



# Installation, Start-Up and Service Instructions

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## 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 information plate agrees with electrical supply to the unit. Electrical shock could cause serious 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 the curb.* If electric or control power is to be routed through the basepan, attach the accessory thru-the-bottom service connections to the basepan in accordance with the accessory installation instructions. Connections must be installed before the unit is set on roof curb.

**IMPORTANT:** The gasketing of the unit to the roof curb is critical for watertightness. 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 unit drain to function properly. Refer to Accessory Roof Curb Installation Instructions for additional information, as required.

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

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

**ALTERNATE UNIT SUPPORT** — When the curb or adapter cannot be used, support unit with sleepers using unit curb or adapter support area. If sleepers cannot be used, support 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; use either drain connection in vertical or horizontal applications.

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

To use the bottom drain connection for a roof curb installation, relocate the factory-installed plug (Red) from the bottom connection to the 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 it against freeze-up. If the drain line is installed downstream from the external trap, pitch the line away from the unit at 1 in. per 10 ft of run. Do not use a pipe size smaller than the unit connection (3/4 in.). See Fig. 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. 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 the 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 roof curb and base rails on each side and in duct end of unit; 35/16-in. clearance between the roof curb and outdoor coil end of the unit (see Fig. 1, section C-C).

*Do not install the unit indoors.* Do not locate the unit's 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.

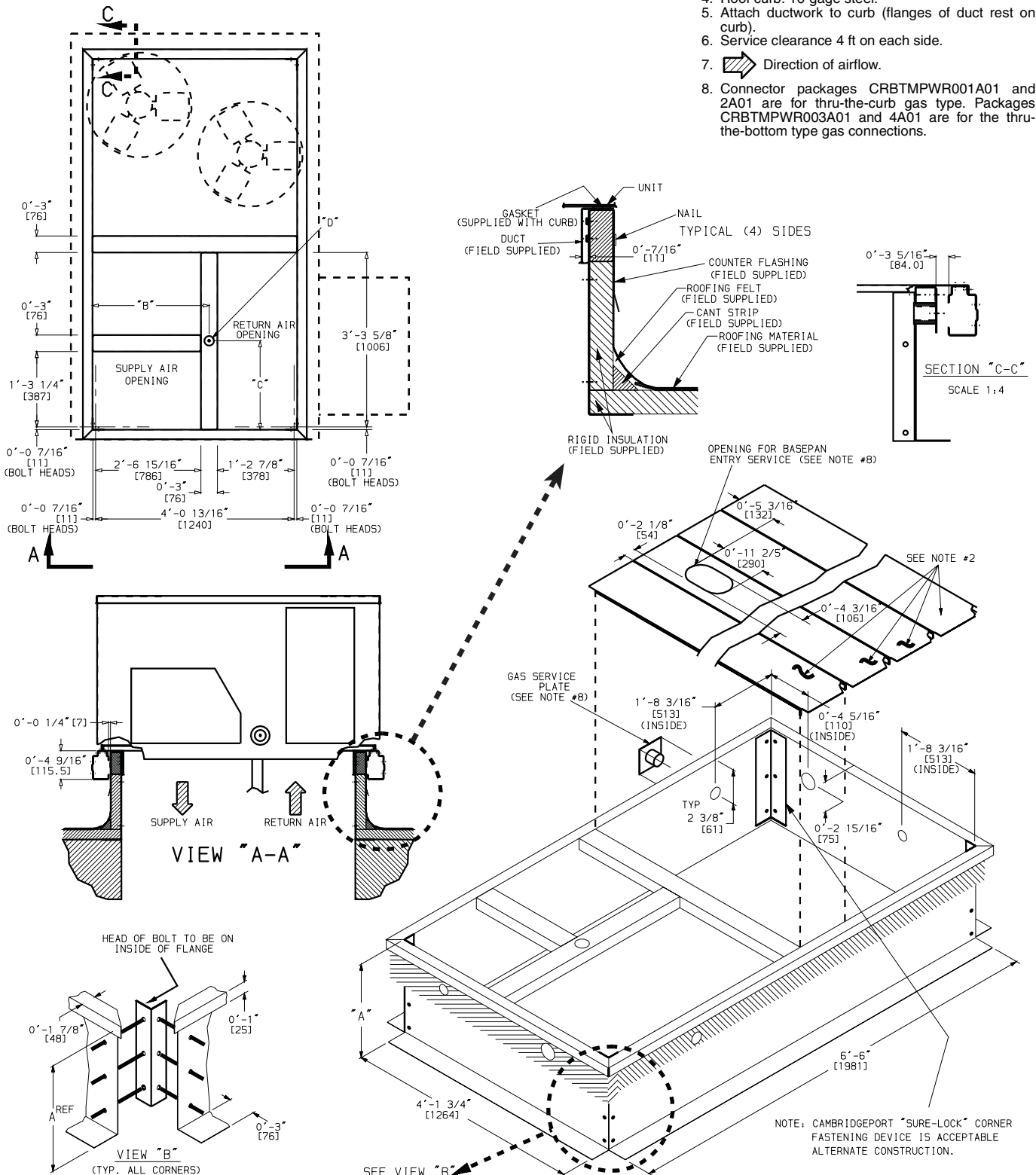
After the unit is in position, remove the polyethylene shipping wrapper and rigging skid.

CONNECTOR PKG. ACCY.	B	C	D ALT DRAIN HOLE	GAS	POWER	CONTROL	ACCESSORY POWER
CRBTMPWR001A01				3/4" [19] NPT	3/4" [19] NPT		
CRBTMPWR002A01				1 1/4" [31.7]	1 1/4" [31.7]		
CRBTMPWR003A01	2'-8 7/16" [827]	1'-10 15/16" [583]	1 3/4" [44.5]	1 1/2" [12.7] NPT	3/4" [19] NPT	1 1/2" [12.7] NPT	1 1/2" [12.7] NPT
CRBTMPWR004A00				3/4" [19] NPT	1 1/4" [31.7]		

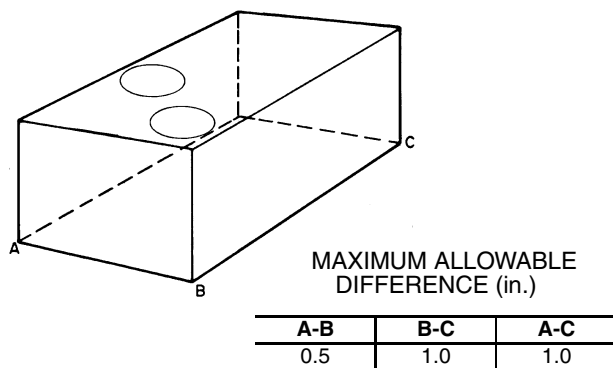
ROOF CURB ACCESSORY	"A"	UNIT SIZE
CRRFCURB003A01	1'-2" [356]	50HJQ008-012
CRRFCURB004A01	2'-0" [610]	

#### NOTES:

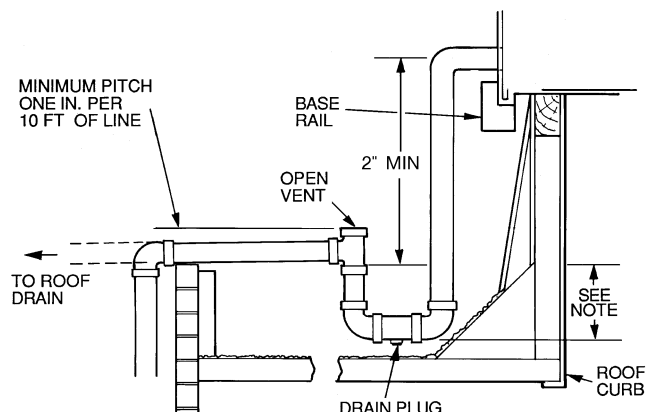
1. Roof curb accessory is shipped disassembled.
2. Insulated panels: 1-in. thick polyurethane foam, 1 3/4 lb density.
3. Dimensions in [ ] are in millimeters.
4. Roof curb: 16-gage steel.
5. Attach ductwork to curb (flanges of duct rest on curb).
6. Service clearance 4 ft on each side.
7.  Direction of airflow.
8. Connector packages CRBTMPWR001A01 and 2A01 are for thru-the-curb gas type. Packages CRBTMPWR003A01 and 4A01 are for the thru-the-bottom type gas connections.



**Fig. 1 — Roof Curb Details**

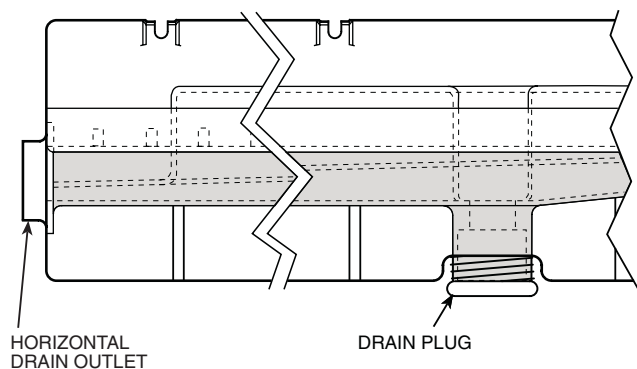


**Fig. 2 — Unit Leveling Tolerances**



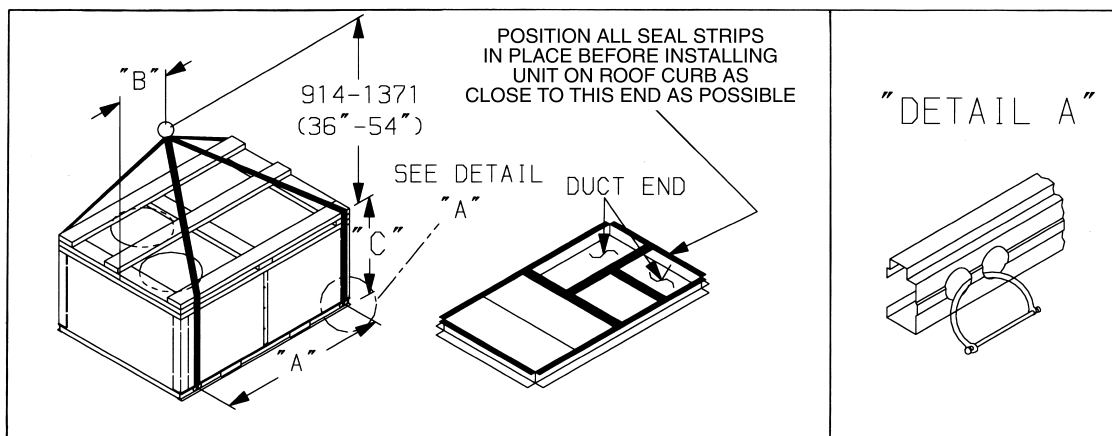
NOTE: Trap should be deep enough to offset maximum unit static difference. A 4-in. trap is recommended.

**Fig. 4 — Condensate Drain Piping Details**



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

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



**NOTES:**

1. Dimension in ( ) is inches. Dimensions outside ( ) are 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.

50HJQ UNIT SIZE	OPERATING WEIGHT		"A"		"B"		"C"	
	lb	kg	in.	mm	in.	mm	in.	mm
008	870	395	77.42	1966.5	41.5	1054	42.12	1070
009	1000	454	77.42	1966.5	41.5	1054	42.12	1070
012	1000	454	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

50HJQ UNIT SIZE	008	009	012
NOMINAL CAPACITY (tons)	7 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>2</sub>	10
OPERATING WEIGHT (lb)			
Unit	870	1000	1000
EconoMiSer IV	75	75	75
Roof Curb	223	223	223
COMPRESSOR		Scroll	
Quantity	2	2	2
Oil (oz) (each compr)	57	70	57
REFRIGERANT TYPE		R-22	
Operating Charge (lb)			
Circuit 1	9.5	11.0	10.7
Circuit 2	9.5	11.0	10.8
OUTDOOR FAN		Propeller	
Quantity...Diameter (in.)	2...22	2...22	2...22
Nominal Cfm	6500	6500	6500
Motor Hp...Rpm	1/4...1100	1/4...1100	1/4...1100
OUTDOOR COIL	Enhanced Copper Tubes, Aluminum Fins, Acutrol™ Metering Device		
Rows...Fins/in.	2...17	2...17	2...17
Total Face Area (sq ft)	20.5	25.1	25.1
INDOOR FAN		Centrifugal Type	
Quantity...Size (in.)	Standard 1...15 x 15	1...15 x 15	1...15 x 15
	High-Static 1...15 x 15	1...15 x 15	1...15 x 15
Type Drive	Standard Belt	Belt	Belt
	High-Static Belt	Belt	Belt
Nominal Cfm	3000	3400	4000
Maximum Continuous Bhp	Standard 2.90	2.90	3.70
	High-Static 3.70	3.70	5.25
Motor Frame Size	Standard 56	56	56
	High-Static 56	56	56
Nominal Rpm	Standard 1725	1725	1725
	High-Static 1725	1725	1725
Fan Rpm Range	Standard 730-950	840-1085	860-1080
	High-Static 860-1080	860-1080	830-1130
Motor Bearing Type	Ball	Ball	Ball
Maximum Allowable Rpm	1300	1300	1300
Motor Pulley Pitch Diameter Min/Max (in.)	Standard 3.4/4.4	3.4/4.4	4.0/5.0
	High-Static 4.0/5.0	4.0/5.0	2.8/3.8
Nominal Motor Shaft Diameter (in.)	Standard 7/8	7/8	7/8
	High-Static 7/8	7/8	7/8
Fan Pulley Pitch Diameter (in.)	Standard 8.0	7.0	8.0
	High-Static 8.0	8.0	5.8
Belt, Quantity...Type...Length (in.)	Standard 1...A...51	1...A...51	1...A...53
	High-Static 1...A...53	1...A...53	1...BX...48
Pulley Center Line Distance (in.)	Standard 16.75-19.25	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 Movable Pulley Flange (rpm)	Standard 45	45	45
	High-Static 45	45	60
Movable Pulley Maximum Full Turns from Closed Position	Standard 5	5	5
	High-Static 5	5	6
Factory Setting	Standard 5	5	5
	High-Static 5	5	5
Factory Speed Setting (rpm)	Standard 730	840	860
	High-Static 860	860	887
Fan Shaft Diameter at Pulley (in.)	1	1	1
INDOOR COIL	Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Acutrol Metering Device		
Rows...Fins/in.	3...15	4...15	4...15
Total Face Area (sq ft)	8.9	11.1	11.1
HIGH-PRESSURE SWITCH (psig)		625	
Standard Compressor Internal Relief		428	
Cutout		320	
Reset (Auto.)			
LOSS-OF-CHARGE/LOW-PRESSURE SWITCH (Liquid Line) (psig)		7 ± 3	
Cutout		22 ± 5	
Reset (Auto.)			
FREEZE PROTECTION THERMOSTAT		30	
Opens (F)		45	
Closes (F)			
OUTDOOR-AIR INLET SCREEN	Cleanable. Screen size and quantity vary by option selected.		
RETURN-AIR FILTERS		Throwaway	
Quantity...Size (in.)	4...16 x 20 x 2	4...20 x 20 x 2	4...20 x 20 x 2

## LEGEND

Bhp — Brake Horsepower



## 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 revision 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 will 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 200-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 unit's 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 the range indicated on the unit nameplate (see Tables 3A-3D). On 3-phase units, voltages between phases must be balanced within 2%, and the current within 10%. Use the formula shown in Tables 3A-3D, 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 invalidates any applicable Carrier warranty.*

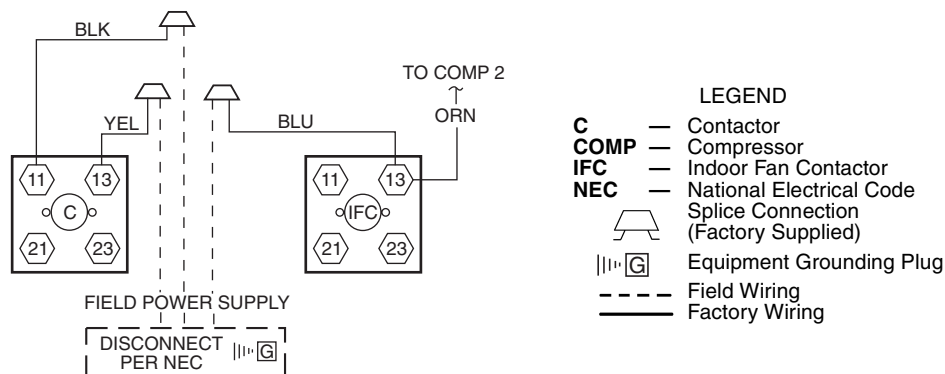


Fig. 7 — Power Wiring Connections

**Table 2 — Electric Heating Capacities**

50HJQ UNIT SIZE	VOLTAGE (60 Hz)	ACCESSORY kW	ACCESSORY HEATER PART NUMBER CRHEATER---A00	ACCESSORY SINGLE POINT BOX PART NO. CRSINGLE---A00
<b>008</b> <b>(7½ Tons)</b>	208/230/240 (3 phase)	7.8/ 9.6/10.4	117	007
		12.0/14.7/16.0	110	007
		18.6/22.8/24.8	111	009
		24.0/29.4/32.0	112	009
		31.8/39.0/42.4*	112,117	013
	460/480 (3 phase)	12.8/13.9	116	006
		15.2/16.5	113	006
		25.6/27.8	114	008
		30.4/33.0	115	008
		38.4/41.7*	114,116	—
<b>009</b> <b>(8½ Tons)</b>	208/230/240 (3 phase)	7.8/ 9.6/10.4	117	012
		12.0/14.7/16.0	110	012
		18.6/22.8/24.8	111	015
		24.0/29.4/32.0	112	015
		31.8/39.0/42.4*	112,117	017
	460/480 (3 phase)	12.8/13.9	116	011
		15.2/16.5	113	011
		25.6/27.8	114	014
		30.4/33.0	115	014
		38.4/41.7*	114,116	016
<b>012</b> <b>(10 Tons)</b>	208/230/240 (3 phase)	7.8/ 9.6/10.4	117	012
		12.0/14.7/16.0	110	012
		24.0/29.4/32.0	112	015
		31.8/39.0/42.4*	112,117	017
		37.6/46.2/50.0*	112,110	017
	460/480 (3 phase)	15.2/16.5	113	011
		25.6/27.8	114	014
		30.4/33.0	115	014
		38.4/41.7*	114,116	016
		46.0/50.0*	115,113	016

\*Two heater packages required to provide kW indicated.

**NOTES:**

1. The rated heater voltage is 240 and 480 v. If power distribution voltage varies from rated heater voltage, heater kW will vary accordingly.
2. To determine heater kW at voltages other than those shown in table, use the following formula:

$$\text{Heater kW}_{\text{new}} = \text{Heater kW rated} \times (\text{unit power distribution voltage}/\text{rated heater voltage})^2$$

As an example:

For a 16 kW heater rated at 240 v with a power distribution voltage of 215 v

$$\text{kW}_{\text{new}} = 16 \text{ kW} (215/240)^2$$

$$\text{kW}_{\text{new}} = 12.8 \text{ kW (rating at 215 v)}$$



**Table 3A — Electrical Data — Standard Motor Units Without Electrical Convenience Outlet**

50HJQ UNIT SIZE	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR (each)		OFM (each)	IFM	ELECTRIC HEAT*		POWER SUPPLY		MINIMUM UNIT DISCONNECT SIZE†	
		Min	Max	RLA	LRA	FLA	FLA	kW**	FLA	MCA	MOCP	FLA	LRA
<b>008</b> (7½ Tons)	208/230-3-60	187	254	12.4	88.0	1.4	7.5	— 7.8/10.4 12.0/16.0 18.6/24.8 24.0/32.0 31.8/42.4	— 21.7/ 25.0 33.3/ 38.5 51.6/ 59.7 66.6/ 77.0 88.3/102.0	38.2/ 38.2 65.3/ 69.5 79.8/ 86.3 102.7/112.8 121.5/134.5 148.6/165.7	40/ 40†† 70/ 70†† 80/ 90 110/125 125/150 150/175	40/ 40 65/ 69 79/ 85 100/109 117/129 142/158	242/242 264/267 275/281*** 294/302*** 309/319*** 330/344***
	460-3-60	414	508	6.4	44.0	0.7	3.4	— 13.9 16.5 27.8 33.0 41.7	— 16.7 19.8 33.4 39.7 50.2	19.2 40.1 44.0 61.0 68.8 82.0	20†† 45†† 45†† 70 70 90	20 39 43 59 66 78	121 138 141 155 161 171
<b>009</b> (8½ Tons)	208/230-3-60	187	254	13.9	105	1.4	7.5	— 7.8/10.4 12.0/16.0 18.6/24.8 24.0/32.0 31.8/42.4	— 21.7/ 25.0 33.3/ 38.5 51.6/ 59.7 66.6/ 77.0 88.3/102.0	41.3/ 41.3 68.4/ 72.5 82.9/ 89.4 105.8/115.9 124.5/137.5 151.7/168.8	45/ 45†† 70/ 80†† 90/ 90 110/125 125/150 175/175	43/43 68/72 82/88 103/112 120/132 145/161	276/276 298/301 309/315*** 328/336*** 343/353*** 364/378***
	460-3-60	414	508	7.9	55.0	0.7	3.4	— 13.9 16.5 27.8 33.0 41.7	— 16.7 19.8 33.4 39.7 50.2	22.3 43.2 47.0 64.0 71.9 85.0	25†† 45†† 50†† 70 80 90	23 43 46 62 69 81	143 160 163 177 183 193
<b>012</b> (10 Tons)	208/230-3-60	187	254	19.3	123.0	1.4	10.6	— 7.8/10.4 12.0/16.0 24.0/32.0 31.8/42.4 37.6/50.0	— 21.7/ 25.0 33.3/ 38.5 66.6/ 77.0 88.3/102.0 104.4/120.3	56.8/ 56.8 84.0/ 88.1 98.5/105.0 140.1/153.1 167.2/184.3 187.3/177.1	60/ 60†† 90/ 90 100/110 150/175 175/200 200/200	60/ 60 85/ 89 98/104 136/148 161/177 180/198	337/337 358/362*** 370/375*** 403/414*** 425/439*** 441/457***
	460-3-60	414	508	10.0	62.0	0.7	4.8	— 16.5 27.8 33.0 41.7 50.0	— 19.8 33.4 39.7 50.2 60.1	28.7 53.5 70.5 78.3 91.5 88.8	30†† 60†† 80 80 100 100	30 53 69 76 88 99	170 189 203 209 220*** 230***

**Table 3B — Electrical Data — Standard Motor Units With Electrical Convenience Outlet**

50HJQ UNIT SIZE	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR (each)		OFM (each)	IFM	ELECTRIC HEAT*		POWER SUPPLY		MINIMUM UNIT DISCONNECT SIZE†	
		Min	Max	RLA	LRA	FLA	FLA	kW**	FLA	MCA	MOCP	FLA	LRA
<b>008</b> (7½ Tons)	208/230-3-60	187	254	12.4	88.0	1.4	7.5	— 7.8/10.4 12.0/16.0 18.6/24.8 24.0/32.0 31.8/42.4	— 21.7/ 25.0 33.3/ 38.5 51.6/ 59.7 66.6/ 77.0 88.3/102.0	43.0/ 43.0 70.1/ 74.3 84.6/ 91.1 107.5/117.6 126.3/139.3 153.4/170.5	45/ 45†† 80/ 80 90/100 110/125 150/150 175/175	46/ 46 71/ 75 84/ 90 105/115 122/134 147/163	247/247 269/272 280/285*** 298/307*** 313/324*** 335/349***
	460-3-60	414	508	6.4	44.0	0.7	3.4	— 13.9 16.5 27.8 33.0 41.7	— 16.7 19.8 33.4 39.7 50.2	21.4 42.3 46.1 63.1 71.0 84.1	25†† 45†† 50†† 70 80 90	23 42 46 61 68 80	123 140 143 157 163 174
<b>009</b> (8½ Tons)	208/230-3-60	187	254	13.9	105	1.4	7.5	— 7.8/10.4 12.0/16.0 18.6/24.8 24.0/32.0 31.8/42.4	— 21.7/ 25.0 33.3/ 38.5 51.6/ 59.7 66.6/ 77.0 88.3/102.0	46.1/ 46.1 73.2/ 77.3 87.7/ 94.2 110.6/120.7 129.3/142.3 156.5/173.6	50/ 50†† 80/ 80 90/100 125/125 150/150 175/175	49/ 49 74/ 78 87/ 93 108/118 126/138 151/166	281/281 303/306 314/319*** 332/341*** 347/358*** 369/383***
	460-3-60	414	508	7.9	55.0	0.7	3.4	— 13.9 16.5 27.8 33.0 41.7	— 16.7 19.8 33.4 39.7 50.2	24.5 45.3 49.2 66.2 74.1 87.2	25†† 50†† 50†† 70 80 90	26 45 49 64 72 84	145 162 165 179 185 196
<b>012</b> (10 Tons)	208/230-3-60	187	254	19.3	123.0	1.4	10.6	— 7.8/10.4 12.0/16.0 24.0/32.0 31.8/42.4 37.6/50.0	— 21.7/ 25.0 33.3/ 38.5 66.6/ 77.0 88.3/102.0 104.4/120.3	61.6/ 61.6 88.8/ 92.9 103.3/109.8 144.9/157.9 172.0/189.1 192.1/181.9	70/ 70 90/100 110/110 150/175 175/200 200/200	65/ 65 90/ 94 104/110 142/154 167/183 185/204	341/341 363/366*** 375/380*** 408/418*** 430/443*** 446/462***
	460-3-60	414	508	10.0	62.0	0.7	4.8	— 16.5 27.8 33.0 41.7 50.0	— 19.8 33.4 39.7 50.2 60.1	30.9 55.6 72.6 80.5 93.6 91.0	35†† 60†† 80 90 100 100	33 55 71 78 90 102	172 191 205 211 222*** 232***

NOTE: See legend and notes on page 11.

**Table 3C — Electrical Data — High-Static Motor Units Without Electrical Convenience Outlet**

50HJQ UNIT SIZE	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR (each)		OFM (each)	IFM	ELECTRIC HEAT*		POWER SUPPLY		MINIMUM UNIT DISCONNECT SIZE†	
		Min	Max	RLA	LRA	FLA	FLA	kW**	FLA	MCA	MOCP	FLA	LRA
008 (7½ Tons)	208/230-3-60	187	254	12.4	88.0	1.4	10.6	— 7.8/10.4 12.0/16.0 18.6/24.8 24.0/32.0 31.8/42.4	— 21.7/ 25.0 33.3/ 38.5 51.6/ 59.7 66.6/ 77.0 88.3/102.0	41.3/ 41.3 68.4/ 72.6 82.9/ 89.4 105.8/115.9 124.6/137.6 151.7/168.8	45/ 45†† 70/ 80 90/ 90 110/125 125/150 175/175	44/ 44 69/ 73 82/ 88 103/113 121/132 145/169	267/267 288/292 300/305*** 318/336*** 333/344*** 355/369***
	460-3-60	414	508	6.4	44.0	0.7	4.8	— 13.9 16.5 27.8 33.0 41.7	— 16.7 19.8 33.4 39.7 50.2	20.6 41.5 45.4 62.4 70.2 83.4	25†† 45†† 50†† 70 80 90	22 41 45 60 68 80	134 150 153 167 173 184
009 (8½ Tons)	208/230-3-60	187	254	13.9	105	1.4	10.6	— 7.8/10.4 12.0/16.0 18.6/24.8 24.0/32.0 31.8/42.4	— 21.7/ 25.0 33.3/ 38.5 51.6/ 59.7 66.6/ 77.0 88.3/102.0	44.4/ 44.4 71.5/ 75.6 86.0/ 92.5 108.9/119.0 127.6/140.6 154.8/171.9	45/ 45†† 80/ 80 90/100 110/125 150/150 175/175	47/ 47 72/ 76 85/ 91 106/116 124/136 149/164	301/301 322/326 334/339*** 352/360*** 367/378*** 389/403***
	460-3-60	414	508	7.9	55.0	0.7	4.8	— 13.9 16.5 27.8 33.0 41.7	— 16.7 19.8 33.4 39.7 50.2	23.7 44.6 48.4 65.4 73.3 86.4	25†† 45†† 50†† 70 80 90	25 44 48 63 71 83	156 172 175 189 195 206
012 (10 Tons)	208/230-3-60	187	254	19.3	123.0	1.4	15.0	— 7.8/10.4 12.0/16.0 18.6/24.8 24.0/32.0 31.8/42.4 37.5/50.0	— 21.7/ 25.0 33.3/ 38.5 51.6/ 59.7 66.6/ 77.0 88.3/102.0 104.4/120.3	61.2/ 61.2 88.4/ 92.5 102.9/109.4 144.5/157.5 171.6/188.7 191.7/181.5	70/ 70 90/100 110/110 150/175 175/200 200/200	65/ 65 90/ 94 103/109 141/153 166/182 185/203	360/360 382/385*** 393/399*** 427/437*** 448/462*** 464/480***
	460-3-60	414	508	10.0	62.0	0.7	7.4	— 16.5 27.8 33.0 41.7 50.0	— 19.8 33.4 39.7 50.2 60.1	31.3 56.1 73.1 80.9 94.1 96.4	35†† 60†† 80 90 100 100	33 56 72 79 91 102	181 201 215 221 231*** 241***

**Table 3D — Electrical Data — High-Static Motor Units With Electrical Convenience Outlet**

50HJQ UNIT SIZE	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR (each)		OFM (each)	IFM	ELECTRIC HEAT*		POWER SUPPLY		MINIMUM UNIT DISCONNECT SIZE†	
		Min	Max	RLA	LRA	FLA	FLA	kW**	FLA	MCA	MOCP	FLA	LRA
008 (7½ Tons)	208/230-3-60	187	254	12.4	88.0	1.4	10.6	— 7.8/10.4 12.0/16.0 18.6/24.8 24.0/32.0 31.8/42.4	— 21.7/ 25.0 33.3/ 38.5 51.6/ 59.7 66.6/ 77.0 88.3/102.0	46.1/ 46.1 73.2/ 77.4 87.7/ 94.2 110.6/120.7 129.4/142.4 156.5/173.6	50/ 50†† 80/ 80 90/100 125/125 150/150 175/175	49/ 49 74/ 78 88/ 94 109/118 126/138 159/167	271/271 293/296 305/310*** 323/331*** 338/348*** 360/373***
	460-3-60	414	508	6.4	44.0	0.7	4.8	— 13.9 16.5 27.8 33.0 41.7	— 16.7 19.8 33.4 39.7 50.2	22.8 43.7 47.5 64.5 72.4 85.5	25†† 45†† 50†† 70 80 90	24 44 47 63 70 82	136 152 155 169 175 186***
009 (8½ Tons)	208/230-3-60	187	254	13.9	105	1.4	10.6	— 7.8/10.4 12.0/16.0 18.6/24.8 24.0/32.0 31.8/42.4	— 21.7/ 25.0 33.3/ 38.5 51.6/ 59.7 66.6/ 77.0 88.3/102.0	49.2/ 49.2 76.3/ 80.4 90.8/ 97.3 113.7/123.8 132.4/145.4 159.6/176.7	50/ 50†† 80/ 90 100/100 125/125 150/150 175/200	53/ 53 78/ 81 91/ 97 112/121 129/141 154/170	305/305 327/330 339/344*** 357/365*** 372/382*** 394/407***
	460-3-60	414	508	7.9	55.0	0.7	4.8	— 13.9 16.5 27.8 33.0 41.7	— 16.7 19.8 33.4 39.7 50.2	25.9 46.7 50.6 67.6 75.5 88.6	30†† 50†† 60†† 70 80 90	27 47 50 66 73 85	158 174 177 191 197 208***
012 (10 Tons)	208/230-3-60	187	254	19.3	123.0	1.4	15.0	— 7.8/10.4 12.0/16.0 18.6/24.8 24.0/32.0 31.8/42.4 37.5/50.0	— 21.7/ 25.0 33.3/ 38.5 51.6/ 59.7 66.6/ 77.0 88.3/102.0 104.4/120.3	66.0/ 66.0 93.2/ 97.3 107.7/114.2 149.3/162.3 176.4/193.5 196.5/186.3	70/ 70 100/100 110/125 150/175 200/200 200/200	70/ 70 95/ 99 109/115 147/159 172/188 190/209	365/365 387/390*** 398/403*** 431/442*** 453/467*** 469/485***
	460-3-60	414	508	10.0	62.0	0.7	7.4	— 16.5 27.8 33.0 41.7 50.0	— 19.8 33.4 39.7 50.2 60.1	33.5 58.2 75.2 83.1 96.2 93.6	35†† 60†† 80 90 100 100	36 58 74 81 93 105	183 203 217 223*** 234*** 243***

NOTE: See legend and notes on page 11.

## LEGEND AND NOTES FOR TABLES 3A-3D

### LEGEND

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



\*Heaters are field installed only.

†Minimum unit disconnect size is used to determine minimum disconnect per NEC.

\*\*Heater capacity (kW) is based on heater voltage of 208 v, 240 v, 480 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.

††Fuse or HACR circuit breaker.

\*\*\*Factory-installed disconnect is not available for these units when electric heat package is installed.

### NOTES:

1. In compliance with NEC requirements for multimotor and combination load and equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker.

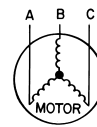
### 2. Unbalanced 3-Phase Supply Voltage

*Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the 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.

3. Non-fused disconnect switch cannot be used when rooftop unit electrical ratings exceed 80 amps.

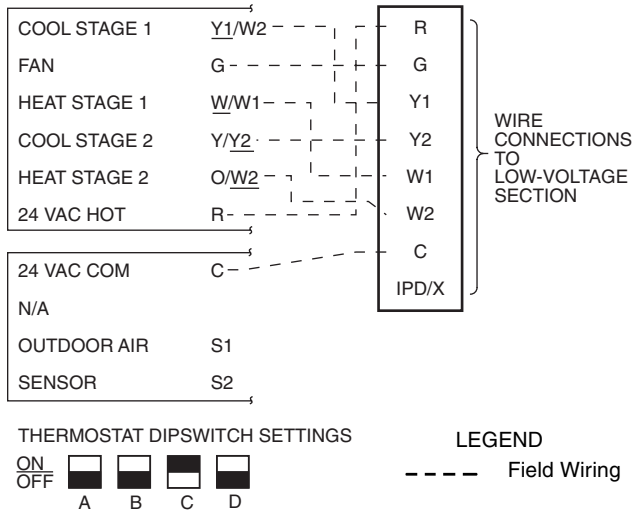
**FIELD CONTROL WIRING** — Install a Carrier-approved accessory thermostat assembly according to the installation instructions included with the accessory. Locate the thermostat assembly on a solid wall in the conditioned space to sense average temperature in accordance with thermostat installation instructions.

**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.

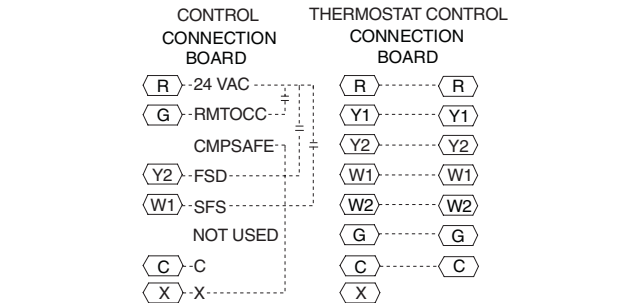
Route the thermostat cable or equivalent single leads of colored wire from the subbase terminals to the low-voltage connections on the unit (shown in Fig. 8A and 8B) as described in Steps 1 through 4 below.

**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 an accessory thru-the-curb service plate connection is used, route the wire through connection plate.
2. Pass control wires through the hole provided on the unit (see connection D in the 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.



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



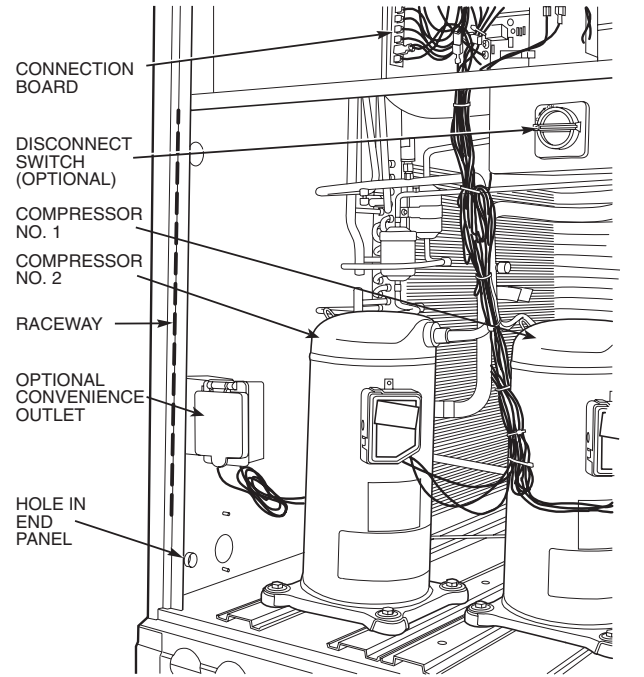
**Fig. 8B — Low Voltage Connections (Units with PremierLink™ Controls)**

4. Connect the thermostat wires to the screw terminals of the low-voltage connector (see Fig. 8A and 8B).

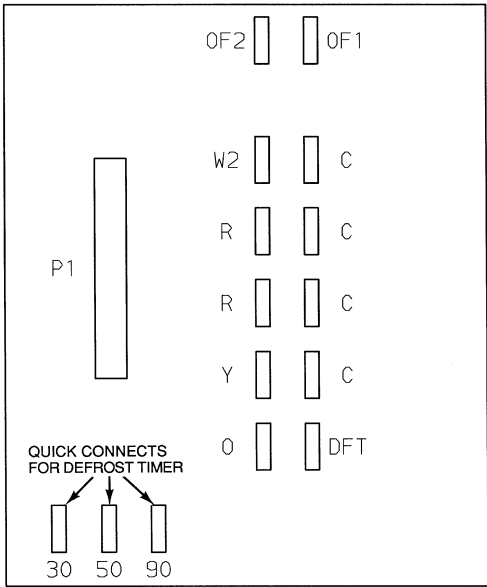
**NOTE:** If the unit is mounted on a roof curb and the electrical power will be run up “thru-the-bottom,” use accessory kit CRBTMPWR002A00. This kit, available from your local distributor, ensures a reliable watertight connection. Refer to the accessory installation instructions for information on power wiring. Refer to Fig. 6 for drilling holes in the basepan.

**DEFROST BOARD** — The defrost board timer cycle is factory set to 30 minutes. To change the cycle time, remove the wire from the 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.



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



**Fig. 10 — Defrost Board**

**Table 4 — Heat Anticipator Settings**

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

\*kW is based on 240 v.

## 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.

**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.

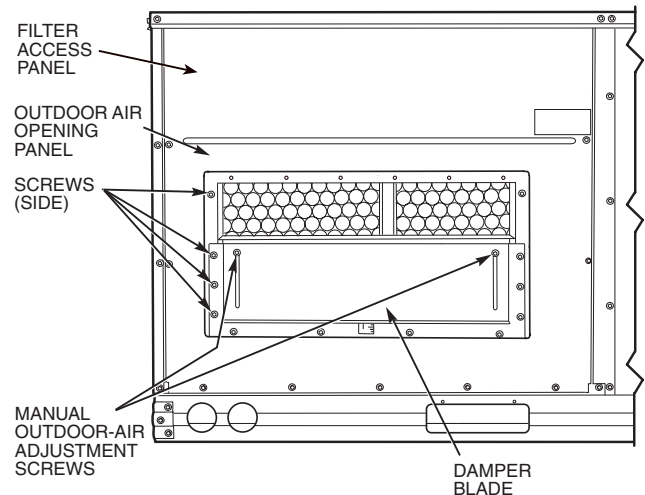
**NOVAR CONTROLS** — Optional Novar controls (ETM 3051) are available for replacement or new construction jobs.

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

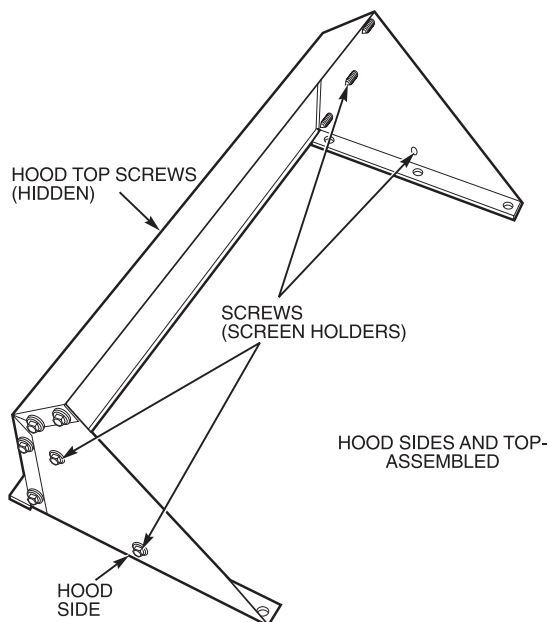
### Assembly:

1. Determine the amount of ventilation required for the building. Record the amount for use in Step 8.
2. Remove the filter access panel by raising the panel and swinging the panel bottom 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.

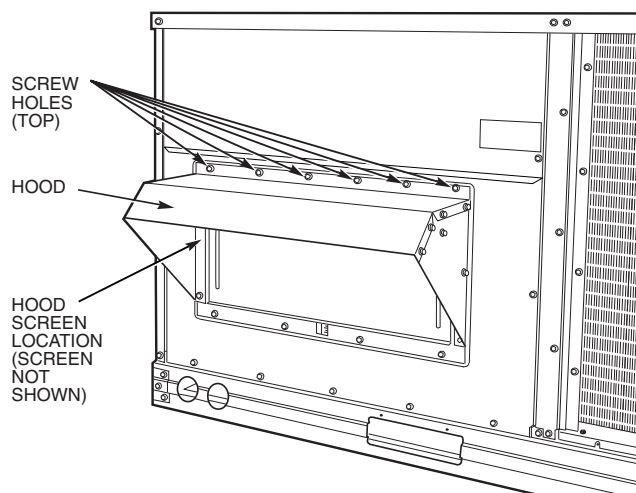
7. Align the screw holes on the hood with the screw holes on the side of manual outdoor-air damper. See Fig. 12 and 13. Secure the hood with 8 screws from Step 6.
8. Adjust the minimum position setting of the damper blade by adjusting the manual outdoor-air adjustment screws on the front of the damper 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.



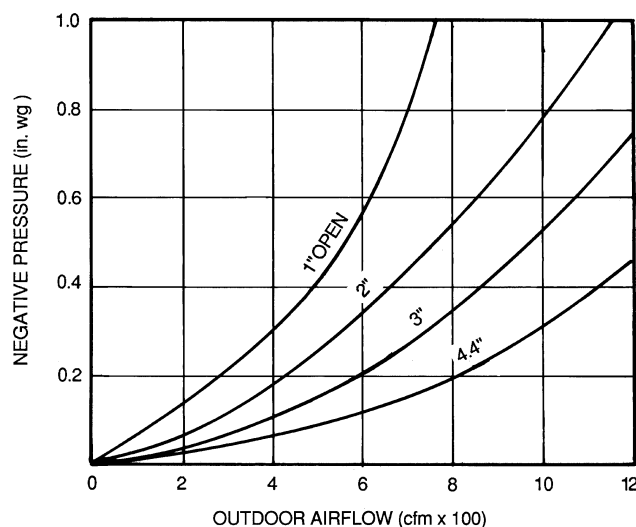
**Fig. 11 — Damper Panel with Manual Outdoor-Air Damper Installed**



**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™ or Scrolling Marquee can be used with the PremierLink controller.

The PremierLink controller (see Fig. 15A and 15B) requires the use of a Carrier electronic thermostat or a CCN connection for time broadcast to initiate its internal timeclock. This is necessary for broadcast of time of day functions (occupied/unoccupied). No sensors are supplied with the field-mounted PremierLink control. The factory-installed PremierLink control includes only the supply-air sensor (SAT) and the outdoor air temperature sensor (OAT) as standard. An indoor air quality (CO<sub>2</sub>) sensor can be added as an option. Refer to Table 5 for sensor usage. Refer to Fig. 16 for PremierLink controller wiring. The PremierLink control may be mounted in the control panel or an area below the control panel.

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

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

The SAT probe is wire-tied to the supply-air opening (on the horizontal opening end) in its shipping position. Remove the sensor for installation. Re-position the sensor in the flange of the supply-air opening or in the supply air duct (as required by local codes). Drill or punch a 1/2-in. hole in the flange or duct. Use two field-supplied, self-drilling screws to secure the sensor probe in a horizontal orientation.

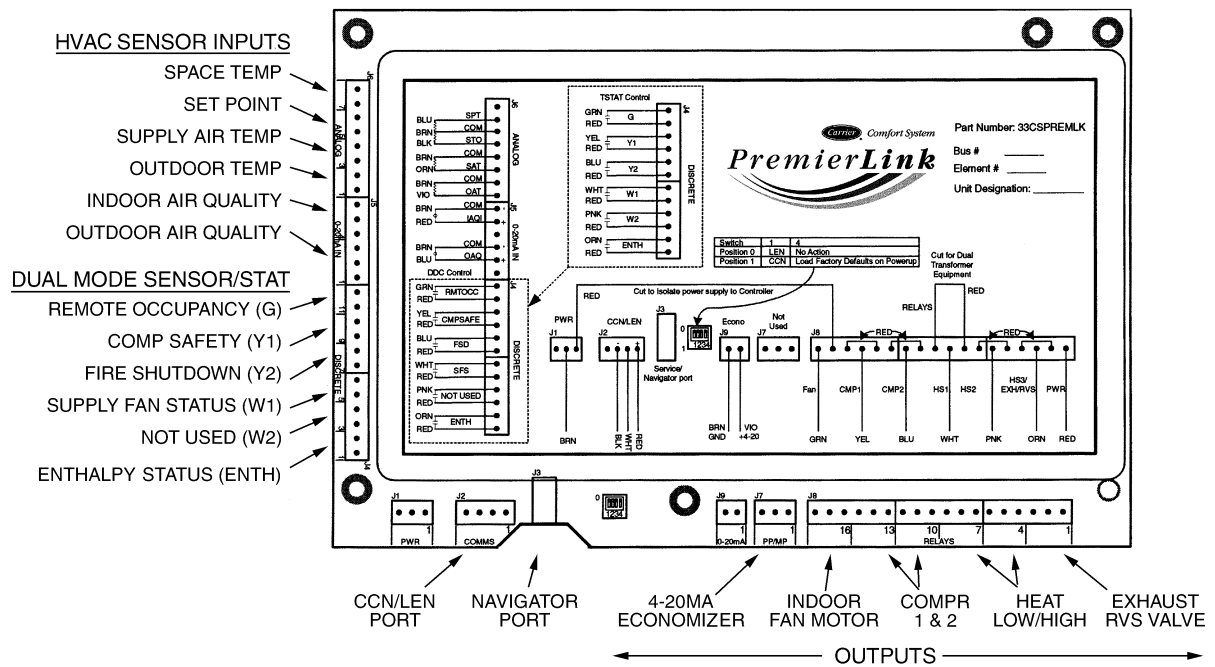
**NOTE:** The sensor must be mounted in the discharge airstream downstream of the cooling coil and any heating devices. Be sure the probe tip does not come in contact with any of the unit or heat surfaces.

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

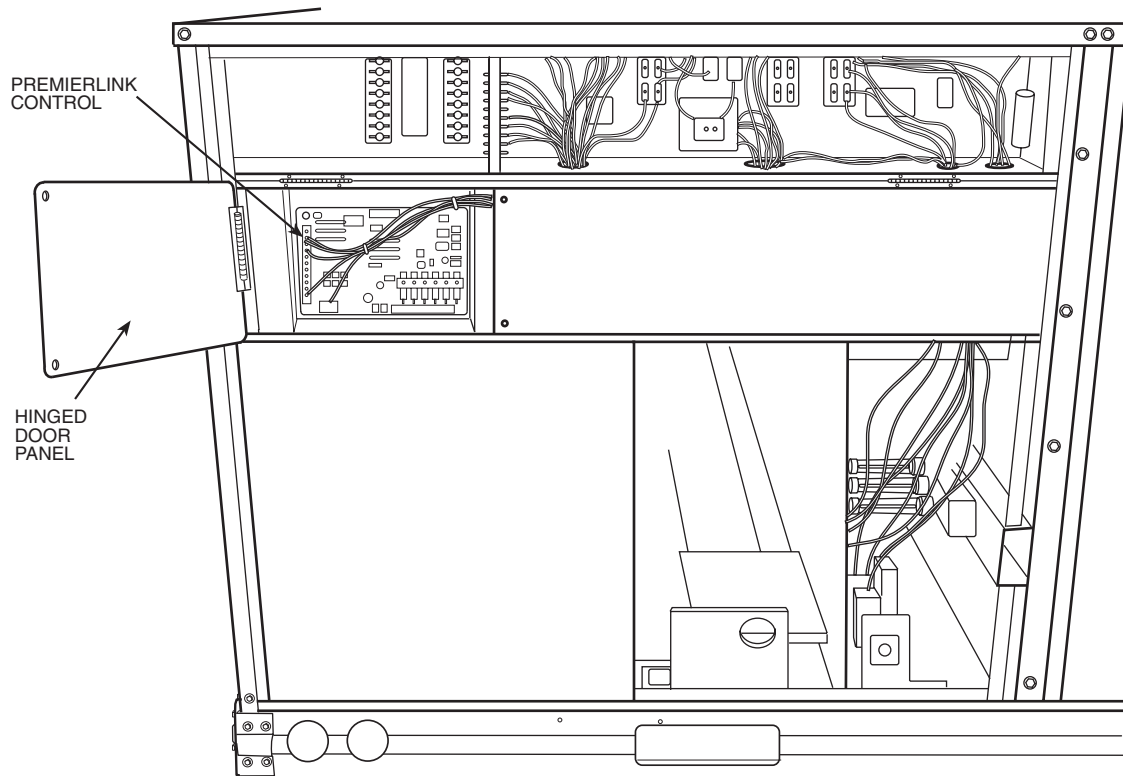
**Install the Indoor Air Quality (CO<sub>2</sub>) Sensor** — Mount the optional indoor air quality (CO<sub>2</sub>) sensor according to manufacturer specifications.

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.



**Fig. 15A — PremierLink™ Controller**



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



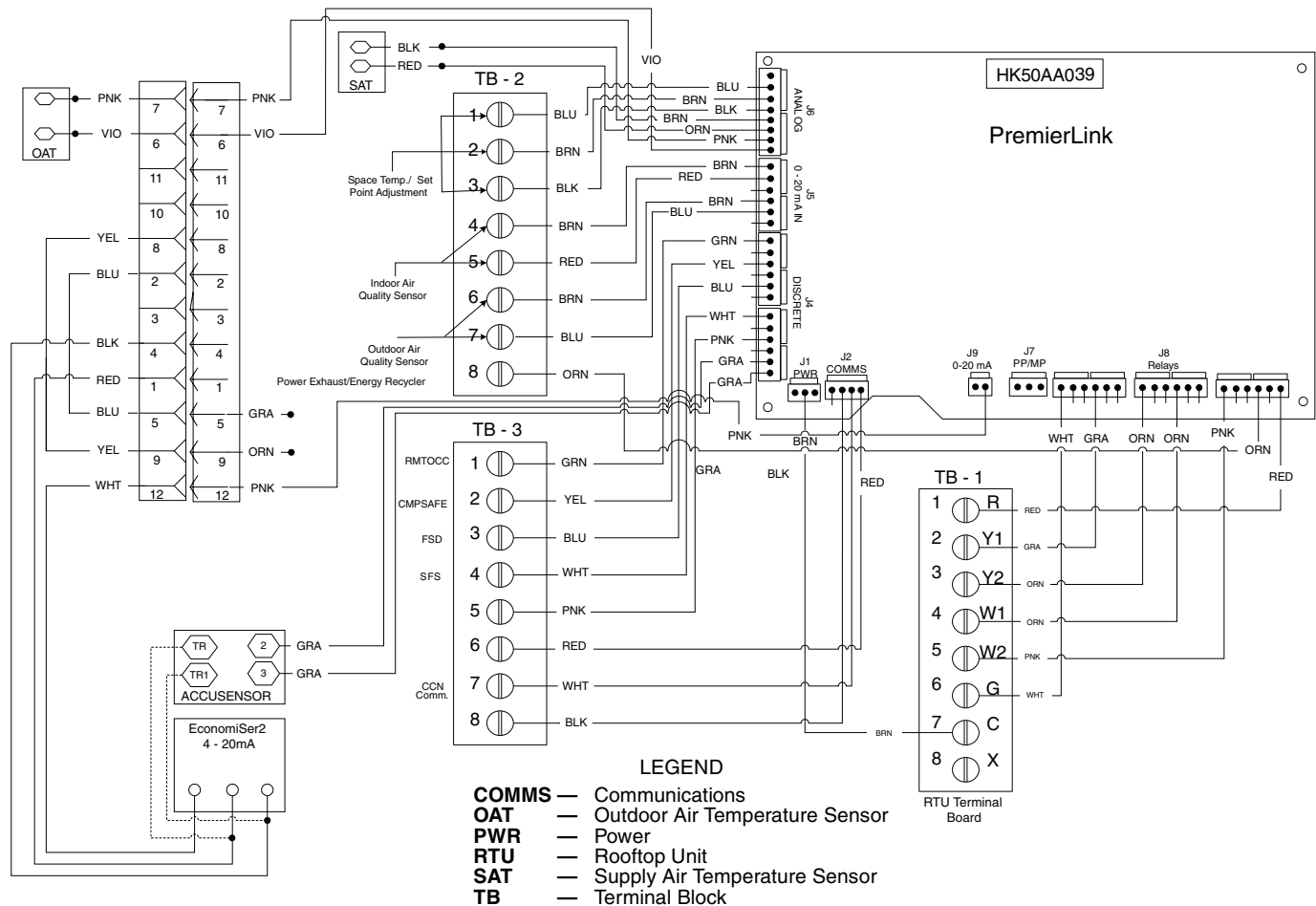
**Table 5 — PremierLink™ Sensor Usage**

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. 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.

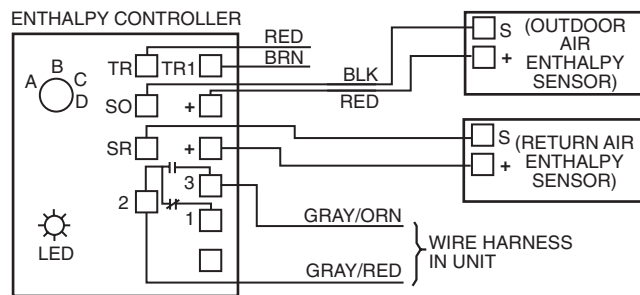
1. Use a 4-conductor, 18 or 20 AWG cable to connect the enthalpy control to the PremierLink controller and power transformer.
2. Connect the following 4 wires from the wire harness located in rooftop unit to the enthalpy controller:
  - a. Connect the BRN wire to the 24 vac terminal (TR1) on enthalpy 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):

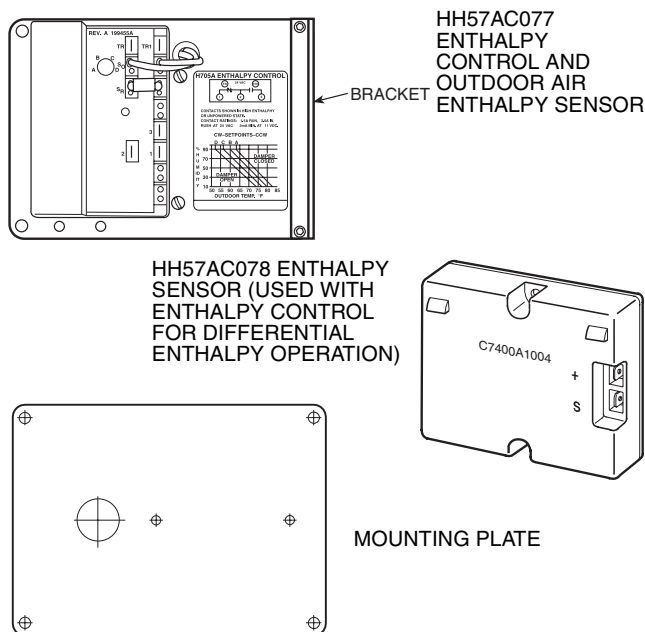
1. Use a 2-conductor, 18 or 20 AWG, twisted pair cable to connect the return air enthalpy sensor to the enthalpy controller.
2. At the enthalpy control remove the factory-installed resistor from the (SR) and (+) terminals.
3. Connect the field-supplied RED wire to (+) spade connector on the return air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

**Fig. 17 — Outside 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.
6. 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.
7. Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 25.
8. Caulk the ends of the joint between the unit top panel and the hood top. See Fig. 23.
9. Replace the filter access panel.
10. Install all EconoMiSer IV accessories. EconoMiSer IV wiring is shown in Fig. 26. EconoMiSer2 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.

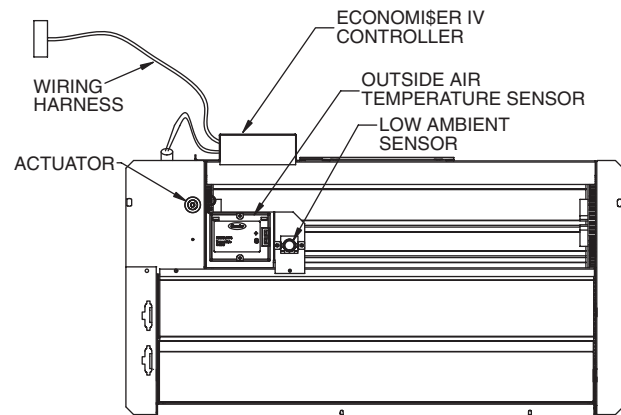
#### ECONOMISER IV STANDARD SENSORS

**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.

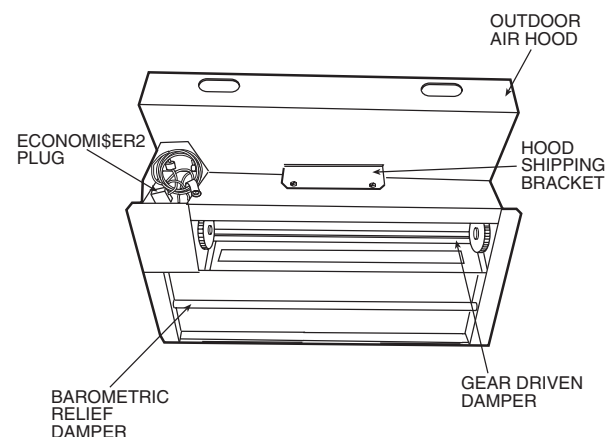
**Supply Air Temperature (SAT) Sensor** — The supply air temperature sensor is a 3 K thermistor located at the inlet of the indoor fan. See Fig. 31. This sensor is factory installed. The operating range of temperature measurement is 0° to 158 F. See Table 6 for sensor temperature/resistance values.

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.

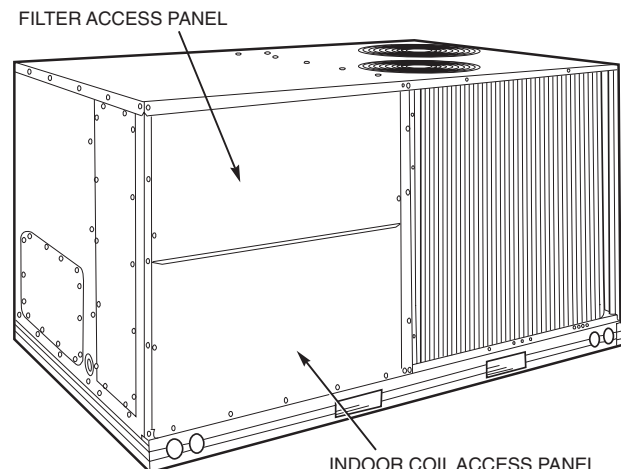
**Outdoor Air Lockout Sensor** — The EconoMiSer IV is equipped with an ambient temperature lockout switch located in the outdoor air stream which is used to lockout the compressors below a 42 F ambient temperature. See Fig. 19.



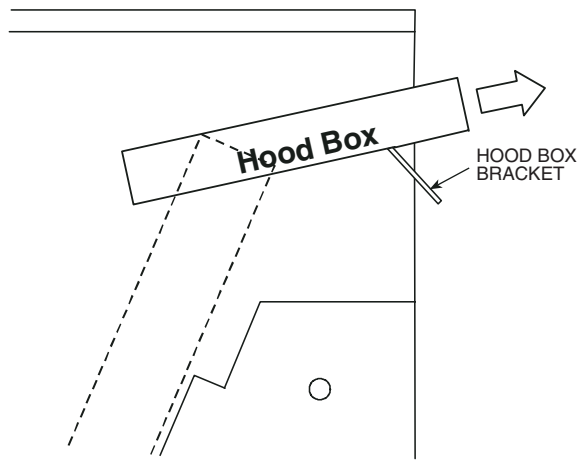
**Fig. 19 — EconoMiSer IV Component Locations**



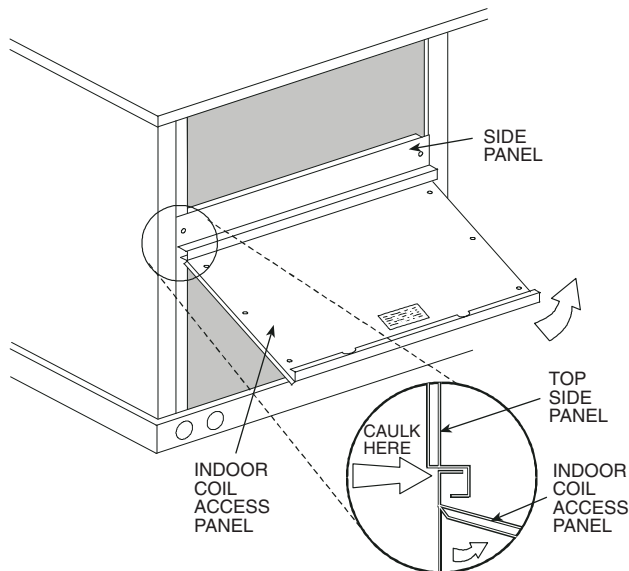
**Fig. 20 — EconoMiSer2 Component Locations**



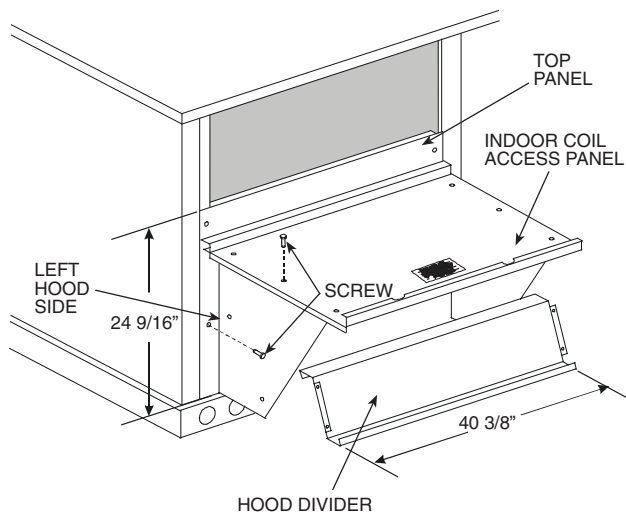
**Fig. 21 — Typical Access Panel Locations**



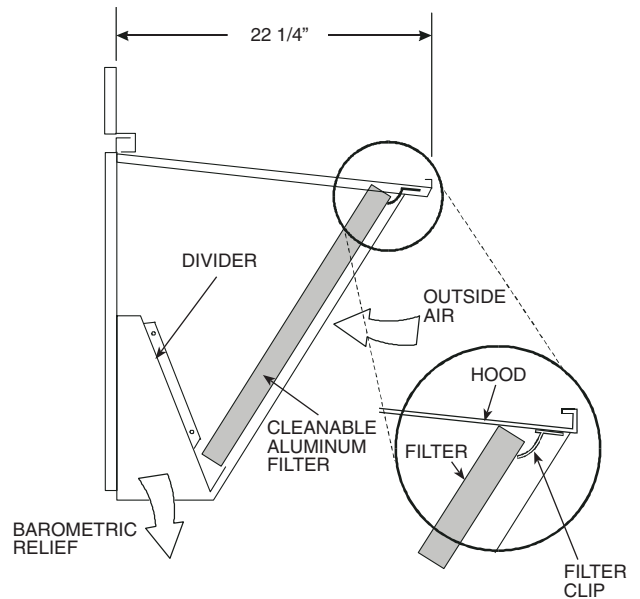
**Fig. 22 — Hood Box Removal**



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



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



**Fig. 25 — Filter Installation**

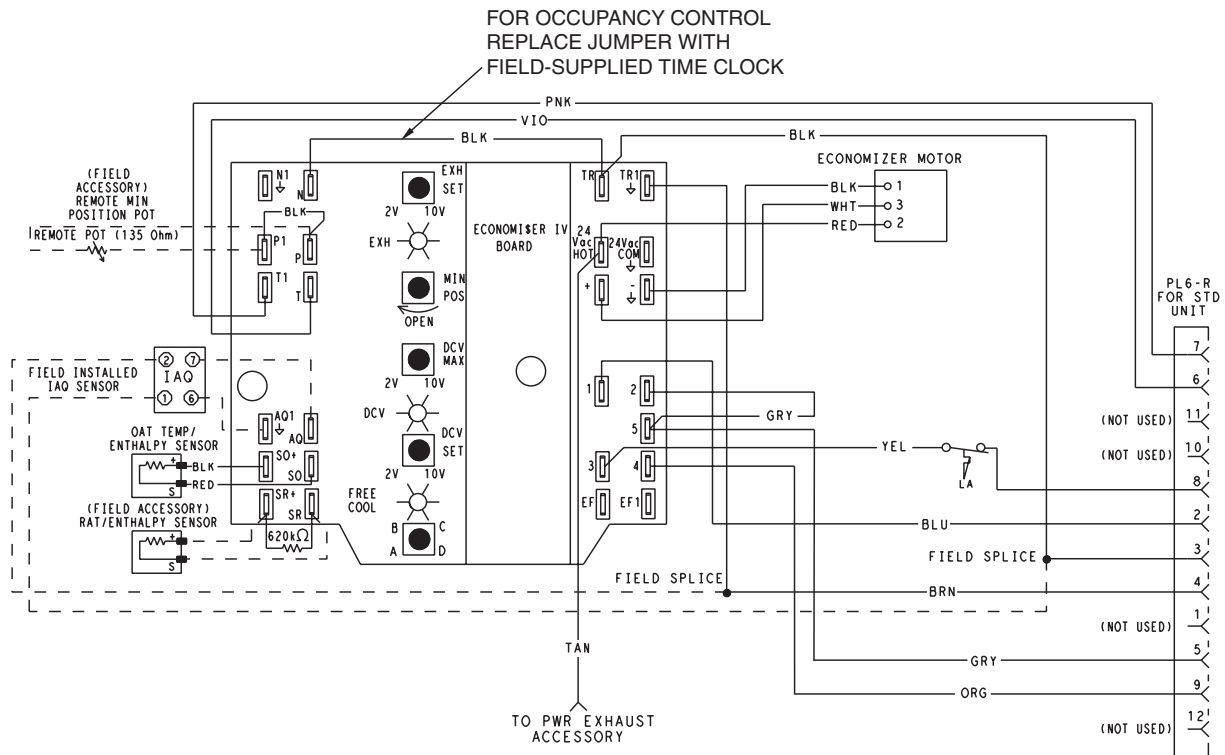
**Table 6 — Supply Air Sensor Temperature/Resistance Values**

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

#### 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.



#### LEGEND

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

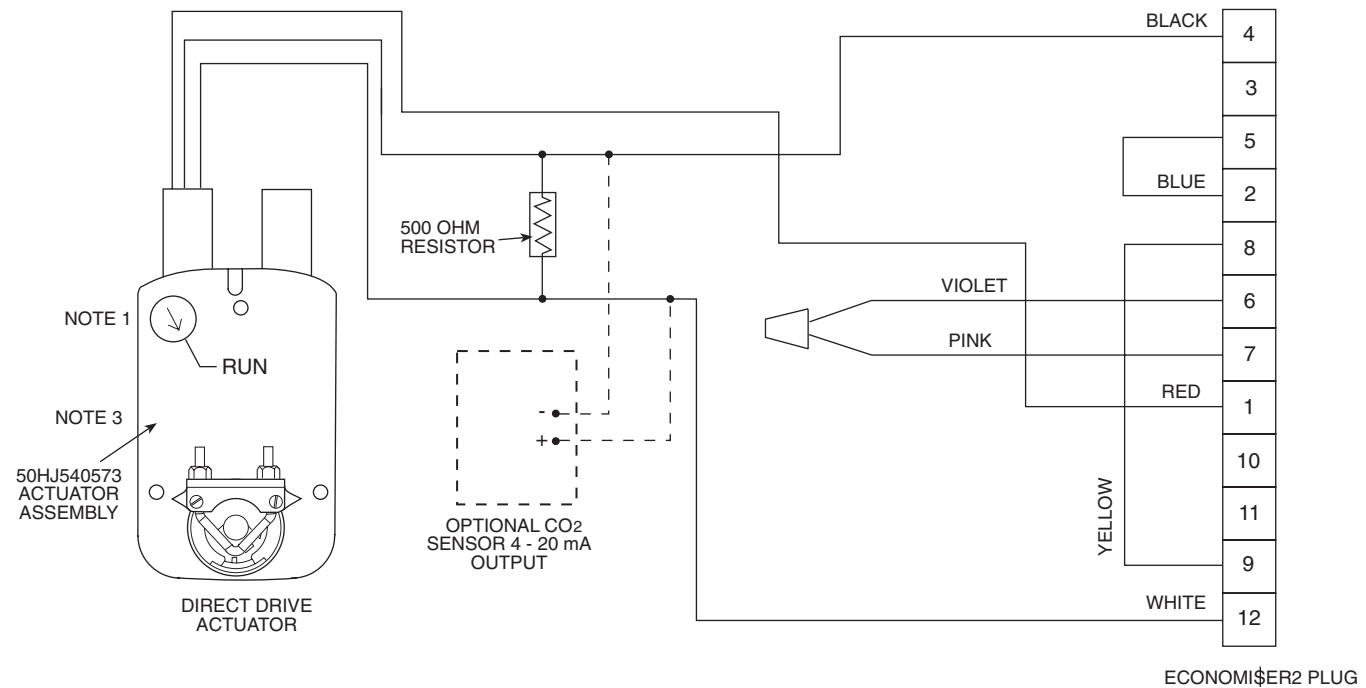
#### Potentiometer Defaults Settings:

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

#### NOTES:

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

**Fig. 26 — EconoMiSer 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 — EconoMiSer2 with 4 to 20 mA Control Wiring**

**Table 7 — EconoMi\$er 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**	RCO	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 EconoMi\$er IV will adjust the outdoor-air dampers to minimum position. If the outdoor-air temperature is below the set point, the position of the outdoor-air dampers will be controlled to provide free cooling using outdoor air. When in this mode, the LED next to the free cooling set point potentiometer will be on. The changeover temperature set point is controlled by the free cooling set point potentiometer located on the control. See Fig. 32. The scale on the potentiometer is A, B, C, and D. See Fig. 33 for the corresponding temperature changeover values.

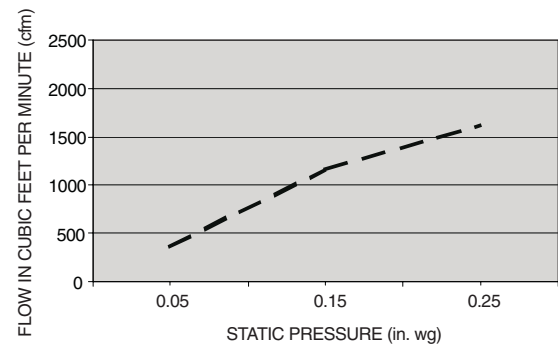
**Differential Dry Bulb Control** — For differential dry bulb control the standard outdoor dry bulb sensor is used in conjunction with an additional accessory dry bulb sensor (part number CRTEMPSN002A00). The accessory sensor must be mounted in the return airstream. See Fig. 34. Wiring is provided in the EconoMi\$er 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.

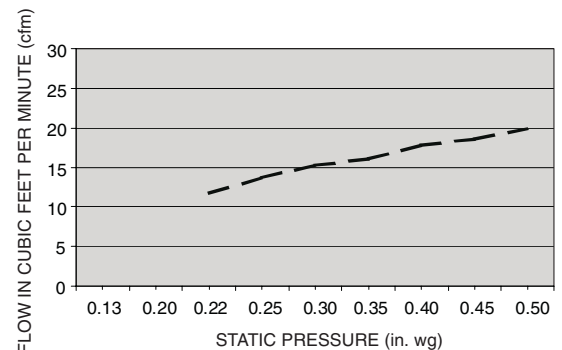
**Outdoor Enthalpy Changeover** — For enthalpy control, accessory enthalpy sensor (part number HH57AC078) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 19. When the outdoor air enthalpy rises above the 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 EconoMi\$er 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 EconoMi\$er IV controller. See Fig. 19 and 36.

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

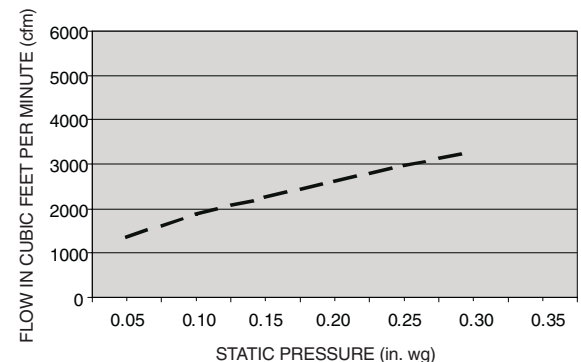
selects the lower enthalpy air (return or outdoor) for cooling. For example, when the outdoor air has a lower enthalpy than the return air, the EconoMi\$er IV opens to bring in outdoor air for free cooling.



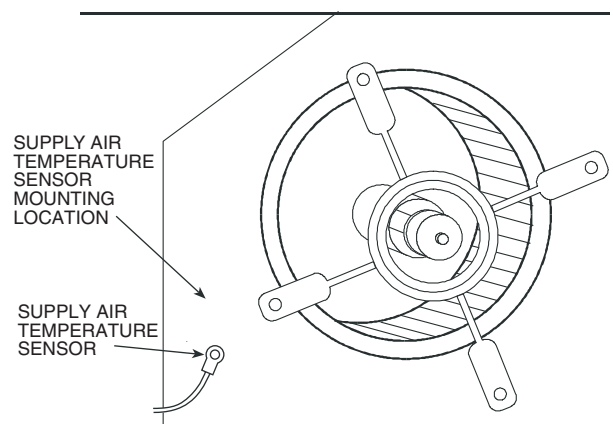
**Fig. 28 — Barometric Flow Capacity**



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

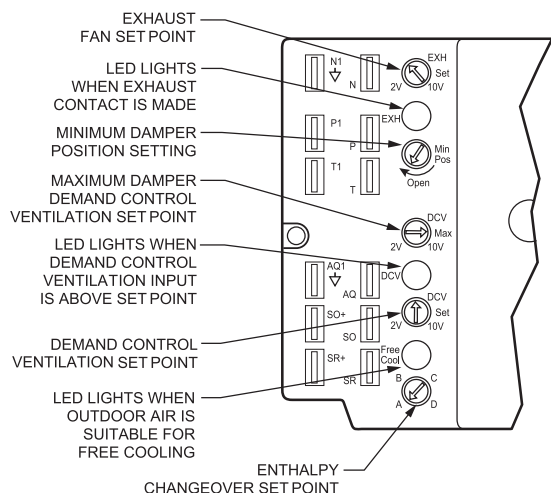


**Fig. 30 — Return-Air Pressure Drop**

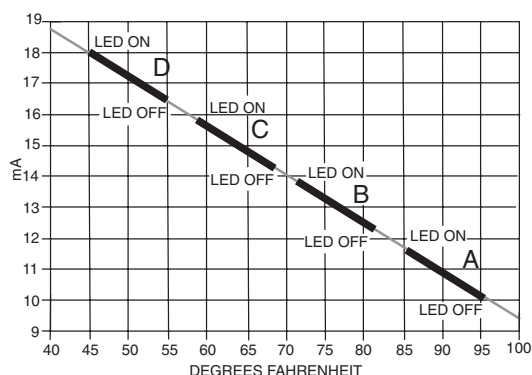


**Fig. 31 — Supply Air Sensor Location**

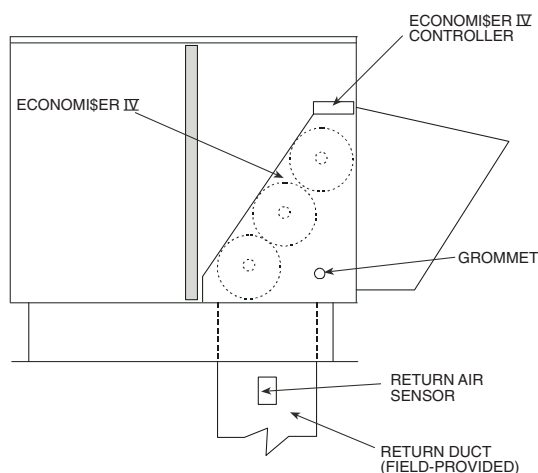




**Fig. 32 — EconoMi\$er IV Controller Potentiometer and LED Locations**



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



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

Replace the standard outside air dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 19. Mount the return air enthalpy sensor in the return air duct. See Fig. 36. Wiring is provided in the EconoMi\$er IV wiring harness. See Fig. 26. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi\$er IV controller. When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting.

**Indoor Air Quality (IAQ) Sensor Input** — The IAQ input can be used for demand control ventilation control based on the level of CO<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 EconoMi\$er IV control board will be damaged.

**Exhaust Set Point Adjustment** — The exhaust set point will determine when the exhaust fan runs based on damper position (if accessory power exhaust is installed). The set point is modified with the Exhaust Fan Set Point (EXH SET) potentiometer. See Fig. 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

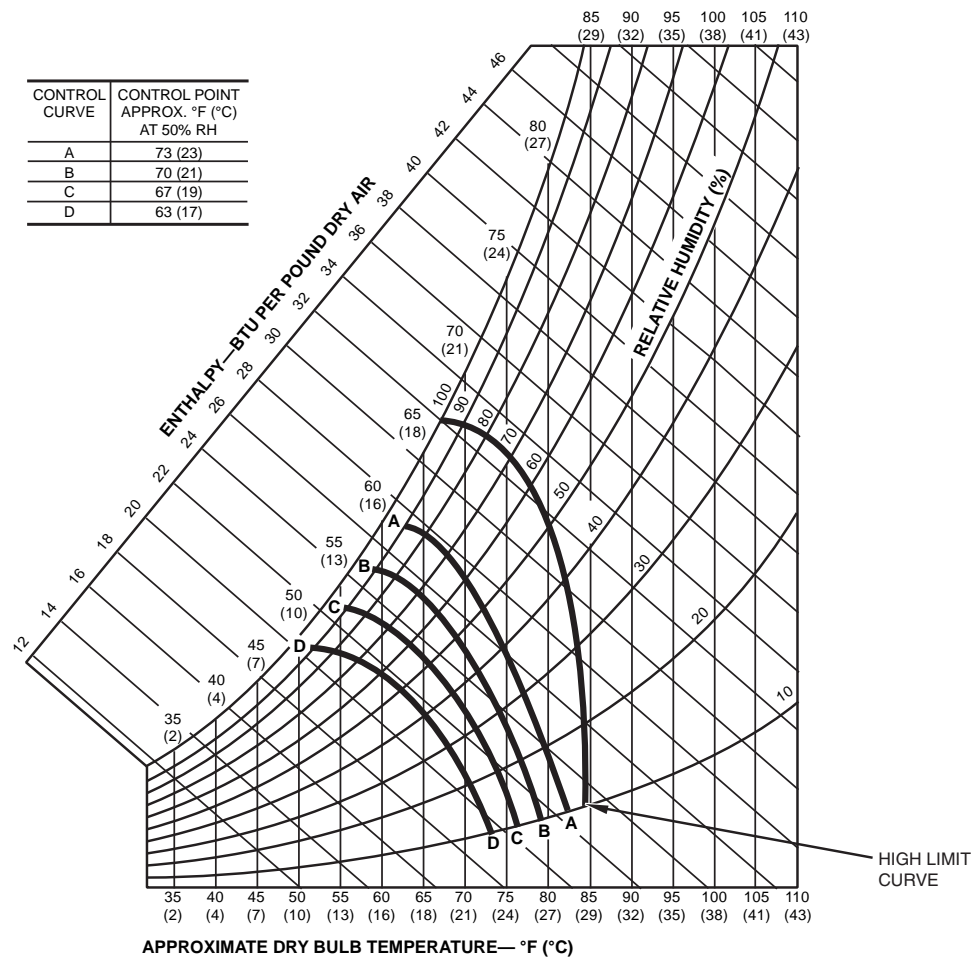
$T_M$  = Mixed-Air Temperature

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.



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

To control the minimum damper position remotely, remove the factory-installed jumper on the P and P1 terminals on the EconoMiSer IV controller. Wire the field-supplied potentiometer to the P and P1 terminals on the EconoMiSer IV controller. See Fig. 36.

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

**Thermostats** — The EconoMiSer 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 EconoMiSer 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 EconoMiSer 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 EconoMiSer IV control will be in occupied mode. When the timeclock contacts are open (removing the 24-v signal from terminal N), the EconoMiSer IV will be in unoccupied mode.

**Demand Controlled Ventilation (DCV)** — When using the EconoMiSer 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<sub>O</sub> = Outdoor-Air Temperature

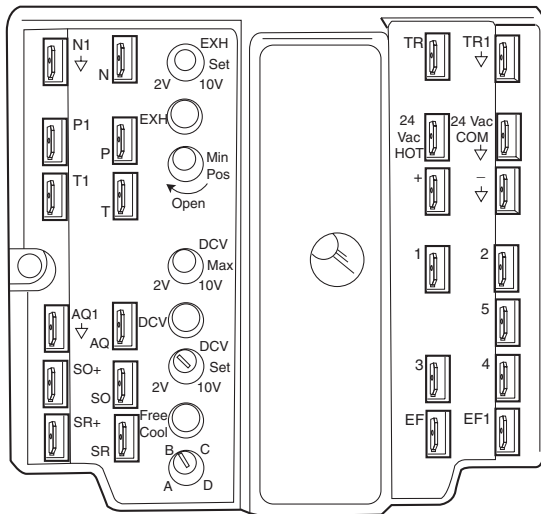
OA = Percent of Outdoor Air

T<sub>R</sub> = Return-Air Temperature

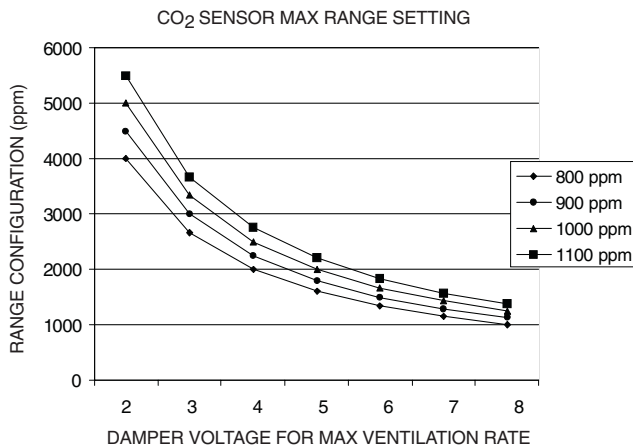
RA = Percent of Return Air

T<sub>M</sub> = Mixed-Air Temperature

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



**Fig. 36 — EconoMi\$er IV Control**



**Fig. 37 — CO<sub>2</sub> Sensor Maximum Range Setting**

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 EconoMi\$er IV controller until it rises above the 3.6 volt setting of the minimum position potentiometer.

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

**CO<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.

**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



**Step 7 — Adjust Indoor-Fan Speed** — Adjust indoor-fan speed to meet jobsite conditions.

For units with electric heat, required minimum cfm is 2250 for 50HJQ008,009 and 3000 for 50HJQ012 with the following exceptions:

UNIT	UNIT VOLTAGE	HEATER KW	UNIT CONFIGURATION	REQUIRED MINIMUM CFM
50HJQ012	208/230	42.4	Horizontal	3200
	208/230	50.0	Horizontal	3200
	460	50.0	Horizontal or Vertical	3200

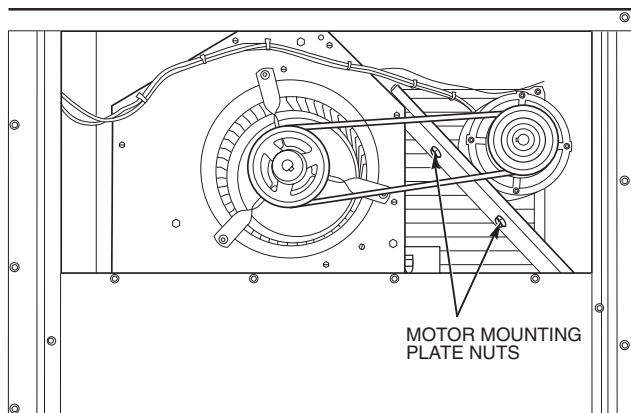
Table 9 shows indoor-fan motor data. Table 10 shows fan rpm at motor pulley settings for standard and alternate motors. Tables 11A and 11B show accessory/FIOP static pressure drop. Refer to Tables 12-23 to determine fan speed settings. Fan motor pulleys are factory set for speed shown in Table 1.

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 fan speed increases the load on the motor. Do not exceed the maximum speed specified in Table 1.
5. Set the movable flange at the nearest keyway of the pulley hub and tighten the setscrew. (See Table 1 for the speed change for each full turn of the pulley flange.)

To align the fan and motor pulleys:

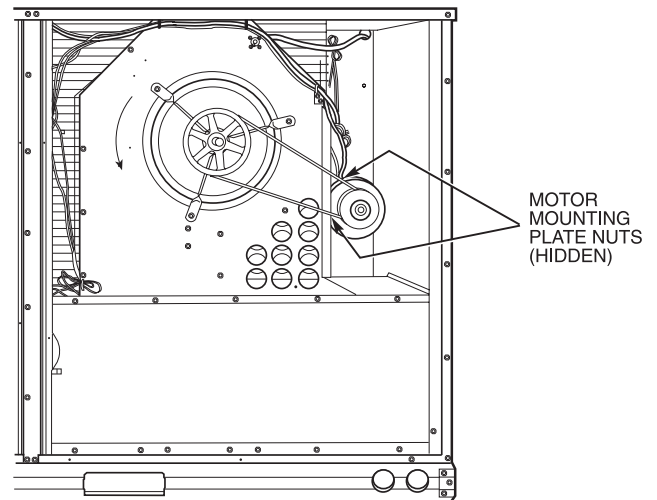
1. Loosen the fan pulley setscrews.
2. Slide the fan pulley along the fan shaft.
3. Make angular alignment by loosening the motor from the mounting plate.



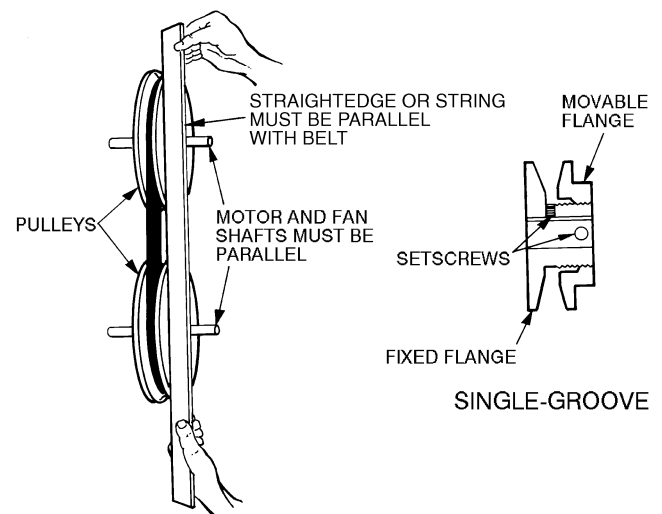
**Fig. 38 — Typical Belt-Drive Motor Mounting for Size 008 and 009**

To adjust the belt tension:

1. Loosen the fan motor mounting nuts.
2. *Size 008 and 009* — Slide the motor mounting plate away from the fan scroll for proper belt tension ( $\frac{1}{2}$ -in. deflection with 8 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. Proper tension is  $\frac{1}{2}$ -in. deflection with 5 to 10 lbs 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 evaporator in fixed position.
4. Verify that the pulleys remain correctly aligned (Fig. 40).



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



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

**Table 9 — Fan Motor Performance**

UNIT 50HJQ	INDOOR-FAN MOTOR	UNIT VOLTAGE	MAXIMUM ACCEPTABLE CONTINUOUS BHP*	MAXIMUM ACCEPTABLE OPERATING WATTS	MAXIMUM AMP DRAW
008,009	Standard	208/230	2.90	2615	8.6
		460			3.9
	High Static	208/230	3.70	3313	11.7
		460			5.5
012	Standard	208/230	3.70	3313	11.7
		460			5.5
	High Static	208/230	5.25	4400	17.3
		460			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 50HJQ	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†	950	930	905	885	865	840	820	795	775	750	730	—	—
008**	1080	1060	1035	1015	990	970	950	925	905	880	860	—	—
009†	1085	1061	1036	1012	987	963	938	914	889	865	840	—	—
009**	1080	1058	1036	1014	992	970	948	926	904	882	860	—	—
012†	1080	1060	1035	1015	990	970	950	925	905	880	860	—	—
012**	1130	1112	1087	1062	1037	1212	987	962	937	912	887	862	830

\*Approximate fan rpm shown.

†Indicates standard motor and drive package.

\*\*Indicates high-static motor and drive package.

**Table 11A — Electric Heater Static Pressure\* (in. wg) — 50HJQ008-012**

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

**Table 11B — EconoMiSer IV and EconoMiSer2 Static Pressure\* (in. wg) — 50HJQ008-012**

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	—	—	—

**LEGEND**

**FIOP** — Factory-Installed Option

\*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.

**GENERAL NOTES FOR FAN PERFORMANCE DATA TABLES**

1. 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. See Indoor-Fan Motor Performance data in Table 9.
2. Values include losses for filters, unit casing, and wet coils. See Table 11A and 11B for static pressure information.
3. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative for details.
4. Interpolation is permissible. Do not extrapolate.

Table 12 — Fan Performance 50HJQ008 — Vertical Discharge Units; Standard Motor (Belt Drive)\*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	511	0.53	492	591	0.73	680	660	0.95	885	722	1.19	1106	779	1.44	1342
2300	519	0.56	518	597	0.76	709	666	0.98	916	727	1.22	1140	784	1.48	1378
2400	534	0.61	571	611	0.82	768	678	1.05	982	739	1.30	1210	795	1.56	1453
2500	550	0.67	629	624	0.89	832	690	1.13	1051	750	1.38	1285	805	1.64	1533
2550	558	0.71	660	631	0.93	866	697	1.17	1088	756	1.42	1324	811	1.69	1574
2600	565	0.74	691	638	0.97	901	703	1.21	1125	762	1.46	1365	816	1.73	1617
2700	581	0.81	758	652	1.04	974	716	1.29	1204	774	1.55	1449	828	1.83	1707
2800	597	0.89	829	667	1.13	1051	729	1.38	1287	786	1.65	1538	839	1.93	1801
2900	613	0.97	905	681	1.22	1133	742	1.48	1376	799	1.75	1632	851	2.04	1900
3000	630	1.06	985	696	1.31	1220	756	1.58	1469	811	1.86	1731	863	2.15	2004
3100	646	1.15	1071	711	1.41	1313	770	1.68	1568	824	1.97	1835	875	2.27	2114
3200	663	1.25	1162	726	1.51	1411	784	1.79	1672	837	2.09	1944	888	2.39	2229
3300	679	1.35	1259	741	1.62	1514	798	1.91	1781	851	2.21	2060	900	2.52	2351
3400	696	1.46	1361	756	1.74	1623	812	2.03	1896	864	2.34	2181	913	2.66	2478
3500	713	1.58	1469	772	1.86	1737	827	2.16	2017	878	2.48	2308	926	2.80	2610
3600	729	1.70	1583	787	1.99	1857	841	2.30	2144	892	2.62	2441	—	—	—
3700	746	1.83	1703	803	2.13	1985	856	2.44	2277	906	2.77	2580	—	—	—
3750	755	1.89	1766	811	2.20	2051	864	2.52	2346	913	2.84	2653	—	—	—

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	832	1.71	1592	882	1.99	1855	928	2.29	2131	973	2.59	2420	—	—	—
2300	837	1.75	1630	886	2.03	1896	933	2.33	2174	977	2.64	2463	—	—	—
2400	847	1.83	1710	896	2.12	1980	942	2.43	2262	986	2.74	2556	—	—	—
2500	857	1.92	1794	905	2.22	2069	951	2.52	2355	995	2.84	2653	—	—	—
2550	862	1.97	1838	910	2.27	2114	956	2.58	2403	999	2.90	2704	—	—	—
2600	867	2.02	1884	915	2.32	2162	961	2.63	2453	—	—	—	—	—	—
2700	878	2.12	1978	926	2.42	2261	971	2.74	2556	—	—	—	—	—	—
2800	889	2.23	2077	936	2.54	2365	981	2.86	2664	—	—	—	—	—	—
2900	900	2.34	2181	947	2.65	2474	—	—	—	—	—	—	—	—	—
3000	912	2.46	2290	958	2.78	2588	—	—	—	—	—	—	—	—	—
3100	923	2.58	2406	969	2.90	2708	—	—	—	—	—	—	—	—	—
3200	935	2.71	2526	—	—	—	—	—	—	—	—	—	—	—	—
3300	947	2.84	2652	—	—	—	—	—	—	—	—	—	—	—	—
3400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.90.
3. See page 26 for General Fan Performance Notes.

\*Motor drive range: 730 to 950 rpm. All other rpms require field-supplied drive.

**Table 13 — Fan Performance 50HJQ008 — Vertical Discharge Units; High-Static Motor (Belt Drive)\***

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	511	0.53	492	591	0.73	680	660	0.95	885	722	1.19	1106	779	1.44	1342
2300	519	0.56	518	597	0.76	709	666	0.98	916	727	1.22	1140	784	1.48	1378
2400	534	0.61	571	611	0.82	768	678	1.05	982	739	1.30	1210	795	1.56	1453
2500	550	0.67	629	624	0.89	832	690	1.13	1051	750	1.38	1285	805	1.64	1533
2550	558	0.71	660	631	0.93	866	697	1.17	1088	756	1.42	1324	811	1.69	1574
2600	565	0.74	691	638	0.97	901	703	1.21	1125	762	1.46	1365	816	1.73	1617
2700	581	0.81	758	652	1.04	974	716	1.29	1204	774	1.55	1449	828	1.83	1707
2800	597	0.89	829	667	1.13	1051	729	1.38	1287	786	1.65	1538	839	1.93	1801
2900	613	0.97	905	681	1.22	1133	742	1.48	1376	799	1.75	1632	851	2.04	1900
3000	630	1.06	985	696	1.31	1220	756	1.58	1469	811	1.86	1731	863	2.15	2004
3100	646	1.15	1071	711	1.41	1313	770	1.68	1568	824	1.97	1835	875	2.27	2114
3200	663	1.25	1162	726	1.51	1411	784	1.79	1672	837	2.09	1944	888	2.39	2229
3300	679	1.35	1259	741	1.62	1514	798	1.91	1781	851	2.21	2060	900	2.52	2351
3400	696	1.46	1361	756	1.74	1623	812	2.03	1896	864	2.34	2181	913	2.66	2478
3500	713	1.58	1469	772	1.86	1737	827	2.16	2017	878	2.48	2308	926	2.80	2610
3600	729	1.70	1583	787	1.99	1857	841	2.30	2144	892	2.62	2441	939	2.95	2749
3700	746	1.83	1703	803	2.13	1985	856	2.44	2277	906	2.77	2580	953	3.10	2894
3750	755	1.89	1766	811	2.20	2051	864	2.52	2346	913	2.84	2653	959	3.18	2969

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	832	1.71	1592	882	1.99	1855	928	2.29	2131	973	2.59	2420	1015	2.92	2720
2300	837	1.75	1630	886	2.03	1896	933	2.33	2174	977	2.64	2463	1020	2.97	2766
2400	847	1.83	1710	896	2.12	1980	942	2.43	2262	986	2.74	2556	1028	3.07	2861
2500	857	1.92	1794	905	2.22	2069	951	2.52	2355	995	2.84	2653	1037	3.18	2962
2550	862	1.97	1838	910	2.27	2114	956	2.58	2403	999	2.90	2704	1041	3.23	3014
2600	867	2.02	1884	915	2.32	2162	961	2.63	2453	1004	2.95	2755	1045	3.29	3068
2700	878	2.12	1978	926	2.42	2261	971	2.74	2556	1013	3.07	2862	1055	3.41	3180
2800	889	2.23	2077	936	2.54	2365	981	2.86	2664	1023	3.19	2975	1064	3.54	3297
2900	900	2.34	2181	947	2.65	2474	991	2.98	2778	1033	3.32	3094	1073	3.67	3419
3000	912	2.46	2290	958	2.78	2588	1001	3.11	2897	1043	3.45	3217	<b>1083</b>	<b>3.80</b>	<b>3547</b>
3100	923	2.58	2406	969	2.90	2708	1012	3.24	3022	1053	3.59	3347	<b>1093</b>	<b>3.95</b>	<b>3682</b>
3200	935	2.71	2526	980	3.04	2834	1023	3.38	3152	<b>1064</b>	<b>3.73</b>	<b>3482</b>	<b>1103</b>	<b>4.10</b>	<b>3821</b>
3300	947	2.84	2652	992	3.18	2966	1034	3.53	3289	<b>1075</b>	<b>3.89</b>	<b>3623</b>	—	—	—
3400	959	2.99	2785	1003	3.33	3103	1045	3.68	3432	<b>1086</b>	<b>4.04</b>	<b>3771</b>	—	—	—
3500	972	3.13	2923	1015	3.48	3246	<b>1057</b>	<b>3.84</b>	<b>3581</b>	—	—	—	—	—	—
3600	984	3.29	3068	1027	3.64	3396	<b>1068</b>	<b>4.01</b>	<b>3736</b>	—	—	—	—	—	—
3700	997	3.45	3218	<b>1040</b>	<b>3.81</b>	<b>3553</b>	<b>1080</b>	<b>4.18</b>	<b>3897</b>	—	—	—	—	—	—
3750	1004	3.54	3296	<b>1046</b>	<b>3.90</b>	<b>3633</b>	—	—	—	—	—	—	—	—	—

**LEGEND**

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

**NOTES:**

1. **Boldface** indicates field-supplied motor or drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 26 for General Fan Performance Notes.

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

**Table 14 — Fan Performance 50HJQ009 — Vertical Discharge Units; Standard Motor (Belt Drive)\***

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2500	489	0.41	386	564	0.54	506	629	0.67	625	688	0.80	745	741	0.93	866
2600	502	0.45	424	576	0.59	548	640	0.72	672	697	0.85	797	750	0.99	923
2700	515	0.50	465	587	0.64	594	650	0.77	723	707	0.91	852	760	1.05	982
2800	529	0.55	508	599	0.69	642	661	0.83	776	718	0.98	910	769	1.12	1044
2900	542	0.59	555	611	0.74	693	672	0.89	832	728	1.04	970	779	1.19	1109
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

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
2500	791	1.06	988	837	1.19	1112	881	1.33	1236	922	1.46	1362	962	1.60	1490
2600	799	1.12	1049	845	1.26	1177	889	1.40	1306	930	1.54	1436	969	1.68	1568
2700	808	1.19	1113	854	1.34	1245	897	1.48	1378	938	1.62	1513	977	1.77	1648
2800	817	1.26	1179	863	1.41	1316	905	1.56	1454	946	1.71	1592	985	1.86	1732
2900	827	1.34	1249	872	1.49	1390	914	1.64	1532	954	1.80	1675	993	1.95	1819
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	—	—	—	—	—	—	—	—	—	—	—	—

**LEGEND**

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

**NOTES:**

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.90.
3. See page 26 for General Fan Performance Notes.

\*Motor drive range: 840 to 1085 rpm. All other rpms require field-supplied drive.

Table 15 — Fan Performance 50HJQ009 — Vertical Discharge Units; High-Static Motor (Belt Drive)\*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2500	489	0.41	386	564	0.54	506	629	0.67	625	688	0.80	745	741	0.93	866
2600	502	0.45	424	576	0.59	548	640	0.72	672	697	0.85	797	750	0.99	923
2700	515	0.50	465	587	0.64	594	650	0.77	723	707	0.91	852	760	1.05	982
2800	529	0.55	508	599	0.69	642	661	0.83	776	718	0.98	910	769	1.12	1044
2900	542	0.59	555	611	0.74	693	672	0.89	832	728	1.04	970	779	1.19	1109
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

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
2500	791	1.06	988	837	1.19	1112	881	1.33	1236	922	1.46	1362	962	1.60	1490
2600	799	1.12	1049	845	1.26	1177	889	1.40	1306	930	1.54	1436	969	1.68	1568
2700	808	1.19	1113	854	1.34	1245	897	1.48	1378	938	1.62	1513	977	1.77	1648
2800	817	1.26	1179	863	1.41	1316	905	1.56	1454	946	1.71	1592	985	1.86	1732
2900	827	1.34	1249	872	1.49	1390	914	1.64	1532	954	1.80	1675	993	1.95	1819
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	<b>1082</b>	<b>3.09</b>	<b>2877</b>
4000	940	2.40	2238	980	2.61	2429	1019	2.81	2620	1056	3.02	2812	<b>1092</b>	<b>3.22</b>	<b>3004</b>
4100	951	2.52	2351	991	2.73	2547	1029	2.94	2743	1066	3.15	2939	<b>1102</b>	<b>3.36</b>	<b>3136</b>
4200	962	2.65	2468	1002	2.86	2668	1040	3.08	2869	1076	3.29	3070	<b>1112</b>	<b>3.51</b>	<b>3271</b>
4300	973	2.78	2589	1013	3.00	2794	1050	3.22	2999	<b>1087</b>	<b>3.44</b>	<b>3205</b>	<b>1122</b>	<b>3.66</b>	<b>3411</b>

LEGEND

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

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 26 for General Fan Performance Notes.

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

**Table 16 — Fan Performance 50HJQ012 — Vertical Discharge Units; Standard Motor (Belt Drive)\***

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	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	—	—	—
4500	996	3.05	2845	1035	3.28	3059	1072	3.51	3274	—	—	—	—	—	—
4600	1008	3.20	2979	1046	3.43	3199	1083	3.67	3418	—	—	—	—	—	—
4700	1020	3.34	3119	1058	3.58	3343	—	—	—	—	—	—	—	—	—
4800	1032	3.50	3263	—	—	—	—	—	—	—	—	—	—	—	—
4900	1044	3.66	3413	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

**LEGEND**

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

**NOTES:**

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 26 for General Fan Performance Notes.

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

Table 17 — Fan Performance 50HJQ012 — Vertical Discharge Units; High-Static Motor (Belt Drive)\*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	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

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 5.25.
3. See page 26 for General Fan Performance Notes.

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



**Table 18 — Fan Performance 50HJQ008 — Horizontal Discharge Units; Standard Motor (Belt Drive)\***

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	465	0.43	402	555	0.64	596	629	0.86	802	694	1.10	1021	753	1.34	1252
2300	471	0.45	421	560	0.66	618	634	0.89	828	699	1.13	1050	757	1.38	1283
2400	483	0.49	461	571	0.71	665	644	0.94	881	708	1.19	1109	766	1.45	1348
2500	495	0.54	503	581	0.77	715	654	1.01	937	717	1.26	1171	775	1.52	1416
2550	501	0.56	526	587	0.79	740	659	1.04	967	722	1.29	1204	779	1.56	1452
2600	507	0.59	549	592	0.82	767	664	1.07	996	727	1.33	1237	784	1.60	1488
2700	519	0.64	597	603	0.88	823	674	1.14	1059	737	1.40	1306	793	1.68	1563
2800	532	0.70	649	614	0.95	882	684	1.21	1125	746	1.48	1378	803	1.76	1641
2900	544	0.75	703	625	1.01	944	695	1.28	1194	756	1.56	1453	812	1.85	1723
3000	557	0.82	761	637	1.08	1009	705	1.36	1266	766	1.64	1533	822	1.94	1808
3100	570	0.88	823	648	1.16	1079	716	1.44	1342	776	1.73	1615	831	2.03	1897
3200	583	0.95	888	660	1.23	1151	727	1.53	1422	787	1.82	1702	841	2.13	1991
3300	596	1.03	957	672	1.32	1228	738	1.61	1506	797	1.92	1792	851	2.24	2088
3400	609	1.10	1030	684	1.40	1308	749	1.71	1593	808	2.02	1887	861	2.35	2188
3500	622	1.19	1106	696	1.49	1392	760	1.81	1685	818	2.13	1985	872	2.46	2294
3600	635	1.27	1187	708	1.59	1481	771	1.91	1781	829	2.24	2088	882	2.58	2403
3700	649	1.36	1272	720	1.69	1573	783	2.02	1881	840	2.35	2195	892	2.70	2517
3750	655	1.41	1316	726	1.74	1621	789	2.07	1932	845	2.41	2250	897	2.76	2575

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	1.60	1494	856	1.87	1747	903	2.15	2009	947	2.45	2282	<b>988</b>	<b>2.75</b>	<b>2564</b>
2300	811	1.64	1528	860	1.91	1784	907	2.20	2048	950	2.49	2323	<b>992</b>	<b>2.80</b>	<b>2607</b>
2400	819	1.71	1599	868	1.99	1859	915	2.28	2129	<b>958</b>	<b>2.58</b>	<b>2410</b>	<b>1000</b>	<b>2.89</b>	<b>2698</b>
2500	828	1.79	1672	877	2.08	1938	923	2.37	2214	<b>966</b>	<b>2.68</b>	<b>2499</b>	—	—	—
2550	832	1.83	1710	881	2.12	1979	927	2.42	2258	<b>971</b>	<b>2.73</b>	<b>2545</b>	—	—	—
2600	836	1.88	1749	885	2.17	2021	931	2.47	2302	<b>975</b>	<b>2.78</b>	<b>2592</b>	—	—	—
2700	845	1.96	1830	894	2.26	2107	940	2.57	2394	<b>983</b>	<b>2.88</b>	<b>2689</b>	—	—	—
2800	854	2.05	1914	903	2.36	2197	948	2.67	2488	—	—	—	—	—	—
2900	864	2.15	2002	912	2.46	2290	<b>957</b>	<b>2.77</b>	<b>2587</b>	—	—	—	—	—	—
3000	873	2.24	2093	921	2.56	2388	<b>966</b>	<b>2.89</b>	<b>2691</b>	—	—	—	—	—	—
3100	882	2.35	2189	930	2.67	2489	—	—	—	—	—	—	—	—	—
3200	892	2.45	2288	939	2.78	2595	—	—	—	—	—	—	—	—	—
3300	901	2.56	2391	948	2.90	2704	—	—	—	—	—	—	—	—	—
3400	911	2.68	2499	—	—	—	—	—	—	—	—	—	—	—	—
3500	921	2.80	2610	—	—	—	—	—	—	—	—	—	—	—	—
3600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3700	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

**LEGEND**

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

**NOTES:**

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.90.
3. See page 26 for General Fan Performance Notes.

\*Motor drive range: 730 to 950 rpm. All other rpms require field-supplied drive.

**Table 19 — Fan Performance 50HJQ008 — Horizontal Discharge Units; High-Static Motor (Belt Drive)\***

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2250	465	0.43	402	555	0.64	596	629	0.86	802	694	1.10	1021	753	1.34	1252
2300	471	0.45	421	560	0.66	618	634	0.89	828	699	1.13	1050	757	1.38	1283
2400	483	0.49	461	571	0.71	665	644	0.94	881	708	1.19	1109	766	1.45	1348
2500	495	0.54	503	581	0.77	715	654	1.01	937	717	1.26	1171	775	1.52	1416
2550	501	0.56	526	587	0.79	740	659	1.04	967	722	1.29	1204	779	1.56	1452
2600	507	0.59	549	592	0.82	767	664	1.07	996	727	1.33	1237	784	1.60	1488
2700	519	0.64	597	603	0.88	823	674	1.14	1059	737	1.40	1306	793	1.68	1563
2800	532	0.70	649	614	0.95	882	684	1.21	1125	746	1.48	1378	803	1.76	1641
2900	544	0.75	703	625	1.01	944	695	1.28	1194	756	1.56	1453	812	1.85	1723
3000	557	0.82	761	637	1.08	1009	705	1.36	1266	766	1.64	1533	822	1.94	1808
3100	570	0.88	823	648	1.16	1079	716	1.44	1342	776	1.73	1615	831	2.03	1897
3200	583	0.95	888	660	1.23	1151	727	1.53	1422	787	1.82	1702	841	2.13	1991
3300	596	1.03	957	672	1.32	1228	738	1.61	1506	797	1.92	1792	851	2.24	2088
3400	609	1.10	1030	684	1.40	1308	749	1.71	1593	808	2.02	1887	861	2.35	2188
3500	622	1.19	1106	696	1.49	1392	760	1.81	1685	818	2.13	1985	872	2.46	2294
3600	635	1.27	1187	708	1.59	1481	771	1.91	1781	829	2.24	2088	882	2.58	2403
3700	649	1.36	1272	720	1.69	1573	783	2.02	1881	840	2.35	2195	892	2.70	2517
3750	655	1.41	1316	726	1.74	1621	789	2.07	1932	845	2.41	2250	897	2.76	2575

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	1.60	1494	856	1.87	1747	903	2.15	2009	947	2.45	2282	988	2.75	2564
2300	811	1.64	1528	860	1.91	1784	907	2.20	2048	950	2.49	2323	992	2.80	2607
2400	819	1.71	1599	868	1.99	1859	915	2.28	2129	958	2.58	2410	1000	2.89	2698
2500	828	1.79	1672	877	2.08	1938	923	2.37	2214	966	2.68	2499	1008	3.00	2793
2550	832	1.83	1710	881	2.12	1979	927	2.42	2258	971	2.73	2545	1012	3.05	2842
2600	836	1.88	1749	885	2.17	2021	931	2.47	2302	975	2.78	2592	1016	3.10	2891
2700	845	1.96	1830	894	2.26	2107	940	2.57	2394	983	2.88	2689	1024	3.21	2993
2800	854	2.05	1914	903	2.36	2197	948	2.67	2488	991	2.99	2790	1032	3.32	3099
2900	864	2.15	2002	912	2.46	2290	957	2.77	2587	1000	3.10	2894	1041	3.44	3209
3000	873	2.24	2093	921	2.56	2388	966	2.89	2691	1008	3.22	3003	1049	3.56	3323
3100	882	2.35	2189	930	2.67	2489	975	3.00	2798	1017	3.34	3115	1057	3.69	3441
3200	892	2.45	2288	939	2.78	2595	984	3.12	2909	1026	3.47	3233	<b>1066</b>	<b>3.82</b>	<b>3564</b>
3300	901	2.56	2391	948	2.90	2704	993	3.24	3024	1035	3.60	3353	<b>1075</b>	<b>3.96</b>	<b>3690</b>
3400	911	2.68	2499	958	3.02	2817	1002	3.37	3144	<b>1044</b>	<b>3.73</b>	<b>3479</b>	<b>1084</b>	<b>4.10</b>	<b>3821</b>
3500	921	2.80	2610	967	3.15	2935	1011	3.50	3268	<b>1053</b>	<b>3.87</b>	<b>3608</b>	—	—	—
3600	931	2.92	2726	977	3.28	3057	1021	3.64	3396	<b>1062</b>	<b>4.01</b>	<b>3743</b>	—	—	—
3700	941	3.05	2847	987	3.41	3184	<b>1030</b>	<b>3.78</b>	<b>3529</b>	<b>1071</b>	<b>4.16</b>	<b>3882</b>	—	—	—
3750	946	3.12	2908	992	3.48	3249	<b>1035</b>	<b>3.86</b>	<b>3597</b>	—	—	—	—	—	—

**LEGEND**

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

**NOTES:**

1. **Boldface** indicates field-supplied motor or drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 26 for General Fan Performance Notes.

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

**Table 20 — Fan Performance 50HJQ009 — Horizontal Discharge Units; Standard Motor (Belt Drive)\***

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2500	462	0.37	348	541	0.50	467	614	0.64	594	681	0.78	728	744	0.93	868
2600	474	0.41	381	551	0.54	505	622	0.68	635	688	0.83	773	750	0.98	916
2700	486	0.45	417	561	0.58	545	630	0.73	679	695	0.88	820	756	1.04	967
2800	498	0.49	456	571	0.63	587	639	0.78	725	702	0.93	870	762	1.09	1020
2900	510	0.53	497	581	0.68	632	648	0.83	774	710	0.99	922	768	1.15	1076
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

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
2500	804	1.09	1013	861	1.25	1164	915	1.41	1319	967	1.59	1479	1017	1.76	1642
2600	809	1.14	1065	864	1.31	1219	918	1.48	1378	969	1.65	1541	1018	1.83	1708
2700	813	1.20	1119	869	1.37	1277	921	1.54	1439	972	1.72	1606	1021	1.90	1776
2800	819	1.26	1176	873	1.43	1337	925	1.61	1503	975	1.79	1673	1023	1.98	1847
2900	824	1.32	1235	878	1.50	1400	929	1.68	1569	978	1.87	1742	1026	2.06	1920
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	—	—	—	—	—	—	—	—	—

**LEGEND**

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

**NOTES:**

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 2.90.
3. See page 26 for General Fan Performance Notes.

\*Motor drive range: 840 to 1085 rpm. All other rpms require field-supplied drive.

**Table 21 — Fan Performance 50HJQ009 — Horizontal Discharge Units; High-Static Motor (Belt Drive)\***

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
2500	462	0.37	348	541	0.50	467	614	0.64	594	681	0.78	728	744	0.93	868
2600	474	0.41	381	551	0.54	505	622	0.68	635	688	0.83	773	750	0.98	916
2700	486	0.45	417	561	0.58	545	630	0.73	679	695	0.88	820	756	1.04	967
2800	498	0.49	456	571	0.63	587	639	0.78	725	702	0.93	870	762	1.09	1020
2900	510	0.53	497	581	0.68	632	648	0.83	774	710	0.99	922	768	1.15	1076
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

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
2500	804	1.09	1013	861	1.25	1164	915	1.41	1319	967	1.59	1479	1017	1.76	1642
2600	809	1.14	1065	864	1.31	1219	918	1.48	1378	969	1.65	1541	1018	1.83	1708
2700	813	1.20	1119	869	1.37	1277	921	1.54	1439	972	1.72	1606	1021	1.90	1776
2800	819	1.26	1176	873	1.43	1337	925	1.61	1503	975	1.79	1673	1023	1.98	1847
2900	824	1.32	1235	878	1.50	1400	929	1.68	1569	978	1.87	1742	1026	2.06	1920
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	<b>1087</b>	<b>3.26</b>	<b>3042</b>
4200	925	2.45	2289	969	2.68	2500	1011	2.91	2716	1053	3.15	2935	<b>1094</b>	<b>3.39</b>	<b>3159</b>
4300	934	2.57	2395	978	2.80	2610	1020	3.03	2828	1061	3.27	3052	<b>1101</b>	<b>3.52</b>	<b>3279</b>

**LEGEND**

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

**NOTES:**

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 26 for General Fan Performance Notes.

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

Table 22 — Fan Performance 50HJQ012 — Horizontal Discharge Units; Standard Motor (Belt Drive)\*

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	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	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	—	—	—
4600	963	2.93	2736	1005	3.18	2962	1045	3.42	3192	1085	3.67	3426	—	—	—
4700	974	3.07	2858	1014	3.31	3088	1054	3.56	3322	—	—	—	—	—	—
4800	984	3.20	2985	1024	3.45	3219	—	—	—	—	—	—	—	—	—
4900	994	3.34	3116	1034	3.60	3353	—	—	—	—	—	—	—	—	—
5000	1005	3.49	3251	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

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

NOTES:

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 3.70.
3. See page 26 for General Fan Performance Notes.

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

**Table 23 — Fan Performance 50HJQ012 — Horizontal Discharge Units; High-Static Motor (Belt Drive)\***

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts	Rpm	Bhp	Watts
3000	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	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	<b>1131</b>	<b>4.08</b>	<b>3801</b>
4800	984	3.20	2985	1024	3.45	3219	1063	3.71	3456	1102	3.96	3697	<b>1139</b>	<b>4.23</b>	<b>3943</b>
4900	994	3.34	3116	1034	3.60	3353	1073	3.85	3594	1111	4.12	3839	<b>1148</b>	<b>4.38</b>	<b>4088</b>
5000	1005	3.49	3251	1044	3.74	3492	1082	4.01	3737	1119	4.27	3986	<b>1156</b>	<b>4.55</b>	<b>4238</b>

**LEGEND**

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

**NOTES:**

1. **Boldface** indicates field-supplied drive is required.
2. Maximum continuous bhp is 5.25.
3. See page 26 for General Fan Performance Notes.

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

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

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 the unit 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's base. Detecting oil generally indicates a refrigerant leak. Leak-test all refrigerant tubing connections using electronic leak detector, halide torch, or liquid-soap solution.
  - c. Inspect all field-wiring and factory-wiring connections. Be sure that the connections are completed and tight. Ensure that electrical wiring does not come in contact with sharp edges or refrigerant tubing.
  - d. Inspect the coil fins. If damaged during shipping and handling, carefully straighten the fins with a fin comb.
  - e. Inspect the pulley and belt tension and alignment.
4. Verify the following conditions:
  - a. Make sure that outdoor-fan blades are correctly positioned in the fan orifice. Refer to the Outdoor Fan Adjustment section on page 43 for more details.
  - b. Make sure that the 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 unit has been installed in accordance with these installation instructions and applicable codes.

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

**Outdoor-Air Inlet Screen** — An 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 the unit control boxes; tighten as required.

**Refrigerant Service Ports** — Each refrigerant system has 5 Schrader-type service gage ports: 2 on the suction line, one on the cooling mode liquid line, and 2 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 may have protective devices installed on them.

**High Flow Valves** — Unit may have high flow valves located on the compressor hot gas and suction tubes. Large black plastic caps distinguish these valves with O-rings located inside the caps. These valves cannot be accessed for service in the field. To prevent a refrigerant leak, ensure that the plastic caps are in place and tight.

**Compressor Rotation** — It is important to be certain the scroll compressor is rotating in the proper direction. To determine whether or not 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 and energize compressors.

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 the 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. Compressor starts on closure of contactor.

Check the unit charge. Refer to Refrigerant Charge section on page 43.

NOTE: Allow the compressor to operate for a minimum of 10 minutes before checking or adjusting the refrigerant charge.

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. Units are equipped with a Cycle-LOC™ protection device. The unit shuts down on any safety trip and remains off; an indicator light on the thermostat comes on. Check the reason for the safety trip.

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 main power supply.

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

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

If accessory electric heaters do not energize, reset the limit switch (located on indoor-fan scroll) by pressing the button located between the 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 in the suction line at the loss-of-charge/low-pressure switch 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 solenoids (RVS1 and RVS2) and compressor contactor are energized and indoor-fan motor, compressor, and outdoor fan starts. The outdoor fan motor runs continuously while unit is cooling.

**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 indoor fan, outdoor fans, and compressor no. 1, and compressor no. 2 are energized and RVS1 and RVS2 are deenergized and switch position.

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.

**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, energize the reversing valve(s) and economizer to provide a supply-air temperature determined to meet the Y1 and Y2 calls from the thermostat using the following three routines. The three control routines are based on OAT.

The 3 routines are based on OAT where:

SASP = Supply Air Set Point

DXCTLO = Direct Expansion Cooling Lockout Set Point

PID = Proportional Integral

**Routine 1 (OAT < DXCTLO)**

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



**Routine 2 (DXCTLO < OAT < 68 F)**

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

**Routine 3 (OAT > 68)**

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

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

If field-installed accessory CO<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, PREMIERLINK CONTROL AND A THERMOSTAT** — When the thermostat calls for heating, terminal W1 is energized. The PremierLink control will move the economizer damper to the minimum position if there is a call for G and closed if there is a call for W1 without G. In order to prevent thermostat from short cycling, the unit is locked into the heating mode for at least 10 minutes when W1 is energized. The reversing valve solenoid(s) deenergizes and switches position (RVS1 and RVS2).

On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the electric heat (if used) comes on. When the thermostat is satisfied and W1 is deenergized, the IFM stops.

**COOLING, UNITS WITH ECONOMIZER2, PREMIERLINK CONTROL AND A ROOM SENSOR** — When free cooling is not available, the compressors will be controlled by the PremierLink controller using a PID Error reduction calculation as indicated by Fig 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 compressors stages with the economizer based on similar logic as the three routines listed in the previous section. The SASP will float up and down based on the error reduction calculations that compare space temperature and space set point. The reversing valves will be energized.

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

The high space set point is used for DX (direct expansion) cooling control, while the economizer space set point is a calculated value between the heating and cooling set points. The economizer set point will always be at least one degree below the cooling set point, allowing for a smooth transition from mechanical cooling with economizer assist, back to economizer cooling as the cooling set point is achieved. The compressors may be used for initial cooling then the PremierLink controller will modulate the economizer using an error reduction calculation to hold the space temperature between the heating and cooling set points. See Fig. 42.

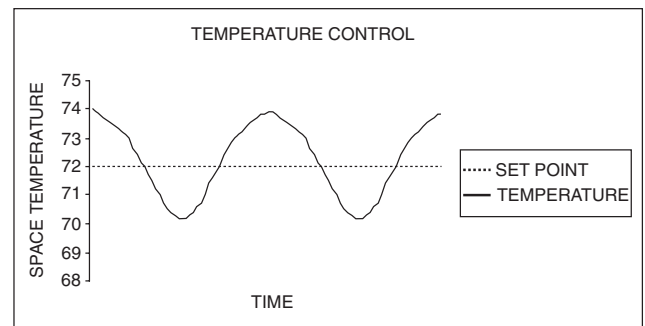
The controller uses the following conditions to determine economizer cooling:

- Enthalpy is Low
- SAT reading is available
- OAT reading is available
- SPT reading is available
- OAT ≤ 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.

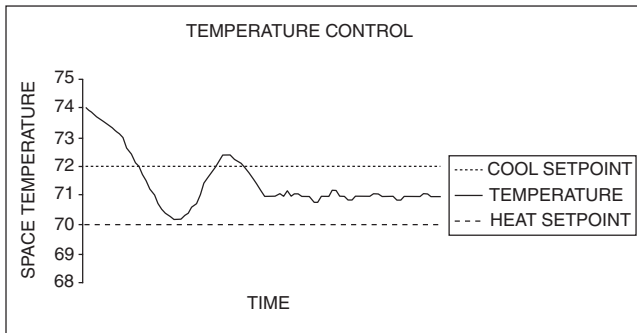
If an optional power exhaust is installed, as the outdoor-air damper opens and closes, the power exhaust fans will be energized and deenergized.

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.

Staging should be as follows:

If Heating PID STAGES=2

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

If Heating PID STAGES=3 and AUXOUT = HS3

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

In order to prevent short cycling, the unit is locked into the Heating mode for at least 10 minutes when HS1 is deenergized. On units equipped for two stages of heat, when additional heat is needed, it may be provided by electric heat (if supplied). When the space condition is satisfied and HS1 is deenergized the IFM stops. The fan will run continuously in the occupied mode as required by national energy and fresh air standards.

**DEFROST** — When the temperature of the outdoor coil drops below 28 F as sensed by the defrost thermostat (DFT2) and the defrost timer is at the end of a timed period (adjustable at 30, 50, or 90 minutes), reversing valve solenoids (RVS1 and RVS2) are energized and the OFC is deenergized. This switches the position of the reversing valves and shuts off the outdoor fan. The electric heaters (if installed) will be energized.

The unit continues to defrost until the coil temperature as measured by DFT2 reaches 65 F, or the duration of defrost cycle completes a 10-minute period.

During the Defrost mode, if circuit 1 defrosts first, RVS1 will oscillate between Heating and Cooling modes until the Defrost mode is complete.

At the end of the defrost cycle, the electric heaters (if installed) will be deenergized; the reversing valves switch and the outdoor-fan motor will be energized. The unit will now operate in the Heating mode.

If the space thermostat is satisfied during a defrost cycle, the unit will continue in the Defrost mode until the time or temperature constraints are satisfied.

## SERVICE

### ⚠ CAUTION

When servicing unit, shut off all electrical power to unit to avoid shock hazard or injury from rotating parts. Refer to Troubleshooting section for additional information.

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

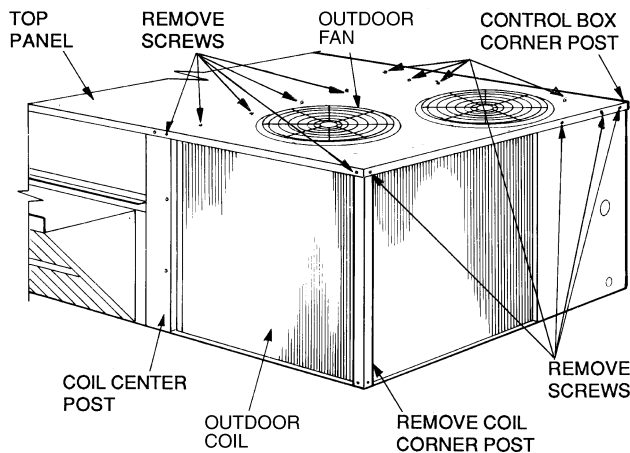
#### INDOOR COIL

1. Turn unit power off 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 economizer or two-position damper by disconnecting economizer plug and removing mounting screws.
3. Slide filters out of 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 and coil after completion.
6. Reinstall the economizer or two-position damper and filters.
7. Reconnect the wiring.
8. Replace the access panels.

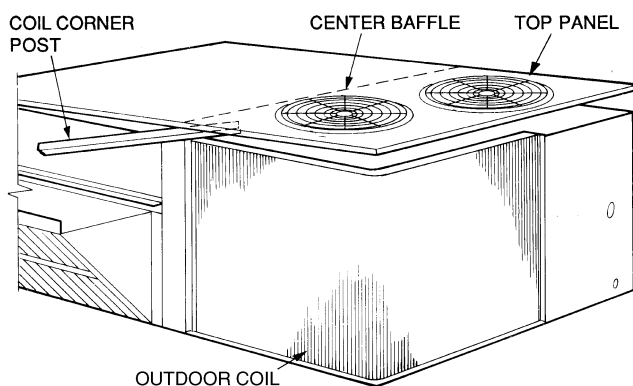
**OUTDOOR COILS** — Inspect the coils monthly. Clean coils annually, and as required by location and outdoor-air conditions.

Clean 2-row coils as follows:

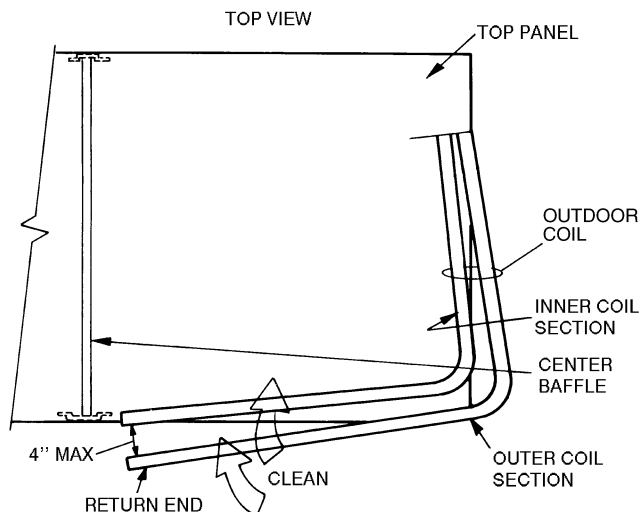
1. Turn off unit power and tag disconnect.
2. Remove the top panel screws on the outdoor end of the unit.
3. Remove the outdoor coil corner post. See Fig. 43. To hold the top panel open, place the coil corner post between the top panel and center post. See Fig. 44.
4. Remove the device holding the coil sections together at the return end of the condenser 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.



**Fig. 43 — Cleaning Condenser Coil**



**Fig. 44 — Propping Up Top Panel**



**Fig. 45 — Separating Coil Sections**

**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.

**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 factory charged with the correct amount of oil.

**FAN MOTOR BEARINGS** — *Fan motor bearings are permanently lubricated.* No further lubrication of outdoor-fan 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 fan height as shown in Fig. 48.
4. Tighten the setscrews and replace the outdoor-fan assembly.

**EconoMi\$er IV Adjustment** — Refer to the Optional EconoMi\$er IV and EconoMi\$er2 section on page 18.

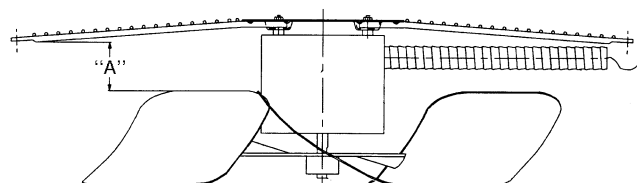
**High-Pressure Switch** — Located on the compressor hot gas line is a high-pressure switch, which contains a Schrader core. This switch opens at 428 psig and closes at 320 psig. No adjustment is necessary. Refer to Table 1.

**Loss-of-Charge Switch** — Located on the outdoor coil liquid line is a low-pressure switch which functions as a loss-of-charge switch. This switch contains a Schrader core. 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** — Amount of refrigerant charge is listed on the unit nameplate (also refer to Table 1). Refer to Carrier Refrigerant Service Techniques Manual, Refrigerants section. The compressor must run for a minimum of 10 minutes before adjusting the charge.

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



UNIT VOLTAGE	"A" (in.)
208/230 V	2.75
460 V	3.50

**Fig. 46 — Outdoor-Fan Adjustment**

**NO CHARGE** — Use standard evacuating techniques. After evacuating the system, to 500 microns, weigh in the specified amount of refrigerant (refer to Table 1).

**LOW CHARGE COOLING** — Use Cooling Charging Charts, Fig. 47-49. Vary refrigerant until the conditions of the appropriate chart are met. Note that 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.

**NOTE:** Do not use pocket style thermometers to measure surface temperatures, as they are not designed for this application.

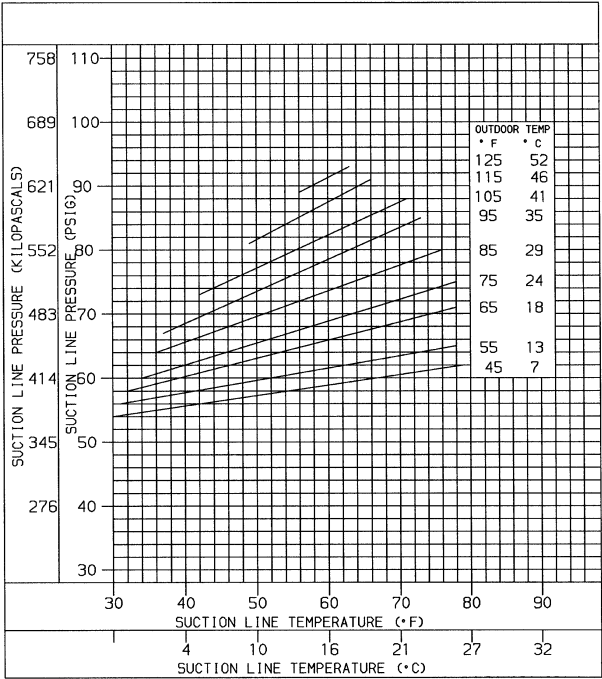
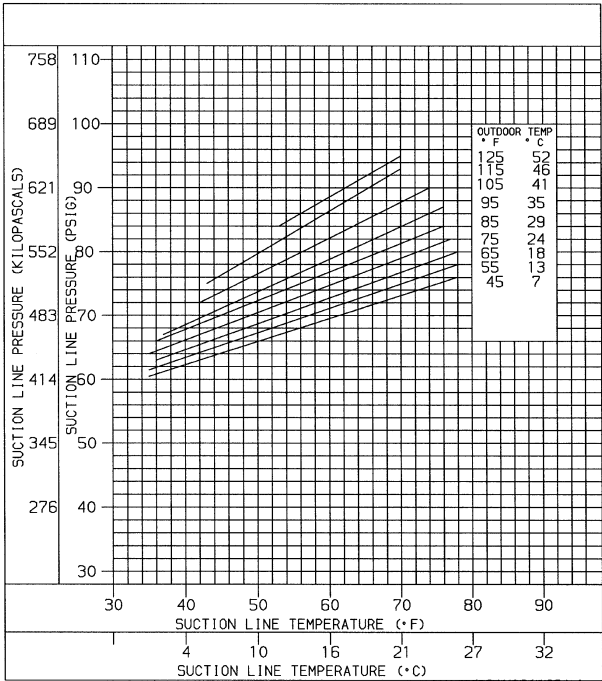
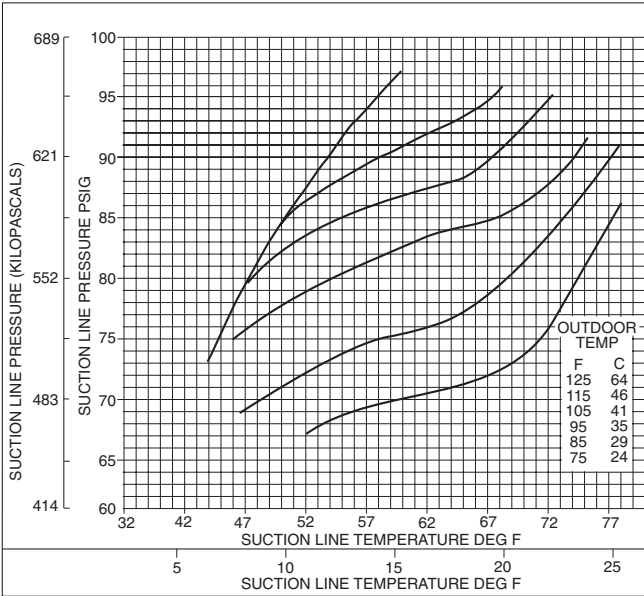
**CHECKING CHARGE — HEATING MODE** — There is no accurate procedure for checking refrigerant charge while the unit is operating in heating mode. If charge is suspect, recover refrigerant, evacuate to 500 microns and weigh in the amount of refrigerant that is listed on unit rating plate.

**TO USE COOLING CHARGING CHARTS — COOLING MODE** — 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 the charge is adjusted.

**EXAMPLE:** (Fig. 47)

Outdoor Temperature ..... 85 F  
Suction Pressure ..... 70 psig  
Suction Temperature should be ..... 51 F  
(Suction Temperature may vary  $\pm 5^{\circ}$  F.)

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



## TROUBLESHOOTING

**Unit Troubleshooting** — For unit troubleshooting refer to Fig. 50 and Table 24.

**EconoMi\$er IV Troubleshooting** — See Table 25 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.

**ECONOMISER 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 mid-point. 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.

**ECONOMISER 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.

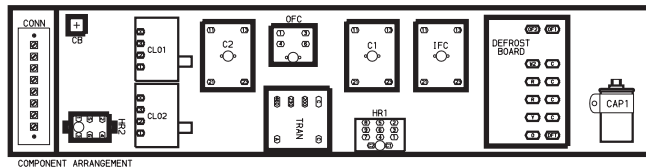
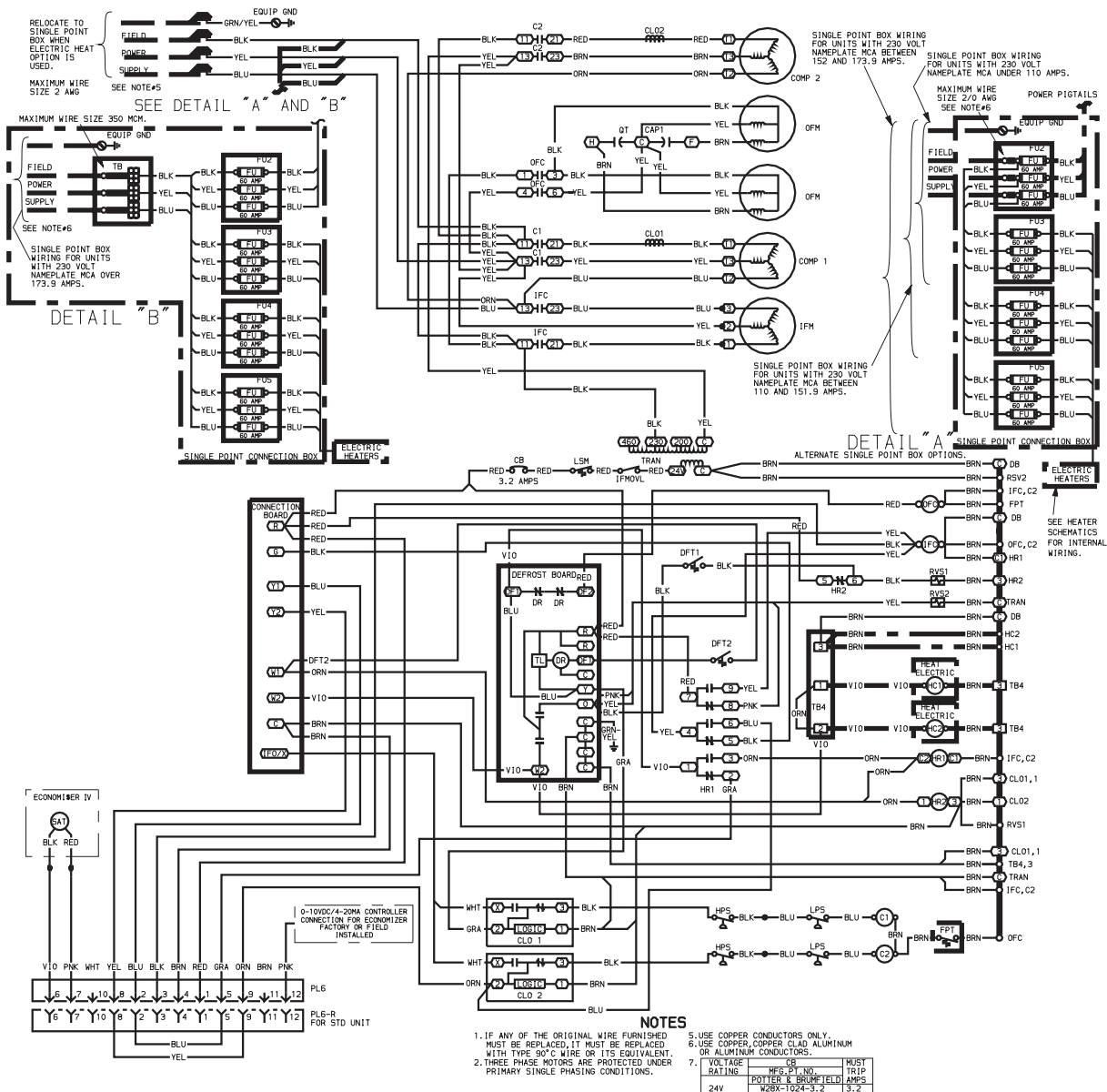
1. Disconnect power at TR and TR1.
2. Set enthalpy potentiometer to previous setting.
3. Set DCV maximum position potentiometer to previous setting.
4. Set minimum position, DCV set point, and exhaust potentiometers to previous settings.
5. Remove 620-ohm resistor from terminals S<sub>R</sub> and +.
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.



- 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.
















### LEGEND

- AWG** — American Wire Gauge
- C** — Contactor, Compressor
- CAP** — Capacitor
- CB** — Circuit Breaker
- CLO** — Compressor Lockout
- COMP** — Compressor Motor
- DFT** — Defrost Thermostat
- EQUIP** — Equipment
- FPT** — Freeze Up Protection Thermostat
- FU** — Fuse
- GND** — Ground
- HC** — Heat Contactor
- HPS** — High-Pressure Switch
- HR** — Heater Relay
- IFC** — Indoor-Fan Contactor
- IFM** — Indoor-Fan Motor
- IFMOVL** — Indoor-Fan Motor Overload Switch
- LPS** — Low-Pressure Switch

LSM	—	Limit Switch
MCA	—	Minimum Circuit Amps
OFC	—	Outdoor-Fan Contactor
OFM	—	Outdoor-Fan Motor
P	—	Plug
PL	—	Plug Assembly
QT	—	Quadropole Terminal
RVS	—	Reversing Valve Solenoid
SAT	—	Supply Air Temperature Sensor
TB	—	Terminal Board
TRAN	—	Transformer

	Field Splice
	Marked Wire
	Terminal (Marked)
	Terminal (Unmarked)

	Terminal Block
	Terminal Econ 2 Position Board
	Splice
	Splice (Marked)
	Factory Wiring
	Field Control Wiring
	Field Power Wiring
	Accessory or Optional Wiring
	To indicate common potential only; not to represent wiring.

**Fig. 50 — Typical Wiring Schematic (208/230-3-60 Unit Shown)**

**Table 24 — Heating and Cooling Troubleshooting**

PROBLEM	CAUSE	REMEDY
<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. Determine root cause.
	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 or allow enough time for internal overload to cool and reset.
	Defective overload.	Determine cause and replace compressor.
	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.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Outdoor coil dirty or restricted.	Clean coil or remove restriction.
<b>Scroll Compressor Makes Excessive Noise</b>	Compressor rotating in the wrong direction.	Reverse the 3-phase power leads as described in Start-Up, page 39.
<b>Excessive Head Pressure.</b>	Dirty outside air or return air filter.	Clean (outside air) or replace (return air) filter.
	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 scroll plates defective.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
<b>Excessive Suction Pressure.</b>	High heat load.	Check for source and eliminate.
	Compressor scroll plates defective.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
<b>Suction Pressure Too Low.</b>	Dirty air filter (cooling) or dirty outdoor coil (heating).	Replace filter (cooling) or clean outdoor coil (heating).
	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 25 — EconoMi\$er IV Input/Output Logic**

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

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

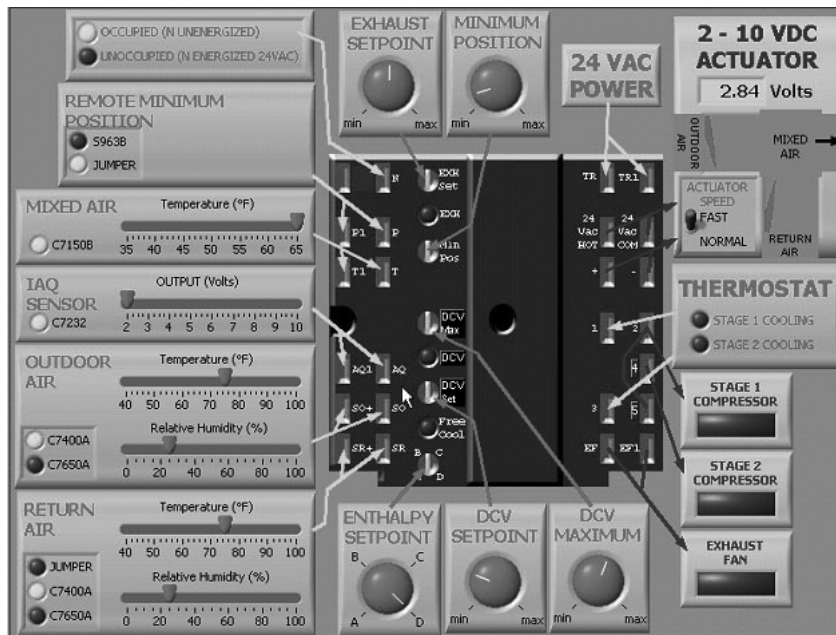
†Power at N terminal determines Occupied/Unoccupied setting: 24 vac (Occupied), no power (Unoccupied).

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

††Modulation is based on the DCV signal.

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

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



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



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**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
- ☐ ENSURE THAT COMPRESSOR IS ROTATING IN THE PROPER DIRECTION
- ☐ 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	_____		_____		_____	
OUTDOOR FAN AMPS	NO. 1	_____	NO. 2	_____		

**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 CORRECT DIRECTION
- ☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS ON PAGE 44.

**GENERAL**

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