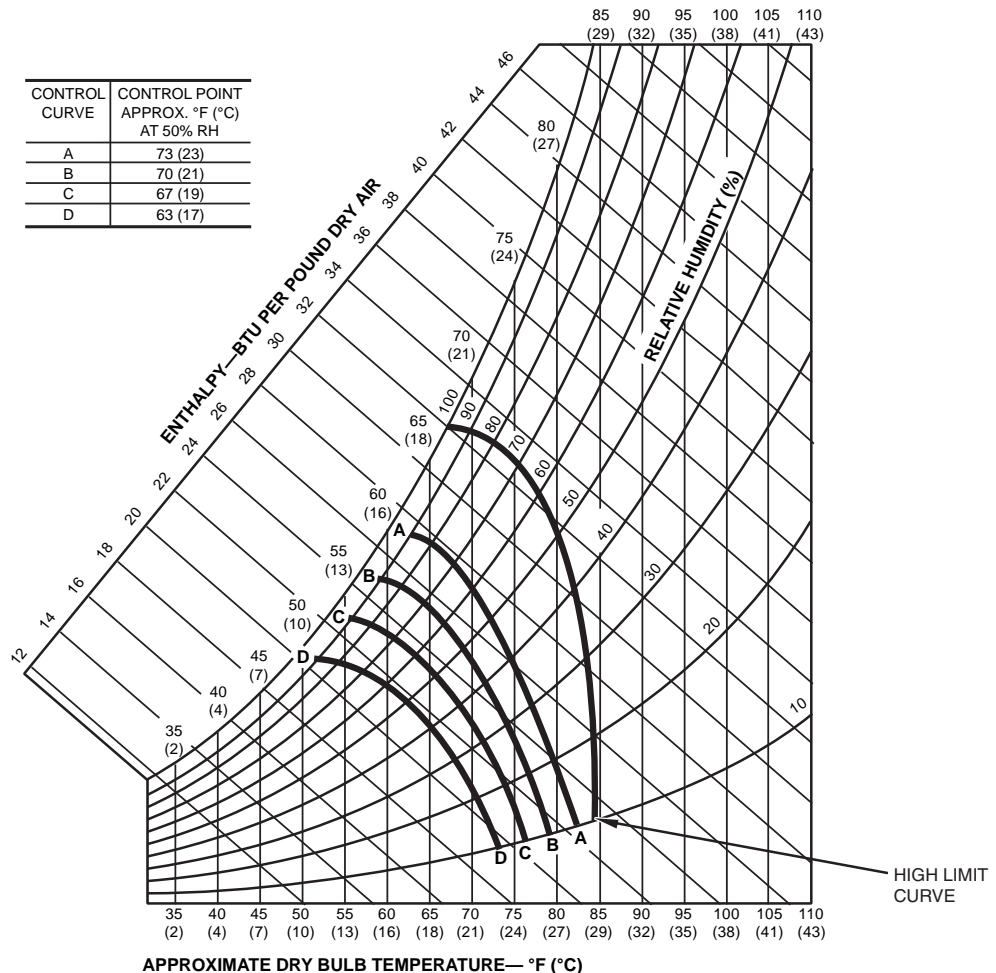
**Indoor Air Quality (IAQ) Sensor Input** — The IAQ input can be used for demand control ventilation control based on the level of CO<sub>2</sub> measured in the space or return air duct.

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. 37.

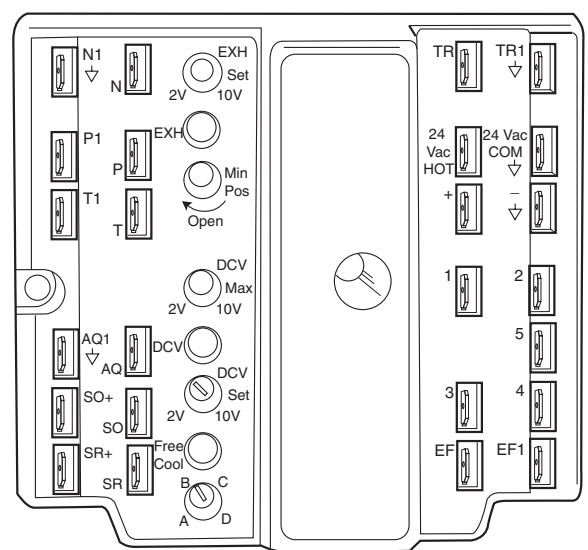
If a separate field-supplied transformer is used to power the IAQ sensor, the sensor must not be grounded or the EconoMiSer IV control board will be damaged.



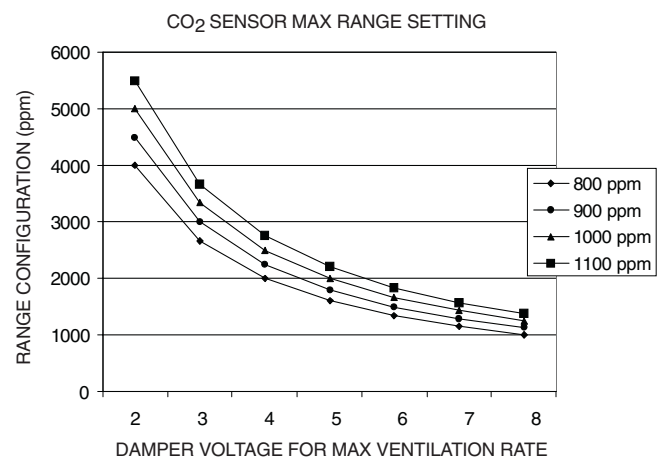
**Fig. 34 — Return Air Temperature or Enthalpy Sensor Mounting Location**



**Fig. 35 — Enthalpy Changeover Set Points**



**Fig. 36 — EconomiSer IV Control**



**Fig. 37 — CO<sub>2</sub> 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. 32. 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  $45 \pm 15$  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. 32. The minimum damper position maintains the minimum airflow into the building during the occupied period.

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

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

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

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

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

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

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

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

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

2. Disconnect the supply air sensor from terminals T and T1.
3. Ensure that the factory-installed jumper is in place across terminals P and P1. If remote damper positioning is being used, make sure that the terminals are wired according to Fig. 26 and that the minimum position potentiometer is turned fully clockwise.
4. Connect 24 vac across terminals TR and TR1.
5. Carefully adjust the minimum position potentiometer until the measured mixed-air temperature matches the calculated value.
6. Reconnect the supply air sensor to terminals T and T1.

Remote control of the 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. 36.

**Damper Movement** — Damper movement from full open to full closed (or vice versa) takes  $2\frac{1}{2}$  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. 26. 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<sub>2</sub> level increases even though the CO<sub>2</sub> set point has not been reached. By the time the CO<sub>2</sub> level reaches the set point, the damper will be at maximum ventilation and should maintain the set point.

In order to have the CO<sub>2</sub> sensor control the economizer damper in this manner, first determine the damper voltage output for minimum or base ventilation. Base ventilation is the ventilation required to remove contaminants during unoccupied periods. The following equation may be used to determine the percent of outside-air entering the building for a given damper position. For best results there should be at least a 10 degree difference in outside and return-air temperatures.

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

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

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

The same equation can be used to determine the occupied or maximum ventilation rate to the building. For example, an output of 3.6 volts to the actuator provides a base ventilation rate of 5% and an output of 6.7 volts provides the maximum ventilation rate of 20% (or base plus 15 cfm per person). Use Fig. 37 to determine the maximum setting of the CO<sub>2</sub> sensor. For example, a 1100 ppm set point relates to a 15 cfm per person design. Use the 1100 ppm curve on Fig. 37 to find the point when the CO<sub>2</sub> 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<sub>2</sub> sensor should be 1800 ppm. The EconoMi\$er IV controller will output the 6.7 volts from the



CO<sub>2</sub> sensor to the actuator when the CO<sub>2</sub> concentration in the space is at 1100 ppm. The DCV set point may be left at 2 volts since the CO<sub>2</sub> sensor voltage will be ignored by the EconoMiSer 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<sub>2</sub> Sensor Configuration** — The CO<sub>2</sub> sensor has preset standard voltage settings that can be selected anytime after the sensor is powered up. See Table 8.

Use setting 1 or 2 for Carrier equipment. See Table 8.

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 8.
4. Press Enter to lock in the selection.
5. Press Mode to exit and resume normal operation.

The custom settings of the CO<sub>2</sub> 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 7 — Adjust Indoor-Fan Speed** — Adjust the indoor-fan speed to meet jobsite conditions.

For units with electric heat, required minimum cfm is 2250 for 50TFQ008, 2550 for 50TFQ009 and 3000 for 50TFQ012 with the following exceptions:

UNIT	UNIT VOLTAGE	HEATER kW	UNIT CONFIGURATION	REQUIRED MINIMUM CFM
50TFQ012	208/230	42.4	Horizontal	3200
	208/230	50.0	Horizontal	3200
	460	50.0	Horizontal or Vertical	3200
	575	17.0	Horizontal or Vertical	2800
51.0		2350		

Table 9 shows indoor-fan motor data. Table 10 shows fan rpm at motor pulley settings for standard and alternate motors. Tables 11A and 11B show static pressure for accessories. Refer to Tables 12-27 to determine fan speed settings. Fan motor pulleys are factory set for speed shown in Table 1.

To change fan speeds:

1. Shut off the unit power supply and tag disconnect.
2. Loosen the belt by loosening the fan motor mounting nuts. See Fig. 38 and 39.
3. Loosen the movable pulley flange setscrew (see Fig. 40).
4. Screw the movable flange toward the fixed flange to increase speed or away from the fixed flange to decrease speed. Increasing the fan speed increases the load on the motor. Do not exceed the maximum speed specified in Table 1.
5. Set the movable flange at nearest keyway of the pulley hub and tighten the setscrew. (See Table 1 for speed change for each full turn of the pulley flange.)

**Table 8 — CO<sub>2</sub> Sensor Standard Settings**

SETTING	EQUIPMENT	OUTPUT	VENTILATION RATE (cfm/Person)	ANALOG OUTPUT	CO <sub>2</sub> 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

To align the fan and motor pulleys:

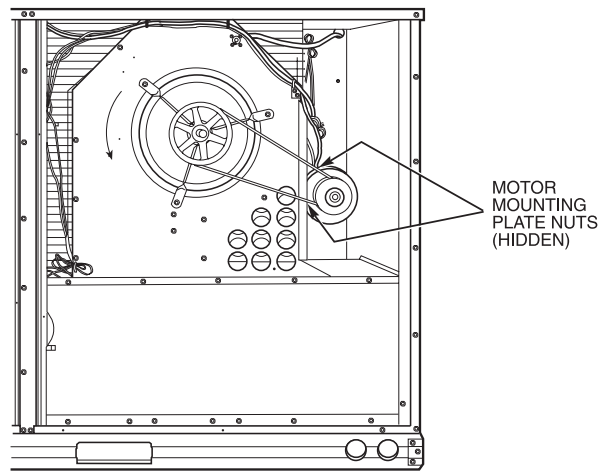
1. Loosen the fan pulley setscrews.
2. Slide the fan pulley along the fan shaft.
3. Make angular alignment by loosening the motor from the mounting plate.

To adjust belt tension:

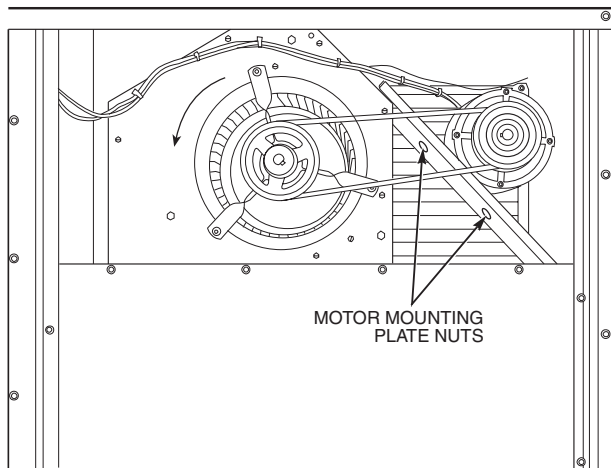
1. Loosen the fan motor mounting nuts.
2. *Sizes 008 and 009* — Slide the motor mounting plate away from the fan scroll for proper belt tension ( $\frac{1}{2}$ -in. deflection with 5 to 10 lb of force) and tighten the mounting nuts (see Fig. 38).

*Size 012* — Slide the motor mounting plate downward to tighten belt tension ( $\frac{1}{2}$ -in. deflection with 5 to 10 lb of force). Secure the motor mounting plate nuts. See Fig. 39.

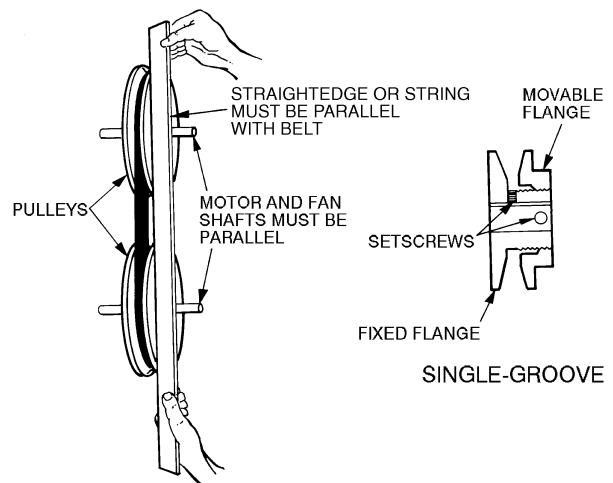
3. Adjust the bolt and nut on the mounting plate to secure the motor in fixed position.



**Fig. 39 — Typical Belt-Drive Motor Mounting for Size 012**



**Fig. 38 — Typical Belt-Drive Motor Mounting for Size 008 and 009**



**Fig. 40 — Indoor-Fan Pulley Adjustment**

**Table 9 — Fan Motor Performance**

UNIT 50TFQ	INDOOR-FAN MOTOR	UNIT VOLTAGE	MAXIMUM ACCEPTABLE CONTINUOUS BHP*	MAXIMUM ACCEPTABLE OPERATING WATTS	MAXIMUM AMP DRAW		
008	Standard, Alternate	208/230	2.40	2120	6.0		
		460			3.0		
		575			3.0		
	High Static	208/230			3.70	3313	11.7
		460					5.5
		575					5.5
009	Standard	208/230	2.40	2120	6.0		
		460			3.0		
		575			3.0		
	High Static	208/230			3.70	3313	11.7
		460					5.5
		575					5.5
012	Standard	208/230	2.40	2120	6.0		
		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		

**LEGEND**

**BHP** — Brake Horsepower

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

**Table 10 — Fan Rpm at Motor Pulley Settings\***

UNIT 50TFQ	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

\*Approximate fan rpm shown.

†Indicates standard motor and drive package.

\*\*Indicates alternate drive package only.

††Indicates high-static motor and drive package.

**Table 11A — Electric Heater Static Pressure\* (in. wg) — 50TFQ008-012**

COMPONENT	CFM										
	2250	2500	3000	3500	4000	4500	5000	5500	6000	6250	
1 Heater Module	0.02	0.03	0.05	0.07	0.08	0.10	0.12	0.14	0.16	0.17	
2 Heater Modules	0.03	0.05	0.07	0.09	0.12	0.14	0.16	0.19	0.21	0.20	

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

**Table 11B — EconoMiSer IV and EconoMiSer2 Static Pressure\* (in. wg) — 50TFQ008-012**

COMPONENT	CFM														
	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	6250	
Vertical EconoMiSer IV and EconoMiSer2	0.06	0.075	0.09	0.115	0.13	0.15	0.17	0.195	0.22	0.25	0.285	0.325	0.36	—	
Horizontal EconoMiSer IV and EconoMiSer2	—	0.1	0.125	0.15	0.18	0.21	0.25	0.275	0.3	0.34	0.388	—	—	—	

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

**Table 12 — Fan Performance, 50TFQ008 — Vertical Discharge Units; Standard Motor and 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	511	<b>0.58</b>	<b>538</b>	591	0.75	697	660	0.93	864	722	1.12	1041	779	1.32	1228
2300	519	<b>0.61</b>	<b>567</b>	597	0.78	729	666	0.97	900	727	1.16	1079	784	1.36	1268
2400	534	<b>0.68</b>	<b>630</b>	611	0.86	798	678	1.04	974	739	1.24	1158	794	1.45	1352
2500	550	<b>0.75</b>	<b>698</b>	624	0.93	872	690	1.13	1053	750	1.33	1243	805	1.55	1441
2550	557	<b>0.79</b>	<b>733</b>	631	0.98	910	697	1.17	1095	756	1.38	1287	811	1.60	1488
2600	565	<b>0.83</b>	<b>770</b>	638	1.02	950	703	1.22	1138	762	1.43	1333	816	1.65	1536
2700	581	<b>0.91</b>	<b>848</b>	652	1.11	1034	716	1.32	1228	774	1.53	1428	828	1.75	1636
2800	597	1.00	932	667	1.21	1124	729	1.42	1323	786	1.64	1529	839	1.87	1742
2900	613	1.09	1020	681	1.31	1220	743	1.53	1425	799	1.75	1636	<b>851</b>	<b>1.99</b>	<b>1855</b>
3000	629	1.20	1115	696	1.42	1321	756	1.64	1532	812	1.88	1749	<b>863</b>	<b>2.12</b>	<b>1973</b>
3100	646	1.30	1217	711	1.53	1428	770	1.76	1645	825	2.00	1869	<b>875</b>	<b>2.25</b>	<b>2098</b>
3200	662	1.42	1324	726	1.65	1542	784	1.89	1765	838	2.14	1994	<b>888</b>	<b>2.39</b>	<b>2229</b>
3300	679	1.54	1438	741	1.78	1663	798	2.03	1892	<b>851</b>	<b>2.28</b>	<b>2126</b>	—	—	—
3400	695	1.67	1558	756	1.92	1790	812	2.17	2025	—	—	—	—	—	—
3500	712	1.81	1686	772	2.06	1923	827	2.32	2165	—	—	—	—	—	—
3600	729	1.95	1820	787	2.21	2065	—	—	—	—	—	—	—	—	—
3700	746	2.10	1962	803	2.37	2213	—	—	—	—	—	—	—	—	—
3750	754	2.18	2036	—	—	—	—	—	—	—	—	—	—	—	—

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	831	1.53	1423	<b>880</b>	<b>1.74</b>	<b>1627</b>	<b>927</b>	<b>1.97</b>	<b>1840</b>	<b>971</b>	<b>2.21</b>	<b>2061</b>	—	—	—
2300	836	1.57	1465	<b>885</b>	<b>1.79</b>	<b>1671</b>	<b>931</b>	<b>2.02</b>	<b>1886</b>	<b>975</b>	<b>2.26</b>	<b>2109</b>	—	—	—
2400	<b>846</b>	<b>1.67</b>	<b>1554</b>	<b>895</b>	<b>1.89</b>	<b>1764</b>	<b>941</b>	<b>2.13</b>	<b>1982</b>	<b>984</b>	<b>2.37</b>	<b>2209</b>	—	—	—
2500	<b>856</b>	<b>1.77</b>	<b>1647</b>	<b>905</b>	<b>2.00</b>	<b>1862</b>	<b>950</b>	<b>2.24</b>	<b>2085</b>	—	—	—	—	—	—
2550	<b>862</b>	<b>1.82</b>	<b>1697</b>	<b>910</b>	<b>2.05</b>	<b>1913</b>	<b>955</b>	<b>2.29</b>	<b>2138</b>	—	—	—	—	—	—
2600	<b>867</b>	<b>1.87</b>	<b>1747</b>	<b>915</b>	<b>2.11</b>	<b>1966</b>	<b>960</b>	<b>2.35</b>	<b>2193</b>	—	—	—	—	—	—
2700	<b>878</b>	<b>1.99</b>	<b>1852</b>	<b>925</b>	<b>2.23</b>	<b>2076</b>	—	—	—	—	—	—	—	—	—
2800	<b>889</b>	<b>2.11</b>	<b>1963</b>	<b>936</b>	<b>2.35</b>	<b>2192</b>	—	—	—	—	—	—	—	—	—
2900	<b>900</b>	<b>2.23</b>	<b>2080</b>	—	—	—	—	—	—	—	—	—	—	—	—
3000	<b>912</b>	<b>2.36</b>	<b>2204</b>	—	—	—	—	—	—	—	—	—	—	—	—
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.

Refer to page 43 General Fan Performance Notes.

**NOTES:**

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

**Table 13 — Fan Performance, 50TFQ008 — Vertical Discharge Units; Alternate Motor and 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	511	0.58	538	591	0.75	697	660	0.93	864	722	1.12	1041	779	1.32	1228
2300	519	0.61	567	597	0.78	729	666	0.97	900	727	1.16	1079	784	1.36	1268
2400	534	0.68	630	611	0.86	798	678	1.04	974	739	1.24	1158	794	1.45	1352
2500	550	0.75	698	624	0.93	872	690	1.13	1053	750	1.33	1243	805	1.55	1441
2550	557	0.79	733	631	0.98	910	697	1.17	1095	756	1.38	1287	811	1.60	1488
2600	565	0.83	770	638	1.02	950	703	1.22	1138	762	1.43	1333	816	1.65	1536
2700	581	0.91	848	652	1.11	1034	716	1.32	1228	774	1.53	1428	828	1.75	1636
2800	597	1.00	932	667	1.21	1124	729	1.42	1323	786	1.64	1529	839	1.87	1742
2900	613	1.09	1020	681	1.31	1220	743	1.53	1425	799	1.75	1636	851	1.99	1855
3000	629	1.20	1115	696	1.42	1321	756	1.64	1532	812	1.88	1749	863	2.12	1973
3100	646	1.30	1217	711	1.53	1428	770	1.76	1645	825	2.00	1869	875	2.25	2098
3200	662	1.42	1324	726	1.65	1542	784	1.89	1765	838	2.14	1994	888	2.39	2229
3300	679	1.54	1438	741	1.78	1663	798	2.03	1892	851	2.28	2126	—	—	—
3400	695	1.67	1558	756	1.92	1790	812	2.17	2025	—	—	—	—	—	—
3500	712	1.81	1686	772	2.06	1923	827	2.32	2165	—	—	—	—	—	—
3600	729	1.95	1820	787	2.21	2065	—	—	—	—	—	—	—	—	—
3700	746	2.10	1962	803	2.37	2213	—	—	—	—	—	—	—	—	—
3750	754	2.18	2036	—	—	—	—	—	—	—	—	—	—	—	—

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	831	1.53	1423	880	1.74	1627	927	1.97	1840	971	2.21	2061	—	—	—
2300	836	1.57	1465	885	1.79	1671	931	2.02	1886	975	2.26	2109	—	—	—
2400	846	1.67	1554	895	1.89	1764	941	2.13	1982	984	2.37	2209	—	—	—
2500	856	1.77	1647	905	2.00	1862	950	2.24	2085	—	—	—	—	—	—
2550	862	1.82	1697	910	2.05	1913	955	2.29	2138	—	—	—	—	—	—
2600	867	1.87	1747	915	2.11	1966	960	2.35	2193	—	—	—	—	—	—
2700	878	1.99	1852	925	2.23	2076	—	—	—	—	—	—	—	—	—
2800	889	2.11	1963	936	2.35	2192	—	—	—	—	—	—	—	—	—
2900	900	2.23	2080	—	—	—	—	—	—	—	—	—	—	—	—
3000	912	2.36	2204	—	—	—	—	—	—	—	—	—	—	—	—
3100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

**LEGEND**

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

Refer to page 43 General Fan Performance Notes.

**NOTES:**

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

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

Table 14 — Fan Performance, 50TFQ008 — Vertical Discharge Units; High-Static Motor and 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	511	0.58	538	591	0.75	697	660	0.93	864	722	1.12	1041	779	1.32	1228
2300	519	0.61	567	597	0.78	729	666	0.97	900	727	1.16	1079	784	1.36	1268
2400	534	0.68	630	611	0.86	798	678	1.04	974	739	1.24	1158	794	1.45	1352
2500	550	0.75	698	624	0.93	872	690	1.13	1053	750	1.33	1243	805	1.55	1441
2550	557	0.79	733	631	0.98	910	697	1.17	1095	756	1.38	1287	811	1.60	1488
2600	565	0.83	770	638	1.02	950	703	1.22	1138	762	1.43	1333	816	1.65	1536
2700	581	0.91	848	652	1.11	1034	716	1.32	1228	774	1.53	1428	828	1.75	1636
2800	597	1.00	932	667	1.21	1124	729	1.42	1323	786	1.64	1529	839	1.87	1742
2900	613	1.09	1020	681	1.31	1220	743	1.53	1425	799	1.75	1636	851	1.99	1855
3000	629	1.20	1115	696	1.42	1321	756	1.64	1532	812	1.88	1749	863	2.12	1973
3100	646	1.30	1217	711	1.53	1428	770	1.76	1645	825	2.00	1869	875	2.25	2098
3200	662	1.42	1324	726	1.65	1542	784	1.89	1765	838	2.14	1994	888	2.39	2229
3300	679	1.54	1438	741	1.78	1663	798	2.03	1892	851	2.28	2126	901	2.54	2367
3400	695	1.67	1558	756	1.92	1790	812	2.17	2025	865	2.43	2266	913	2.69	2512
3500	712	1.81	1686	772	2.06	1923	827	2.32	2165	878	2.59	2412	926	2.86	2664
3600	729	1.95	1820	787	2.21	2065	841	2.48	2312	892	2.75	2565	940	3.03	2823
3700	746	2.10	1962	803	2.37	2213	856	2.65	2467	906	2.92	2726	953	3.21	2990
3750	754	2.18	2036	811	2.46	2290	864	2.73	2548	913	3.01	2809	960	3.30	3076

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	831	1.53	1423	880	1.74	1627	927	1.97	1840	971	2.21	2061	1013	2.46	2289
2300	836	1.57	1465	885	1.79	1671	931	2.02	1886	975	2.26	2109	1017	2.51	2340
2400	846	1.67	1554	895	1.89	1764	941	2.13	1982	984	2.37	2209	1026	2.62	2443
2500	856	1.77	1647	905	2.00	1862	950	2.24	2085	993	2.48	2315	1035	2.74	2553
2550	862	1.82	1697	910	2.05	1913	955	2.29	2138	998	2.54	2370	1039	2.80	2611
2600	867	1.87	1747	915	2.11	1966	960	2.35	2193	1003	2.60	2427	1044	2.86	2669
2700	878	1.99	1852	925	2.23	2076	970	2.47	2307	1012	2.73	2545	1053	2.99	2791
2800	889	2.11	1963	936	2.35	2192	980	2.60	2427	1022	2.86	2670	1063	3.13	2920
2900	900	2.23	2080	946	2.48	2314	990	2.74	2554	1032	3.00	2800	1072	3.28	3055
3000	912	2.36	2204	957	2.62	2442	1001	2.88	2687	1043	3.15	2938	<b>1082</b>	<b>3.43</b>	<b>3196</b>
3100	923	2.50	2334	969	2.76	2577	1012	3.03	2826	1053	3.31	3082	<b>1093</b>	<b>3.59</b>	<b>3345</b>
3200	935	2.65	2471	980	2.92	2718	1023	3.19	2973	1064	3.47	3233	—	—	—
3300	947	2.80	2613	992	3.07	2867	1034	3.35	3126	1074	3.64	3391	—	—	—
3400	960	2.96	2764	1003	3.24	3022	1045	3.52	3286	—	—	—	—	—	—
3500	972	3.13	2921	1015	3.42	3185	1057	3.70	3454	—	—	—	—	—	—
3600	985	3.31	3086	1028	3.60	3355	—	—	—	—	—	—	—	—	—
3700	997	3.49	3259	—	—	—	—	—	—	—	—	—	—	—	—
3750	1004	3.59	3347	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

Refer to page 43 General Fan Performance Notes.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.

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

**Table 15 — Fan Performance, 50TFQ009 — Vertical Discharge Units; Standard Motor and 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	557	0.79	733	631	0.98	910	697	1.17	1095	756	1.38	1287	811	1.60	1488
2600	565	0.83	770	638	1.02	950	703	1.22	1138	762	1.43	1333	816	1.65	1536
2700	581	0.91	848	652	1.11	1034	716	1.32	1228	774	1.53	1428	828	1.75	1636
2800	597	1.00	932	667	1.21	1124	729	1.42	1323	786	1.64	1529	839	1.87	1742
2900	613	1.09	1020	681	1.31	1220	743	1.53	1425	799	1.75	1636	851	1.99	1855
3000	629	1.20	1115	696	1.42	1321	756	1.64	1532	812	1.88	1749	863	2.12	1973
3100	646	1.30	1217	711	1.53	1428	770	1.76	1645	825	2.00	1869	875	2.25	2098
3200	662	1.42	1324	726	1.65	1542	784	1.89	1765	838	2.14	1994	888	2.39	2229
3300	679	1.54	1438	741	1.78	1663	798	2.03	1892	851	2.28	2126	—	—	—
3400	695	1.67	1558	756	1.92	1790	812	2.17	2025	—	—	—	—	—	—
3500	712	1.81	1686	772	2.06	1923	827	2.32	2165	—	—	—	—	—	—
3600	729	1.95	1820	787	2.21	2065	—	—	—	—	—	—	—	—	—
3700	746	2.10	1962	803	2.37	2213	—	—	—	—	—	—	—	—	—
3750	754	2.18	2036	—	—	—	—	—	—	—	—	—	—	—	—
3800	763	2.26	2112	—	—	—	—	—	—	—	—	—	—	—	—
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	862	1.82	1697	910	2.05	1913	955	2.29	2138	—	—	—	—	—	—
2600	867	1.87	1747	915	2.11	1966	960	2.35	2193	—	—	—	—	—	—
2700	878	1.99	1852	925	2.23	2076	—	—	—	—	—	—	—	—	—
2800	889	2.11	1963	936	2.35	2192	—	—	—	—	—	—	—	—	—
2900	900	2.23	2080	—	—	—	—	—	—	—	—	—	—	—	—
3000	912	2.36	2204	—	—	—	—	—	—	—	—	—	—	—	—
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.

Refer to page 43 General Fan Performance Notes.

NOTES:

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

Table 16 — Fan Performance, 50TFQ009 — Vertical Discharge Units; High-Static Motor and 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	557	0.79	733	631	0.98	910	697	1.17	1095	756	1.38	1287	811	1.60	1488
2600	565	0.83	770	638	1.02	950	703	1.22	1138	762	1.43	1333	816	1.65	1536
2700	581	0.91	848	652	1.11	1034	716	1.32	1228	774	1.53	1428	828	1.75	1636
2800	597	1.00	932	667	1.21	1124	729	1.42	1323	786	1.64	1529	839	1.87	1742
2900	613	1.09	1020	681	1.31	1220	743	1.53	1425	799	1.75	1636	851	1.99	1855
3000	629	1.20	1115	696	1.42	1321	756	1.64	1532	812	1.88	1749	863	2.12	1973
3100	646	1.30	1217	711	1.53	1428	770	1.76	1645	825	2.00	1869	875	2.25	2098
3200	662	1.42	1324	726	1.65	1542	784	1.89	1765	838	2.14	1994	888	2.39	2229
3300	679	1.54	1438	741	1.78	1663	798	2.03	1892	851	2.28	2126	901	2.54	2367
3400	695	1.67	1558	756	1.92	1790	812	2.17	2025	865	2.43	2266	913	2.69	2512
3500	712	1.81	1686	772	2.06	1923	827	2.32	2165	878	2.59	2412	926	2.86	2664
3600	729	1.95	1820	787	2.21	2065	841	2.48	2312	892	2.75	2565	940	3.03	2823
3700	746	2.10	1962	803	2.37	2213	856	2.65	2467	906	2.92	2726	953	3.21	2990
3750	754	2.18	2036	811	2.46	2290	864	2.73	2548	913	3.01	2809	960	3.30	3076
3800	763	2.26	2112	819	2.54	2369	871	2.82	2630	920	3.10	2895	966	3.39	3164
3900	780	2.43	2269	835	2.72	2533	886	3.00	2800	934	3.29	3070	980	3.59	3346
4000	797	2.61	2434	851	2.90	2705	901	3.19	2978	949	3.49	3255	—	—	—
4100	814	2.80	2607	867	3.09	2884	916	3.39	3164	963	3.70	3447	—	—	—
4200	831	2.99	2788	883	3.29	3072	932	3.60	3358	—	—	—	—	—	—
4250	840	3.09	2883	891	3.40	3170	—	—	—	—	—	—	—	—	—

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	862	1.82	1697	910	2.05	1913	955	2.29	2138	998	2.54	2370	1039	2.80	2611
2600	867	1.87	1747	915	2.11	1966	960	2.35	2193	1003	2.60	2427	1044	2.86	2669
2700	878	1.99	1852	925	2.23	2076	970	2.47	2307	1012	2.73	2545	1053	2.99	2791
2800	889	2.11	1963	936	2.35	2192	980	2.60	2427	1022	2.86	2670	1063	3.13	2920
2900	900	2.23	2080	946	2.48	2314	990	2.74	2554	1032	3.00	2800	1072	3.28	3055
3000	912	2.36	2204	957	2.62	2442	1001	2.88	2687	1043	3.15	2938	<b>1082</b>	<b>3.43</b>	<b>3196</b>
3100	923	2.50	2334	969	2.76	2577	1012	3.03	2826	1053	3.31	3082	<b>1093</b>	<b>3.59</b>	<b>3345</b>
3200	935	2.65	2471	980	2.92	2718	1023	3.19	2973	1064	3.47	3233	—	—	—
3300	947	2.80	2613	992	3.07	2867	1034	3.35	3126	1074	3.64	3391	—	—	—
3400	960	2.96	2764	1003	3.24	3022	1045	3.52	3286	—	—	—	—	—	—
3500	972	3.13	2921	1015	3.42	3185	1057	3.70	3454	—	—	—	—	—	—
3600	985	3.31	3086	1028	3.60	3355	—	—	—	—	—	—	—	—	—
3700	997	3.49	3259	—	—	—	—	—	—	—	—	—	—	—	—
3750	1004	3.59	3347	—	—	—	—	—	—	—	—	—	—	—	—
3800	1010	3.69	3438	—	—	—	—	—	—	—	—	—	—	—	—
3900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

Refer to page 43 General Fan Performance Notes.

NOTES:

- Boldface** indicates field-supplied drive is required.
- Maximum continuous bhp is 3.70.

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



Table 17 — Fan Performance, 50TFQ012 — Vertical Discharge Units; Standard Motor and 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	556	0.65	604	623	0.80	748	684	0.95	891	738	1.11	1034	789	1.26	1177
3100	569	0.70	656	636	0.86	805	695	1.02	953	749	1.18	1100	799	1.34	1249
3200	583	0.76	712	648	0.93	865	707	1.09	1018	760	1.26	1170	809	1.42	1323
3300	597	0.83	770	661	1.00	929	718	1.17	1086	771	1.33	1244	820	1.50	1401
3400	611	0.89	832	674	1.07	996	730	1.24	1158	782	1.42	1320	831	1.59	1483
3500	625	0.96	898	687	1.14	1066	742	1.32	1233	794	1.50	1400	841	1.68	1567
3600	639	1.04	967	700	1.22	1140	754	1.41	1312	805	1.59	1484	852	1.78	1656
3700	654	1.11	1040	713	1.31	1218	767	1.50	1395	817	1.69	1571	863	1.87	1748
3800	668	1.20	1116	726	1.39	1299	779	1.59	1481	828	1.78	1662	874	1.98	1844
3900	683	1.28	1197	739	1.48	1385	792	1.69	1572	840	1.88	1758	886	2.08	1943
4000	697	1.37	1281	753	1.58	1474	804	1.79	1666	852	1.99	1857	897	2.20	2048
4100	712	1.47	1370	766	1.68	1567	817	1.89	1764	864	2.10	1960	909	2.31	2155
4200	726	1.57	1462	780	1.79	1665	830	2.00	1866	876	2.22	2067	—	—	—
4300	741	1.67	1559	794	1.89	1767	843	2.12	1973	889	2.34	2179	—	—	—
4400	755	1.78	1660	807	2.01	1873	856	2.23	2084	—	—	—	—	—	—
4500	770	1.89	1766	821	2.13	1984	869	2.36	2200	—	—	—	—	—	—
4600	785	2.01	1876	835	2.25	2099	—	—	—	—	—	—	—	—	—
4700	800	2.14	1991	849	2.38	2219	—	—	—	—	—	—	—	—	—
4800	815	2.26	2111	—	—	—	—	—	—	—	—	—	—	—	—
4900	829	2.40	2235	—	—	—	—	—	—	—	—	—	—	—	—
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	836	1.42	1322	881	1.57	1467	923	1.73	1613	963	1.89	1761	1001	2.05	1909
3100	846	1.50	1398	890	1.66	1547	932	1.82	1698	972	1.98	1849	1010	2.15	2002
3200	856	1.58	1477	899	1.75	1631	941	1.92	1786	980	2.08	1942	1018	2.25	2099
3300	866	1.67	1559	909	1.84	1718	950	2.01	1878	989	2.19	2038	1027	2.36	2199
3400	876	1.76	1645	919	1.94	1808	960	2.12	1972	998	2.29	2137	—	—	—
3500	886	1.86	1734	929	2.04	1902	969	2.22	2071	1008	2.40	2240	—	—	—
3600	897	1.96	1827	939	2.14	2000	979	2.33	2173	—	—	—	—	—	—
3700	907	2.06	1924	949	2.25	2101	—	—	—	—	—	—	—	—	—
3800	918	2.17	2025	959	2.37	2207	—	—	—	—	—	—	—	—	—
3900	929	2.28	2130	—	—	—	—	—	—	—	—	—	—	—	—
4000	940	2.40	2238	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

Refer to page 43 General Fan Performance Notes.

NOTES:

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

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

Table 18 — Fan Performance, 50TFQ012 — Vertical Discharge Units; Alternate Motor and 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	556	0.65	604	623	0.80	748	684	0.95	891	738	1.11	1034	789	1.26	1177
3100	569	0.70	656	636	0.86	805	695	1.02	953	749	1.18	1100	799	1.34	1249
3200	583	0.76	712	648	0.93	865	707	1.09	1018	760	1.26	1170	809	1.42	1323
3300	597	0.83	770	661	1.00	929	718	1.17	1086	771	1.33	1244	820	1.50	1401
3400	611	0.89	832	674	1.07	996	730	1.24	1158	782	1.42	1320	831	1.59	1483
3500	625	0.96	898	687	1.14	1066	742	1.32	1233	794	1.50	1400	841	1.68	1567
3600	639	1.04	967	700	1.22	1140	754	1.41	1312	805	1.59	1484	852	1.78	1656
3700	654	1.11	1040	713	1.31	1218	767	1.50	1395	817	1.69	1571	863	1.87	1748
3800	668	1.20	1116	726	1.39	1299	779	1.59	1481	828	1.78	1662	874	1.98	1844
3900	683	1.28	1197	739	1.48	1385	792	1.69	1572	840	1.88	1758	886	2.08	1943
4000	697	1.37	1281	753	1.58	1474	804	1.79	1666	852	1.99	1857	897	2.20	2048
4100	712	1.47	1370	766	1.68	1567	817	1.89	1764	864	2.10	1960	909	2.31	2155
4200	726	1.57	1462	780	1.79	1665	830	2.00	1866	876	2.22	2067	920	2.43	2268
4300	741	1.67	1559	794	1.89	1767	843	2.12	1973	889	2.34	2179	932	2.56	2384
4400	755	1.78	1660	807	2.01	1873	856	2.23	2084	901	2.46	2295	944	2.69	2505
4500	770	1.89	1766	821	2.13	1984	869	2.36	2200	914	2.59	2415	956	2.82	2630
4600	785	2.01	1876	835	2.25	2099	882	2.49	2320	926	2.72	2541	—	—	—
4700	800	2.14	1991	849	2.38	2219	895	2.62	2445	939	2.86	2670	—	—	—
4800	815	2.26	2111	863	2.51	2344	909	2.76	2575	—	—	—	—	—	—
4900	829	2.40	2235	877	2.65	2473	—	—	—	—	—	—	—	—	—
5000	844	2.54	2365	891	2.80	2608	—	—	—	—	—	—	—	—	—

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	836	1.42	1322	881	1.57	1467	923	1.73	1613	963	1.89	1761	1001	2.05	1909
3100	846	1.50	1398	890	1.66	1547	932	1.82	1698	972	1.98	1849	1010	2.15	2002
3200	856	1.58	1477	899	1.75	1631	941	1.92	1786	980	2.08	1942	1018	2.25	2099
3300	866	1.67	1559	909	1.84	1718	950	2.01	1878	989	2.19	2038	1027	2.36	2199
3400	876	1.76	1645	919	1.94	1808	960	2.12	1972	998	2.29	2137	1036	2.47	2303
3500	886	1.86	1734	929	2.04	1902	969	2.22	2071	1008	2.40	2240	1045	2.58	2410
3600	897	1.96	1827	939	2.14	2000	979	2.33	2173	1017	2.52	2347	1054	2.70	2521
3700	907	2.06	1924	949	2.25	2101	989	2.44	2279	1027	2.63	2457	1063	2.83	2636
3800	918	2.17	2025	959	2.37	2207	999	2.56	2389	1036	2.76	2571	—	—	—
3900	929	2.28	2130	970	2.48	2316	1009	2.68	2502	1046	2.88	2690	—	—	—
4000	940	2.40	2238	980	2.61	2429	1019	2.81	2620	—	—	—	—	—	—
4100	951	2.52	2351	991	2.73	2547	—	—	—	—	—	—	—	—	—
4200	962	2.65	2468	1002	2.86	2668	—	—	—	—	—	—	—	—	—
4300	973	2.78	2589	—	—	—	—	—	—	—	—	—	—	—	—
4400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

Refer to page 43 General Fan Performance Notes.

NOTES:

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

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

Table 19 — Fan Performance, 50TFQ012 — Vertical Discharge Units; High-Static Motor and 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	556	0.65	604	623	0.80	748	684	0.95	891	738	1.11	1034	789	1.26	1177
3100	569	0.70	656	636	0.86	805	695	1.02	953	749	1.18	1100	799	1.34	1249
3200	583	0.76	712	648	0.93	865	707	1.09	1018	760	1.26	1170	809	1.42	1323
3300	597	0.83	770	661	1.00	929	718	1.17	1086	771	1.33	1244	820	1.50	1401
3400	611	0.89	832	674	1.07	996	730	1.24	1158	782	1.42	1320	831	1.59	1483
3500	625	0.96	898	687	1.14	1066	742	1.32	1233	794	1.50	1400	841	1.68	1567
3600	639	1.04	967	700	1.22	1140	754	1.41	1312	805	1.59	1484	852	1.78	1656
3700	654	1.11	1040	713	1.31	1218	767	1.50	1395	817	1.69	1571	863	1.87	1748
3800	668	1.20	1116	726	1.39	1299	779	1.59	1481	828	1.78	1662	874	1.98	1844
3900	683	1.28	1197	739	1.48	1385	792	1.69	1572	840	1.88	1758	886	2.08	1943
4000	697	1.37	1281	753	1.58	1474	804	1.79	1666	852	1.99	1857	897	2.20	2048
4100	712	1.47	1370	766	1.68	1567	817	1.89	1764	864	2.10	1960	909	2.31	2155
4200	726	1.57	1462	780	1.79	1665	830	2.00	1866	876	2.22	2067	920	2.43	2268
4300	741	1.67	1559	794	1.89	1767	843	2.12	1973	889	2.34	2179	932	2.56	2384
4400	755	1.78	1660	807	2.01	1873	856	2.23	2084	901	2.46	2295	944	2.69	2505
4500	770	1.89	1766	821	2.13	1984	869	2.36	2200	914	2.59	2415	956	2.82	2630
4600	785	2.01	1876	835	2.25	2099	882	2.49	2320	926	2.72	2541	968	2.96	2760
4700	800	2.14	1991	849	2.38	2219	895	2.62	2445	939	2.86	2670	980	3.10	2895
4800	815	2.26	2111	863	2.51	2344	909	2.76	2575	952	3.01	2805	993	3.25	3034
4900	829	2.40	2235	877	2.65	2473	922	2.91	2709	965	3.16	2944	1005	3.41	3178
5000	844	2.54	2365	891	2.80	2608	936	3.06	2849	978	3.31	3089	1018	3.57	3328

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	836	1.42	1322	881	1.57	1467	923	1.73	1613	963	1.89	1761	1001	2.05	1909
3100	846	1.50	1398	890	1.66	1547	932	1.82	1698	972	1.98	1849	1010	2.15	2002
3200	856	1.58	1477	899	1.75	1631	941	1.92	1786	980	2.08	1942	1018	2.25	2099
3300	866	1.67	1559	909	1.84	1718	950	2.01	1878	989	2.19	2038	1027	2.36	2199
3400	876	1.76	1645	919	1.94	1808	960	2.12	1972	998	2.29	2137	1036	2.47	2303
3500	886	1.86	1734	929	2.04	1902	969	2.22	2071	1008	2.40	2240	1045	2.58	2410
3600	897	1.96	1827	939	2.14	2000	979	2.33	2173	1017	2.52	2347	1054	2.70	2521
3700	907	2.06	1924	949	2.25	2101	989	2.44	2279	1027	2.63	2457	1063	2.83	2636
3800	918	2.17	2025	959	2.37	2207	999	2.56	2389	1036	2.76	2571	1073	2.95	2755
3900	929	2.28	2130	970	2.48	2316	1009	2.68	2502	1046	2.88	2690	1082	3.09	2877
4000	940	2.40	2238	980	2.61	2429	1019	2.81	2620	1056	3.02	2812	1092	3.22	3004
4100	951	2.52	2351	991	2.73	2547	1029	2.94	2743	1066	3.15	2939	1102	3.36	3136
4200	962	2.65	2468	1002	2.86	2668	1040	3.08	2869	1076	3.29	3070	1112	3.51	3271
4300	973	2.78	2589	1013	3.00	2794	1050	3.22	2999	1087	3.44	3205	1122	3.66	3411
4400	985	2.91	2715	1024	3.14	2924	1061	3.36	3134	1097	3.59	3345	1132	3.81	3555
4500	996	3.05	2845	1035	3.28	3059	1072	3.51	3274	1108	3.74	3489	1142	3.97	3704
4600	1008	3.20	2979	1046	3.43	3199	1083	3.67	3418	1118	3.90	3638	1152	4.14	3857
4700	1020	3.34	3119	1058	3.58	3343	1094	3.83	3567	1129	4.07	3792	1163	4.31	4016
4800	1032	3.50	3263	1069	3.74	3492	1105	3.99	3721	1140	4.24	3950	1174	4.48	4179
4900	1044	3.66	3413	1081	3.91	3646	1117	4.16	3880	1151	4.41	4113	1184	4.66	4347
5000	1056	3.82	3566	1093	4.08	3805	1128	4.34	4044	1162	4.59	4282	1195	4.85	4520

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.

Refer to page 43 General Fan Performance Notes.

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 5.25.

Table 20 — Fan Performance, 50TFQ008 — Horizontal Discharge Units; Standard Motor and 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	465	0.49	459	555	0.67	621	629	0.84	786	694	1.03	959	752	1.22	1138
2300	471	0.52	483	560	0.69	648	634	0.88	817	698	1.06	992	757	1.26	1174
2400	483	0.57	534	570	0.76	705	644	0.94	880	708	1.14	1061	765	1.34	1248
2500	495	0.63	588	581	0.82	767	653	1.02	948	717	1.22	1134	774	1.42	1327
2550	501	0.66	617	586	0.86	799	658	1.05	983	722	1.26	1173	779	1.47	1368
2600	507	0.69	647	592	0.89	832	663	1.09	1020	727	1.30	1212	784	1.51	1410
2700	519	0.76	709	603	0.97	902	674	1.18	1096	736	1.39	1294	793	1.61	1498
2800	532	0.83	775	614	1.05	976	684	1.26	1176	746	1.48	1381	802	1.71	1590
2900	544	0.91	846	625	1.13	1054	694	1.35	1261	756	1.58	1472	812	1.81	1687
3000	557	0.99	922	637	1.22	1137	705	1.45	1351	766	1.68	1568	821	1.92	1789
3100	570	1.07	1002	648	1.31	1224	716	1.55	1445	776	1.79	1669	831	2.03	1896
3200	582	1.17	1087	660	1.41	1317	727	1.66	1545	786	1.90	1774	841	2.15	2008
3300	595	1.26	1177	671	1.52	1414	738	1.77	1649	797	2.02	1885	851	2.28	2125
3400	608	1.36	1271	683	1.63	1517	749	1.89	1759	807	2.15	2002	—	—	—
3500	622	1.47	1372	695	1.74	1625	760	2.01	1874	818	2.28	2124	—	—	—
3600	635	1.58	1477	707	1.86	1738	771	2.14	1995	—	—	—	—	—	—
3700	648	1.70	1588	720	1.99	1857	783	2.27	2121	—	—	—	—	—	—
3750	655	1.77	1646	726	2.06	1918	788	2.34	2187	—	—	—	—	—	—

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	806	1.42	1326	855	1.63	1521	902	1.85	1723	946	2.07	1932	988	2.30	2148
2300	810	1.46	1363	859	1.67	1561	906	1.89	1765	950	2.12	1976	991	2.35	2194
2400	818	1.55	1443	868	1.76	1644	914	1.99	1853	958	2.22	2068	—	—	—
2500	827	1.64	1527	876	1.86	1733	922	2.09	1946	966	2.32	2165	—	—	—
2550	832	1.68	1570	880	1.91	1779	926	2.14	1994	970	2.38	2215	—	—	—
2600	836	1.73	1615	885	1.96	1826	931	2.19	2043	—	—	—	—	—	—
2700	845	1.83	1708	893	2.06	1923	939	2.30	2146	—	—	—	—	—	—
2800	854	1.94	1805	902	2.17	2026	—	—	—	—	—	—	—	—	—
2900	863	2.05	1907	911	2.29	2134	—	—	—	—	—	—	—	—	—
3000	872	2.16	2015	—	—	—	—	—	—	—	—	—	—	—	—
3100	882	2.28	2127	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

Refer to page 43 General Fan Performance Notes.

NOTES:

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

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

Table 21 — Fan Performance, 50TFQ008 — Horizontal Discharge Units; Alternate Motor and 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	465	0.49	459	555	0.67	621	629	0.84	786	694	1.03	959	752	1.22	1138
2300	471	0.52	483	560	0.69	648	634	0.88	817	698	1.06	992	757	1.26	1174
2400	483	0.57	534	570	0.76	705	644	0.94	880	708	1.14	1061	765	1.34	1248
2500	495	0.63	588	581	0.82	767	653	1.02	948	717	1.22	1134	774	1.42	1327
2550	501	0.66	617	586	0.86	799	658	1.05	983	722	1.26	1173	779	1.47	1368
2600	507	0.69	647	592	0.89	832	663	1.09	1020	727	1.30	1212	784	1.51	1410
2700	519	0.76	709	603	0.97	902	674	1.18	1096	736	1.39	1294	793	1.61	1498
2800	532	0.83	775	614	1.05	976	684	1.26	1176	746	1.48	1381	802	1.71	1590
2900	544	0.91	846	625	1.13	1054	694	1.35	1261	756	1.58	1472	812	1.81	1687
3000	557	0.99	922	637	1.22	1137	705	1.45	1351	766	1.68	1568	821	1.92	1789
3100	570	1.07	1002	648	1.31	1224	716	1.55	1445	776	1.79	1669	831	2.03	1896
3200	582	1.17	1087	660	1.41	1317	727	1.66	1545	786	1.90	1774	841	2.15	2008
3300	595	1.26	1177	671	1.52	1414	738	1.77	1649	797	2.02	1885	851	2.28	2125
3400	608	1.36	1271	683	1.63	1517	749	1.89	1759	807	2.15	2002	—	—	—
3500	622	1.47	1372	695	1.74	1625	760	2.01	1874	818	2.28	2124	—	—	—
3600	635	1.58	1477	707	1.86	1738	771	2.14	1995	—	—	—	—	—	—
3700	648	1.70	1588	720	1.99	1857	783	2.27	2121	—	—	—	—	—	—
3750	655	1.77	1646	726	2.06	1918	788	2.34	2187	—	—	—	—	—	—

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	806	1.42	1326	855	1.63	1521	902	1.85	1723	946	2.07	1932	988	2.30	2148
2300	810	1.46	1363	859	1.67	1561	906	1.89	1765	950	2.12	1976	991	2.35	2194
2400	818	1.55	1443	868	1.76	1644	914	1.99	1853	958	2.22	2068	—	—	—
2500	827	1.64	1527	876	1.86	1733	922	2.09	1946	966	2.32	2165	—	—	—
2550	832	1.68	1570	880	1.91	1779	926	2.14	1994	970	2.38	2215	—	—	—
2600	836	1.73	1615	885	1.96	1826	931	2.19	2043	—	—	—	—	—	—
2700	845	1.83	1708	893	2.06	1923	939	2.30	2146	—	—	—	—	—	—
2800	854	1.94	1805	902	2.17	2026	—	—	—	—	—	—	—	—	—
2900	863	2.05	1907	911	2.29	2134	—	—	—	—	—	—	—	—	—
3000	872	2.16	2015	—	—	—	—	—	—	—	—	—	—	—	—
3100	882	2.28	2127	—	—	—	—	—	—	—	—	—	—	—	—
3200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

Refer to page 43 General Fan Performance Notes.

NOTES:

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

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

**Table 22 — Fan Performance, 50TFQ008 — Horizontal Discharge Units; High-Static Motor and 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	465	0.49	459	555	0.67	621	629	0.84	786	694	1.03	959	752	1.22	1138
2300	471	0.52	483	560	0.69	648	634	0.88	817	698	1.06	992	757	1.26	1174
2400	483	0.57	534	570	0.76	705	644	0.94	880	708	1.14	1061	765	1.34	1248
2500	495	0.63	588	581	0.82	767	653	1.02	948	717	1.22	1134	774	1.42	1327
2550	501	0.66	617	586	0.86	799	658	1.05	983	722	1.26	1173	779	1.47	1368
2600	507	0.69	647	592	0.89	832	663	1.09	1020	727	1.30	1212	784	1.51	1410
2700	519	0.76	709	603	0.97	902	674	1.18	1096	736	1.39	1294	793	1.61	1498
2800	532	0.83	775	614	1.05	976	684	1.26	1176	746	1.48	1381	802	1.71	1590
2900	544	0.91	846	625	1.13	1054	694	1.35	1261	756	1.58	1472	812	1.81	1687
3000	557	0.99	922	637	1.22	1137	705	1.45	1351	766	1.68	1568	821	1.92	1789
3100	570	1.07	1002	648	1.31	1224	716	1.55	1445	776	1.79	1669	831	2.03	1896
3200	582	1.17	1087	660	1.41	1317	727	1.66	1545	786	1.90	1774	841	2.15	2008
3300	595	1.26	1177	671	1.52	1414	738	1.77	1649	797	2.02	1885	851	2.28	2125
3400	608	1.36	1271	683	1.63	1517	749	1.89	1759	807	2.15	2002	861	2.41	2248
3500	622	1.47	1372	695	1.74	1625	760	2.01	1874	818	2.28	2124	871	2.55	2376
3600	635	1.58	1477	707	1.86	1738	771	2.14	1995	829	2.41	2252	881	2.69	2510
3700	648	1.70	1588	720	1.99	1857	783	2.27	2121	839	2.56	2385	892	2.84	2650
3750	655	1.77	1646	726	2.06	1918	788	2.34	2187	845	2.63	2454	897	2.92	2722

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	806	1.42	1326	855	1.63	1521	902	1.85	1723	946	2.07	1932	988	2.30	2148
2300	810	1.46	1363	859	1.67	1561	906	1.89	1765	950	2.12	1976	991	2.35	2194
2400	818	1.55	1443	868	1.76	1644	914	1.99	1853	958	2.22	2068	999	2.46	2290
2500	827	1.64	1527	876	1.86	1733	922	2.09	1946	966	2.32	2165	1007	2.56	2391
2550	832	1.68	1570	880	1.91	1779	926	2.14	1994	970	2.38	2215	1011	2.62	2444
2600	836	1.73	1615	885	1.96	1826	931	2.19	2043	974	2.43	2267	1015	2.68	2497
2700	845	1.83	1708	893	2.06	1923	939	2.30	2146	982	2.55	2374	1023	2.80	2609
2800	854	1.94	1805	902	2.17	2026	948	2.42	2253	991	2.67	2486	1031	2.92	2725
2900	863	2.05	1907	911	2.29	2134	956	2.54	2366	999	2.79	2603	1040	3.05	2847
3000	872	2.16	2015	920	2.41	2246	965	2.66	2483	1008	2.92	2726	1048	3.19	2974
3100	882	2.28	2127	929	2.54	2365	974	2.80	2607	1016	3.06	2854	1057	3.33	3107
3200	891	2.41	2245	938	2.67	2488	983	2.93	2735	1025	3.20	2988	1065	3.48	3246
3300	901	2.54	2369	948	2.81	2617	992	3.08	2869	1034	3.35	3127	1074	3.64	3390
3400	911	2.68	2497	957	2.95	2751	1001	3.23	3010	1043	3.51	3273	—	—	—
3500	921	2.82	2632	967	3.10	2891	1011	3.38	3155	1052	3.67	3424	—	—	—
3600	930	2.97	2772	977	3.26	3038	1020	3.55	3307	—	—	—	—	—	—
3700	941	3.13	2918	986	3.42	3190	1030	3.72	3465	—	—	—	—	—	—
3750	946	3.21	2994	991	3.50	3268	—	—	—	—	—	—	—	—	—

**LEGEND**

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

Refer to page 43 General Fan Performance Notes.

**NOTES:**

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.

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

**Table 23 — Fan Performance, 50TFQ09 — Horizontal Discharge Units; Standard Motor and 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	501	0.66	617	586	0.86	799	658	1.05	983	722	1.26	1173	779	1.47	1368
2600	507	0.69	647	592	0.89	832	663	1.09	1020	727	1.30	1212	784	1.51	1410
2700	519	0.76	709	603	0.97	902	674	1.18	1096	736	1.39	1294	793	1.61	1498
2800	532	0.83	775	614	1.05	976	684	1.26	1176	746	1.48	1381	802	1.71	1590
2900	544	0.91	846	625	1.13	1054	694	1.35	1261	756	1.58	1472	812	1.81	1687
3000	557	0.99	922	637	1.22	1137	705	1.45	1351	766	1.68	1568	821	1.92	1789
3100	570	1.07	1002	648	1.31	1224	716	1.55	1445	776	1.79	1669	831	2.03	1896
3200	582	1.17	1087	660	1.41	1317	727	1.66	1545	786	1.90	1774	841	2.15	2008
3300	595	1.26	1177	671	1.52	1414	738	1.77	1649	797	2.02	1885	851	2.28	2125
3400	608	1.36	1271	683	1.63	1517	749	1.89	1759	807	2.15	2002	—	—	—
3500	622	1.47	1372	695	1.74	1625	760	2.01	1874	818	2.28	2124	—	—	—
3600	635	1.58	1477	707	1.86	1738	771	2.14	1995	—	—	—	—	—	—
3700	648	1.70	1588	720	1.99	1857	783	2.27	2121	—	—	—	—	—	—
3750	655	1.77	1646	726	2.06	1918	788	2.34	2187	—	—	—	—	—	—
3800	662	1.83	1705	732	2.13	1982	—	—	—	—	—	—	—	—	—
3900	675	1.96	1828	744	2.26	2112	—	—	—	—	—	—	—	—	—
4000	689	2.10	1957	—	—	—	—	—	—	—	—	—	—	—	—
4100	702	2.24	2092	—	—	—	—	—	—	—	—	—	—	—	—
4200	716	2.40	2234	—	—	—	—	—	—	—	—	—	—	—	—
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	832	1.68	1570	880	1.91	1779	926	2.14	1994	970	2.38	2215	—	—	—
2600	836	1.73	1615	885	1.96	1826	931	2.19	2043	—	—	—	—	—	—
2700	845	1.83	1708	893	2.06	1923	939	2.30	2146	—	—	—	—	—	—
2800	854	1.94	1805	902	2.17	2026	—	—	—	—	—	—	—	—	—
2900	863	2.05	1907	911	2.29	2134	—	—	—	—	—	—	—	—	—
3000	872	2.16	2015	—	—	—	—	—	—	—	—	—	—	—	—
3100	882	2.28	2127	—	—	—	—	—	—	—	—	—	—	—	—
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.

Refer to page 43 General Fan Performance Notes.

NOTES:

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

**Table 24 — Fan Performance, 50TFQ009 — Horizontal Discharge Units; High-Static Motor and 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	501	0.66	617	586	0.86	799	658	1.05	983	722	1.26	1173	779	1.47	1368
2600	507	0.69	647	592	0.89	832	663	1.09	1020	727	1.30	1212	784	1.51	1410
2700	519	0.76	709	603	0.97	902	674	1.18	1096	736	1.39	1294	793	1.61	1498
2800	532	0.83	775	614	1.05	976	684	1.26	1176	746	1.48	1381	802	1.71	1590
2900	544	0.91	846	625	1.13	1054	694	1.35	1261	756	1.58	1472	812	1.81	1687
3000	557	0.99	922	637	1.22	1137	705	1.45	1351	766	1.68	1568	821	1.92	1789
3100	570	1.07	1002	648	1.31	1224	716	1.55	1445	776	1.79	1669	831	2.03	1896
3200	582	1.17	1087	660	1.41	1317	727	1.66	1545	786	1.90	1774	841	2.15	2008
3300	595	1.26	1177	671	1.52	1414	738	1.77	1649	797	2.02	1885	851	2.28	2125
3400	608	1.36	1271	683	1.63	1517	749	1.89	1759	807	2.15	2002	861	2.41	2248
3500	622	1.47	1372	695	1.74	1625	760	2.01	1874	818	2.28	2124	871	2.55	2376
3600	635	1.58	1477	707	1.86	1738	771	2.14	1995	829	2.41	2252	881	2.69	2510
3700	648	1.70	1588	720	1.99	1857	783	2.27	2121	839	2.56	2385	892	2.84	2650
3750	655	1.77	1646	726	2.06	1918	788	2.34	2187	845	2.63	2454	897	2.92	2722
3800	662	1.83	1705	732	2.13	1982	794	2.42	2253	850	2.71	2524	902	3.00	2796
3900	675	1.96	1828	744	2.26	2112	806	2.56	2392	861	2.86	2669	913	3.16	2948
4000	689	2.10	1957	757	2.41	2249	817	2.72	2536	873	3.02	2820	924	3.33	3106
4100	702	2.24	2092	769	2.57	2392	829	2.88	2686	884	3.19	2978	935	3.51	3271
4200	716	2.40	2234	782	2.73	2541	841	3.05	2843	895	3.37	3143	945	3.69	3442
4250	723	2.47	2307	788	2.81	2619	847	3.14	2924	901	3.46	3227	—	—	—

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	<b>832</b>	<b>1.68</b>	<b>1570</b>	880	1.91	1779	926	2.14	1994	970	2.38	2215	1011	2.62	2444
2600	<b>836</b>	<b>1.73</b>	<b>1615</b>	885	1.96	1826	931	2.19	2043	974	2.43	2267	1015	2.68	2497
2700	<b>845</b>	<b>1.83</b>	<b>1708</b>	893	2.06	1923	939	2.30	2146	982	2.55	2374	1023	2.80	2609
2800	<b>854</b>	<b>1.94</b>	<b>1805</b>	902	2.17	2026	948	2.42	2253	991	2.67	2486	1031	2.92	2725
2900	863	2.05	1907	911	2.29	2134	956	2.54	2366	999	2.79	2603	1040	3.05	2847
3000	872	2.16	2015	920	2.41	2246	965	2.66	2483	1008	2.92	2726	1048	3.19	2974
3100	882	2.28	2127	929	2.54	2365	974	2.80	2607	1016	3.06	2854	1057	3.33	3107
3200	891	2.41	2245	938	2.67	2488	983	2.93	2735	1025	3.20	2988	1065	3.48	3246
3300	901	2.54	2369	948	2.81	2617	992	3.08	2869	1034	3.35	3127	1074	3.64	3390
3400	911	2.68	2497	957	2.95	2751	1001	3.23	3010	1043	3.51	3273	—	—	—
3500	921	2.82	2632	967	3.10	2891	1011	3.38	3155	1052	3.67	3424	—	—	—
3600	930	2.97	2772	977	3.26	3038	1020	3.55	3307	—	—	—	—	—	—
3700	941	3.13	2918	986	3.42	3190	—	—	—	—	—	—	—	—	—
3750	946	3.21	2994	991	3.50	3268	—	—	—	—	—	—	—	—	—
3800	951	3.29	3071	996	3.59	3348	—	—	—	—	—	—	—	—	—
3900	961	3.46	3229	—	—	—	—	—	—	—	—	—	—	—	—
4000	971	3.64	3393	—	—	—	—	—	—	—	—	—	—	—	—
4100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

Refer to page 43 General Fan Performance Notes.

NOTES:

- 1. Boldface** indicates field-supplied drive is required.
- Maximum continuous bhp is 3.70.

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



Table 25 — Fan Performance, 50TFQ012 — Horizontal Discharge Units; Standard Motor and 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	523	0.58	541	592	0.73	680	657	0.88	825	718	1.05	977	775	1.22	1135
3100	536	0.63	587	603	0.78	730	666	0.94	879	726	1.11	1035	783	1.28	1196
3200	549	0.68	637	614	0.84	783	676	1.00	936	735	1.17	1096	790	1.35	1260
3300	562	0.74	689	626	0.90	839	686	1.07	996	743	1.24	1159	798	1.42	1328
3400	575	0.80	744	637	0.96	898	696	1.14	1059	752	1.31	1226	806	1.50	1398
3500	588	0.86	802	649	1.03	961	707	1.21	1125	762	1.39	1296	815	1.58	1472
3600	601	0.93	864	661	1.10	1026	717	1.28	1194	771	1.47	1369	823	1.66	1548
3700	614	1.00	929	673	1.17	1095	728	1.36	1267	781	1.55	1445	832	1.75	1629
3800	628	1.07	997	685	1.25	1167	739	1.44	1343	791	1.64	1525	841	1.84	1712
3900	641	1.15	1069	697	1.33	1243	750	1.53	1423	801	1.72	1608	850	1.93	1799
4000	655	1.23	1144	709	1.42	1322	761	1.61	1506	812	1.82	1695	860	2.03	1890
4100	668	1.31	1223	722	1.51	1405	773	1.71	1593	822	1.92	1786	870	2.13	1984
4200	682	1.40	1305	734	1.60	1492	784	1.80	1683	833	2.02	1880	880	2.23	2082
4300	696	1.49	1392	747	1.70	1582	796	1.91	1777	844	2.12	1979	890	2.34	2184
4400	710	1.59	1482	760	1.80	1677	808	2.01	1876	855	2.23	2081	—	—	—
4500	723	1.69	1577	773	1.90	1775	820	2.12	1978	866	2.35	2187	—	—	—
4600	737	1.80	1675	785	2.01	1877	832	2.24	2085	—	—	—	—	—	—
4700	751	1.91	1778	798	2.13	1984	844	2.35	2195	—	—	—	—	—	—
4800	765	2.02	1885	812	2.25	2095	—	—	—	—	—	—	—	—	—
4900	779	2.14	1996	825	2.37	2210	—	—	—	—	—	—	—	—	—
5000	793	2.26	2112	—	—	—	—	—	—	—	—	—	—	—	—

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	830	1.39	1298	883	1.57	1466	934	1.76	1638	982	1.95	1815	1029	2.14	1996
3100	837	1.46	1363	889	1.65	1534	938	1.83	1710	986	2.03	1891	1033	2.23	2075
3200	843	1.53	1431	894	1.72	1606	944	1.91	1785	991	2.11	1969	1037	2.31	2157
3300	850	1.61	1502	901	1.80	1680	949	2.00	1863	996	2.20	2051	1041	2.40	2242
3400	858	1.69	1576	907	1.88	1758	955	2.09	1944	1001	2.29	2135	—	—	—
3500	865	1.77	1653	914	1.97	1838	961	2.18	2029	1007	2.38	2223	—	—	—
3600	873	1.86	1733	921	2.06	1922	967	2.27	2116	—	—	—	—	—	—
3700	881	1.95	1816	928	2.16	2010	974	2.37	2207	—	—	—	—	—	—
3800	889	2.04	1904	936	2.25	2100	—	—	—	—	—	—	—	—	—
3900	898	2.14	1995	944	2.35	2195	—	—	—	—	—	—	—	—	—
4000	907	2.24	2089	—	—	—	—	—	—	—	—	—	—	—	—
4100	916	2.35	2187	—	—	—	—	—	—	—	—	—	—	—	—
4200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

Refer to page 43 General Fan Performance Notes.

NOTES:

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

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

Table 26 — Fan Performance, 50TFQ012 — Horizontal Discharge Units; Alternate Motor and 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	523	0.58	541	592	0.73	680	657	0.88	825	718	1.05	977	775	1.22	1135
3100	536	0.63	587	603	0.78	730	666	0.94	879	726	1.11	1035	783	1.28	1196
3200	549	0.68	637	614	0.84	783	676	1.00	936	735	1.17	1096	790	1.35	1260
3300	562	0.74	689	626	0.90	839	686	1.07	996	743	1.24	1159	798	1.42	1328
3400	575	0.80	744	637	0.96	898	696	1.14	1059	752	1.31	1226	806	1.50	1398
3500	588	0.86	802	649	1.03	961	707	1.21	1125	762	1.39	1296	815	1.58	1472
3600	601	0.93	864	661	1.10	1026	717	1.28	1194	771	1.47	1369	823	1.66	1548
3700	614	1.00	929	673	1.17	1095	728	1.36	1267	781	1.55	1445	832	1.75	1629
3800	628	1.07	997	685	1.25	1167	739	1.44	1343	791	1.64	1525	841	1.84	1712
3900	641	1.15	1069	697	1.33	1243	750	1.53	1423	801	1.72	1608	850	1.93	1799
4000	655	1.23	1144	709	1.42	1322	761	1.61	1506	812	1.82	1695	860	2.03	1890
4100	668	1.31	1223	722	1.51	1405	773	1.71	1593	822	1.92	1786	870	2.13	1984
4200	682	1.40	1305	734	1.60	1492	784	1.80	1683	833	2.02	1880	880	2.23	2082
4300	696	1.49	1392	747	1.70	1582	796	1.91	1777	844	2.12	1979	890	2.34	2184
4400	710	1.59	1482	760	1.80	1677	808	2.01	1876	855	2.23	2081	900	2.46	2290
4500	723	1.69	1577	773	1.90	1775	820	2.12	1978	866	2.35	2187	910	2.57	2400
4600	737	1.80	1675	785	2.01	1877	832	2.24	2085	877	2.46	2297	921	2.70	2514
4700	751	1.91	1778	798	2.13	1984	844	2.35	2195	889	2.59	2412	932	2.82	2633
4800	765	2.02	1885	812	2.25	2095	856	2.48	2310	900	2.71	2531	—	—	—
4900	779	2.14	1996	825	2.37	2210	869	2.61	2430	912	2.85	2654	—	—	—
5000	793	2.26	2112	838	2.50	2330	881	2.74	2554	—	—	—	—	—	—

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	830	1.39	1298	883	1.57	1466	934	1.76	1638	982	1.95	1815	1029	2.14	1996
3100	837	1.46	1363	889	1.65	1534	938	1.83	1710	986	2.03	1891	1033	2.23	2075
3200	843	1.53	1431	894	1.72	1606	944	1.91	1785	991	2.11	1969	1037	2.31	2157
3300	850	1.61	1502	901	1.80	1680	949	2.00	1863	996	2.20	2051	1041	2.40	2242
3400	858	1.69	1576	907	1.88	1758	955	2.09	1944	1001	2.29	2135	1046	2.50	2331
3500	865	1.77	1653	914	1.97	1838	961	2.18	2029	1007	2.38	2223	1051	2.60	2422
3600	873	1.86	1733	921	2.06	1922	967	2.27	2116	1012	2.48	2314	1056	2.70	2516
3700	881	1.95	1816	928	2.16	2010	974	2.37	2207	1019	2.58	2409	1062	2.80	2615
3800	889	2.04	1904	936	2.25	2100	981	2.47	2302	1025	2.69	2507	—	—	—
3900	898	2.14	1995	944	2.35	2195	988	2.57	2399	1032	2.80	2608	—	—	—
4000	907	2.24	2089	952	2.46	2293	996	2.68	2501	—	—	—	—	—	—
4100	916	2.35	2187	960	2.57	2395	1004	2.80	2607	—	—	—	—	—	—
4200	925	2.45	2289	969	2.68	2500	—	—	—	—	—	—	—	—	—
4300	934	2.57	2395	978	2.80	2610	—	—	—	—	—	—	—	—	—
4400	944	2.69	2504	—	—	—	—	—	—	—	—	—	—	—	—
4500	954	2.81	2618	—	—	—	—	—	—	—	—	—	—	—	—
4600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4800	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

Refer to page 43 General Fan Performance Notes.

NOTES:

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

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

**Table 27 — Fan Performance, 50TFQ012 — Horizontal Discharge Units; High-Static Motor and 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	523	0.58	541	592	0.73	680	657	0.88	825	718	1.05	977	775	1.22	1135
3100	536	0.63	587	603	0.78	730	666	0.94	879	726	1.11	1035	783	1.28	1196
3200	549	0.68	637	614	0.84	783	676	1.00	936	735	1.17	1096	790	1.35	1260
3300	562	0.74	689	626	0.90	839	686	1.07	996	743	1.24	1159	798	1.42	1328
3400	575	0.80	744	637	0.96	898	696	1.14	1059	752	1.31	1226	806	1.50	1398
3500	588	0.86	802	649	1.03	961	707	1.21	1125	762	1.39	1296	815	1.58	1472
3600	601	0.93	864	661	1.10	1026	717	1.28	1194	771	1.47	1369	823	1.66	1548
3700	614	1.00	929	673	1.17	1095	728	1.36	1267	781	1.55	1445	832	1.75	1629
3800	628	1.07	997	685	1.25	1167	739	1.44	1343	791	1.64	1525	841	1.84	1712
3900	641	1.15	1069	697	1.33	1243	750	1.53	1423	801	1.72	1608	850	1.93	1799
4000	655	1.23	1144	709	1.42	1322	761	1.61	1506	812	1.82	1695	860	2.03	1890
4100	668	1.31	1223	722	1.51	1405	773	1.71	1593	822	1.92	1786	870	2.13	1984
4200	682	1.40	1305	734	1.60	1492	784	1.80	1683	833	2.02	1880	880	2.23	2082
4300	696	1.49	1392	747	1.70	1582	796	1.91	1777	844	2.12	1979	890	2.34	2184
4400	710	1.59	1482	760	1.80	1677	808	2.01	1876	855	2.23	2071	900	2.46	2290
4500	723	1.69	1577	773	1.90	1775	820	2.12	1978	866	2.35	2187	910	2.57	2400
4600	737	1.80	1675	785	2.01	1877	832	2.24	2085	877	2.46	2297	921	2.70	2514
4700	751	1.91	1778	798	2.13	1984	844	2.35	2195	889	2.59	2412	932	2.82	2633
4800	765	2.02	1885	812	2.25	2095	856	2.48	2310	900	2.71	2531	942	2.95	2756
4900	779	2.14	1996	825	2.37	2210	869	2.61	2430	912	2.85	2654	953	3.09	2883
5000	793	2.26	2112	838	2.50	2330	881	2.74	2554	923	2.98	2782	965	3.23	3014

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	830	1.39	1298	883	1.57	1466	934	1.76	1638	982	1.95	1815	1029	2.14	1996
3100	837	1.46	1363	889	1.65	1534	938	1.83	1710	986	2.03	1891	1033	2.23	2075
3200	843	1.53	1431	894	1.72	1606	944	1.91	1785	991	2.11	1969	1037	2.31	2157
3300	850	1.61	1502	901	1.80	1680	949	2.00	1863	996	2.20	2051	1041	2.40	2242
3400	858	1.69	1576	907	1.88	1758	955	2.09	1944	1001	2.29	2135	1046	2.50	2331
3500	865	1.77	1653	914	1.97	1838	961	2.18	2029	1007	2.38	2223	1051	2.60	2422
3600	873	1.86	1733	921	2.06	1922	967	2.27	2116	1012	2.48	2314	1056	2.70	2516
3700	881	1.95	1816	928	2.16	2010	974	2.37	2207	1019	2.58	2409	1062	2.80	2615
3800	889	2.04	1904	936	2.25	2100	981	2.47	2302	1025	2.69	2507	1068	2.91	2716
3900	898	2.14	1995	944	2.35	2195	988	2.57	2399	1032	2.80	2608	1074	3.03	2821
4000	907	2.24	2089	952	2.46	2293	996	2.68	2501	1038	2.91	2713	1080	3.14	2930
4100	916	2.35	2187	960	2.57	2395	1004	2.80	2607	1046	3.03	2822	1087	3.26	3042
4200	925	2.45	2289	969	2.68	2500	1011	2.91	2716	1053	3.15	2935	1094	3.39	3159
4300	934	2.57	2395	978	2.80	2610	1020	3.03	2828	1061	3.27	3052	1101	3.52	3279
4400	944	2.69	2504	986	2.92	2723	1028	3.16	2946	1068	3.40	3173	1108	3.65	3403
4500	954	2.81	2618	996	3.05	2840	1037	3.29	3067	1076	3.54	3297	1115	3.79	3531
4600	963	2.93	2736	1005	3.18	2962	1045	3.42	3192	1085	3.67	3426	1123	3.93	3664
4700	974	3.07	2858	1014	3.31	3088	1054	3.56	3322	1093	3.82	3560	1131	4.08	3801
4800	984	3.20	2985	1024	3.45	3219	1063	3.71	3456	1102	3.96	3697	1139	4.23	3943
4900	994	3.34	3116	1034	3.60	3353	1073	3.85	3594	1111	4.12	3839	1148	4.38	4088
5000	1005	3.49	3251	1044	3.74	3492	1082	4.01	3737	1119	4.27	3986	1156	4.55	4238

**LEGEND**

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

Refer to General Fan Performance Notes below.

**NOTES:**

- 1. Boldface** indicates field-supplied drive is required.
- Maximum continuous bhp is 5.25.

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

**GENERAL NOTES FOR FAN PERFORMANCE DATA TABLES**

- Fan performance is based on clean filters and wet coil data.
- Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using fan motors up to the wattage ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. For additional information on motor performance Table 9.
- Values include losses for filters, unit casing, and wet coils. See Tables 11A and 11B for static pressure information.
- Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.
- Interpolation is permissible. Do not extrapolate.

## 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 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 a refrigerant leak is suspected around the compressor terminals. Use accepted methods to recover refrigerant.
5. Never attempt to repair a soldered connection while the refrigerant system is under pressure.
6. Do not use a 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 electrical power to the unit and tag disconnect.
  - b. Relieve all pressure from the system using both the high and low-pressure ports. Use accepted methods to recover refrigerant.
  - c. Cut the component connection tubing with tubing cutter, and remove the component from the unit.
  - d. Carefully unsweat the remaining tubing stubs when necessary. Oil can ignite when exposed to a 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 unit.
3. Make the following inspections:
  - a. Inspect for shipping and handling damages such as broken lines, loose parts, or disconnected wires.
  - b. Inspect for oil at all refrigerant tubing connections and on the 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. Ensure that electrical wires do not contact refrigerant tubing.
  - d. Inspect the 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 the outdoor-fan blades are correctly positioned in the fan orifice. Refer to Outdoor-Fan Adjustment section on page 48 for more details.
  - b. Make sure that an air filter(s) is in place.
  - c. Make sure that the 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 the unit has been installed in accordance with installation instructions and applicable codes.

**Return-Air Filters** — Make sure that the correct filters are installed in the unit (see Table 1). Do not operate the unit without return-air filters.

**Outdoor-Air Inlet Screen** — The outdoor-air inlet screen must be in place before operating the unit.

**Compressor Mounting** — Compressors are internally spring mounted. Do not loosen or remove the compressor hold-down bolts.

**Internal Wiring** — Check all electrical connections in unit control boxes; tighten as required.

**Refrigerant Service Ports** — Each refrigerant system has 3 Schrader-type service gage ports: One on the suction line, one on the cooling mode liquid line, and one on the compressor discharge line. Be sure that the caps on the ports are tight. The port on the cooling mode liquid line and one port on the discharge line have protective devices installed on them.

**HIGH FLOW REFRIGERANT VALVES** — Two high flow valves may be located on the hot gas tube coming out of the compressor and the suction tube going into the compressor. Large black plastic caps identify these valves with O-rings inside screwing the cap and onto a brass body. No field access to these valves is available at this time. Ensure the plastic caps remain on the valves and are tight or the possibility of refrigerant leakage could occur.

**Compressor Rotation** — It is important to be certain that the scroll compressor (size 012 only) is rotating in the proper direction. To determine whether or not the compressor is rotating in the proper direction:

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

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

1. Note that the indoor fan is probably also rotating in the wrong direction.
2. Turn off power to the unit and tag disconnect.
3. Reverse any two of the unit power leads.
4. Turn on power to the unit. Re-energize 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 makes more noise and does not provide heating/cooling.

**Cooling** — To start the unit, turn on main power supply. Set the system selector switch at COOL position and the fan switch at AUTO position. Adjust the thermostat to a setting below room temperature. The compressor starts on closure of the contactor.

Check the unit charge. Refer to Refrigerant Charge section on page 48.

Reset the thermostat at a position above room temperature. The compressor will shut off.

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

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

**Heating** — To start the unit, turn on the main power supply.

Set the thermostat at HEAT position at a setting above room temperature, the fan at AUTO position.

The first stage of the thermostat energizes the indoor-fan motor, compressor, and outdoor fan; the second stage energizes electric heater elements, if installed. Check the heating effects at the air supply grille(s).

If the accessory electric heaters do not energize, reset limit switch (located on indoor-fan scroll) by pressing the button located between terminals on the switch.

**TO SHUT OFF UNIT** — Set the system selector switch at OFF position. Resetting the heating selector lever below room temperature temporarily shuts the unit off until the space temperature falls below the thermostat setting.

**Safety Relief** — A soft solder joint on the suction line at the loss-of-charge/low-pressure fitting provides pressure relief under abnormal temperature and pressure conditions.

**Ventilation (Continuous Fan)** — Set the fan and system selector switches at ON and OFF positions, respectively. The indoor fan operates continuously to provide constant air circulation.

### Operating Sequence

**COOLING, UNITS WITHOUT ECONOMIZER** — When thermostat calls for cooling, terminals G and Y1 are energized. The indoor-fan contactor (IFC), reversing valve solenoid (RVS1) and compressor contactor no. 1 (C1) are energized and indoor-fan motor, compressor no. 1, and outdoor fan starts. The outdoor-fan motor(s) run continuously while unit is cooling. If the thermostat calls for a second stage of cooling by energizing Y2, compressor contactor no. 2 (C2) and reversing valve solenoid (RVS2) are energized and compressor no. 2 starts.

**HEATING, UNITS WITHOUT ECONOMIZER** — Upon a request for heating from the space thermostat, terminal W1 will be energized with 24 v. The IFC, outdoor-fan contactor (OFC), C1, and C2 will be energized. The reversing valves switch position and the indoor fan, outdoor fan, compressor no. 1, and compressor no. 2 are energized.

If the space temperature continues to fall while W1 is energized, W2 will be energized with 24 v, and the heater contactor(s) (HC) will be energized, which will energize the electric heater(s).

When the space thermostat is satisfied, W2 will be deenergized first, and the electric heater(s) will be deenergized.

Upon a further rise in space temperature, W1 will be deenergized, and the reversing valve solenoids (RVS1 and RVS2) will be energized.

**COOLING, UNITS WITH ECONOMIZER 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 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<sub>2</sub> sensors are connected to the EconoMi\$er IV control, a demand controlled ventilation strategy will begin to operate. As the CO<sub>2</sub> level in the zone increases above the CO<sub>2</sub> set point, the minimum position of the damper will be increased proportionally. As the CO<sub>2</sub> level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed. Damper position will follow the higher demand condition from DCV mode or free cooling mode.

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

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

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

**HEATING, UNITS WITH ECONOMIZER 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 ECONOMIZER2, PREMIER-LINK™ 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 there 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, where:

SASP = Supply Air Set Point

DXCTLO = Direct Expansion Cooling Lockout Set Point

**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 no. 1 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<sub>2</sub> sensors are connected to the PremierLink™ control, a PID-controlled demand ventilation strategy will begin to operate. As the CO<sub>2</sub> level in the zone increases above the CO<sub>2</sub> set point, the minimum position of the damper will be increased proportionally. As the CO<sub>2</sub> level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed.

**HEATING, UNITS WITH ECONOMIZER2, PREMIER-LINK 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.

**COOLING, UNITS WITH ECONOMIZER2, PREMIER-LINK CONTROL AND A ROOM SENSOR** — When free cooling is not available, the compressors will be controlled by the PremierLink controller using a PID (proportional integral) Error reduction calculation as indicated by Fig. 41.

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. 42.

The PremierLink control will integrate the compressor 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 outside-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. 42.

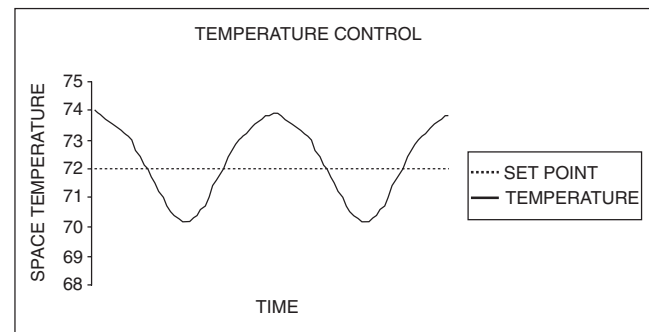
The controller uses the following conditions to determine economizer cooling:

- Enthalpy is Low
- SAT reading is available
- OAT reading is available
- SPT reading is available
- $OAT \leq SPT$
- Economizer Position is NOT forced

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.

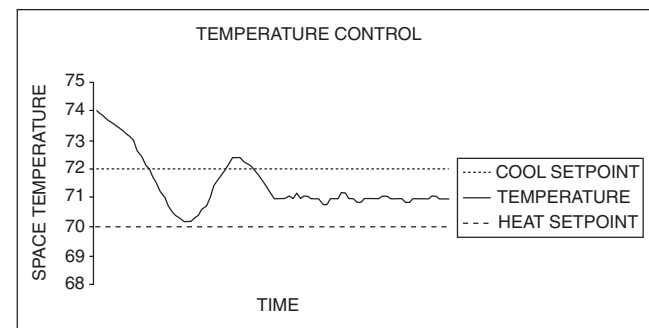
If an optional power exhaust is installed, as the outdoor-air damper opens and closes, the power exhaust fans will be energized and deenergized.

If field-installed accessory CO<sub>2</sub> sensors are connected to the PremierLink control, a PID-controlled demand ventilation strategy will begin to operate. As the CO<sub>2</sub> level in the zone increases above the CO<sub>2</sub> set point, the minimum position of the damper will be increased proportionally. As the CO<sub>2</sub> level decreases because of the increase in fresh air, the outdoor-air damper will be proportionally closed.



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

**Fig. 41 — DX Cooling Temperature Control Example**



**Fig. 42 — Economizer Temperature Control Example**

HEATING UNIT WITH ECONOMIZER2, 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.

## SERVICE

### ⚠ CAUTION

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

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

#### INDOOR COIL

1. Turn off the unit power and tag disconnect. Remove the filter access panel and indoor coil access panel.
2. If an economizer or accessory two-position damper is installed, remove the economizer or two-position damper by disconnecting the economizer plug and removing the mounting screws.
3. Slide the filters out of the unit.
4. Clean the coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister. Wash both sides of the coil and flush with clean water. For best results, backflush toward the return-air section to remove foreign material.
5. Flush the condensate pan after completion.
6. Reinstall the economizer/two-position damper and filters.
7. Reconnect the wiring.
8. Replace the access panels.

**OUTDOOR COILS** — Inspect the coils monthly. Clean condenser coils annually, and as required by location and outdoor-air conditions.

Clean 2-row coils as follows:

1. Turn off the unit power and tag disconnect.
2. Remove the top panel screws on the outdoor end of the unit.
3. Remove the outdoor coil corner post. See Fig. 43. To hold the top panel open, place the coil corner post between the top panel and the center post. See Fig. 44.
4. Remove the device holding the coil sections together at the return end of the outdoor coil. Carefully separate the outer coil section 3 to 4 in. from the inner coil section. See Fig. 45.
5. 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.

6. Secure the sections together. Reposition the coil sections, and remove the coil corner post from between the top panel and center post. Install the coil corner post and coil center post, and replace all screws.

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

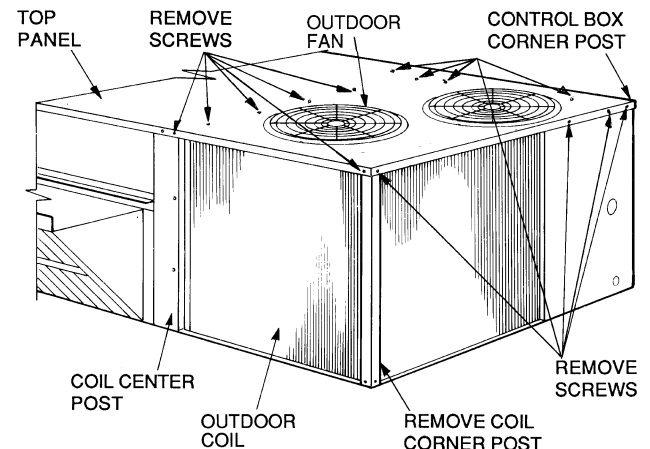


Fig. 43 — Cleaning Outdoor Coil

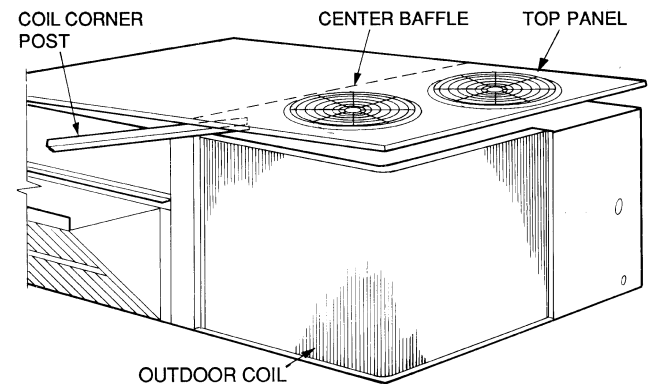


Fig. 44 — Propping Up Top Panel

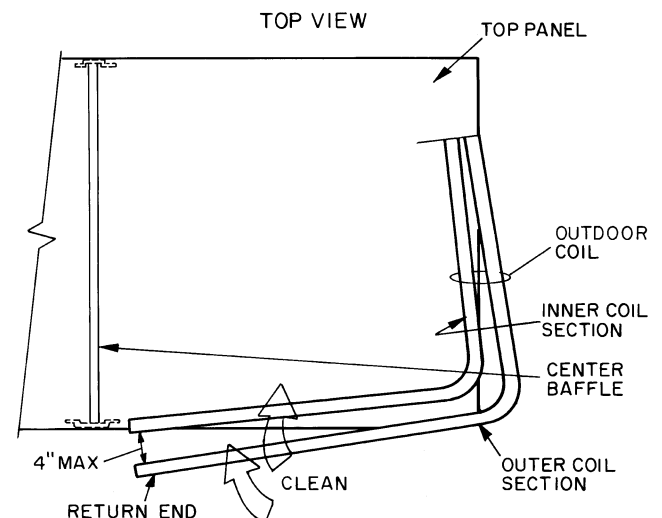


Fig. 45 — Separating Coil Sections

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

**OUTDOOR-AIR INLET SCREEN** — Clean the screen with steam or hot water and a mild detergent. Do not use disposable filters in place of screens.

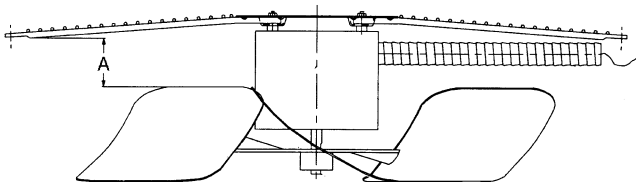
**Lubrication**

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

**FAN MOTOR BEARINGS** — *Fan motor bearings are permanently lubricated.* No further lubrication of outdoor or indoor-fan motors is required.

**Outdoor Fan Adjustment (Fig. 46)**

1. Shut off the unit power supply and tag disconnect.
2. Remove the outdoor-fan assembly (grille, motor, motor cover, and fan) and loosen the fan hub setscrews.
3. Adjust the fan height as shown in Fig. 46.
4. Tighten the setscrews and replace the outdoor-fan assembly.



UNIT VOLTAGE	"A" in.
208/230 V	2.75
460 V and 575 V	3.50

**Fig. 46 — Outdoor Fan Adjustment**

**Blower Belt Adjustment** — Inspect the 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 7 — Adjust Indoor-Fan Speed on page 25 for adjustment and alignment procedures.

**High-Pressure Switch** — Located on the compressor hot gas line is a high-pressure switch, which contains a Schrader core depressor. This switch opens at 428 psig and closes at 320 psig. No adjustment is necessary. Refer to Table 1.

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

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

**Refrigerant Charge** — The amount of refrigerant charge is listed on the unit nameplate (also refer to Table 1). Refer to Carrier Refrigerant Service Techniques Manual, Refrigerants section.

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

**NO CHARGE** — Use standard evacuating techniques. After evacuating the system, weigh in the specified amount of refrigerant (refer to Table 1).

**LOW CHARGE COOLING** — Use the Cooling Charging Charts, Fig. 47-49. Vary the refrigerant until the conditions of the appropriate chart are met. Note that the charging charts are different from the type normally used. Charts are based on charging the units to the correct superheat for the various operating conditions. An accurate pressure gage and temperature sensing device are required. Connect the pressure gage to the service port on the suction line. Mount the temperature sensing device on the suction line and insulate it so that outdoor ambient temperature does not affect the reading. Indoor-air cfm must be within the normal operating range of the unit.

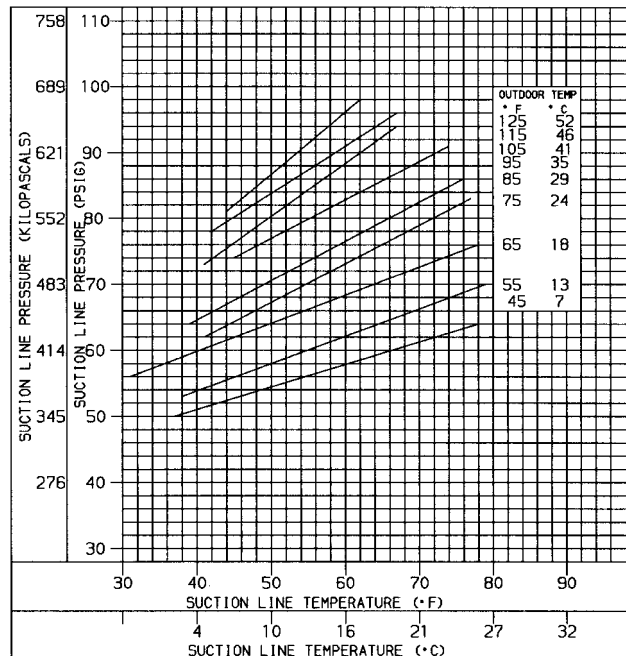
**TO USE COOLING CHARGING CHARTS** — Take the outdoor ambient temperature and read the suction pressure gage. Refer to the appropriate chart to determine what the suction temperature should be. If the suction temperature is high, add refrigerant. If the suction temperature is low, carefully recover some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

**EXAMPLE: (Fig. 47)**

Outdoor Temperature ..... 85 F  
 Suction Pressure ..... 70 psig  
 Suction Temperature should be ..... 49 F  
 (Suction Temperature may vary  $\pm 5^{\circ}$  F.)

**HEATING CHARGE** — Do not attempt to adjust refrigerant charge while the unit is operating in the heating mode. If the charge amount is believed to be incorrect, recover refrigerant and weigh in the amount listed on the unit rating plate.

**Replacement Parts** — A complete list of replacement parts can be obtained from any Carrier distributor.



**Fig. 47 — Cooling Charging Chart, 50TFQ008**



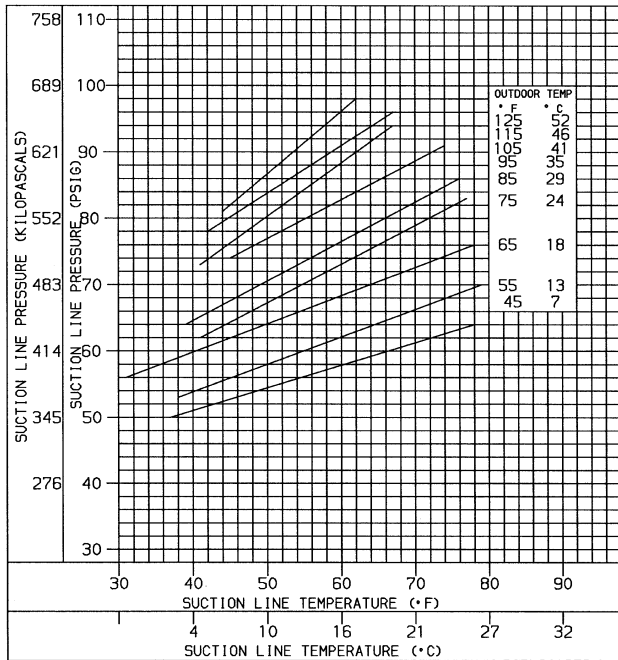


Fig. 48 — Cooling Charging Chart, 50TFQ009

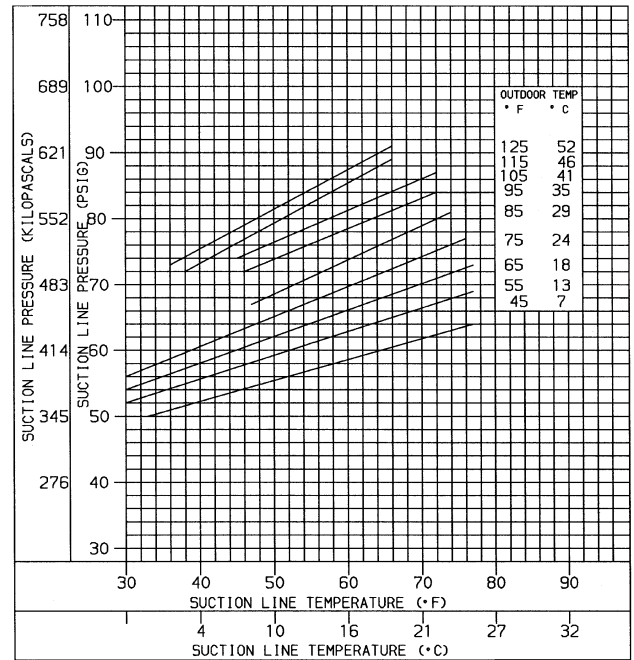


Fig. 49 — Cooling Charging Chart, 50TFQ012

## TROUBLESHOOTING

**Unit Troubleshooting** — For unit troubleshooting, refer to Fig. 50 and Table 28.

**EconoMi\$er IV Troubleshooting** — See Table 29 for EconoMi\$er IV logic.

A functional view of the EconoMi\$er IV is shown in Fig. 51. 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<sub>O</sub> and +. Connect 1.2 kilo-ohm 4074EJM checkout resistor across terminals S<sub>O</sub> and +.
8. Put 620-ohm resistor across terminals S<sub>R</sub> 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<sub>O</sub> and +.
3. Place 1.2 kilo-ohm resistor across S<sub>R</sub> and +. The Free Cool LED should be lit.
4. Remove 620-ohm resistor across S<sub>O</sub> 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<sub>R</sub> and +.
6. Remove 1.2 kilo-ohm checkout resistor from terminals S<sub>O</sub> and +. If used, reconnect sensor from terminals S<sub>O</sub> 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 28 — Heating and Cooling Troubleshooting**

<b>PROBLEM</b>	<b>CAUSE</b>	<b>REMEDY</b>
<b>Compressor and Outdoor Fan Will Not Start.</b>	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.
	High-pressure switch tripped.	See problem "Excessive Head Pressure."
	Low-pressure switch tripped.	Check for leaks, repair, and recharge.
	Freeze-up protection thermostat tripped.	See problem "Suction Pressure Too Low."
<b>Compressor Will Not Start But Outdoor Fan Runs.</b>	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor.
	Defective overload.	Determine cause and replace.
	One leg of 3-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
<b>Compressor Cycles (Other Than Normally Satisfying Thermostat).</b>	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 outdoor coil or dirty air filter.	Determine cause and correct.
	Defective overload.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty outdoor-fan (cooling) or indoor-fan (heating) motor or capacitor.	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
<b>Compressor Operates Continuously.</b>	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.
	Outdoor coil dirty or restricted.	Clean coil or remove restriction.
	Dirty air filter.	Replace filter.
<b>Excessive Head Pressure.</b>	Dirty outdoor coil.	Clean coil.
	Refrigerant overcharged.	Remove excess refrigerant.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condensing air restricted or air short-cycling.	Determine cause and correct.
<b>Head Pressure Too Low.</b>	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
<b>Excessive Suction Pressure.</b>	High heat load.	Check for source and eliminate.
	Compressor valves leaking.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
<b>Suction Pressure Too Low.</b>	Dirty air filter (cooling) or dirty outdoor coil (heating).	Replace filter or clean coil.
	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Metering device or low side restricted	Remove source of restriction.
	Insufficient indoor airflow (cooling mode).	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Field-installed filter drier restricted.	Replace.
	Outdoor ambient temperature below 25 F.	Install low-ambient kit.
<b>Compressor No. 2 Will Not Run.</b>	Unit in economizer mode.	Proper operation; no remedy necessary.

**Table 29 — EconoMi\$er IV Input/Output Logic**

Demand Control Ventilation (DCV)	INPUTS				OUTPUTS			
	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		
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	Off	Off		
			Off	Off	Off	Off		
Below set (DCV LED 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.

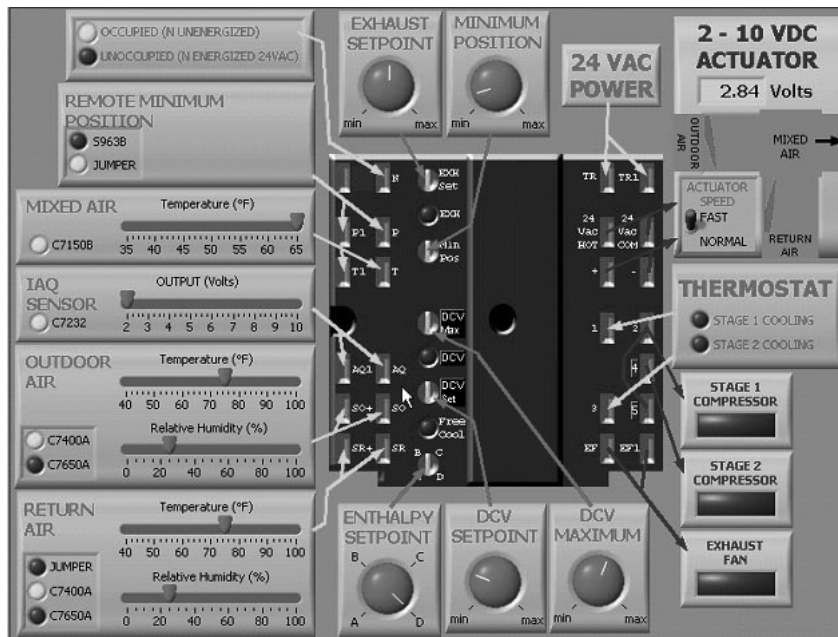
†Power at N terminal determines Occupied/Unoccupied setting: 24 vac (Occupied), no power (Unoccupied).

\*\*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. 51 — EconoMi\$er IV Functional View**

## INDEX

- Access panels 18
- Barometric flow capacity 20
- Carrier Comfort Network 14
- Charging chart, refrigerant 48, 49
- Clearance 3, 6
- CO<sub>2</sub> sensor
  - Configuration 25
  - Settings 23, 25
- Compressor
  - Mounting 44
  - Rotation 44
- Condensate drain
  - Cleaning 47
  - Location 3
- Control circuit
  - Wiring 12
  - Wiring raceway 12
- Convenience outlet 10, 11, 13
- Defrost board 12, 13
- Demand control ventilation 24
  - Dehumidification 25
- Dimensions 2, 6
- Ductwork 3
- EconoMiSer2 18
  - Components 18
  - 4 to 20 mA control 20
  - Wiring 20
- EconoMiSer IV 18-25
  - Components 18
  - Damper 24
  - Dry bulb changeover 21
  - Enthalpy changeover 22
  - Inputs and outputs 53
  - Troubleshooting 49, 50
  - Wiring 19
- Electrical connections 7
- Electrical data 8-11
- Electric heat 8
- Enthalpy changeover set points 23
- Factory-installed options 12-25
  - Convenience outlet 13
  - EconoMiSer2 18-20
  - EconoMiSer IV 18-25
  - Manual outdoor air damper 13
  - Novar controls 13
  - PremierLink™ controls 14-16
- Filter
  - Cleaning 48
  - Installation 19
  - Size 5
- Freeze protection thermostat 5, 48
- Heat anticipator settings 12, 13
- High flow valves 44
- High pressure switch 5, 48
- Horizontal units 3
- Indoor air quality 14, 22
- Indoor coil 5
  - Cleaning 47
- Indoor fan motor 5
  - Lubrication 48
  - Motor data 26
  - Performance 28-43
  - Pulley adjustment 26
  - Pulley setting 5, 27
  - Speed 5
- Low pressure switch 5, 48
- Manual outdoor air damper 13
- Mounting
  - Compressor 44
  - Unit 3
- Novar controls 13
- Operating sequence
  - Cooling 45
  - EconoMiSer2 45-47
  - EconoMiSer IV 45
  - Heating 45
- Outdoor air hood 14, 19
- Outdoor air inlet screens 44
  - Cleaning 48
- Outdoor coil 5
  - Cleaning 47
- Outdoor fan 5
  - Adjustment 48
- Physical data 5
- Potentiometer 22
- Power supply
  - Wiring 7
- PremierLink controls 14-16
- Pressure, drop
  - Electric heat 27
  - Return air 20
  - Outdoor air 20
- Pre-start-up 44
- Pressure switches
  - High pressure 5
  - Low pressure 5
- Refrigerant
  - Charge 5, 48, 49
  - Type 5
- Refrigerant service ports 44
- Replacement parts 48
- Return air filter 5, 44
- Return air temperature sensor 22
- Rigging unit 3, 4
- Roof curb
  - Assembly 1
  - Dimensions 2
  - Connector package 2
  - Leveling tolerances 3
  - Weight 5
- Safety considerations 1
- Safety relief 45
- Service 47-49
- Service ports 44
- Slab mount 3
- Start-up 44-47
- Start-up checklist CL-1
- Supply-air temperature sensor 14, 21
- Thermostat 12, 24
- Troubleshooting 49-53
- Ventilation 45
- Weight
  - Corner 6
  - EconoMiSer IV 5, 6
  - Unit 4-6
- Wiring
  - 4 to 20 mA control 20
  - EconoMiSer2 20
  - EconoMiSer IV 19
  - Power connections 7
  - PremierLink 16
  - Thermostat 12
  - Unit 51



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

**I. PRELIMINARY INFORMATION**

MODEL NO.: \_\_\_\_\_ SERIAL NO.: \_\_\_\_\_  
 DATE: \_\_\_\_\_ TECHNICIAN: \_\_\_\_\_  
 BUILDING LOCATION: \_\_\_\_\_

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

- VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTALLATION INSTRUCTIONS
- CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS
- CHECK THAT RETURN (INDOOR) AIR FILTERS ARE CLEAN AND IN PLACE
- VERIFY THAT UNIT INSTALLATION IS LEVEL
- CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS
- CHECK PULLEY ALIGNMENT AND BELT TENSION PER INSTALLATION INSTRUCTIONS
- VERIFY INSTALLATION OF ECONOMIZER HOOD (IF EQUIPPED)

**III. START-UP:**

**ELECTRICAL**

SUPPLY VOLTAGE	L1-L2	_____	L2-L3	_____	L3-L1	_____
CIRCUIT 1 COMPRESSOR AMPS	L1	_____	L2	_____	L3	_____
CIRCUIT 2 COMPRESSOR AMPS	L1	_____	L2	_____	L3	_____
INDOOR-FAN AMPS	L1	_____	L2	_____	L3	_____

**TEMPERATURES**

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

**PRESSURES (COOLING MODE)**

REFRIGERANT SUCTION, CIRCUIT 1	_____	PSIG	_____	F
REFRIGERANT SUCTION, CIRCUIT 2	_____	PSIG	_____	F
REFRIGERANT DISCHARGE, CIRCUIT 1	_____	PSIG	_____	F
REFRIGERANT DISCHARGE, CIRCUIT 2	_____	PSIG	_____	F

- VERIFY THAT 3-PHASE SCROLL COMPRESSOR IS ROTATING IN THE CORRECT DIRECTION (SIZE 012 ONLY)
- VERIFY REFRIGERANT CHARGE USING COOLING CHARGING CHARTS ON PAGES 48 AND 49.

**GENERAL**

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

CUT ALONG DOTTED LINE



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