48HJD005-007, 48HJE/HJF004-007
48HJL/HJM/HJN/HJG/HJH/HJK004-006 (LOW NO_x)
Single-Package Rooftop Heating/Cooling

Installation, Start-Up and Service Instructions

CONTENTS

SAFETY CONSIDERATIONS

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

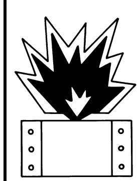
Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit,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

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

⚠ WARNING

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

⚠ WARNING



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

INSTALLATION

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

NOTE: Any combination of supply and return ducting is permissible, i.e., vertical supply combined with horizontal return.

Step 1 — Provide Unit Support

ROOF CURB — Assemble and install accessory roof curb in accordance with instructions shipped with curb. See Fig. 1. Install insulation, cant strips, roofing felt, and counter flashing as shown. *Ductwork must be attached to curb, not to the unit.* If electric control power or gas service 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 unit is set on roof curb.

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

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 unit cabinet. Install a gravel apron in front of condenser-coil air inlet to prevent grass and foliage from obstructing airflow.

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

Book 1 4 Tab 1a 6a   PC 111   Catalog No. 534-767   Printed in U.S.A.   Form 48HJ-18SI   Pg 1   9-00   Replaces: 48HJ-17SI

UNIT SIZE	B	C	D ALT DRAIN HOLE	"E" GAS	"F" POWER	"G" CONTROL	CONNECTOR PKG. ACCY.
48HJD004-007 50HJF004-007	1′-9 11/16″ [551]	1′-4″ [406]	1 3/4″ [44.5]	3/4″ [19] NPT	3/4″ [19] NPT	1/2″ [12.7] NPT	CRBTMPWR001A00
					1 1/4″ [31.7]		CRBTMPWR002A00
				1/2″ [12.7] NPT	3/4″ [19] NPT	1/2″ [12.7] NPT	CRBTMPWR003A00
				3/4″ [19] NPT	1 1/4″ [31.7]		CRBTMPWR004A00

ROOF CURB ACCESSORY	"A"	UNIT SIZE 48/50HJ
CRRFCURB001A00	1′-2″ [356]	004-007
CRRFCURB002A00	2′-0″ [610]	

NOTES:
1. Roof curb accessory is shipped disassembled.
2. Insulated panels.
3. Dimensions in [ ] are in millimeters.
4. Roof curb: galvanized 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 CRBTMPWR001A00 and 002A00 are for thru-the-curb connections. Packages CRBTMP003A00 and 004A00 are for thru-the-bottom connections.

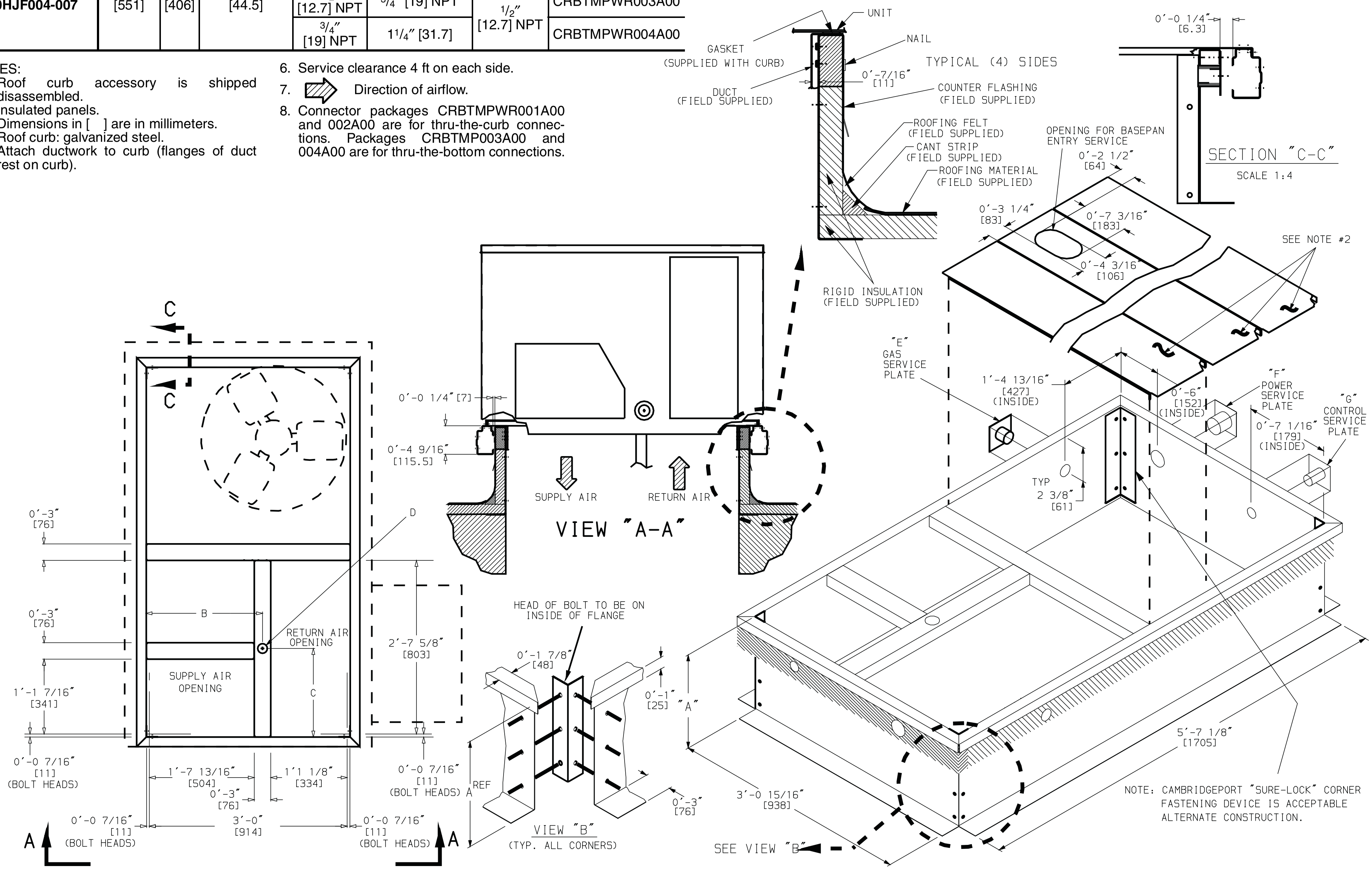
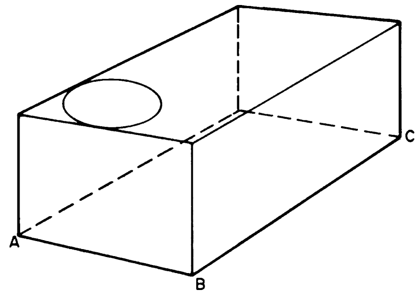
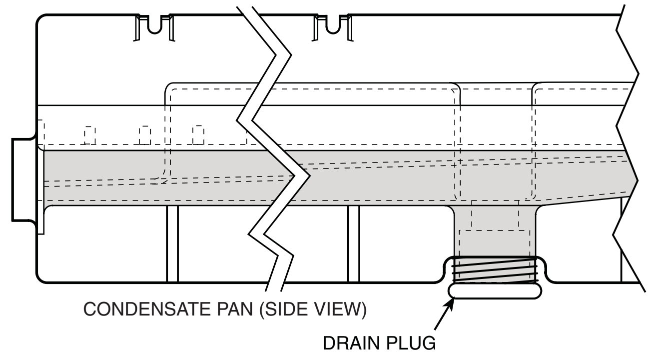


Fig. 1 — Roof Curb Details



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

Fig. 2 — Unit Leveling Tolerances



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

Fig. 3 — Condensate Drain Pan

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

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

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

A minimum clearance is not required around ductwork. Cabinet return-air static shall not exceed –.35 in. wg with Durablade economizer, or –.30 in. wg with EconoMi$er, or –.45 in. wg without economizer.

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

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

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

To use the bottom drain connection for a roof curb installation, relocate the factory-installed plug (Red) from the bottom connection to the side connection. See Fig. 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 4-in. deep and protect against freeze-up. If drain line is installed downstream from the external trap, pitch the line away from the unit at 1 in. per 10 ft of run. Do not use a pipe size smaller than the unit connection ($^{3}/_{4}$ in.).

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

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

⚠ CAUTION

All panels must be in place when rigging and lifting.

POSITIONING — Maintain clearance around and above unit to provide minimum distance from combustible materials, proper airflow, and service access. See Fig. 5. A properly positioned unit will have the following clearances between unit and roof curb; $^{1}/_{4}$-in. clearance between roof curb and base rails on each side and duct end of unit; $^{1}/_{4}$ in. clearance between roof curb and condenser coil end of unit. (See Fig. 1, section C-C.)

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

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

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

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

Locate mechanical draft system flue assembly at least 48 in. from any opening through which combustion products could enter the building, and at least 48 in. from an adjacent building. When unit is located adjacent to public walkways, flue assembly must be at least 7 ft above grade.

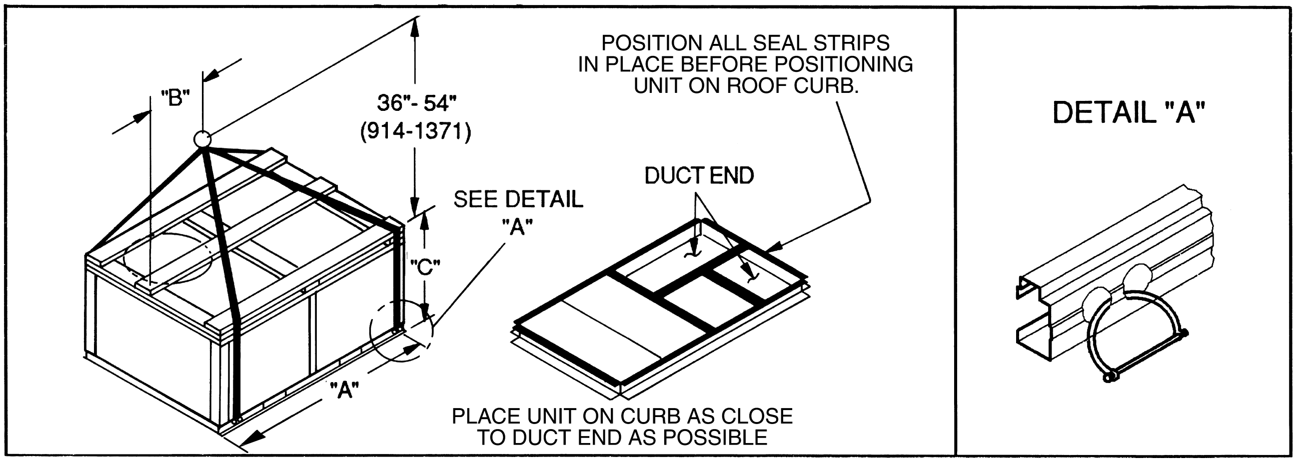
NOTE: When unit is equipped with an accessory flue discharge deflector, allowable clearance is 18 inches.

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

Adequate combustion-air space must be provided for proper operation of this equipment. Be sure that installation complies with all local codes and Section 5.3, Air for Combustion and Ventilation, NFGC (National Fuel Gas Code), ANSI (American National Standards Institute) Z223.1-1984 and addendum Z223.1a-1987. In Canada, installation must be in accordance with the CAN1.B149.1 and CAN1.B149.2 installation codes for gas burning appliances.

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

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



NOTES:
1. Place unit on curb as close as possible to the duct end.
2. Dimension in ( ) is in millimeters.
3. 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.
4. Weights include base unit without economizer. See Table 1 for unit operating weights with accessory economizer.

UNIT 48HJ	MAX WEIGHT		"A"		"B"		"C"	
	lb	kg	in.	mm	in.	mm	in.	mm
004	530	240	73.69	1872	35.50	902	33.31	847
005	540	245	73.69	1872	35.50	902	33.31	847
006	560	254	73.69	1872	35.50	902	33.31	847
007	615	279	73.69	1872	35.50	902	33.31	847

⚠ CAUTION

All panels must be in place when rigging.

Fig. 4 — Rigging Details

Step 5 — Install Flue Hood — Flue hood is shipped screwed to the burner compartment access panel. Remove from shipping location and, using screws provided, install flue hood in location shown in Fig. 5 and 6.

For units being installed in California Air Quality Management Districts which require NO_x emissions of 40 nanograms/joule or less, kit CRLOWNOX001A00 must be installed.

Step 6 — Install Gas Piping — Unit is equipped for use with type of gas shown on nameplate. Refer to local building codes, or in the absence of local codes, to ANSI Z223.1-1984 and addendum Z223.1A-1987 entitled National Fuel Gas Code. In Canada, installation must be in accordance with the CAN1.B149.1 and CAN1.B149.2 installation codes for gas burning appliances.

For natural gas applications, gas pressure at unit gas connection must not be less than 4 in. wg or greater than 13 in. wg while the unit is operating. On 48HJ005-007 high-heat units, the gas pressure at unit gas connection must not be less than 5 in. wg or greater than 13 in. wg while the unit is operating. For propane applications, the gas pressure must not be less than 5 in. wg or greater than 13 in. wg at the unit connection.

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

Support gas piping as shown in the table in Fig. 7. For example, a 3/4-in. gas pipe must have one field-fabricated support beam every 8 ft. Therefore, an 18-ft long gas pipe would have a minimum of 3 support beams, and a 48-ft long pipe would have a minimum of 6 support beams.

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

Step 7 — Make Electrical Connections

⚠ WARNING

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code), ANSI/NFPA (National Fire Protection Association), latest edition, and local electrical codes. *Do not use gas piping as an electrical ground.* Failure to follow this warning could result in the installer being liable for personal injury of others.

FIELD POWER SUPPLY — All units except 208/230-v units are factory wired for the voltage shown on the nameplate. If the 208/230-v unit is to be connected to a 208-v power supply, the transformer *must* be rewired by moving the black wire from the 230-v terminal on the transformer and connecting it to the 200-v terminal from the transformer.

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

When installing units, provide a disconnect per NEC.

All field wiring must comply with NEC and local requirements.

Table 1 — Physical Data

BASE UNIT 48		HJE/F/H/K/M/N004	HJD/E/F/G/H/K/L/M/N005	HJD/E/F/G/H/K/L/M/N006	HJD/HJE/HJF007
NOMINAL CAPACITY		3	4	5	6
OPERATING WEIGHT (lb)					
Unit		530	540	560	615
With Durablade Economizer		564	574	594	649
With EconoMi$er		577	587	607	662
With MoistureMiser Dehumidification Package		548	558	578	633
Roof Curb		115	115	115	115
COMPRESSOR		Scroll			
Quantity		1	1	1	1
Oil (oz)		42	53	50	60
REFRIGERANT TYPE		R-22			
Operating Charge (lb-oz)					
Standard Unit		5- 8	8-6	10- 0	9-10
Unit With MoistureMizer Dehumidification Package		8-13	11-2	12-13	13- 6
CONDENSER FAN		Propeller			
Quantity...Diameter (in.)		1...22	1...22	1..22	1...22
Nominal Cfm		3500	3500	4100	4100
Motor Hp...Rpm		1/4...825	1/4...825	1/4...1100	1/4...1100
Watts Input (Total)		180	180	320	320
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins			
Standard Unit					
Rows...Fins/in.		1...17	2..17	2...17	2...17
Total Face Area (sq ft)		14.6	16.5	16.5	16.5
Unit with MoistureMiser Dehumidification Package					
Rows...Fins/in.		1...17	1...17	1...17	1...17
Total Face Area (sq ft)		3.9	3.9	3.9	3.9
EVAPORATOR FAN		Centrifugal Type, Belt Drive			
Quantity...Size (in.)		1...10 x 10	1...10 x 10	1...10 x 10	1...10 x 10
Nominal Cfm		1200	1600	2000	2400
Maximum Continuous Bhp	Std	1.20	1.20	1.30/2.40*	2.40
	Hi-Static	2.40	2.40	2.90	2.90
Motor Frame Size	Std	48	48	48/56*	56
	Hi-Static	56	56	56	56
Fan Rpm Range	Std	760-1090	840-1185	1020-1460/1120-1585*	1120-1585
	Hi-Static	1075-1455	1075-1455	1300-1685	1300-1685
Motor Bearing Type		Ball	Ball	Ball	Ball
Maximum Fan Rpm		2100	2100	2100	2100
Motor Pulley Pitch Diameter	Std	1.9/2.9	1.9/2.0	2.4/3.4	2.4/3.4
A/B (in.)	Hi-Static	2.8/3.8	2.8/3.8	3.4/4.4	3.4/3.4
Nominal Motor Shaft Diameter (in.)	Std	1/2	1/2	5/8	5/8
	Hi-Static	5/8	5/8	5/8	5/8
Fan Pulley Pitch Diameter (in.)	Std	4.5	4.0	4.0	4.0
	Hi-Static	4.5	4.0	4.5	4.5
Belt — Type...Length (in.)	Std	1...A...33	1...A...33	1....4...40	1...A...38
	Hi-Static	1...A...39	1...A...39	1...A...40	1...A...40
Pulley Center Line Distance (in.)		10.0-12.4	10.0-12.4	14.7-15.5	14.7-15.5
Speed Change per Full Turn of	Std	65	70	75	95
Movable Pulley Flange (rpm)	Hi-Static	65	65	60	60
Movable Pulley Maximum Full	Std	5	5	6	5
Turns from Closed Position	Hi-Static	6	6	5	5
Factory Setting — Full Turns Open	Std	3	3	3	3
	Hi-Static	3 1/2	3 1/2	3 1/2	3 1/2
Factory Speed Setting (rpm)	Std	890	980	1240	1304
	Hi-Static	1233	1233	1396	1396
Fan Shaft Diameter at Pulley (in.)		5/8	5/8	5/8	5/8
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Acutrol™ Metering Device			
Rows...Fins/in.		2...15	2...15	4...15	4...15
Total Face Area (sq ft)		5.5	5.5	5.5	5.5

LEGEND

Bhp — Brake Horsepower

*Single phase/three phase.
†Indicates automatic reset.
**48HJD005-007 and 48HJE004 (72,000 Btuh heat input) units have 2 burners. 48HJE005-007 and 48HJF004 (115,000 Btuh heat input) units and 48HJF005-007 (150,000 Btuh Heat input) units have 3 burners.
††An LP kit is available as an accessory.
||Three-phase standard models have heating inputs as shown. Single-phase standard models have one-stage heating with heating input values as follows:
48HJE004, 48HJD005,006 — 72,000 Btuh
48HJF004, 48HJE005,006 — 115,000 Btuh
48HJF005,006 — 150,000 Btuh
***California compliant three-phase models.
†††California SCAQMD compliant low NO_x models have combustion products that are controlled to 40 nanograms per joule or less.

Table 1 — Physical Data (cont)

BASE UNIT 48	HJE/F/H/K/M/N004	HJD/E/F/G/H/K/L/M/N005	HJD/E/F/G/H/K/L/M/N006	HJD/HJE/HJF007
FURNACE SECTION				
Rollout Switch Cutout Temp (F)†	195	195	195	195
Burner Orifice Diameter (in. ...drill size)**				
Natural Gas — Std	**HJE** .113...33 **HJF** .113...33 — **HJH** .113...33 **HJK** .113...33 — **HJM** .102...38 **HJN** .102...38 —	**HJD** .113...33 **HJE** .113...33 **HJF** .129...30 **HJG** .113...33 **HJH** .113...33 **HJK** .129...30 **HJL** .102...38 **HJM** .102...38 **HJN** .116...32	**HJD** .113...33 **HJE** .113...33 **HJF** .129...30 **HJG** .113...33 **HJH** .113...33 **HJK** .129...30 **HJL** .102...38 **HJM** .102...38 **HJN** .116...32	**HJD** .113...33 **HJE** .113...33 **HJF** .129...30 — — — — — —
Liquid Propane — Alt††	**HJE** .089...43 **HJF** .089...43 — **HJH** .082...45 **HJK** .082...45 — **HJM** .082...45 **HJN** .082...45 —	**HJD** .089...43 **HJE** .089...43 **HJF** .102...38 **HJG** .089...43 **HJH** .089...43 **HJK** .102...38 **HJL** .082...45 **HJM** .082...45 **HJN** .094...42	**HJD** .089...43 **HJE** .089...43 **HJF** .102...38 **HJG** .089...43 **HJH** .089...43 **HJK** .102...38 **HJL** .082...45 **HJM** .082...45 **HJN** .094...42	**HJD** .089...43 **HJE** .089...43 **HJF** .102...38 — — — — — —
Thermostat Heat Anticipator Setting (amps) 208/230/460 v				
First Stage	.14	.14	.14	.14
Second Stage	.14	.14	.14	.14
Gas Input (Btuh)				
First Stage/Second Stage	**HJE**|| 50,000/ 72,000 **HJF**|| 82,000/115,000 — **HJH***** —/ 72,000 **HJK*****—/115,000 — **HJM**††† —/ 60,000 **HJN**††† —/ 90,000 —	**HJD**|| 50,000/ 72,000 **HJE**|| 82,000/115,000 **HJF**|| 120,000/150,000 **HJG***** —/ 72,000 **HJH***** —/115,000 **HJK***** —/150,000 **HJL**††† —/ 60,000 **HJM**††† —/ 90,000 **HJN**††† —/120,000	**HJD**|| 50,000/ 72,000 **HJE**|| 82,000/115,000 **HJF**|| 120,000/150,000 **HJG***** —/ 72,000 **HJH***** —/115,000 **HJK***** —/150,000 **HJL**††† —/ 60,000 **HJM**†††—/ 90,000 **HJN**††† —/120,000	**HJD**|| 50,000/ 72,000 **HJE**|| 82,000/115,000 **HJF**|| 120,000/150,000 — — — — — —
Efficiency (Steady State) (%)	**HJE** 82 **HJF** 81 — **HJH** 82 **HJK** 81 — **HJM** 81 **HJN** 81 —	**HJD** 82 **HJE** 81 **HJF** 80 **HJG** 82 **HJH** 81 **HJK** 80 **HJL** 81 **HJM** 81 **HJN** 82	**HJD** 82 **HJE** 81 **HJF** 80 **HJG** 82 **HJH** 81 **HJK** 80 **HJL** 81 **HJM** 81 **HJN** 82	**HJD** 82 **HJE** 81 **HJF** 80 — — — — — —
Temperature Rise Range	**HJE** 15-45 **HJF** 55-85 — **HJH** 15-45 **HJK** 55-85 — **HJM** 20-50 **HJN** 30-60 —	**HJD** 15-45 **HJE** 35-65 **HJF** 50-80 **HJG** 15-45 **HJH** 35-65 **HJK** 50-80 **HJL** 20-50 **HJM** 30-60 **HJN** 40-70	**HJD** 15-45 **HJE** 35-65 **HJF** 50-80 **HJG** 15-45 **HJH** 35-65 **HJK** 50-80 **HJL** 20-50 **HJM** 30-60 **HJN** 40-70	**HJD** 15-45 **HJE** 35-65 **HJF** 50-80 — — — — — —
Manifold Pressure (in. wg)				
Natural Gas — Std	3.5	3.5	3.5	3.5
Liquid Propane — Alt††	3.5	3.5	3.5	3.5
Maximum Static Pressure (in. wg)	1.0	1.0	1.0	1.0
Field Gas Connection Size (in.)	1/2	1/2	1/2	1/2
HIGH-PRESSURE SWITCH (psig)				
Standard Compressor Internal Relief	450 ± 50			
Cutout	428			
Reset (Auto.)	320			
LOSS-OF-CHARGE SWITCH/LOW-PRESSURE SWITCH (Liquid LIne) (psig)				
Cutout	7 ± 3			
Reset (Auto.)	22 ± 5			
FREEZE PROTECTION THERMOSTAT				
Opens (F)	30 ± 5			
Closes (F)	45 ± 5			
OUTDOOR-AIR INLET SCREENS	Cleanable			
Quantity...Size (in.)	1...20 x 24 x 1			
RETURN-AIR FILTERS	Throwaway			
Quantity...Size (in.)	2...16 x 25 x 2			

LEGEND

Bhp — Brake Horsepower

*Single phase/three phase.
†Indicates automatic reset.
**48HJD005-007 and 48HJE004 (72,000 Btuh heat input) units have 2 burners. 48HJE005-007 and 48HJF004 (115,000 Btuh heat input) units and 48HJF005-007 (150,000 Btuh Heat input) units have 3 burners.
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||Three-phase standard models have heating inputs as shown. Single-phase standard models have one-stage heating with heating input values as follows:
48HJE004, 48HJD005,006 — 72,000 Btuh
48HJF004, 48HJE005,006 — 115,000 Btuh
48HJF005,006 — 150,000 Btuh
***California compliant three-phase models.
†††California SCAQMD compliant low NO_x models have combustion products that are controlled to 40 nanograms per joule or less.

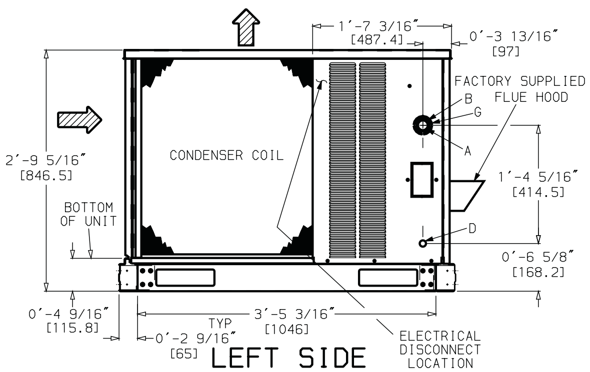
UNIT 48HJ	STANDARD UNIT WEIGHT		DURABLADE ECONOMIZER WEIGHT		ECONOMI$ER WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg
004	530	240	34	15.4	47	21.3	127	57.6	122	55.3	138	62.6	143	64.9
005	540	245	34	15.4	47	21.3	129	58.5	124	56.2	141	64.0	146	66.2
006	560	254	34	15.4	47	21.3	134	60.8	129	58.5	146	66.2	151	68.5
007	615	279	34	15.4	47	21.3	147	66.7	142	64.4	160	72.6	166	75.3

BOTTOM POWER CHART, THESE HOLES REQUIRED FOR USE WITH ACCESSORY PACKAGES — CRBTMPWR001A00 THROUGH CRBTMPWR004A00

THREADED CONDUIT SIZE	WIRE USE	REQURED HOLE SIZES (MAX.)
1/2″	24 V	7/8″ [22.2]
3/4″	Power*	1 1/8″ [28.4]
1 1/4″	Power*	1 3/4″ [44.4]
1/2″ NPT	Gas†	1 1/4″ [31.8]
3/4″ NPT	Gas†	1 5/8″ [41.3]

*Select either 3/4″ or 1 1/4″ for power, depending on wire size.
†Select either 1/2″ or 3/4″ for gas depending on gas connection.

	CONNECTION SIZES
A	1 3/8″ Dia [35] Field Power Supply Hole
B	2″ Dia [51] Power Supply Knockout
C	1 3/4″ Dia [44] Charging Port Hole
D	7/8″ Dia [22] Field Control Wiring Hole
E	3/4″-14 NPT Condensate Drain
F	5/8″-14 NPT Gas Connection
G	2 1/2″ Dia [64] Power Supply Knockout



NOTES:
1. Dimensions in [ ] are in millimeters.
2. Center of gravity.
3. Direction of airflow.
4. On vertical discharge units, ductwork to be attached to accessory roof curb only. For horizontal discharge units, field-supplied flanges should be attached to horizontal discharge openings, and all ductwork should be attached to the flanges.
5. Minimum clearance (local codes or jurisdiction may prevail):
   a. Between unit, flue side and combustible surfaces, 48 inches. (18 in. when using accessory flue discharge deflector.)
   b. Bottom of unit to combustible surfaces (when not using curb), 1 inch. Bottom of base rail to combustible surfaces (when not using curb) 0 inches.
   c. Condenser coil, for proper airflow, 36 in. one side, 12 in. the other. The side getting the greater clearance is optional.
   d. Overhead, 60 in. to assure proper condenser fan operation.
   e. Between units, control box side, 42 in. per NEC (National Electrical Code).
   f. Between unit and ungrounded surfaces, control box side, 36 in. per NEC.
   g. Between unit and block or concrete walls and other grounded surfaces, control box side, 42 in. per NEC.
   h. Horizontal supply and return end, 0 inches.
6. With the exception of the clearance for the condenser coil and combustion side as stated in notes 5a, b and c, a removable fence or barricade requires no clearance.
7. Units may be installed on combustible floors made from wood or Class A, B, or C roof covering material if set on base rail.
8. The vertical center of gravity is 1′-6″ [457] up from the bottom of the base rail.

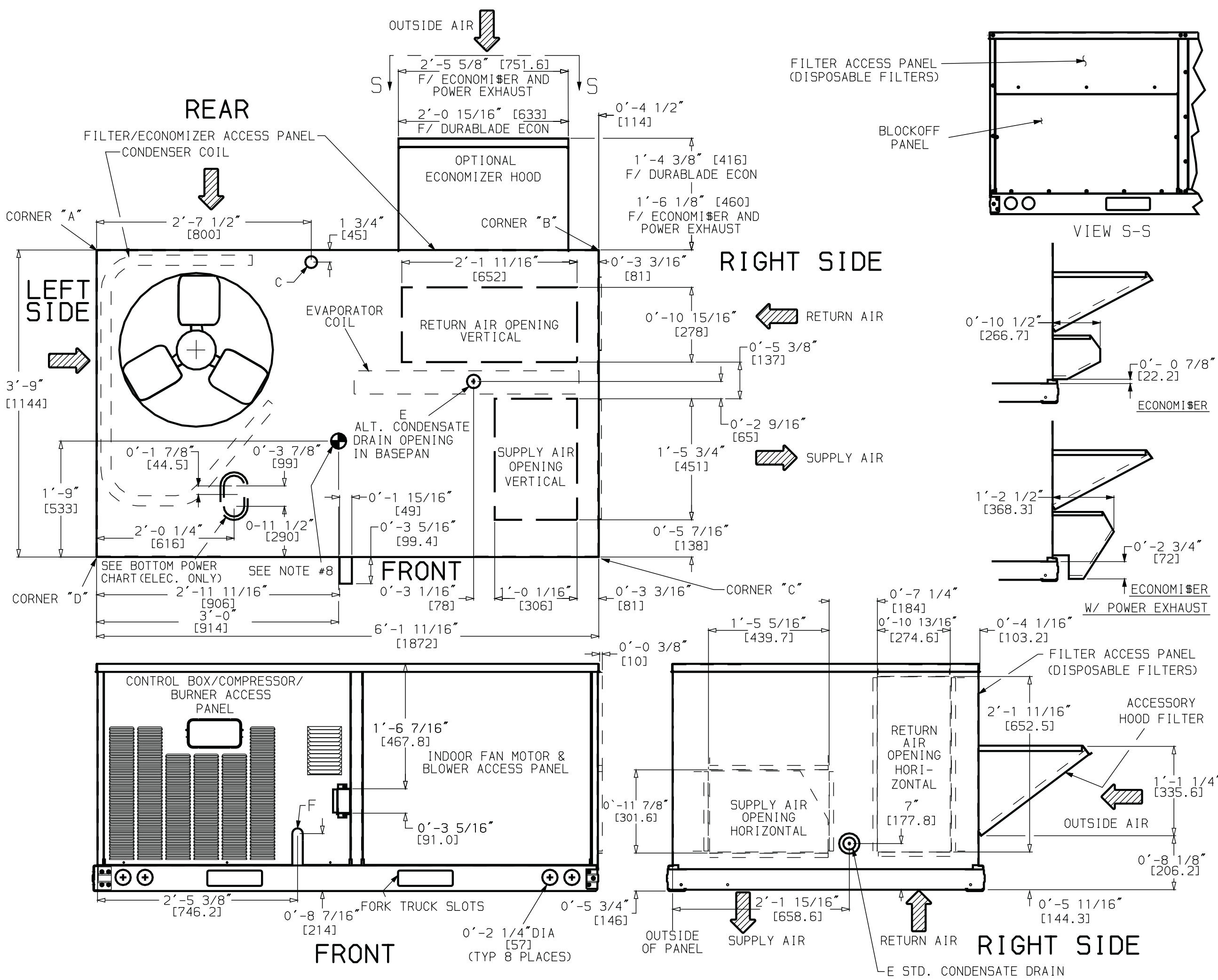


Fig. 5 — Base Unit Dimensions — 48HJ004-007

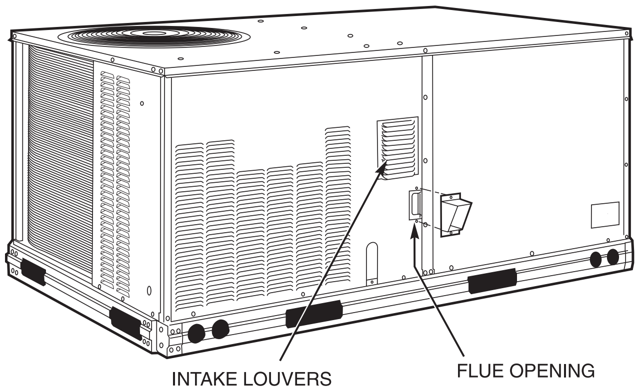
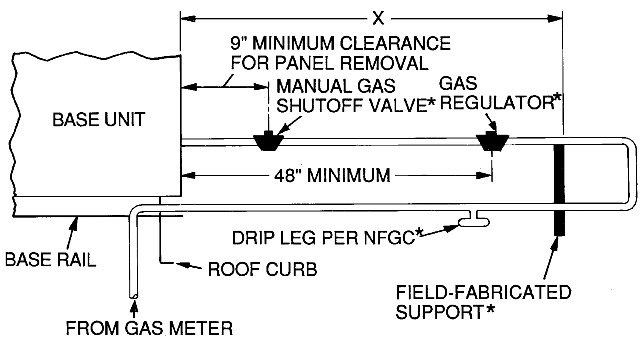


Fig. 6 — Flue Hood Details



LEGEND

NFGC — National Fuel Gas Code

*Field supplied.

NOTE: Follow all local codes.

SPACING OF SUPPORTS

STEEL PIPE NOMINAL DIAMETER (in.)	SPACING OF SUPPORTS X DIMENSION (ft)
$^1/_2$	6
$^3/_4$ or 1	8
$1^1/_4$ or larger	10

Fig. 7 — Gas Piping Guide (With Accessory Thru-the-Curb Service Connections)

Install conduit through side panel openings indicated in Fig. 5. Route power lines through connector to terminal connections as shown in Fig. 8.

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

NOTE: If accessory thru-the-bottom connections and roof curb are used, refer to the Thru-the-Bottom Accessory Installation Instructions for information on power wiring and gas connection piping. The power wiring, control wiring and gas piping can be routed through field-drilled holes in the basepan. The basepan is specially designed and dimpled for drilling the access connection holes.

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

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

Connect thermostat wires to matching screw terminals of low-voltage connection board. See Fig. 9.

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

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

HEAT ANTICIPATOR SETTINGS — Set heat anticipator settings at .14 amp for first stage and .14 for second stage heating, when available.

Step 8 — Adjust Factory-Installed Options

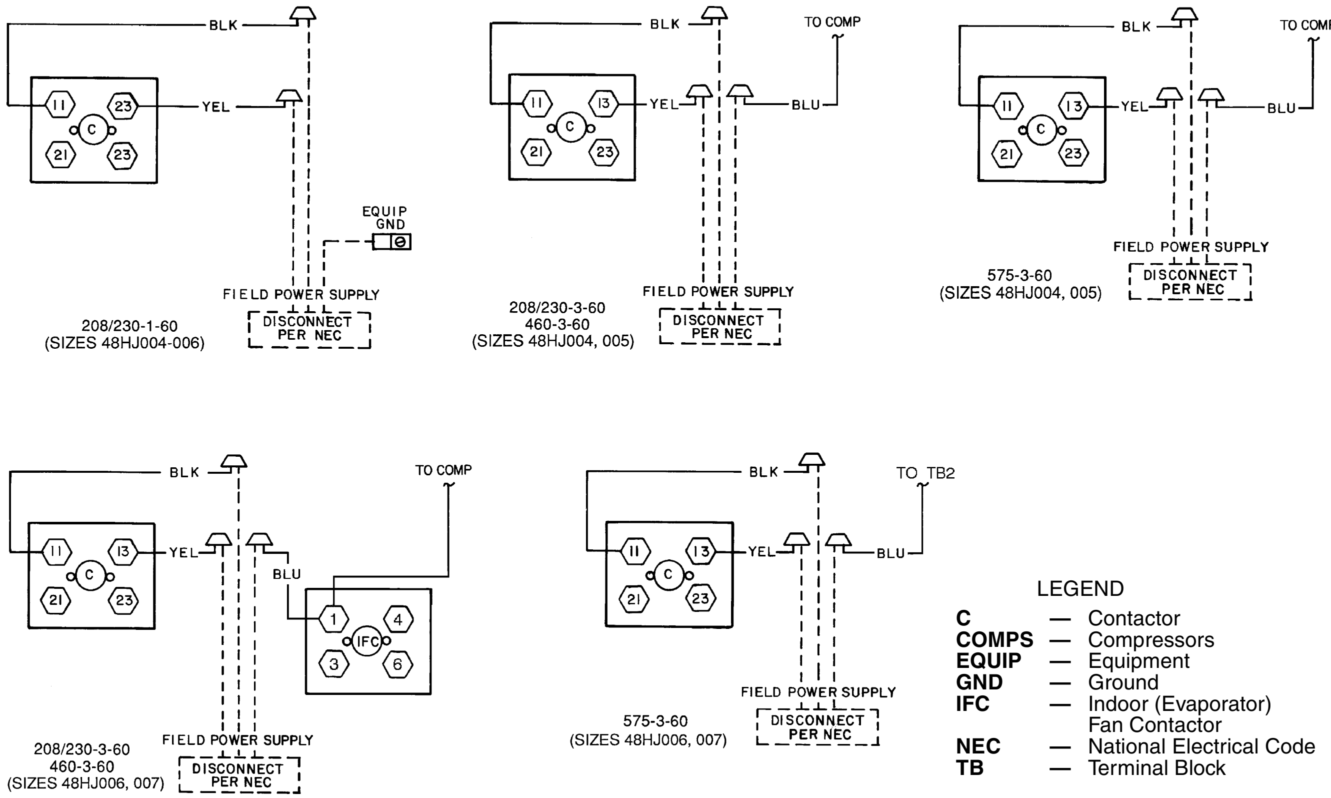
MOISTUREMISER DEHUMIDIFICATION PACKAGE — MoistureMiser package operation can be controlled by field installation of a Carrier-approved humidistat (Fig. 11). To install the humidistat:

1. Route humidistat cable through hole provided in unit corner post.
2. Feed wires through the raceway built into the corner post to the 24-v barrier located on the left side of the control box. See Fig. 10. The raceway provides the UL-required clearance between high- and low-voltage wiring.
3. Use a wire nut to connect humidistat cable into low-voltage wiring as shown in Fig. 12.

APOLLO CONTROL — The optional Apollo control is used to actively monitor all modes of operation as well as indoor (evaporator) fan status, filter status, and indoor-air quality. The Apollo control is designed to work with Carrier TEMP and VVT® systems.

The thermostat must be wired to the Apollo Control before starting the unit. Refer to the Apollo Control installation instructions for information on installing the thermostat.

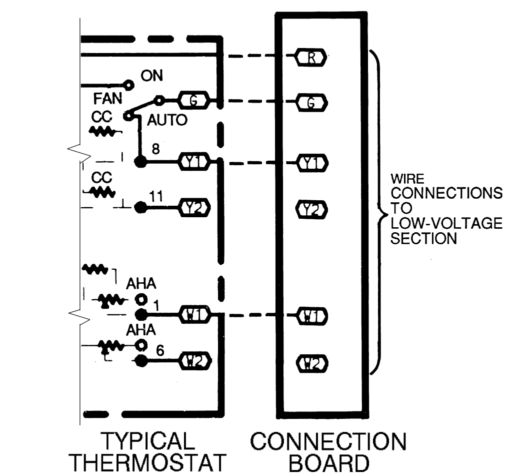
DISCONNECT SWITCH — The optional disconnect switch is non-fused. The switch has the capability of being locked in place for safety purposes.



LEGEND

C — Contactor
COMPS — Compressors
EQUIP — Equipment
GND — Ground
IFC — Indoor (Evaporator) Fan Contactor
NEC — National Electrical Code
TB — Terminal Block

Fig. 8 — Power Wiring Connections



LEGEND

AHA — Adjustable Heat Anticipator
CC — Cooling Compensator
TC — Thermostat-Cooling
TH — Thermostat-Heating
– – – – Field Wiring
——— Factory Wiring

NOTE: Connect Y2 when unit is equipped with an integrated economizer.

Fig. 9 — Low-Voltage Connections With or Without Economizer

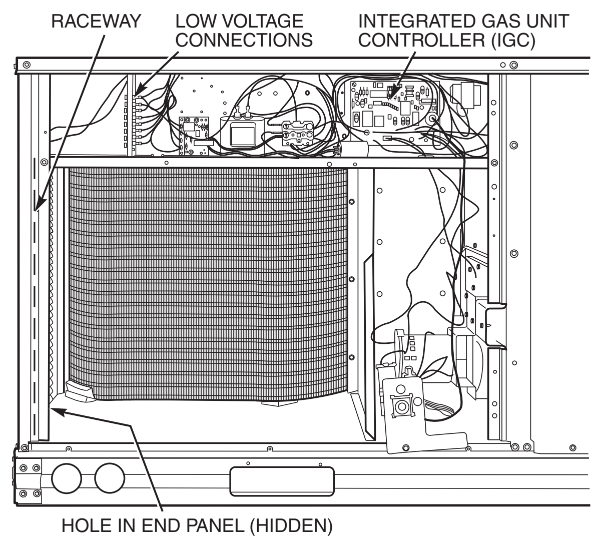


Fig. 10 — Field Control Wiring Raceway

Table 2A — 48HJ Electrical Data Standard Motor (Units Without Electrical Convenience Outlet)

UNIT 48HJ_	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR		OFM	IFM	COMBUSTION FAN MOTOR	POWER SUPPLY WITH OUTLET		MINIMUM UNIT DISCONNECT SIZE*	
		Min	Max	RLA	LRA	FLA	FLA	FLA	MCA	MOCP†	FLA	LRA
004 (3 Tons)	208/230-1-60	187	254	16.0	88.0	0.7	4.9	.57	25.6/25.6	35/35	25/25	101/101
	208/230-3-60	187	254	10.3	77.0	0.7	4.9	.57	18.5/18.5	25/25	18/18	90/ 90
	460-3-60	414	508	5.1	39.0	0.4	2.2	.30	9.0	15	9	46
	575-3-60	518	632	4.2	31.0	0.4	2.2	.30	7.3	15	7	36
005 (4 Tons)	208/230-1-60	187	254	23.7	129.0	0.7	4.9	.57	35.2/35.2	45/45	34/34	142/142
	208/230-3-60	187	254	13.5	99.0	0.7	4.9	.57	22.5/22.5	30/30	22/22	112/112
	460-3-60	414	508	7.4	49.5	0.4	2.2	.30	11.9	15	12	56
	575-3-60	518	632	5.8	40.0	0.4	2.2	.30	9.3	15	9	45
006 (5 Tons)	208/230-1-60	187	254	28.8	169.0	1.5	8.8	.57	46.3/46.3	60/60	45/45	216/216
	208/230-3-60	187	254	17.3	123.0	1.5	5.8	.57	28.9/28.9	35/35	28/28	168/168
	460-3-60	414	508	9.0	62.0	0.8	2.6	.30	14.7	20	14	84
	575-3-60	518	632	7.1	50.0	0.8	2.6	.30	11.6	15	11	67
007 (6 Tons)	208/230-3-60	187	254	20.5	156.0	1.4	5.8	.57	32.8/32.8	40/40	32/32	200/200
	460-3-60	414	508	9.6	70.0	0.6	2.6	.30	15.2	20	15	92
	575-3-60	518	632	7.7	56.0	0.6	2.6	.30	12.2	15	13	78

Table 2B — 48HJ Electrical Data Standard Motor (Units With Electrical Convenience Outlet)

UNIT 48HJ_	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR		OFM	IFM	COMBUSTION FAN MOTOR	POWER SUPPLY WITH OUTLET		MINIMUM UNIT DISCONNECT SIZE*	
		Min	Max	RLA	LRA	FLA	FLA	FLA	MCA	MOCP†	FLA	LRA
004 (3 Tons)	208/230-1-60	187	254	16.0	88.0	0.7	4.9	.57	31.6/31.6	40/40	30/30	106/106
	208/230-3-60	187	254	10.3	77.0	0.7	4.9	.57	24.5/24.5	30/30	24/24	95/95
	460-3-60	414	508	5.1	39.0	0.4	2.2	.30	11.7	15	11	48
	575-3-60	518	632	4.2	31.0	0.4	2.2	.30	9.5	15	9	38
005 (4 Tons)	208/230-1-60	187	254	23.7	129.0	0.7	4.9	.57	41.2/41.2	50/50	39/39	147/147
	208/230-3-60	187	254	13.5	99.0	0.7	4.9	.57	28.5/28.5	35/35	27/27	117/117
	460-3-60	414	508	7.4	49.5	0.4	2.2	.30	14.6	20	14	58
	575-3-60	518	632	5.8	40.0	0.4	2.2	.30	11.5	15	11	47
006 (5 Tons)	208/230-1-60	187	254	28.8	169.0	1.5	8.8	.57	52.3/52.3	60/60	50/50	221/221
	208/230-3-60	187	254	17.3	123.0	1.5	5.8	.57	34.9/34.9	40/40	34/34	173/173
	460-3-60	414	508	9.0	62.0	0.8	2.6	.30	17.4	20	17	86
	575-3-60	518	632	7.1	50.0	0.8	2.6	.30	13.8	20	13	69
007 (6 Tons)	208/230-3-60	187	254	20.5	156.0	1.4	5.8	.57	38.8/38.8	45/45	37/37	205/205
	460-3-60	414	508	9.6	70.0	0.6	2.6	.30	17.9	20	17	94
	575-3-60	518	632	7.7	56.0	0.6	2.6	.30	14.3	20	15	79

LEGEND

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

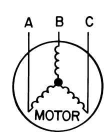
*Used to determine minimum disconnect per NEC.
†Fuse or HACR circuit breaker.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. UL, Canada units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

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

Example: Supply voltage is 460-3-60.



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

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

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

$$= 457$$

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

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

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

$$= 1.53\%$$

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

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

c UL US

Table 2C — 48HJ High-Static Motor Units Without Electrical Convenience Outlet

UNIT 48HJ_	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR (each)		OFM	IFM	COMBUSTION FAN MOTOR	POWER SUPPLY		MINIMUM UNIT DISCONNECT SIZE*	
		Min	Max	RLA	LRA	FLA	FLA	RLA	MCA	MOCP†	FLA	LRA
004	208/230-3-60	187	254	10.3	77.0	0.7	5.8	0.6	19.4/19.4	25/25	19/19	120/120
	460-3-60	414	508	5.1	39.0	0.4	2.6	0.3	9.4	15	9	60
	575-3-60	518	632	4.2	31.0	0.4	2.6	0.3	7.7	15	8	48
005	208/230-3-60	187	254	13.5	99.0	0.7	5.8	0.6	23.4/23.4	30/30	23/23	142/142
	460-3-60	414	508	7.4	49.5	0.4	2.6	0.3	12.3	15	12	71
	575-3-60	518	632	5.8	40.0	0.4	2.6	0.3	9.7	15	9	57
006	208/230-3-60	187	254	17.3	123.0	1.5	7.5	0.6	30.6/30.6	35/35	30/30	187/187
	460-3-60	414	508	9.0	62.0	0.8	3.4	0.3	15.5	20	15	94
	575-3-60	518	632	7.1	50.0	0.8	3.4	0.3	12.2	15	12	76
007	208/230-3-60	187	254	20.5	156.0	1.4	7.5	0.6	30.6/30.6	35/35	30/30	187/187
	460-3-60	414	508	9.6	70.0	0.6	3.4	0.3	15.5	20	15	94
	575-3-60	518	632	7.7	56.0	0.6	3.4	0.3	12.2	15	12	76

Table 2D — 48HJ High-Static Motor Units With Electrical Convenience Outlet

UNIT 48HJ_	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR (each)		OFM	IFM	COMBUSTION FAN MOTOR	POWER SUPPLY		MINIMUM UNIT DISCONNECT SIZE*	
		Min	Max	RLA	LRA	FLA	FLA	RLA	MCA	MOCP†	FLA	LRA
004	208/230-3-60	187	254	10.3	77.0	0.7	5.8	0.6	25.4/25.4	30/30	25	124/124
	460-3-60	414	508	5.1	39.0	0.4	2.6	0.3	12.1	15	12	63
	575-3-60	518	632	4.2	31.0	0.4	2.6	0.3	9.8	15	10	50
005	208/230-3-60	187	254	13.5	99.0	0.7	5.8	0.6	29.4/29.4	35/35	29	146/146
	460-3-60	414	508	7.4	49.5	0.4	2.6	0.3	15.0	20	14	73
	575-3-60	518	632	5.8	40.0	0.4	2.6	0.3	11.8	15	11	59
006	208/230-3-60	187	254	17.3	123.0	1.5	7.5	0.6	36.6/36.6	40/40	36	192/192
	460-3-60	414	508	9.0	62.0	0.8	3.4	0.3	18.2	20	18	96
	575-3-60	518	632	7.1	50.0	0.8	3.4	0.3	14.4	20	14	77
007	208/230-3-60	187	254	20.5	156.0	1.4	7.5	0.6	40.5/40.5	45/45	39	224/224
	460-3-60	414	508	9.6	70.0	0.6	3.4	0.3	18.7	25	18	104
	575-3-60	518	632	7.7	56.0	0.6	3.4	0.3	15.0	20	15	89

LEGEND

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

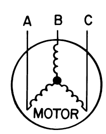
*Used to determine minimum disconnect per NEC.
†Fuse or HACR circuit breaker.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. UL, Canada units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

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

Example: Supply voltage is 460-3-60.



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

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

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

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

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

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

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

OPTIONAL DURABLADE ECONOMIZER — The optional economizer hood assembly is packaged and shipped in the filter section. Damper blades and control boards are installed at the factory and the economizer is shipped in the vertical discharge position.

NOTE: Horizontal discharge block-off plate is shipped with the air hood package. If unit is to be used for vertical discharge application, discard this plate.

Assembly:

1. Determine if ventilation air is required in building. If so, determine the minimum amount to be supplied by each unit and record quantity of ventilation air needed for use in Step 7.
2. Remove filter access panel by raising panel and swinging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove filter access panel. Remove outdoor-air opening panel. Save panels and screws. See Fig. 13. Remove economizer, and remove optional outdoor-air damper hood package from filter section (located behind economizer).
3. Assemble outdoor-air hood top and side plates as shown in Fig. 14. Install seal strips on hood top and sides. Put aside screen retainer and retainer screw for later assembly. *Do not attach hood to unit at this time.*
4. Slide economizer into unit and secure with screws. See Fig. 15.

   NOTE: Be sure to engage rear economizer flange under tabs in vertical return-air opening.
5. To convert to horizontal discharge application:
   a. Rotate economizer 90 degrees until the economizer motor faces the condenser section (see Fig. 16).
   b. Remove tape and shipping screw, rotate the barometric relief damper cover 90 degrees.
   c. Install horizontal discharge block-off plate over the opening on the access panel. (Block-off plate MUST be installed before installing hood assembly.) See Fig. 17.
6. Remove 12-pin blue and yellow wire jumper plug from factory wiring harness and store. Insert economizer plug into 12-pin plug of factory wiring harness. Remove tape and shipping screw from barometric relief damper. See Fig.18.
7. If ventilation air is not required, proceed to Step 8. If ventilation air is required, determine minimum position setting for required airflow. See Fig. 19. Adjust minimum position setting by adjusting the screws on the position setting bracket. Slide bracket until the top screw is in the position determined by Fig. 19. Tighten screws.
8. Remove tape from outdoor-air thermostat (OAT). Fasten OAT to inside of hood using screws and speed clips provided. See Fig. 20. Make sure OAT terminals are positioned up.

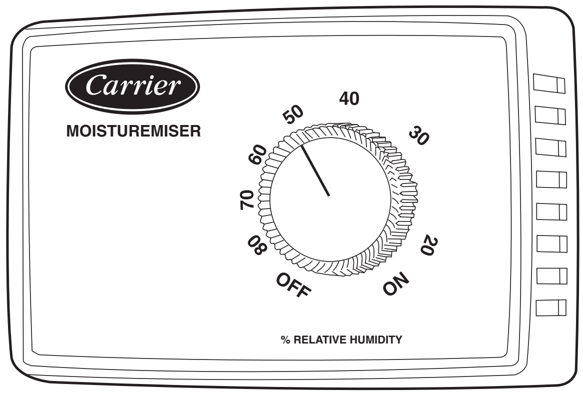


Fig. 11 — Accessory Field-Installed Humidistat

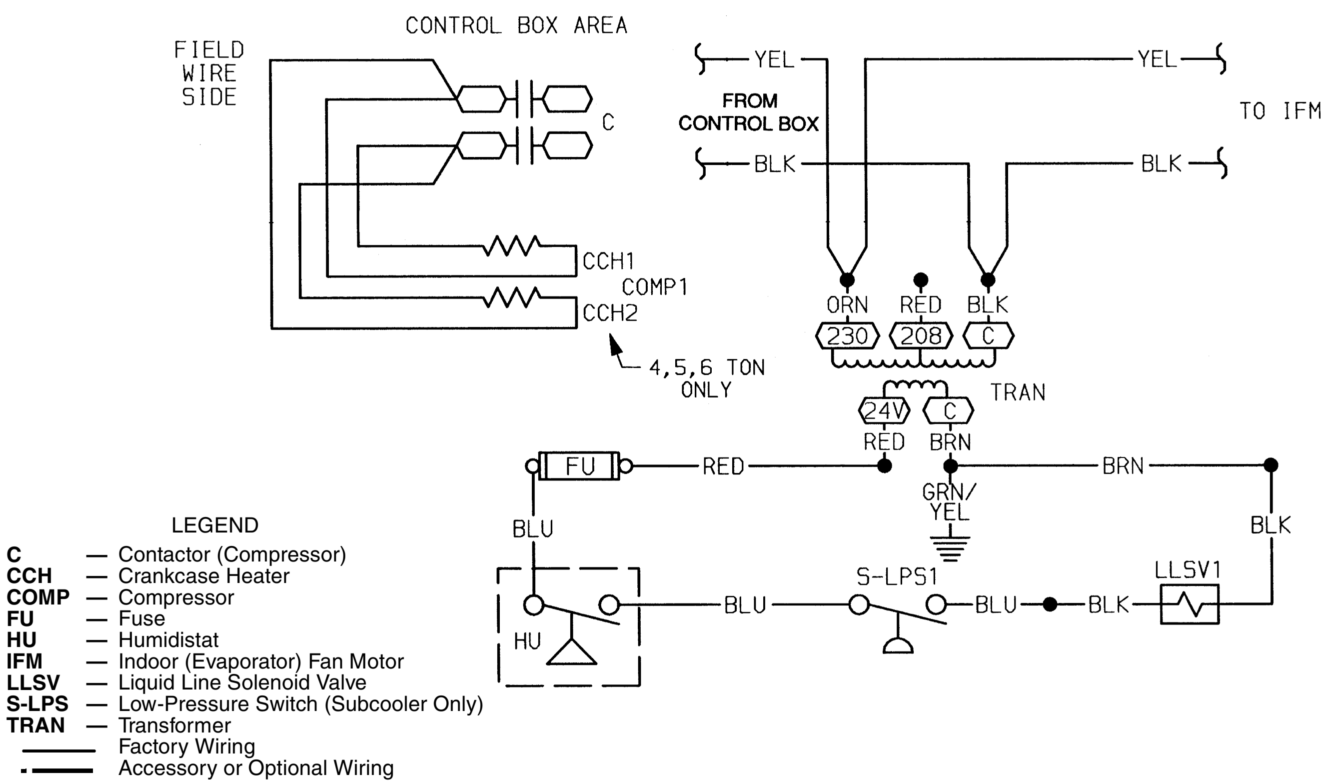


Fig. 12 — Typical MoistureMiser Dehumidification Package Humidistat Wiring (208/230-V Unit Shown)

9. Replace outdoor-air opening panel using screws from Step 2. Replace filter access panel. Ensure the filter access panel slides along the tracks and is securely engaged.
10. Fasten hood top and side plate assembly (Fig. 14) to outdoor-air opening panel with screws provided.
11. Place knob supplied with economizer on OAT. See Fig. 20. Set for 3° F below indoor room thermostat setting. If accessory enthalpy control (EC) is used in place of OAT, see instructions shipped with EC for installation and adjustment. See Fig. 20.
12. Connect OAT per Fig. 21.
13. Slide outdoor-air inlet screen into screen track on hood side plate. While holding screen in place, fasten screen retainer to hood using screws provided.

NOTE: Refer to Fig. 22 for economizer barometric relief damper characteristics.

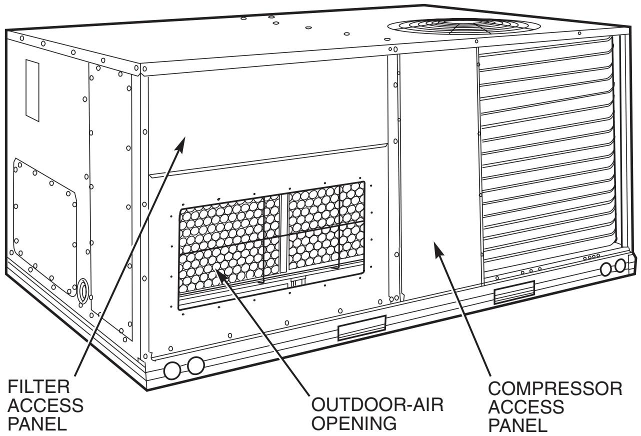


Fig. 13 — Typical Access Panel Locations

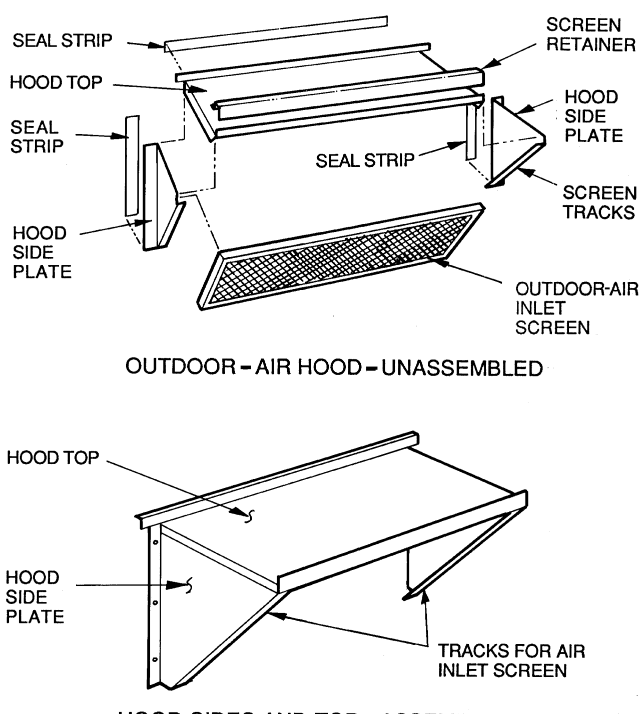


Fig. 14 — Outdoor-Air Hood Details

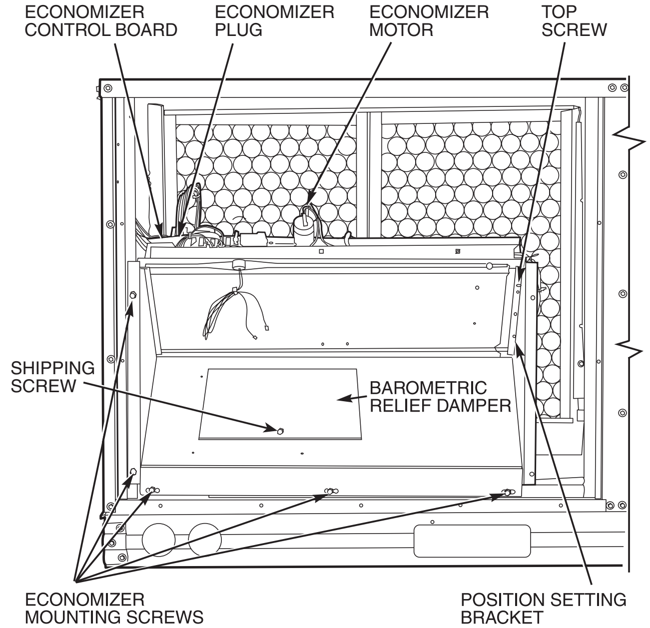


Fig. 15 — Durablade Economizer Installed in Unit

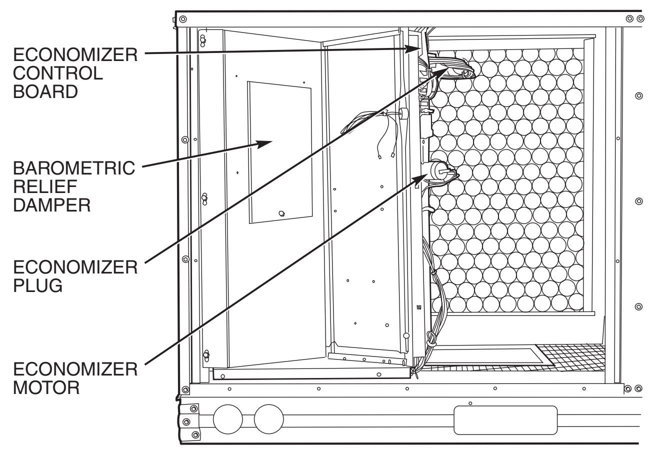


Fig. 16 — Horizontal Durablade Economizer Installation

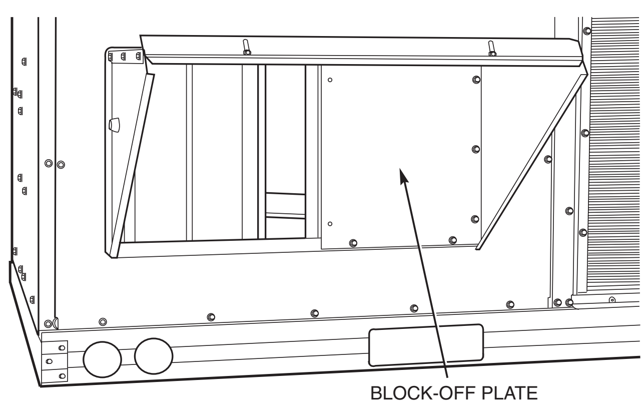


Fig. 17 — Horizontal Discharge Block-Off Plate

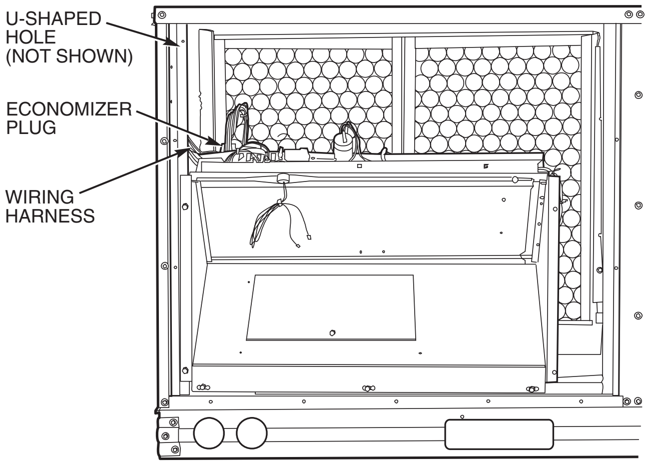
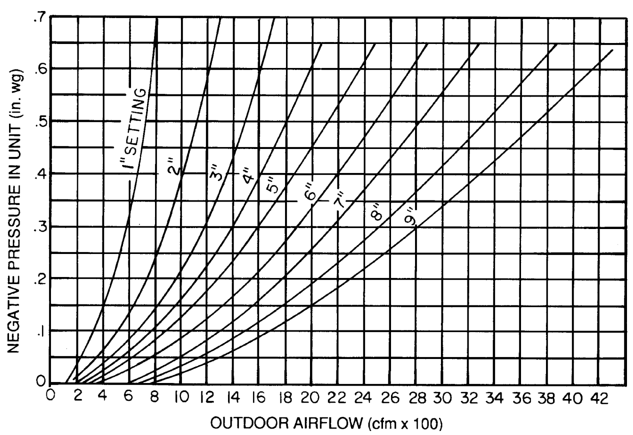


Fig. 18 — Typical Durablade Economizer and Wiring Harness



Example:
Given —
Negative Pressure . . . . 0.1 in. wg
Outdoor Airflow . . . . 1100 cfm
Determine —
Setting = 6

Fig. 19A — Durablade Economizer Damper Minimum Position Setting

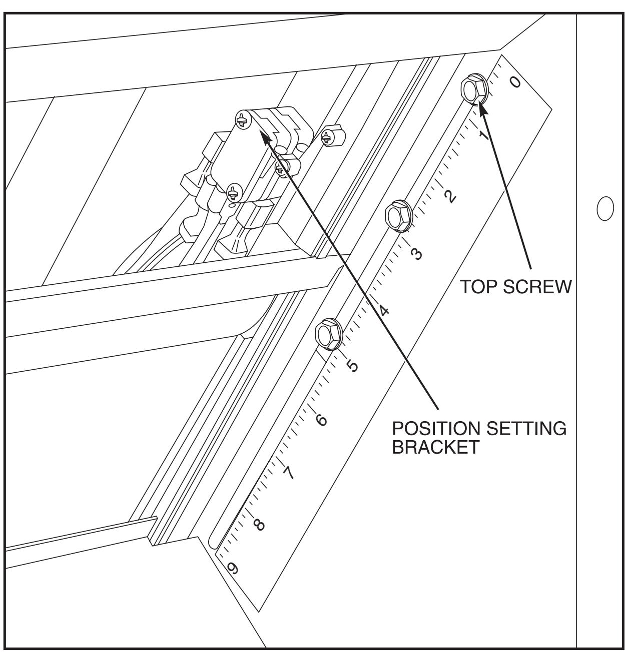


Fig. 19B — Durablade Economizer Minimum Position Damper Setting

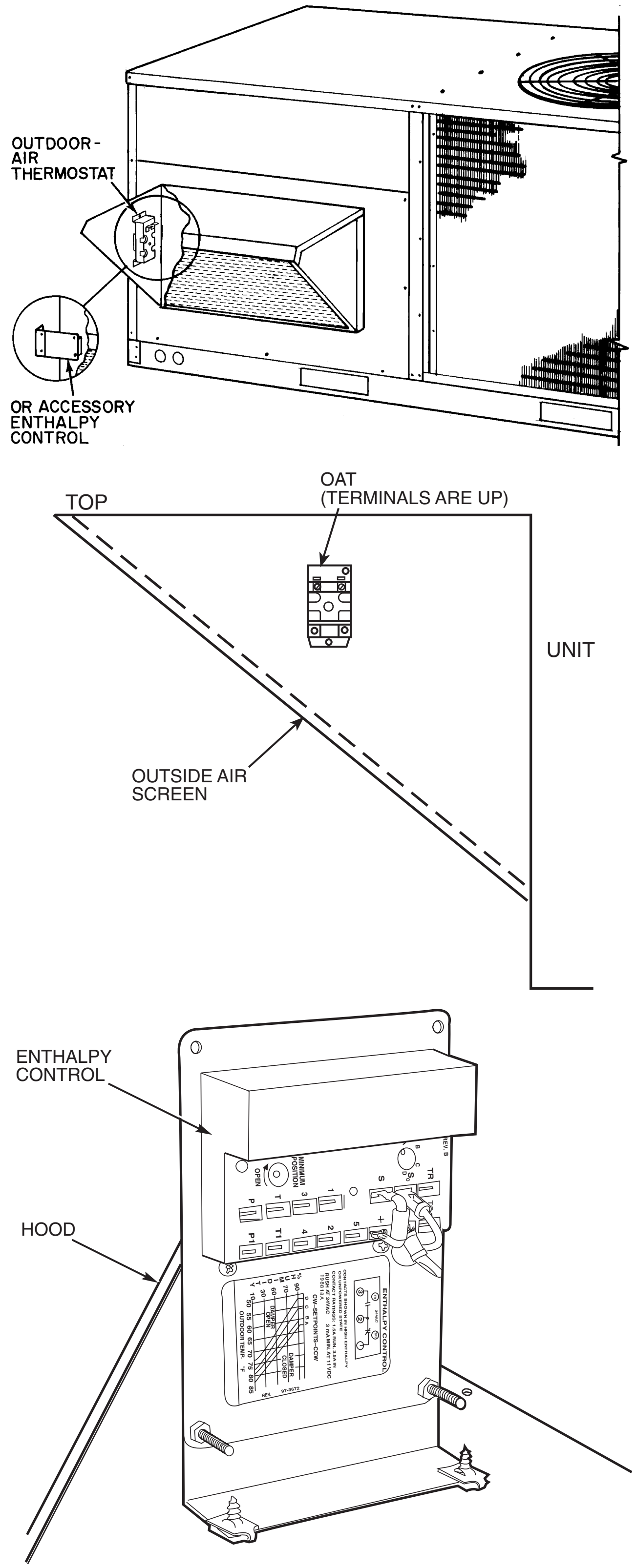


Fig. 20 — Outdoor-Air Thermostat/ Enthalpy Control Installation

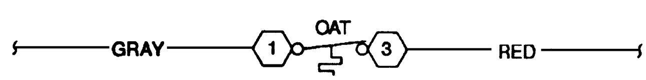


Fig. 21 — Wiring Connections for Outdoor-Air Thermostat

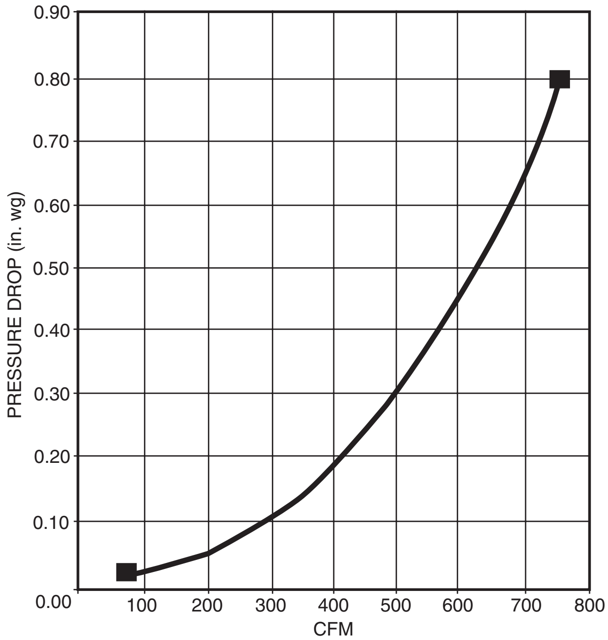


Fig. 22 — Durablade Economizer Barometric Relief Damper Characteristics

OPTIONAL ECONOMI$ER — See Fig. 23 for EconoMi$er component locations.

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. Remove the indoor coil access panel and discard. See Fig. 24.

   If installing an optional Power Exhaust Assembly, refer to the *EconoMi$er Power Exhaust Installation Instructions.*

   Controller should be mounted in vertical position as shown in Fig. 23.
2. Assemble the hood assembly as follows:

   Remove the EconoMi$er hood from its packaging. Remove shipping brackets holding hood package to EconoMi$er. Locate the outdoor-air opening panel. See Fig. 25. Remove hood assembly shipping brackets located on the back (sloped) side of the EconoMi$er assembly. These brackets are used to retain the hood assembly during shipping only.
3. Install the $^{1}/_{8}$ x $^{3}/_{4}$-in. seal strip on the exhaust air hood side panels and the bottom bracket. Assemble the exhaust air hood to the outdoor-air opening panel as shown in Fig. 25, using the screws provided. *Do not attach hood assembly to unit at this time.*
4. Install the $^{1}/_{8}$ x $^{3}/_{4}$ in. seal strip on the outdoor-air hood top and side panels. Assemble the outdoor-air hood to the outdoor-air opening panel as shown in Fig. 26, using the screws provided. *Do not attach hood assembly to the unit at this time.*
5. Slide the outdoor-air inlet screens into the screen track on the hood side panels. While holding the screens in place, fasten the screen retainer to the hood using the screws provided. Repeat the process for the barometric exhaust air screen. *Do not attach completed (Fig. 27) hood assembly to unit at this time.*
6. Install the EconoMi$er assembly into the rooftop unit. See Fig. 28 and 29.

   NOTE: Be sure to engage rear EconoMi$er flange under tabs in return-air opening of the unit base. See Fig. 28.
7. Install the outdoor-air block-off plate, then secure the EconoMi$er with the screws provided. See Fig. 29.
8. Remove and discard the 12-pin jumper plug from the unit wiring harness located int he upper left corner and insert the EconoMi$er plug into the unit wiring harness. Refer to wiring diagram Fig. 30 and 31. Also refer to Fig. 32 if installing an accessory power exhaust.
9. Install the complete hood assembly on the unit and secure using the screws provided.
10. Remove the indoor fan motor access panel. See Fig. 33.
11. Mount the supply-air temperature sensor to the lower left portion of the indoor blower housing with the two (2) screws provided (see Fig. 34). Connect the violet and pink wires to the corresponding connections on the supply-air temperature sensor. Replace the indoor fan motor access panel.

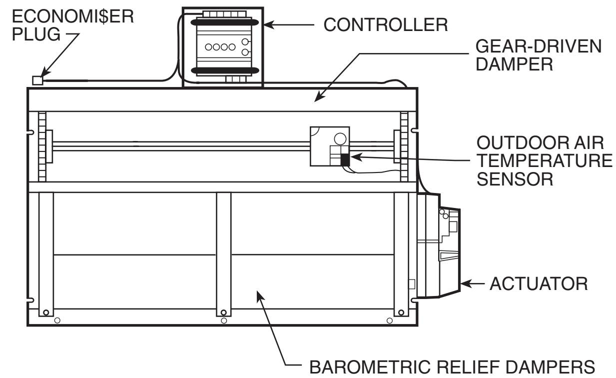


Fig. 23 — Economizer Component Locations

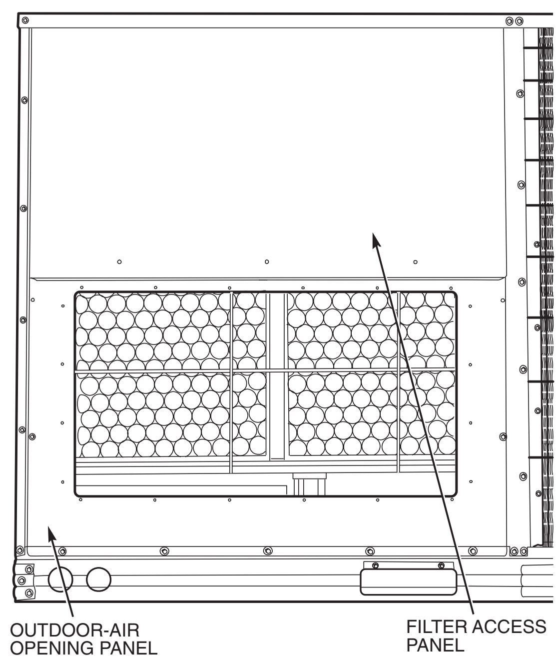


Fig. 24 — Typical Access Panel Locations

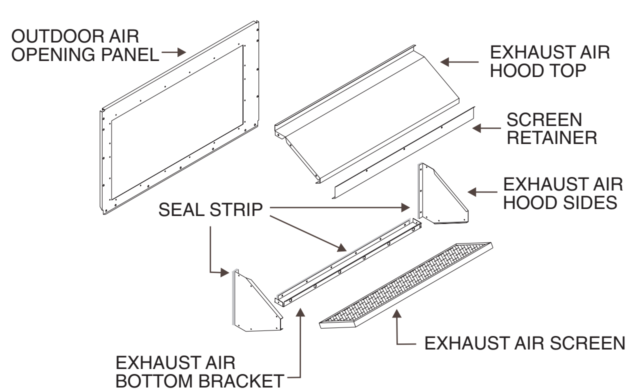


Fig. 25 — Exhaust Air Hood Assembly

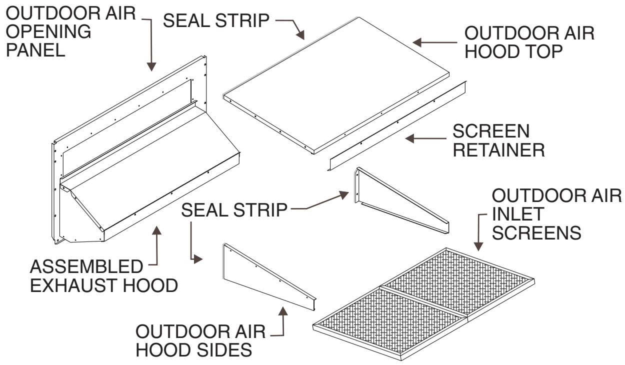


Fig. 26 — Outdoor-Air Hood Assembly

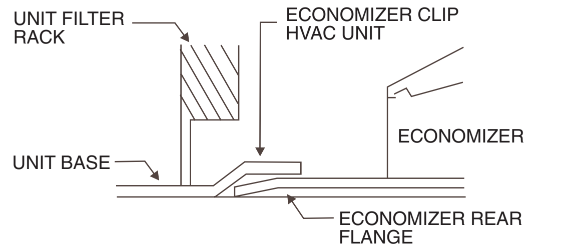


Fig. 28 — Rear EconoMi$er Flange Installation

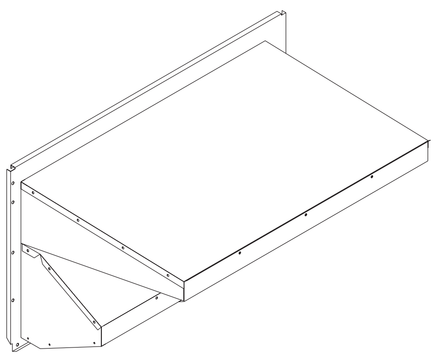


Fig. 27 — Completed Hood Assembly

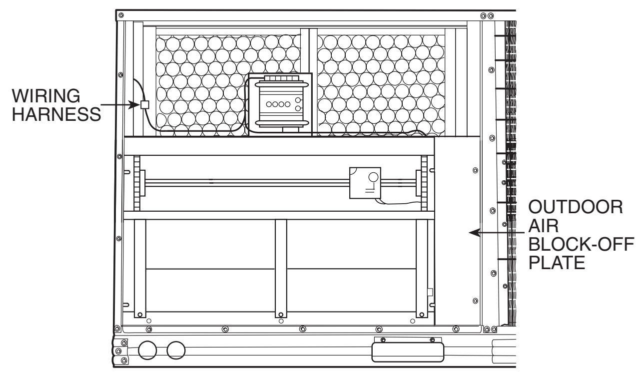
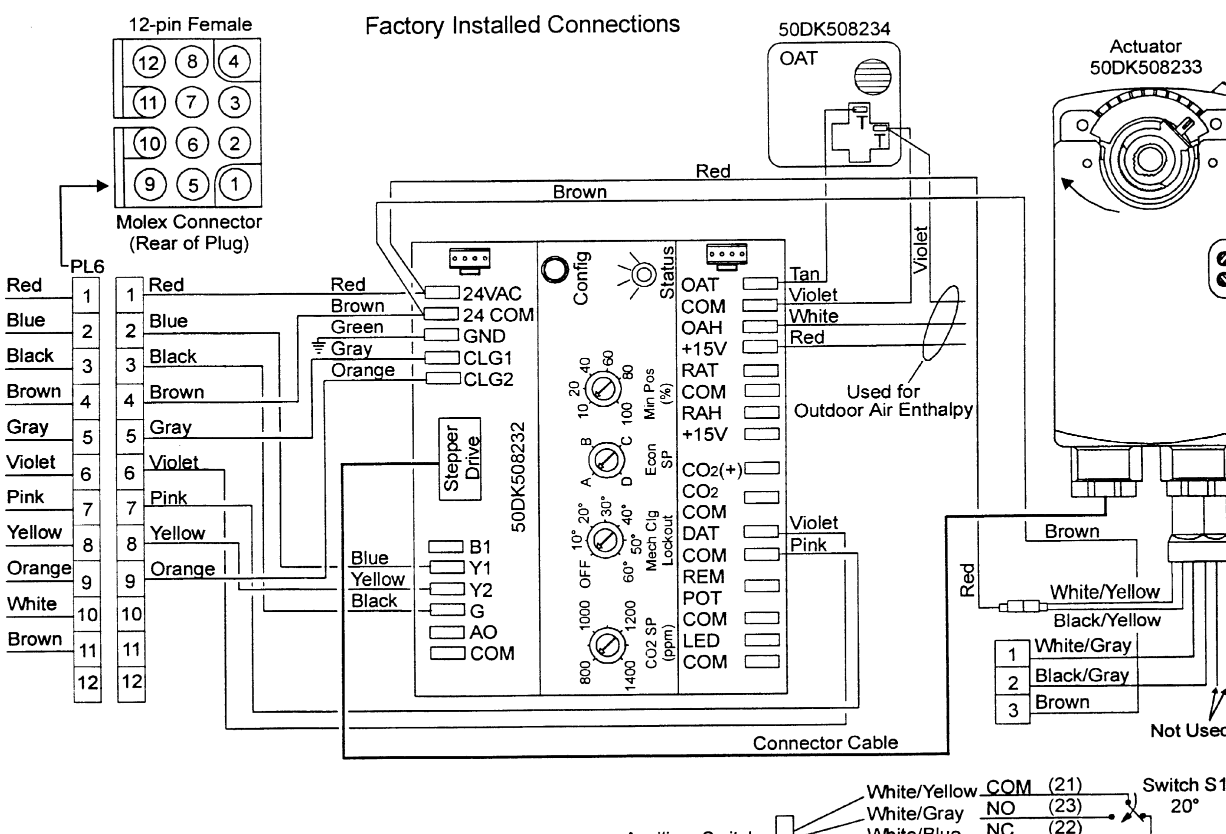


Fig. 29 — EconoMi$er Installed



LEGEND

OAT — Outdoor-Air Thermostat

Fig. 30 — EconoMi$er Wiring

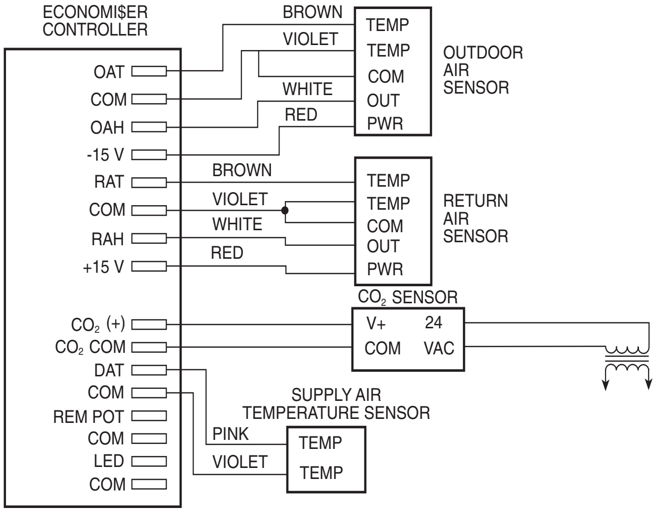


Fig. 31 — EconoMi$er Sensor Wiring

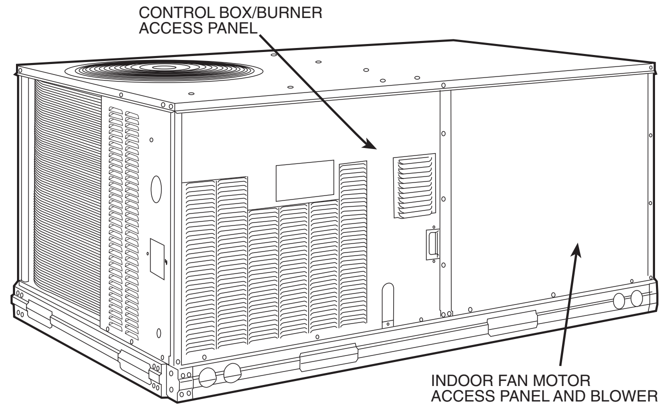


Fig. 33 — Typical Access Panel Locations (Standard Efficiency Unit Shown)

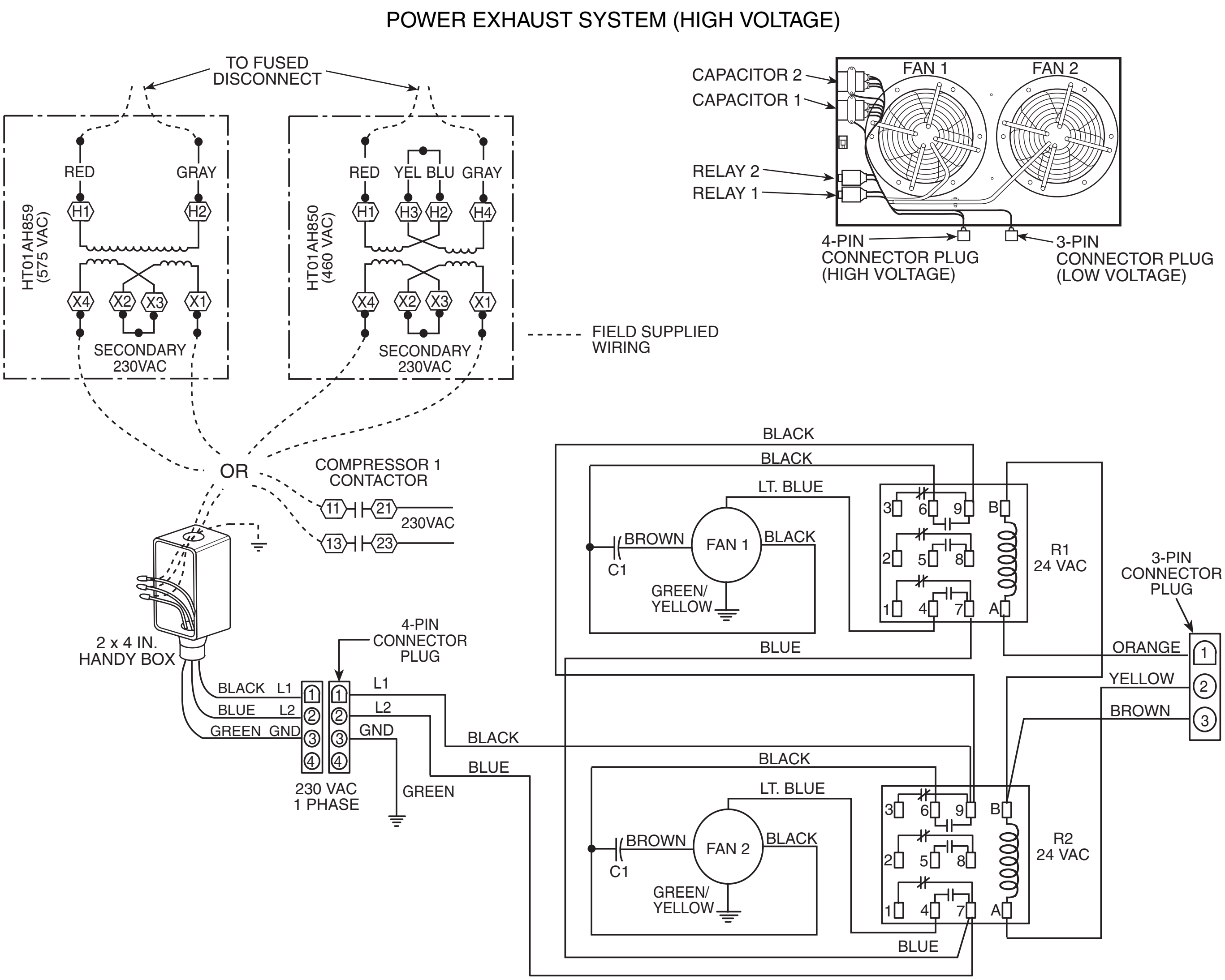


Fig. 32 — Wiring Diagram for Power Exhaust System

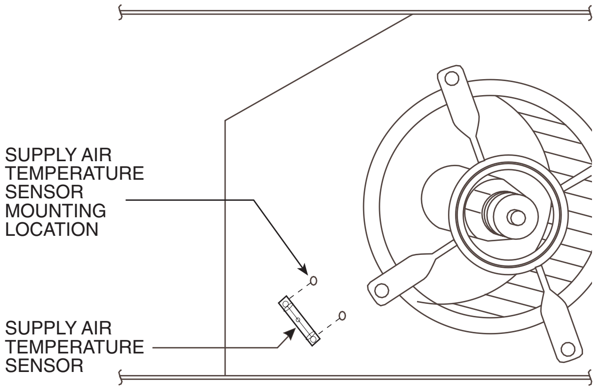


Fig. 34 — Supply-Air Sensor Placement

<u>CO_2 Control Setup</u> — If a CO_2 sensor is not being used, proceed to the next section. If a CO_2 sensor is being used, perform the following:

1. Determine the value at which you want the minimum position of the dampers to begin opening to allow a greater amount of outdoor air to enter. The range is 800 to 1,400 ppm.
2. Locate the CO_2 SP (PPM) potentiometer and adjust to the desired set point. See Fig. 35.

<u>Mechanical Cooling Lockout</u> — Determine the outdoor-air temperature at which you want the mechanical cooling (compressors) to be disabled. Locate the mechanical cooling lockout (MECH CLG LOCKOUT) potentiometer. To disable this feature, turn the potentiometer counterclockwise (CCW) to the OFF position. Otherwise, set the value between 10 and 60 F. Mechanical cooling will not operate when the outdoor air temperature is below this value. See Fig. 35.

<u>Dry Bulb Changeover Set Up</u> — Determine the dry bulb changeover set point from Table 3. The settings are A, B, C and D. Locate the ECON SP potentiometer and set the dry bulb changeover set point. See Fig. 35. When the OAT is above this set point, the damper is limited to minimum position setting.

Table 3 — Changeover Set Points

SETTINGS	A	B	C	D
Dry Bulb (°F)	73	69	66	63
Single Enthalpy* (Btu/lb)	27	25	24	22
Differential Temperature* (°F, Not Adjustable)	2	2	2	2
Differential Enthalpy* (Btu/lb, Not Adjustable)	1	1	1	1

*Field-installed accessory.

If a potentiometer fails, its setting will default to the values in Table 4.

Table 4 — Default Potentiometer Settings

POTENTIOMETER	DEFAULT SETTING
CO_2 SP (PPM)	1,000
MECH CLG LOCKOUT	47°
ECON SP	D
MIN POS (%)	20

<u>Ventilation Air (Minimum Position Set Up)</u> — If ventilation air is not required, proceed to Step 5. If ventilation air is required, perform the following:

1. The indoor fan must be on to set the ventilation air. Either put the thermostat in the continuous fan mode or jumper the R and G terminals at the rooftop unit connection board.
2. Locate the minimum position (MIN POS) potentiometer. Turn the potentiometer full CCW to fully close the outdoor air dampers. Turn the potentiometer gradually clockwise (CW) to the desired position. See Fig. 35.
3. Replace the filter access panel. See Fig. 24. Ensure the filter access panel slides along the tracks and is securely engaged.
4. Calculate the minimum airflow across the EconoMi$er.
   a. Calculate % of outside air using the following formula.

      % Outdoor air through EconoMi$er

$$\%\ \text{Outdoor air} = \frac{\text{Mixture Temp} - \text{Return Air Temp}}{\text{Outdoor Temp} - \text{Return Air Temp}}$$

   b. Divide total CFM by percentage outdoor air, this gives outdoor air volume in CFM.
5. Turn on base unit power.

NOTE: The EconoMi$er begins operation three minutes after power up.

⚠ WARNING

Personal Injury Hazard. Avoid possible injury by keeping fingers away from damper blades.

6. See Fig. 36 for barometric relief damper characteristics.

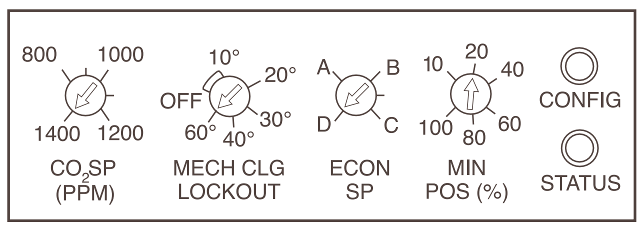


Fig. 35 — EconoMi$er Control Adjustment Potentiometers (Factory Settings)

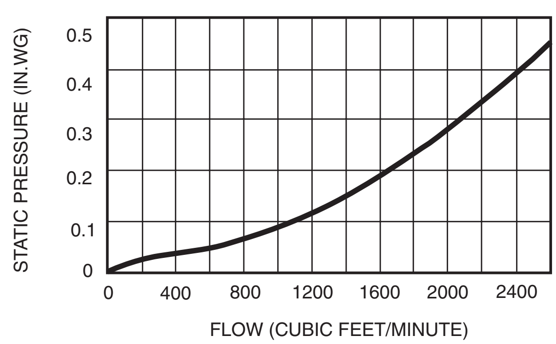


Fig. 36 — Barometric Relief Capacity

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

Tables 5A and 5B show fan rpm at motor pulley settings. Tables 6 and 7 show maximum amp draw of belt-drive motor. Table 8 shows motor nominal horsepower for evaporator-fan motors. Refer to Tables 8-25 for performance data. See Tables 26 and 27 for accessory and option static pressure drops.

BELT-DRIVE MOTORS — Fan motor pulleys are factory set for speed shown in Table 1. Check pulley alignment and belt tension prior to start-up.

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

To change fan speed:

1. Shut off unit power supply, tag disconnect.
2. Loosen belt by loosening fan motor mounting nuts. See Fig. 37.
3. Loosen movable pulley flange setscrew (see Fig. 38).
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Table 1.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 1 for speed change for each full turn of pulley flange.)

To align fan and motor pulleys, loosen fan pulley setscrews and slide fan pulley along fan shaft. Make angular alignment by loosening motor from mounting.

To adjust belt tension:

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

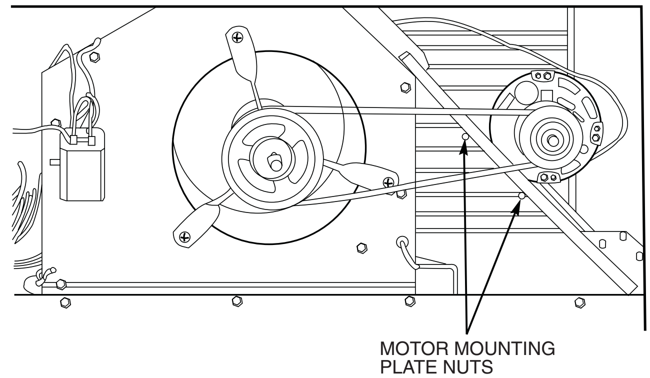


Fig. 37 — Belt-Drive Motor Mounting

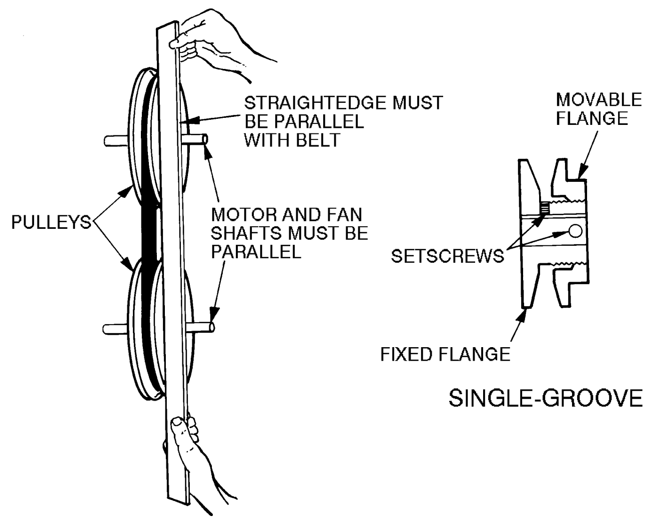


Fig. 38 — Evaporator-Fan Pulley Adjustment

Table 5A — 48HJ Fan Rpm at Motor Pulley Setting With Standard Motor

STANDARD MOTOR*													
UNIT 48HJ	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
004	1090	1055	1025	990	960	925	890	860	825	795	760	—	—
005	1185	1150	1115	1080	1045	1015	980	945	910	875	840	—	—
006 (single-phase)	1460	1425	1385	1350	1315	1275	1240	1205	1165	1130	1095	1055	1020
006 (3-phase) and 007	1585	1540	1490	1445	1400	1350	1305	1260	1210	1165	1120	—	—

*Approximate fan rpm shown (standard motor/drive).

Table 5B — 48HJ Fan Rpm at Motor Pulley Setting With High Static Motor

HIGH-STATIC MOTOR													
UNIT 48HJ	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
004	1455	1423	1392	1360	1328	1297	1265	1233	1202	1170	1138	1107	1075
005	1455	1423	1392	1360	1328	1297	1265	1233	1202	1170	1138	1107	1075
006	1685	1589	1557	1525	1493	1460	1428	1396	1364	1332	1300	—	—
007	1685	1589	1557	1525	1493	1460	1428	1396	1364	1332	1300	—	—

Table 6 — Evaporator-Fan Motor Data — Standard Motor

UNIT 48HJ	UNIT PHASE	MAXIMUM CONTINUOUS BHP*	MAXIMUM OPERATING WATTS*	UNIT VOLTAGE	MAXIMUM AMP DRAW
004	Single	1.20	1000	208/230	5.4
	Three	1.20	1000	208/230	5.4
				460	2.4
				575	2.4
005	Single	1.20	1000	208/230	5.4
	Three	1.20	1000	208/230	5.4
				460	2.4
				575	2.4
006	Single	1.30	1650	208/230	9.7
	Three	2.40	2120	208/230	6.4
				460	2.9
				575	2.9
007	Three	2.40	2120	208/230	6.4
				460	2.9
				575	2.9

LEGEND

Bhp — Brake Horsepower

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

Table 7 — Evaporator-Fan Motor Data — High-Static Motors

UNIT 48HJ	UNIT PHASE	MAXIMUM CONTINUOUS BHP*	MAXIMUM OPERATING WATTS*	UNIT VOLTAGE	MAXIMUM AMP DRAW
004	Three	2.40	2120	208/230	6.4
				460	2.9
				575	2.9
005	Three	2.40	2120	208/230	6.4
				460	2.9
				575	2.9
006	Three	2.90	2615	208/230	7.9
				460	3.6
				575	3.6
007	Three	2.90	2615	208/230	6.4
				460	3.6
				575	3.6

LEGEND

Bhp — Brake Horsepower

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

Table 8 — Motor Nominal Horsepower

UNIT 48HJ	MOTOR	NOMINAL HORSEPOWER
004	All	1.00
005	All	1.00
006	Single Phase	1.50
	Three Phase	2.00
007	All	2.00

Table 9 — Outdoor Sound Power (Total Unit)

UNIT 48HJ	ARI RATING (Bels)	OCTAVE BANDS							
		63	125	250	500	1000	2000	4000	8000
004,005	7.6	55.9	66.0	64.0	66.2	68.4	64.5	61.7	57.3
006,007	8.0	59.1	68.9	68.7	71.9	74.0	68.9	65.7	59.0

LEGEND

ARI — Air Conditioning and Refrigeration Institute
Bels — Sound Levels (1 bel = 10 decibels)

Table 10 — 48HJ004 Fan Performance — Vertical Discharge Units With Standard Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
	0.1		0.2		0.3		0.4		0.5		0.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	581	0.12	673	0.18	736	0.22	805	0.25	865	0.29	911	0.34
1000	644	0.19	709	0.22	782	0.28	835	0.30	900	0.35	937	0.38
1100	687	0.22	746	0.26	806	0.30	867	0.35	929	0.40	964	0.40
1200	733	0.26	785	0.32	843	0.35	903	0.41	960	0.47	994	0.50
1300	754	0.29	826	0.38	891	0.43	942	0.48	991	0.53	1047	0.60
1400	810	0.35	868	0.45	937	0.51	984	0.57	1032	0.62	1067	0.67
1500	841	0.42	911	0.53	985	0.61	1029	0.66	1073	0.72	1109	0.77

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
	0.7		0.8		0.9		1.0		1.1		1.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	957	0.39	988	0.43	1039	0.47	1061	0.51	1083	0.54	1105	0.58
1000	992	0.44	1039	0.49	1061	0.55	1088	0.60	1111	0.66	1136	0.72
1100	1013	0.49	1068	0.55	1091	0.61	1109	0.66	1127	0.73	1145	0.80
1200	1045	0.56	1090	0.64	1109	0.68	1156	0.73	1203	0.81	1250	0.86
1300	1075	0.64	1122	0.70	1152	0.76	1190	0.82	1228	0.87	1266	0.94
1400	1110	0.73	1160	0.78	1181	0.83	1237	0.88	1293	0.94	1349	0.99
1500	1150	0.78	1190	0.84	1225	0.89	1271	0.95	1371	1.00	1383	1.05

Table 11 — 48HJ004 Fan Performance — Vertical Discharge Units With High-Static Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	**673**	**0.18**	**805**	**0.25**	**911**	**0.34**	**988**	**0.43**	**1061**	**0.47**
1000	**709**	**0.22**	**835**	**0.30**	**937**	**0.38**	**1039**	**0.49**	1086	0.55
1100	**746**	**0.28**	**867**	**0.35**	**964**	**0.40**	**1068**	**0.55**	1109	0.61
1200	**785**	**0.32**	**903**	**0.41**	**994**	**0.50**	1090	0.64	1156	0.68
1300	**826**	**0.38**	**942**	**0.48**	**1047**	**0.60**	1122	0.70	1190	0.76
1400	**868**	**0.45**	**984**	**0.57**	1087	0.67	1160	0.84	1237	0.85
1500	**911**	**0.53**	**1029**	**0.66**	1109	0.77	1190	1.00	1271	0.95

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	1105	0.57	1140	0.63	1170	0.68	1198	0.73	1224	0.77
1000	1136	0.63	1172	0.69	1203	0.75	1232	0.80	1258	0.86
1100	1145	0.67	1181	0.73	1213	0.80	1242	0.85	1268	0.91
1200	1210	0.74	1248	0.81	1282	0.88	1312	0.94	1340	1.01
1300	1266	0.84	1306	0.92	1341	1.00	1373	1.07	1402	1.14
1400	1349	0.93	1391	1.02	1429	1.11	**1463**	**1.19**	**1494**	**1.26**
1500	1363	1.05	1406	1.15	**1465**	**1.25**	**1500**	**1.34**	**1532**	**1.43**

LEGEND AND NOTES FOR TABLES 10 AND 11

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 2.)
2. Motor drive range is 760 to 1090 rpm for standard motor; 1075 to 1455 rpm for high-static motor. All other rpms require a field-supplied drive.
3. Values include losses for filters, unit casing, and wet coils. See page 28 for accessory/FIOP static pressure information.
4. Maximum continuous bhp is 1.20 for standard motor, 2.40 for high-static motor. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Evaporator-Fan Motor Data tables on page 20 for additional information.
5. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
6. Interpolation is permissible. Do not extrapolate.

Table 12 — 48HJ005 Fan Performance — Vertical Discharge Units With Standard Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.1		0.2		0.3		0.4		0.6		0.7		0.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	596	0.20	665	0.25	722	0.31	779	0.36	872	0.48	915	0.54	957	0.60
1300	633	0.24	699	0.30	754	0.36	809	0.42	902	0.55	943	0.61	984	0.67
1400	672	0.30	735	0.36	788	0.42	840	0.48	933	0.62	972	0.69	1011	0.75
1500	711	0.35	770	0.42	822	0.49	873	0.55	963	0.69	1002	0.77	1041	0.84
1600	751	0.42	835	0.49	871	0.56	907	0.63	993	0.77	1033	0.85	1072	0.93
1700	791	0.49	873	0.57	907	0.65	941	0.72	1024	0.87	1064	0.96	1103	1.04
1800	831	0.58	881	0.66	929	0.74	976	0.81	1057	0.97	1095	1.06	1132	1.14
1900	872	0.67	919	0.75	965	0.84	1011	0.92	1091	1.08	1127	1.17	1162	1.25
2000	913	0.77	958	0.86	1002	0.95	1046	1.03	1125	1.21	1160	1.30	1195	1.38

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.4		1.6		1.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	993	0.65	1028	0.69	1056	0.72	1083	0.74	1134	0.80	1185	0.88	1331	0.99
1300	1021	0.74	1058	0.80	1090	0.85	1121	0.89	1171	0.94	1219	1.00	1268	1.10
1400	1049	0.82	1086	0.89	1120	0.96	1153	1.00	1210	1.12	1257	1.17	1307	1.25
1500	1077	0.92	1113	0.99	1147	1.06	1180	1.13	1241	1.27	1295	1.37	1339	1.43
1600	1107	1.00	1141	1.09	1174	1.17	1207	1.25	1269	1.40	1326	1.54	1376	1.65
1700	1137	1.12	1171	1.20	1203	1.29	1235	1.37	1296	1.53	1354	1.70	1407	1.84
1800	1167	1.23	1202	1.32	1233	1.41	1263	1.49	1323	1.67	1381	1.85	1436	2.02
1900	1197	1.35	1232	1.45	1263	1.54	1294	1.63	1351	1.81	1408	2.00	1463	2.19
2000	1229	1.48	1262	1.58	1294	1.68	1325	1.78	1362	1.97	1436	2.16	1489	2.36

Table 13 — 48HJ005 Fan Performance — Vertical Discharge Units With High-Static Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	**665**	**0.25**	**779**	**0.36**	**872**	**0.48**	**957**	**0.60**	**1028**	**0.69**
1300	**699**	**0.30**	**809**	**0.42**	**902**	**0.55**	**984**	**0.67**	**1058**	**0.80**
1400	**735**	**0.36**	**840**	**0.48**	**933**	**0.62**	**1011**	**0.75**	1086	0.89
1500	**770**	**0.42**	**873**	**0.55**	**963**	**0.69**	**1041**	**0.84**	1113	0.99
1600	**835**	**0.49**	**907**	**0.63**	**993**	**0.77**	**1072**	**0.93**	1141	1.09
1700	**873**	**0.57**	**941**	**0.72**	**1024**	**0.87**	1103	1.04	1171	1.20
1800	**881**	**0.66**	**976**	**0.81**	**1057**	**0.97**	1132	1.14	1202	1.32
1900	**919**	**0.75**	**1011**	**0.92**	1091	1.08	1162	1.25	1232	1.45
2000	**958**	**0.86**	**1046**	**1.03**	1125	1.21	1195	1.38	1262	1.58

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	1083	0.74	1134	0.80	1185	0.88	1331	0.99	1374	1.09
1300	1121	0.89	1171	0.94	1219	1.00	1268	1.10	1309	1.21
1400	1153	1.00	1210	1.12	1257	1.17	1307	1.25	1349	1.37
1500	1180	1.13	1241	1.27	1295	1.37	1339	1.43	1382	1.57
1600	1207	1.25	1269	1.40	1326	1.54	1376	1.65	1420	1.81
1700	1235	1.37	1296	1.53	1354	1.70	1407	1.84	1452	2.02
1800	1263	1.49	1323	1.67	1381	1.85	1436	2.02	**1482**	**2.22**
1900	1294	1.63	1351	1.81	1408	2.00	**1463**	**2.19**	—	—
2000	1325	1.78	1362	1.97	1436	2.16	**1489**	**2.36**	—	—

LEGEND AND NOTES FOR TABLES 12 AND 13

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. [shaded box] indicates field-supplied motor and drive required.
3. Motor drive range is 840 to 1185 rpm for standard motor; 1075 to 1455 rpm for high-static motor. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils. See page 28 for accessory/FIOP static pressure information.
5. Maximum continuous bhp is 1.2 for standard motor, 2.4 for high-static motor. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Evaporator-Fan Motor Data tables on page 20 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 14 — 48HJ006 Fan Performance — Vertical Discharge Units With Standard Motor

Single-Phase Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	**771**	**0.37**	**828**	**0.44**	**935**	**0.58**	1027	0.73	1107	0.88	1185	1.04	1257	1.20	1330	1.38	1411	1.59
1600	**816**	**0.45**	**869**	**0.51**	**968**	**0.66**	1056	0.81	1127	0.97	1215	1.14	1286	1.31	1353	1.49	1421	1.68
1700	**902**	**0.61**	**940**	**0.60**	**1007**	**0.75**	1094	0.91	1175	1.09	1245	1.26	1315	1.44	1381	1.52	1443	1.69
1800	**942**	**0.70**	**978**	**0.66**	1063	0.82	1147	0.97	1248	1.20	1322	1.33	1395	1.46	1475	1.56	1542	1.71
1900	**982**	**0.80**	1023	0.78	1097	0.91	1175	1.11	1266	1.29	1356	1.47	1430	1.58	1504	1.69	1556	1.82
2000	1022	0.91	1068	0.90	1132	1.01	1218	1.23	1303	1.41	1397	1.52	1459	1.67	1532	1.82	1588	1.97
2100	1063	0.99	1115	1.00	1180	1.17	1261	1.35	1340	1.53	1428	1.66	1489	1.80	1567	1.99	1626	2.16
2200	1104	1.13	1159	1.15	1214	1.28	1310	1.52	1375	1.63	1459	1.80	1528	1.95	1603	2.17	1666	2.37
2300	1130	1.26	1202	1.29	1248	1.38	1358	1.69	1410	1.72	1488	1.93	1561	2.13	1637	2.35	1710	2.54
2400	1174	1.37	1237	1.41	1292	1.55	1392	1.81	1460	1.90	1532	2.14	1584	2.28	1671	2.55	1756	2.70
2500	1201	1.48	1272	1.53	1335	1.71	1427	1.94	1518	2.16	1575	2.35	1633	2.53	1698	2.72	—	—

3-Phase Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	**771**	**0.37**	**828**	**0.44**	**935**	**0.58**	**1027**	**0.73**	**1107**	**0.88**	1185	1.04	1257	1.20	1330	1.38	1411	1.59
1600	**816**	**0.45**	**869**	**0.51**	**968**	**0.66**	**1056**	**0.81**	1127	0.97	1215	1.14	1286	1.31	1353	1.49	1421	1.68
1700	**902**	**0.61**	**940**	**0.60**	**1007**	**0.75**	**1094**	**0.91**	1175	1.09	1245	1.26	1315	1.44	1381	1.52	1443	1.69
1800	**942**	**0.70**	**978**	**0.66**	**1063**	**0.82**	1147	0.97	1248	1.20	1322	1.33	1395	1.46	1475	1.56	1542	1.71
1900	**982**	**0.80**	**1023**	**0.78**	**1097**	**0.91**	1175	1.11	1266	1.29	1356	1.47	1430	1.58	1504	1.69	1556	1.82
2000	**1022**	**0.91**	**1068**	**0.90**	1132	1.01	1218	1.23	1303	1.41	1397	1.52	1459	1.67	1532	1.82	**1588**	**1.97**
2100	**1063**	**0.99**	1115	1.00	1180	1.17	1261	1.35	1340	1.53	1428	1.66	1489	1.80	1567	1.99	**1626**	**2.16**
2200	**1104**	**1.13**	1159	1.15	1214	1.28	1310	1.52	1375	1.63	1459	1.80	1528	1.95	**1603**	**2.17**	**1666**	**2.37**
2300	1130	1.26	1202	1.29	1248	1.38	1358	1.69	1410	1.72	1488	1.93	1561	2.13	**1637**	**2.35**	1710	2.54
2400	1174	1.37	1237	1.41	1292	1.55	1392	1.81	1460	1.90	1532	2.14	1584	2.28	1671	2.55	1756	2.70
2500	1201	1.48	1272	1.53	1335	1.71	1427	1.94	1518	2.16	1575	2.35	1633	2.53	1698	2.72	—	—

Table 15 — 48HJ006 Fan Performance — Vertical Discharge Units With High-Static Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	**808**	**0.42**	**914**	**0.56**	**1001**	**0.69**	**1084**	**0.85**	**1168**	**1.01**
1600	**846**	**0.49**	**950**	**0.64**	**1034**	**0.78**	**1111**	**0.94**	**1194**	**1.11**
1700	**884**	**0.57**	**983**	**0.72**	**1068**	**0.88**	**1145**	**1.03**	**1218**	**1.21**
1800	**924**	**0.66**	**1018**	**0.82**	**1105**	**0.98**	**1179**	**1.13**	**1246**	**1.32**
1900	**965**	**0.76**	**1057**	**0.92**	**1143**	**1.10**	**1212**	**1.26**	**1280**	**1.43**
2000	**1008**	**0.87**	**1096**	**1.04**	**1177**	**1.22**	**1247**	**1.40**	1300	1.57
2100	**1051**	**0.99**	**1136**	**1.17**	**1210**	**1.35**	**1284**	**1.54**	1347	1.72
2200	**1095**	**1.12**	**1173**	**1.30**	**1245**	**1.49**	1322	1.70	1380	1.89
2300	**1140**	**1.26**	**1210**	**1.47**	**1284**	**1.65**	1356	1.80	1418	2.07
2400	**1185**	**1.41**	**1249**	**1.61**	1323	1.80	1389	2.03	1456	2.26
2500	**1231**	**1.57**	**1289**	**1.78**	1363	2.00	1424	2.22	1500	2.45

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	**1199**	**1.19**	1126	1.46	1250	1.69	1301	1.91	1349	2.12
1600	**1263**	**1.28**	1275	1.49	1299	1.78	1352	2.01	1401	2.23
1700	**1295**	**1.39**	1351	1.58	1352	1.80	1407	2.03	1459	2.26
1800	1319	1.52	1389	1.71	1435	1.91	1494	2.15	1548	2.40
1900	1343	1.64	1415	1.80	1478	2.05	1538	2.31	1594	2.57
2000	1374	1.77	1438	1.99	1505	2.21	1566	2.49	1624	2.77
2100	1409	1.91	1465	2.14	1533	2.45	1596	2.77	1654	3.08
2200	1442	2.08	1498	2.30	1568	2.64	1632	2.97	1691	3.31
2300	1475	2.26	1554	2.64	1627	3.03	1693	3.42	1755	3.81
2400	1565	2.47	1649	2.89	1726	3.31	—	—	—	—
2500	1596	2.95	1682	3.45	1760	3.96	—	—	—	—

LEGEND AND NOTES FOR TABLES 14 AND 15

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. (shaded) indicates field-supplied motor and drive required.
3. Motor drive range is 1020 to 1460 rpm for single-phase standard motors, 1120 to 1585 for 3-phase standard motors, and 1300 to 1685 for high-static motors. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils. See page 28 for accessory/FIOP static pressure information.
5. Maximum continuous bhp is 1.30 for single-phase standard motors, 2.40 for 3-phase standard motors, and 2.90 for high-static motors. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Evaporator-Fan Motor Data tables on page 20 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 16 — 48HJ007 Fan Performance — Vertical Discharge Units With Standard Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	**942**	**0.70**	**978**	**0.66**	**1063**	**0.82**	1147	0.97	1248	1.20	1322	1.33	1395	1.46	1475	1.56	1542	1.71
1900	**982**	**0.80**	**1023**	**0.78**	**1097**	**0.91**	1175	1.11	1266	1.29	1356	1.47	1430	1.58	1504	1.69	1556	1.82
2000	**1022**	**0.91**	**1068**	**0.90**	1132	1.01	1218	1.23	1303	1.41	1397	1.52	1459	1.67	1532	1.82	**1588**	**1.97**
2100	**1063**	**0.99**	**1115**	**1.00**	1180	1.17	1261	1.35	1340	1.53	1428	1.66	1489	1.80	1567	1.99	**1626**	**2.16**
2200	**1104**	**1.13**	1159	1.15	1214	1.28	1310	1.52	1375	1.63	1459	1.80	1528	1.95	**1603**	**2.17**	**1666**	**2.37**
2300	1130	1.26	1202	1.29	1248	1.38	1358	1.69	1410	1.72	1488	1.93	1561	2.13	**1637**	**2.35**	1710	2.54
2400	1174	1.37	1237	1.41	1292	1.55	1392	1.81	1460	1.90	1532	2.14	1584	2.28	1671	2.55	1756	2.70
2500	1201	1.48	1272	1.53	1335	1.71	1427	1.94	1518	2.16	1575	2.35	1633	2.53	1698	2.72	—	—
2600	1246	1.62	1320	1.68	1368	1.81	1458	2.06	1562	2.42	1620	2.59	1675	2.77	—	—	—	—
2700	1285	1.75	1361	1.82	1400	1.91	1490	2.19	1602	2.64	1666	2.85	—	—	—	—	—	—
2800	1304	1.87	1402	1.95	1439	2.08	1543	2.43	1642	2.86	—	—	—	—	—	—	—	—
2900	1345	2.07	1446	2.16	1477	2.16	1585	2.65	—	—	—	—	—	—	—	—	—	—
3000	1378	2.26	1489	2.36	1529	2.52	1598	2.73	—	—	—	—	—	—	—	—	—	—

Table 17 — 48HJ007 Fan Performance — Vertical Discharge Units With High-Static Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	**978**	**0.66**	**1063**	**0.82**	**1147**	**0.97**	**1248**	**1.20**	1322	1.33
1900	**1023**	**0.78**	**1097**	**0.91**	**1175**	**1.11**	**1266**	**1.29**	1356	1.47
2000	**1068**	**0.90**	**1132**	**1.01**	**1218**	**1.23**	1303	1.41	1397	1.52
2100	**1115**	**1.00**	**1180**	**1.17**	**1261**	**1.35**	1340	1.53	1428	1.66
2200	**1159**	**1.15**	**1214**	**1.28**	1310	1.52	1375	1.63	1459	1.80
2300	**1202**	**1.29**	**1248**	**1.38**	1358	1.69	1410	1.72	1488	1.93
2400	**1237**	**1.41**	**1292**	**1.55**	1392	1.81	1460	1.90	1532	2.14
2500	**1272**	**1.53**	1335	1.71	1427	1.94	1518	2.16	1575	2.35
2600	1320	1.68	1368	1.81	1458	2.06	1562	2.42	1620	2.59
2700	1361	1.82	1400	1.91	1490	2.19	1602	2.64	1666	2.85
2800	1402	1.95	1439	2.08	1543	2.43	1642	2.86	1775	3.62
2900	1446	2.16	1477	2.16	1585	2.65	1753	3.58	—	—
3000	1489	2.36	1529	2.52	1598	2.73	1767	3.69	—	—

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	1395	1.46	1475	1.56	1542	1.71	1607	1.94	1667	2.16
1900	1430	1.58	1504	1.69	1556	1.82	1621	2.06	1682	2.30
2000	1459	1.67	1532	1.82	1588	1.97	1655	2.23	**1717**	**2.49**
2100	1489	1.80	1567	1.99	1626	2.16	**1694**	**2.44**	**1758**	**2.73**
2200	1528	1.95	1603	2.17	1666	2.37	**1736**	**2.68**	—	—
2300	1561	2.13	1637	2.35	**1710**	**2.54**	**1782**	**2.87**	—	—
2400	1584	2.28	1671	2.55	**1756**	**2.70**	—	—	—	—
2500	1633	2.53	**1698**	**2.72**	1779	3.13	—	—	—	—
2600	1675	2.77	1768	3.26	—	—	—	—	—	—
2700	1776	3.45	—	—	—	—	—	—	—	—
2800	—	—	—	—	—	—	—	—	—	—
2900	—	—	—	—	—	—	—	—	—	—
3000	—	—	—	—	—	—	—	—	—	—

LEGEND AND NOTES FOR TABLES 16 AND 17

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option

NOTES:

1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. (shaded box) indicates field-supplied motor and drive required.
3. Motor drive range is 1120 to 1585 rpm for standard motors, 1130 to 1685 rpm for high-static motors. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils. See page 28 for accessory/FIOP static pressure information.
5. Maximum continuous bhp is 2.40 for standard motors, 2.90 for high-static motors. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Evaporator-Fan Motor Data tables on page 20 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 18 — 48HJ004 Fan Performance — Horizontal Discharge Units With Standard Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
	0.1		0.2		0.3		0.4		0.5		0.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	**526**	**0.06**	**584**	**0.08**	**656**	**0.12**	**734**	**0.22**	818	0.25	875	0.27
1000	**570**	**0.09**	**627**	**0.13**	**738**	**0.19**	800	0.26	848	0.29	895	0.31
1100	**614**	**0.13**	**670**	**0.16**	**758**	**0.23**	812	0.29	863	0.32	914	0.35
1200	**658**	**0.16**	**710**	**0.23**	780	0.28	840	0.32	889	0.36	938	0.40
1300	**703**	**0.20**	**752**	**0.27**	808	0.32	868	0.37	916	0.41	963	0.45
1400	**725**	**0.29**	776	0.31	845	0.38	891	0.42	937	0.47	983	0.51
1500	**755**	**0.33**	816	0.38	870	0.43	924	0.48	969	0.53	1014	0.58

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
	0.7		0.8		0.9		1.0		1.1		1.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	924	0.32	953	0.35	989	0.38	1028	0.42	1074	0.45	**1120**	**0.50**
1000	936	0.35	977	0.39	1020	0.44	1064	0.48	**1124**	**0.52**	**1185**	**0.55**
1100	960	0.39	1005	0.43	1052	0.49	**1100**	**0.52**	**1163**	**0.56**	**1225**	**0.60**
1200	988	0.45	1038	0.50	1076	0.53	**1136**	**0.59**	**1201**	**0.61**	**1266**	**0.64**
1300	1012	0.51	1061	0.56	**1094**	**0.61**	**1172**	**0.65**	**1239**	**0.69**	**1306**	**0.72**
1400	1027	0.56	1071	0.60	**1108**	**0.67**	**1208**	**0.70**	**1278**	**0.75**	**1347**	**0.79**
1500	1056	0.63	**1097**	**0.68**	**1117**	**0.70**	**1245**	**0.74**	**1315**	**0.80**	**1385**	**0.85**

Table 19 — 48HJ004 Fan Performance — Horizontal Discharge Units With High-Static Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	**584**	**0.08**	**734**	**0.22**	**875**	**0.27**	**953**	**0.36**	**1028**	**0.42**
1000	**627**	**0.13**	**800**	**0.26**	**895**	**0.31**	**977**	**0.39**	**1064**	**0.48**
1100	**670**	**0.16**	**812**	**0.29**	**914**	**0.35**	**1005**	**0.43**	1100	0.52
1200	**710**	**0.23**	**840**	**0.32**	**938**	**0.40**	**1038**	**0.50**	1136	0.59
1300	**752**	**0.27**	**868**	**0.37**	**963**	**0.45**	**1061**	**0.56**	1172	0.65
1400	**776**	**0.31**	**891**	**0.42**	**983**	**0.51**	**1071**	**0.60**	1208	0.70
1500	**816**	**0.38**	**924**	**0.48**	**1014**	**0.58**	1097	0.68	1245	0.74

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
900	1120	0.54	1155	0.59	1186	0.64	1215	0.69	1240	0.73
1000	1185	0.60	1222	0.66	1255	0.71	1285	0.77	1312	0.82
1100	1225	0.65	1263	0.71	1298	0.77	1328	0.83	1357	0.88
1200	1266	0.72	1306	0.79	1341	0.86	1373	0.92	1402	0.98
1300	1306	0.79	1347	0.87	1383	0.94	1416	1.01	1446	1.07
1400	1347	0.87	1389	0.95	1427	1.03	**1461**	**1.11**	**1492**	**1.18**
1500	1385	0.96	1428	1.05	**1467**	**1.14**	**1502**	**1.22**	**1534**	**1.30**

LEGEND AND NOTES FOR TABLES 18 AND 19

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. Motor drive range is 760 to 1090 rpm for standard motors; 1075 to 1455 rpm for high-static motors. All other rpms require a field-supplied drive.
3. Values include losses for filters, unit casing, and wet coils. See page 28 for accessory/FIOP static pressure information.
4. Maximum continuous bhp is 1.20 for standard motors; 2.40 for high-static motors. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Evaporator-Fan Motor Data tables on page 20 for additional information.
5. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
6. Interpolation is permissible. Do not extrapolate.

Table 20 — 48HJ005 Fan Performance — Horizontal Discharge Units With Standard Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.1		0.2		0.3		0.4		0.6		0.7		0.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	**569**	**0.18**	**641**	**0.23**	**701**	**0.29**	**761**	**0.34**	859	0.46	901	0.52	943	0.58
1300	**604**	**0.22**	**673**	**0.28**	**731**	**0.34**	**788**	**0.39**	887	0.52	928	0.59	968	0.65
1400	**640**	**0.27**	**705**	**0.33**	**761**	**0.39**	**817**	**0.45**	914	0.59	955	0.66	996	0.72
1500	**676**	**0.32**	**738**	**0.38**	**793**	**0.45**	847	0.51	940	0.65	982	0.73	1024	0.81
1600	**713**	**0.38**	**772**	**0.44**	**825**	**0.51**	877	0.58	967	0.73	1009	0.81	1051	0.89
1700	**750**	**0.45**	**806**	**0.51**	857	0.59	908	0.66	997	0.81	1037	0.90	1077	1.01
1800	**788**	**0.52**	841	0.59	890	0.67	939	0.75	1026	0.91	1065	1.01	1104	1.07
1900	**826**	**0.60**	876	0.68	924	0.76	971	0.84	1056	1.01	1094	1.10	1132	1.18
2000	864	0.70	912	0.77	958	0.86	1004	0.94	1087	1.12	1125	1.21	1162	1.30

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)													
	0.9		1.0		1.1		1.2		1.4		1.6		1.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	987	0.64	1030	0.70	1068	0.79	1106	0.87	1134	0.98	**1189**	**1.12**	1245	1.21
1300	1006	0.71	1044	0.77	1086	0.84	1128	0.91	1183	1.10	1226	1.23	1297	1.35
1400	1033	0.79	1069	0.86	1104	0.93	1139	1.01	**1218**	**1.14**	1286	1.34	1320	1.48
1500	1060	0.88	1095	0.95	1129	1.02	1162	1.09	1228	1.24	1303	1.40	1343	1.60
1600	1087	1.01	1123	1.05	1156	1.13	1185	1.20	1250	1.35	1319	1.51	1382	1.68
1700	1114	1.07	1151	1.15	1183	1.23	1215	1.31	1276	1.48	1334	1.64	1398	1.80
1800	1141	1.17	1178	1.26	1211	1.35	1243	1.43	1303	1.61	1359	1.78	1418	1.95
1900	1168	1.28	1204	1.37	1238	1.47	1271	1.56	1330	1.74	1386	1.93	1439	2.11
2000	1197	1.39	1231	1.48	1265	1.59	1298	1.69	1358	1.89	1413	2.08	1466	2.27

Table 21 — 48HJ005 Fan Performance — Horizontal Discharge Units With High-Static Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	**641**	**0.23**	**761**	**0.34**	**859**	**0.46**	**943**	**0.58**	**1030**	**0.70**
1300	**673**	**0.28**	**788**	**0.39**	**887**	**0.52**	**968**	**0.65**	**1044**	**0.77**
1400	**705**	**0.33**	**817**	**0.45**	**914**	**0.59**	**996**	**0.72**	**1069**	**0.86**
1500	**738**	**0.38**	**847**	**0.51**	**940**	**0.65**	**1024**	**0.81**	1095	0.95
1600	**772**	**0.44**	**877**	**0.58**	**967**	**0.73**	**1051**	**0.89**	1123	1.05
1700	**806**	**0.51**	**908**	**0.66**	**997**	**0.81**	1077	1.01	1151	1.15
1800	**841**	**0.59**	**939**	**0.75**	**1026**	**0.91**	1104	1.07	1178	1.26
1900	**876**	**0.68**	**971**	**0.84**	**1056**	**1.01**	1132	1.18	1204	1.37
2000	**912**	**0.77**	**1004**	**0.94**	1087	1.12	1162	1.30	1231	1.48

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	1106	0.87	1134	0.98	1189	1.12	1245	1.21	1292	1.35
1300	1128	0.91	1183	1.10	1226	1.23	1297	1.35	1346	1.51
1400	1139	1.01	1218	1.14	1286	1.34	1320	1.48	1370	1.65
1500	1162	1.09	1228	1.24	1303	1.40	1343	1.60	1393	1.79
1600	1185	1.20	1250	1.35	1319	1.51	1382	1.68	1434	1.88
1700	1215	1.31	1276	1.48	1334	1.64	1398	1.80	1451	2.01
1800	1243	1.43	1303	1.61	1359	1.78	1418	1.95	**1471**	**2.18**
1900	1271	1.56	1330	1.74	1386	1.93	1439	2.11	**1493**	**2.36**
2000	1298	1.69	1358	1.89	1413	2.08	**1466**	**2.27**	15.21	2.54

LEGEND AND NOTES FOR TABLES 20 AND 21

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. (shaded) indicates field-supplied motor and drive required.
3. Motor drive range is 840 to 1185 rpm for standard units; 1075 to 1455 rpm for high-static motors. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils. See page 28 for accessory/FIOP static pressure information.
5. Maximum continuous bhp is 1.20 for standard motors; 2.40 for high-static motors. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Evaporator-Fan Motor Data tables on page 20 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 22 — 48HJ006 Fan Performance — Horizontal Discharge Units With Standard Motor

Single-Phase Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm
1500	**741**	**0.38**	**798**	**0.43**	**895**	**0.54**	**990**	**0.67**	1073	0.80	1154	0.95	1218	1.12	1295	1.36	1360	1.40
1600	**783**	**0.45**	**838**	**0.51**	**933**	**0.63**	**1016**	**0.75**	1102	0.90	1182	1.04	1251	1.20	1310	1.40	1385	1.49
1700	**825**	**0.53**	**878**	**0.60**	**969**	**0.72**	1049	0.84	1134	1.00	1206	1.14	1281	1.31	1342	1.48	1398	1.53
1800	**885**	**0.63**	**942**	**0.73**	1047	0.90	1139	1.05	1193	1.14	1276	1.30	1341	1.40	1413	1.55	1474	1.58
1900	**928**	**0.73**	**982**	**0.83**	1084	1.02	1160	1.11	1223	1.24	1301	1.38	1374	1.53	1437	1.62	1490	1.67
2000	**971**	**0.84**	1022	0.94	1121	1.12	1188	1.22	1254	1.36	1329	1.44	1396	1.66	1460	1.68	1509	1.77
2100	**1015**	**0.97**	1063	1.10	1140	1.18	1196	1.27	1272	1.45	1354	1.58	1413	1.75	1475	1.73	1529	1.92
2200	1060	1.10	1104	1.20	1159	1.23	1229	1.41	1306	1.53	1363	1.70	1434	1.81	1487	1.85	1554	2.07
2300	1104	1.25	1130	1.27	1196	1.37	1264	1.56	1340	1.66	1397	1.86	1459	1.88	1520	2.07	1576	2.24
2400	1138	1.30	1174	1.37	1245	1.57	1305	1.63	1373	1.84	1440	1.95	1502	2.06	1552	2.24	1604	2.42
2500	1183	1.43	1201	1.50	1284	1.65	1338	1.75	1402	1.99	1469	2.04	1524	2.24	1585	2.42	1638	2.60

3-Phase Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm
1500	**741**	**0.38**	**798**	**0.43**	**895**	**0.54**	**990**	**0.67**	**1073**	**0.80**	1154	0.95	1218	1.12	1295	1.36	1360	1.40
1600	**783**	**0.45**	**838**	**0.51**	**933**	**0.63**	**1016**	**0.75**	**1102**	**0.90**	1182	1.04	1251	1.20	1310	1.40	1385	1.49
1700	**825**	**0.53**	**878**	**0.60**	**969**	**0.72**	**1049**	**0.84**	1134	1.00	1206	1.14	1281	1.31	1342	1.48	1398	1.53
1800	**885**	**0.63**	**942**	**0.73**	**1047**	**0.90**	1139	1.05	1193	1.14	1276	1.30	1341	1.40	1413	1.55	1474	1.58
1900	**928**	**0.73**	**982**	**0.83**	**1084**	**1.02**	1160	1.11	1223	1.24	1301	1.38	1374	1.53	1437	1.62	1490	1.67
2000	**971**	**0.84**	**1022**	**0.94**	1121	1.12	1188	1.22	1254	1.36	1329	1.44	1396	1.66	1460	1.68	1509	1.77
2100	**1015**	**0.97**	**1063**	**1.10**	1140	1.18	1196	1.27	1272	1.45	1354	1.58	1413	1.75	1475	1.73	1529	1.92
2200	**1060**	**1.10**	**1104**	**1.20**	1159	1.23	1229	1.41	1306	1.53	1363	1.70	1434	1.81	1487	1.85	1554	2.07
2300	**1104**	**1.25**	1130	1.27	1196	1.37	1264	1.56	1340	1.66	1397	1.86	1459	1.88	1520	2.07	1576	2.24
2400	1138	1.30	1174	1.37	1245	1.57	1305	1.63	1373	1.84	1440	1.95	1502	2.06	1552	2.24	1604	2.42
2500	1183	1.43	1201	1.50	1284	1.65	1338	1.75	1402	1.99	1469	2.04	1524	2.24	1585	2.42	1638	2.60

Table 23 — 48HJ006 Fan Performance — Horizontal Discharge Units With High-Static Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	**789**	**0.40**	**896**	**0.53**	**990**	**0.67**	**1072**	**0.83**	**1153**	**1.00**
1600	**826**	**0.46**	**931**	**0.61**	**1020**	**0.75**	**1101**	**0.91**	**1178**	**1.09**
1700	**865**	**0.54**	**966**	**0.69**	**1051**	**0.84**	**1133**	**1.01**	**1205**	**1.18**
1800	**905**	**0.62**	**1002**	**0.78**	**1084**	**0.93**	**1163**	**1.10**	**1235**	**1.29**
1900	**945**	**0.72**	**1037**	**0.88**	**1119**	**1.04**	**1194**	**1.21**	**1266**	**1.40**
2000	**984**	**0.82**	**1072**	**0.98**	**1154**	**1.16**	**1226**	**1.33**	**1297**	**1.53**
2100	**1024**	**0.93**	**1108**	**1.10**	**1192**	**1.29**	**1259**	**1.47**	1327	1.66
2200	**1064**	**1.05**	**1145**	**1.22**	**1225**	**1.43**	**1294**	**1.62**	1359	1.80
2300	**1104**	**1.18**	**1183**	**1.36**	**1260**	**1.57**	1330	1.78	1392	1.97
2400	**1145**	**1.32**	**1222**	**1.45**	**1296**	**1.73**	1365	1.94	1426	2.15
2500	**1186**	**1.48**	**1262**	**1.68**	1331	1.89	1400	2.12	1461	2.34

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	**1221**	**1.17**	**1256**	**1.30**	1283	1.32	1303	1.22	1345	1.34
1600	**1252**	**1.27**	1311	1.45	1340	1.58	1330	1.61	1373	1.77
1700	**1278**	**1.37**	1345	1.57	1397	1.76	1424	1.89	1470	2.08
1800	1303	1.48	1371	1.69	1433	1.90	1480	2.09	1528	2.30
1900	1330	1.59	1396	1.80	1460	2.03	1517	2.25	1566	2.47
2000	1362	1.73	1422	1.94	1485	2.16	1544	2.40	1594	2.64
2100	1393	1.87	1452	2.08	1510	2.31	1570	2.55	1620	2.80
2200	1423	2.02	1483	2.24	1538	2.46	1594	2.71	1645	2.98
2300	1454	2.18	1515	2.41	1571	2.64	1623	2.88	1676	3.17
2400	1485	2.36	1544	2.59	1604	2.84	1657	3.07	1710	3.38
2500	1518	2.55	1574	2.78	1633	3.03	1692	3.28	1746	3.61

LEGEND AND NOTES FOR TABLES 22 AND 23

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option

NOTES:

1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. (shaded) indicates field-supplied motor and drive required.
3. Motor drive range is 1020 to 1460 rpm for single-phase standard units, 1120 to 1585 for 3-phase standard units, and 1300 to 1685 for high-static units. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils. See page 28 for accessory/FIOP static pressure information.
5. Maximum continuous bhp is 1.30 for single-phase standard units, 2.40 for 3-phase standard motors, and 2.90 for high-static motors. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Evaporator-Fan Motor Data tables on page 20 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 24 — 48HJ007 Fan Performance — Horizontal Discharge Units With Standard Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	**885**	**0.63**	**942**	**0.73**	**1047**	**0.90**	1139	1.05	1193	1.14	1276	1.30	1341	1.40	1413	1.55	1474	1.58
1900	**928**	**0.73**	**982**	**0.83**	**1084**	**1.02**	1160	1.11	1223	1.24	1301	1.38	1374	1.53	1437	1.62	1490	1.67
2000	**971**	**0.84**	**1022**	**0.94**	1121	1.12	1188	1.22	1254	1.36	1329	1.44	1396	1.66	1460	1.68	1509	1.77
2100	**1015**	**0.97**	**1063**	**1.10**	1140	1.18	1196	1.27	1272	1.45	1354	1.58	1413	1.75	1475	1.73	1529	1.92
2200	**1060**	**1.10**	**1104**	**1.20**	1159	1.23	1229	1.41	1306	1.53	1363	1.70	1434	1.81	1487	1.85	1554	2.07
2300	**1104**	**1.25**	1130	1.27	1196	1.37	1264	1.56	1340	1.66	1397	1.86	1459	1.88	1520	2.07	1576	2.24
2400	1138	1.30	1174	1.37	1245	1.57	1305	1.63	1373	1.84	1440	1.95	1502	2.06	1552	2.24	1604	2.42
2500	1183	1.43	1201	1.50	1284	1.65	1338	1.75	1402	1.99	1469	2.04	1524	2.24	1585	2.42	1638	2.60
2600	1210	1.58	1243	1.67	1312	1.76	1366	1.96	1435	2.10	1494	2.19	1552	2.40	1616	2.63	1671	2.80
2700	1254	1.76	1285	1.80	1354	1.95	1403	2.14	1474	2.21	1536	2.46	1584	2.61	1646	2.83	1706	2.97
2800	1274	1.82	1304	1.85	1374	2.12	1459	2.25	1514	2.42	1570	2.66	1624	2.85	1677	2.99	—	—
2900	1318	1.95	1345	2.05	1412	2.32	1496	2.45	1529	2.61	1603	2.87	1671	3.03	—	—	—	—
3000	1362	2.20	1378	2.30	1451	2.40	1534	2.66	1560	2.81	1611	3.01	—	—	—	—	—	—

Table 25 — 48HJ007 Fan Performance — Horizontal Discharge Units With High-Static Motor

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	**942**	**0.73**	**1047**	**0.90**	**1139**	**1.05**	**1193**	**1.14**	**1276**	**1.30**	1341	1.40	1413	1.55	1474	1.58	1522	1.74	1566	1.89
1900	**982**	**0.83**	**1084**	**1.02**	**1160**	**1.11**	**1223**	**1.24**	1301	1.38	1374	1.53	1437	1.62	1490	1.67	1538	1.84	1583	2.00
2000	**1022**	**0.94**	**1121**	**1.12**	**1188**	**1.22**	**1264**	**1.36**	1329	1.44	1396	1.66	1460	1.68	1509	1.77	1558	1.95	1603	2.12
2100	**1063**	**1.10**	**1140**	**1.18**	**1196**	**1.27**	**1272**	**1.45**	1354	1.58	1413	1.75	1475	1.73	1529	1.92	1578	2.11	1624	2.30
2200	**1104**	**1.20**	**1159**	**1.23**	**1229**	**1.41**	1306	1.53	1363	1.70	1434	1.81	1487	1.85	1554	2.07	1604	2.28	1651	2.48
2300	**1130**	**1.27**	**1196**	**1.37**	**1264**	**1.56**	1340	1.66	1397	1.86	1459	1.88	1520	2.07	1576	2.24	1627	2.46	1674	2.68
2400	**1174**	**1.37**	**1245**	**1.57**	1305	1.63	1373	1.84	1440	1.95	1502	2.06	1552	2.24	1604	2.42	1656	2.66	**1704**	**2.90**
2500	**1201**	**1.50**	**1284**	**1.65**	1338	1.75	1402	1.99	1469	2.04	1524	2.24	1585	2.42	1638	2.60	**1691**	**2.86**	1740	3.12
2600	**1246**	**1.67**	1312	1.76	1366	1.96	1435	2.10	1494	2.19	1552	2.40	1616	2.63	1671	2.80	1726	3.09	1775	3.35
2700	**1285**	**1.80**	1354	1.95	1403	2.14	1474	2.21	1536	2.46	1584	2.61	1646	2.83	1706	2.97	1761	3.27	—	—
2800	1304	1.85	1374	2.12	1459	2.25	1514	2.42	1570	2.66	1624	2.85	1677	2.99	1739	3.33	1795	3.67	—	—
2900	1345	2.05	1412	2.32	1496	2.54	1529	2.61	1603	2.87	1671	3.03	1742	3.43	—	—	—	—	—	—
3000	1378	2.30	1451	2.40	1534	2.66	1560	2.81	1611	3.01	1692	3.49	1764	3.95	—	—	—	—	—	—

LEGEND AND NOTES FOR TABLES 24 AND 25

LEGEND

Bhp — Brake Horsepower Input to Fan
FIOP — Factory-Installed Option

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. indicates field-supplied motor and drive required.
3. Motor drive range is 1120 to 1585 rpm for standard motors; 1300 to 1685 rpm for high-static motors. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils. See below for accessory/FIOP static pressure information.
5. Maximum continuous bhp is 2.4 for standard motors; 2.9 for high-static motors. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected. See Evaporator-Fan Motor Data tables on page 20 for additional information.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 26 — Economizer Static Pressure Drop (in. wg)

UNIT	CFM								
	900	1200	1400	1600	1800	2000	2200	2400	2600
Durablade	.05	.05	.05	.05	.05	.05	.05	.05	.05
EconoMi$er	.05	.10	.13	.17	.22	.27	.32	.39	.45

Table 27 — FIOP MoistureMiser Dehumidification Package Static Pressure Drop (in. wg)

UNIT SIZE 48HJ	UNIT NOMINAL TONS	CFM PER TON		
		300	400	500
E/F004	3	.04	.07	.09
D/E/F005	4	.07	.12	.15
D/E/F006	5	.09	.15	.21
D/E/F007	6	.12	.20	.28

LEGEND

FIOP — Factory-Installed Option

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.
> 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 and then gas to unit.
>   b. Reclaim refrigerant to relieve all pressure from system using both high- and low-pressure ports.
>   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 for shipping and handling damages such as broken lines, loose parts, or disconnected wires, etc.
   b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak-test all refrigerant tubing connections using electronic leak detector, halide torch, or liquid-soap solution.
   c. Inspect all field- and factory-wiring connections. Be sure that connections are completed and tight. Be sure that wires are not in contact with refrigerant tubing or sharp edges.
   d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following conditions:
   a. Make sure that condenser-fan blade are correctly positioned in fan orifice. See Condenser-Fan Adjustment section on page 34 for more details.
   b. Make sure that air filter(s) is in place.
   c. Make sure that condensate drain trap is filled with water to ensure proper drainage.
   d. Make sure that all tools and miscellaneous loose parts have been removed.

START-UP

Unit Preparation — Make sure that unit has been installed in accordance with installation instructions and applicable codes.

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

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

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

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

Refrigerant Service Ports — Each unit system has 3 Schrader-type service ports: one on the suction line, one on the liquid line, and one on the compressor discharge line. Be sure that caps on the ports are tight. Two additional Schrader valves are located under the high-pressure and low-pressure switches, respectively.

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

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

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

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

1. Note that the evaporator fan (006 and 007 only) is probably also rotating in the wrong direction.
2. Turn off power to the unit, tag disconnect.
3. Reverse any two of the unit power leads.
4. Reenergize to the compressor. Check pressures.

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

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

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

Check unit charge. Refer to Refrigerant Charge section on page 34.

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

TO SHUT OFF UNIT — Set system selector switch at OFF position. Resetting thermostat at a position above room temperature shuts unit off temporarily until space temperature exceeds thermostat setting. Units are equipped with Cycle-LOC™ protection device. Unit shuts down on any safety trip, and indicator light on thermostat comes on. Check reason for all safety trips.

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

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

TO CHECK ignition of main burners and heating controls, move thermostat set point above room temperature and verify that the burners light and evaporator fan is energized. Check heating effect, then lower the thermostat setting below the room temperature and verify that the burners and evaporator fan turn off.

Refer to Table 28 for the correct orifice to use at high altitudes.

Table 28 — Altitude Compensation*

ELEVATION (ft)	72,000 AND 115,000 BTUH NOMINAL INPUT		150,000 BTUH NOMINAL INPUT	
	Natural Gas Orifice Size†	Liquid Propane Orifice Size†	Natural Gas Orifice Size†	Liquid Propane Orifice Size†
0-2,000	33	43	30	38
2,000	34	43	30	39
3,000	35	44	31	40
4,000	36	44	32	41
5,000	36	44	33	42
6,000	37	45	34	43
7,000	37	45	35	43
8,000	38	46	36	44
9,000	39	47	37	44
10,000	41	48	38	45
11,000	43	48	39	45
12,000	44	49	40	46
13,000	44	49	41	47
14,000	45	50	42	47

*As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes.
†Orifices available through your local Carrier distributor.

Heating

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

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

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

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

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

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

Safety Relief — A soft-solder joint at the suction service Schrader port provides pressure relief under abnormal temperature and pressure conditions.

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

Operating Sequence

COOLING, UNITS WITHOUT ECONOMIZER — When thermostat calls for cooling, terminals G and Y1 and the compressor contactor (C) are energized. The indoor (evaporator) fan motor (IFM), compressor, and outdoor (condenser) fan motor (OFM) start. The OFM runs continuously while the unit is in cooling. When the thermostat is satisfied, C is deenergized and the compressor and OFM shut off. After a 30-second delay, the (IFM) shuts off. If the thermostat fan selector switch is in the ON position, the evaporator motor will run continuously.

HEATING, UNITS WITHOUT ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. When additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45-second time-off delay.

COOLING, UNITS WITH DURABLADE ECONOMIZER — When the outdoor-air temperature is above the outdoor-air thermostat (OAT) setting and the room thermostat calls for cooling, compressor contactor is energized to start compressor and the outdoor (condenser) fan motor (OFM). The indoor (evaporator) fan motor (IFM) is energized and the economizer damper moves to the minimum position. After the thermostat is satisfied, there is a 30-second delay before the evaporator fan turns off. The damper then moves to the fully-closed position. When using continuous fan, the damper moves to the minimum position.

When the outdoor-air temperature is below the OAT setting and the thermostat calls for cooling, the economizer damper move to the minimum position. If the supply-air temperature is above 57 F, the damper continues to open until it reaches the fully-open position or until the supply-air temperature drops below 52 F.

When the supply-air temperature falls between 57 F and 52 F, the damper will remain at an intermediate open position. If the supply-air temperature falls below 52 F, the damper will modulate closed until it reaches the minimum position or until the supply-air temperature is above 52 F. When the thermostat is satisfied, the damper moves to the fully closed position when using AUTO. fan or to the minimum position when using continuous fan.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing two stages of cooling. Compressor and the condenser fan will be energized and the position of the economizer damper will be determined by the supply-air temperature. When the second stage of cooling is satisfied, the compressor and OFM will be deenergized. The damper position will be determined by the supply-air temperature. When the first stage of cooling is satisfied, there is a 30-second delay before the evaporator fan shuts off. The damper then moves to the fully closed position. When using a continuous fan, the damper moves to the minimum position.

COOLING, UNITS WITH ECONOMI$ER — When the Outdoor Air Temperature (OAT) is above the ECON SP set point and the room thermostat calls for Stage 1 cooling (R to G +Y1), the indoor-fan motor (IFM) is energized and the EconoMi$er damper modulates to minimum position. The compressor contactor is energized starting the compressor and outdoor-fan motor (OFM). After the thermostat is satisfied, the damper modulates to the fully closed position when the IFM is deenergized.

When the OAT is below the ECON SP set point and the room thermostat calls for Stage 1 cooling (R to G + Y1), the EconoMi$er modulates to the minimum position when the IFM is energized. The EconoMi$er provides Stage 1 of cooling by modulating the return and outdoor air dampers to maintain a 55 F supply air set point. If the supply-air temperature (SAT) is greater than 57 F, the EconoMi$er modulates open, allowing a greater amount of outdoor air to enter the unit. If the SAT drops below 53 F, the outdoor-air damper modules closed to reduce the amount of outdoor air. When the SAT is between 53 and 57 F, the EconoMi$er maintains its position.

HEATING, UNITS WITH ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited and the damper moves to the minimum position. When additional heat is needed, W2 energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45-second time-off delay. The economizer damper then moves to the fully closed position. When using continuous fan, the damper will remain in the minimum position.

UNITS WITH MOISTUREMISER DEHUMIDIFICATION PACKAGE — When thermostat calls for cooling, terminals G and Y1 and the compressor contactor C1 is energized. The indoor (evaporator) fan motor (IFM), compressor, and outdoor (condenser) fan motor (OFM) start. The OFM runs continuously while the unit is in cooling. As shipped from the factory, MoistureMiser dehumidification circuit is always energized. If MoistureMiser circuit modulation is desired, a field-installed, wall-mounted humidistat is required.

If the MoistureMiser humidistat is installed and calls for the MoistureMiser subcooler coil to operate, the humidistat internal switch closes. This energizes and closes the liquid line solenoid valve coil (LLSV) of the MoistureMiser circuit, forcing the hot liquid refrigerant of the liquid line to enter the subcooler coil (see Fig. 39). As the hot liquid passes through the subcooler coil, it is exposed to the cold supply airflow coming off from the evaporator coil and the liquid is further cooled to a temperature approaching the evaporator coil leaving-air temperature. The state of the refrigerant leaving the subcooler coil is a highly subcooled liquid refrigerant. The liquid then enters a thermostatic expansion valve (TXV) where the liquid is dropped to a lower pressure. The TXV does not have a pressure drop great enough to change the liquid to a 2-phase fluid. The TXV can throttle the pressure drop of the liquid refrigerant and maintain proper conditions at the compressor suction valve over a wide range of operating conditions. The liquid then enters a second fixed restrictor expansion device for a second pressure drop to a 2-phase fluid. The liquid proceeds to the evaporator coil at a temperature lower than normal cooling operation. This lower temperature is what increases the latent capacity of the rooftop. The 2-phase refrigerant passes through the evaporator and is changed into a vapor. The air passing over the evaporator coil will become colder than during normal operation as a result of the colder refrigerant temperatures. However, as it passes over the subcooler coil, the air will be warmed slightly.

As the refrigerant leaves the evaporator, the refrigerant passes a low-pressure switch in the suction line. This low-pressure switch will de-activate the MoistureMiser package when the suction pressure reaches 60 psig. The low-pressure switch is an added safety device to protect against evaporator coil freeze-up. The low-pressure switch will only de-activate and open the liquid line solenoid valve in the MoistureMiser circuit. The compressors will continue to run as long as there is a call for cooling, regardless of the position of the low-pressure switch. The solenoid valve and the MoistureMiser package will be re-activated only when the call for cooling has been satisfied, the low-pressure switch has closed, and a new call for cooling exists. The crankcase heaters on the scroll compressor provide additional protection for the compressor due to the additional refrigerant charge in the subcooler.

When the humidistat is satisfied, the humidistat internal switch opens cutting power to and opening the LLSV. The refrigerant is routed back through the evaporator and the subcooler coil is removed from the refrigerant loop.

When the thermostat is satisfied, C1 is deenergized and the compressor and OFM shut off. After a 30-second delay, the IFM shuts off. If the thermostat fan selector switch is in the ON position, the IFM will run continuously.

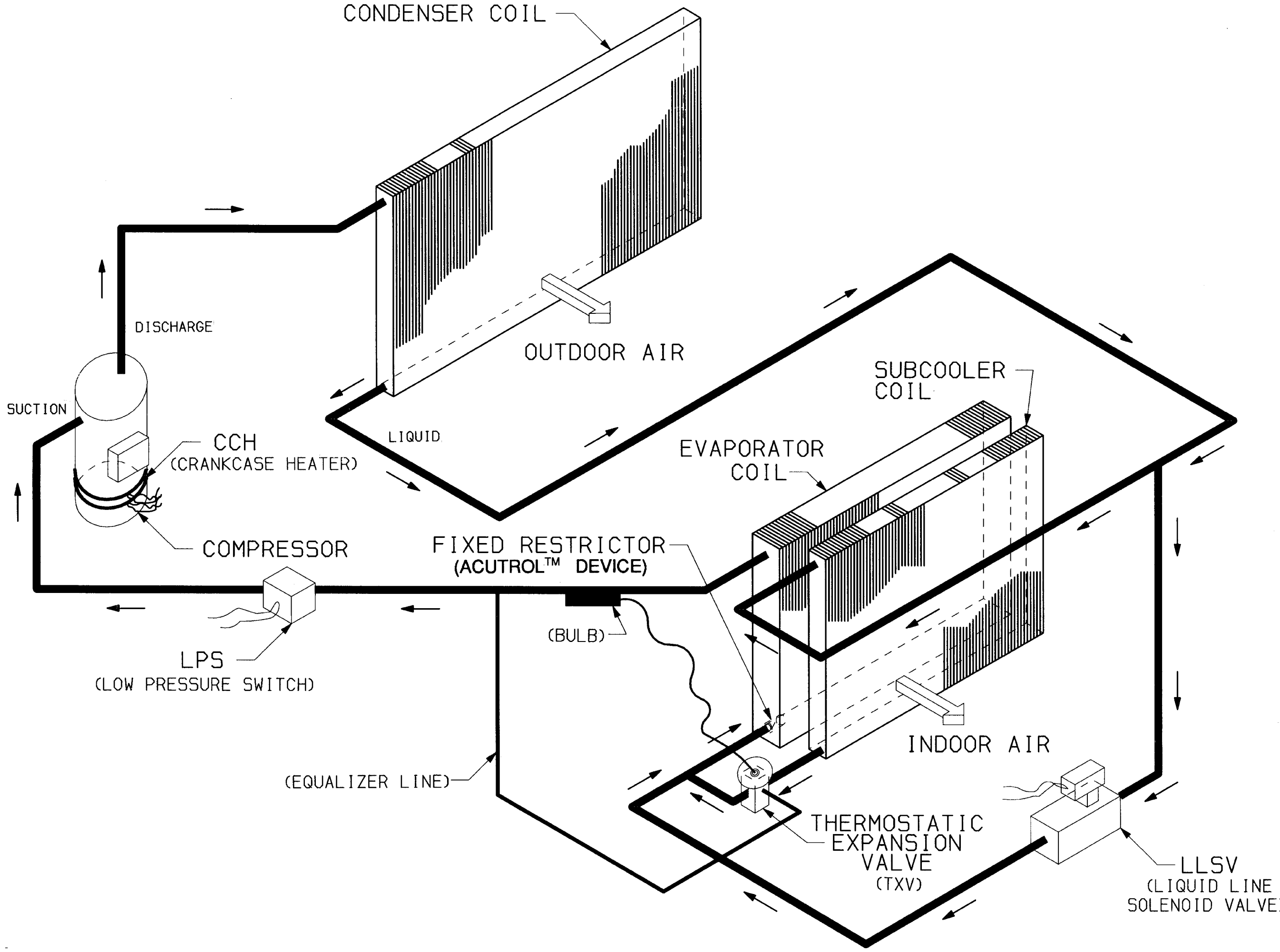


Fig. 39 — MoistureMiser Option Operation

SERVICE

⚠ CAUTION

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

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

EVAPORATOR COIL

1. Turn unit power off, tag disconnect. Remove evaporator coil access panel.
2. If economizer or two-position damper is installed, remove economizer by disconnecting Molex plug and removing mounting screws. Refer to accessory economizer installation instructions or Optional Economizer sections on pages 12 and 15 for additional information.
3. Slide filters out of unit.
4. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister. Wash both sides of coil and flush with clean water. For best results, back-flush toward return-air section to remove foreign material. Flush condensate pan after completion.
5. Reinstall economizer and filters.
6. Reconnect wiring.
7. Replace access panels.

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

One-Row Coil — Wash coil with commercial coil cleaner. It is not necessary to remove top panel.

2-Row Coils

Clean coil as follows:

1. Turn off unit power, tag disconnecct.
2. Remove top panel screws on condenser end of unit.
3. Remove condenser coil corner post. See Fig. 40. To hold top panel open, place coil corner post between top panel and center post. See Fig. 41.
4. Remove screws securing coil to compressor plate and compressor access panel.
5. Remove fastener holding coil sections together at return end of condenser coil. Carefully separate the outer coil section 3 to 4 in. from the inner coil section. See Fig. 42.
6. Use a water hose or other suitable equipment to flush down between the 2 coil sections to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.
7. Secure inner and outer coil rows together with a field-supplied fastener.
8. Reposition the outer coil section and remove the coil corner post from between the top panel and center post. Reinstall the coil corner post and replace all screws.

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

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

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

Lubrication

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

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

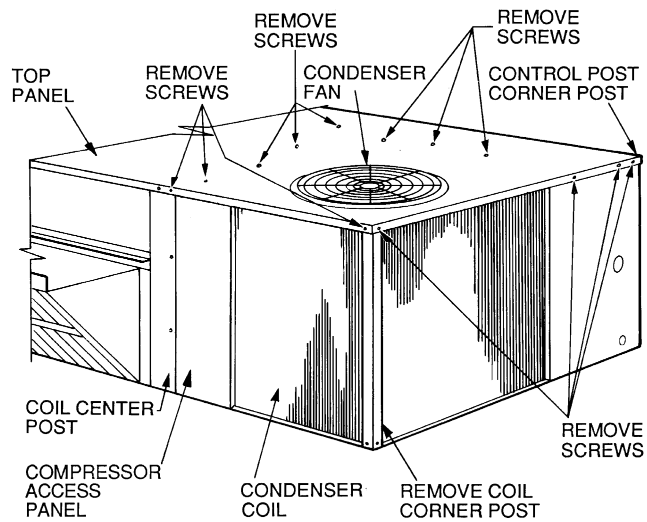


Fig. 40 — Cleaning Condenser Coil

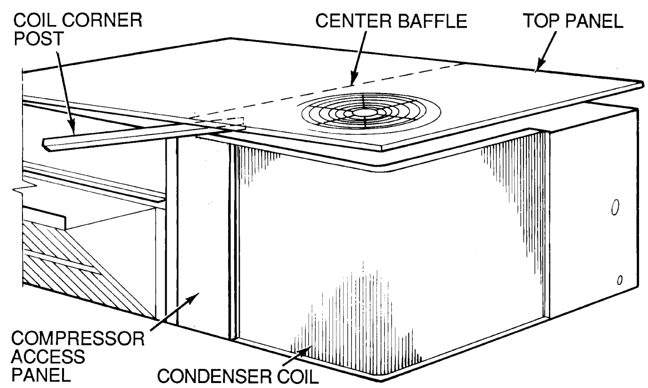


Fig. 41 — Propping Up Top Panel

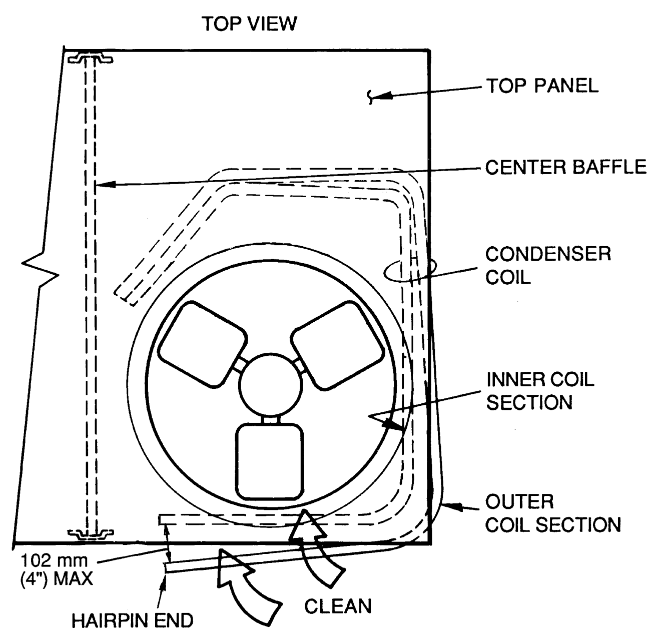
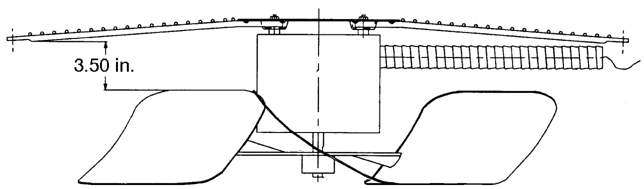


Fig. 42 — Separating Coil Sections

Condenser-Fan Adjustment (Fig. 43) — Shut off unit power supply. Remove condenser-fan assembly (grille, motor, motor cover, and fan) and loosen fan hub setscrews. Adjust fan height as shown in Fig. 43. Tighten setscrews and replace condenser-fan assembly.



UNIT 48HJ	FAN HEIGHT — "A" (in.)
004-006 and 007 (208/230 V)	2.75
007 (460 and 575 V)	3.50

Fig. 43 — Condenser-Fan Adjustment

Economizer Adjustment — Refer to Optional Economizer sections on pages 12 and 15.

Evaporator Fan Belt Inspection — Check condition of evaporator belt or tension during heating and cooling inspections or as conditions require. Replace belt or adjust as necessary.

High-Pressure Switch — The high-pressure switch contains a Schrader core depressor, and is located on the compressor hot gas line. This switch opens at 428 psig and closes at 320 psig. No adjustments are necessary.

Loss-of-Charge Switch — The loss-of-charge switch contains a Schrader core depressor, and is located on the compressor liquid line. This switch opens at 7 psig and closes at 22 psig. No adjustments are necessary.

Freeze-Stat — The freeze-stat is a bimetal temperature-sensing switch that is located on the "hair-pin" end of the evaporator coil. The 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 adjustments are necessary.

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate (also refer to Table 1). Refer to Carrier GTAC2-5 Charging, Recovery, Recycling, and Reclamation training manual and the following procedures.

Unit panels must be in place when unit is operating during charging procedure. Unit must operate a minimum of 10 minutes before checking or adjusting referigerant charge.

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

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

LOW CHARGE COOLING — Using Cooling Charging Charts, Fig. 44-47, vary refrigerant until the conditions of the charts are met. Note the charging charts are different from type normally used. Charts are based on charging the units to the correct superheat for the various operating conditions. Accurate pressure gage and temperature sensing device are required. 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.

MOISTUREMISER SYSTEM CHARGING — The system charge for units with the MoistureMiser option is greater than that of the standard unit alone. The charge for units with this option is indicated on the unit nameplate drawing. Also refer to Fig. 48-51. To charge systems using the MoistureMiser Dehumidification package, fully evacuate, recover, and recharge the system to the nameplate specified charge level.

To check or adjust refrigerant charge on systems using the MoistureMiser Dehumidification package, charge per Fig. 48-51. The subcooler MUST be energized to use the charging charts. The charts reference a liquid pressure (psig) and temperature at a point between the condenser coil and the subcooler coil. A tap is provided on the unit to measure liquid pressure entering the subcooler.

IMPORTANT: The subcooler charging charts (Fig. 48-51) are to be used ONLY with units having the optional MoistureMiser subcooling option. DO NOT use standard charge (Fig. 44-47) for units with MoistureMiser option, and DO NOT use Fig. 48-51 for standard units.

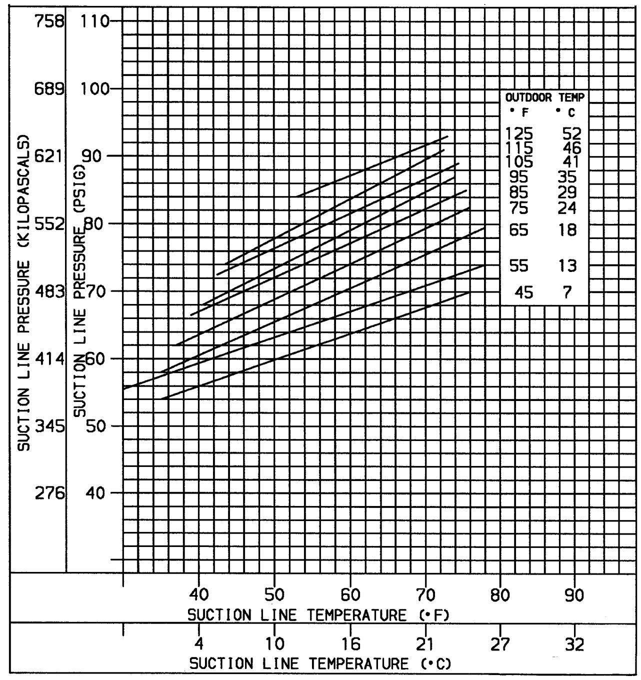


Fig. 44 — Cooling Charging Chart, Standard 48HJ004

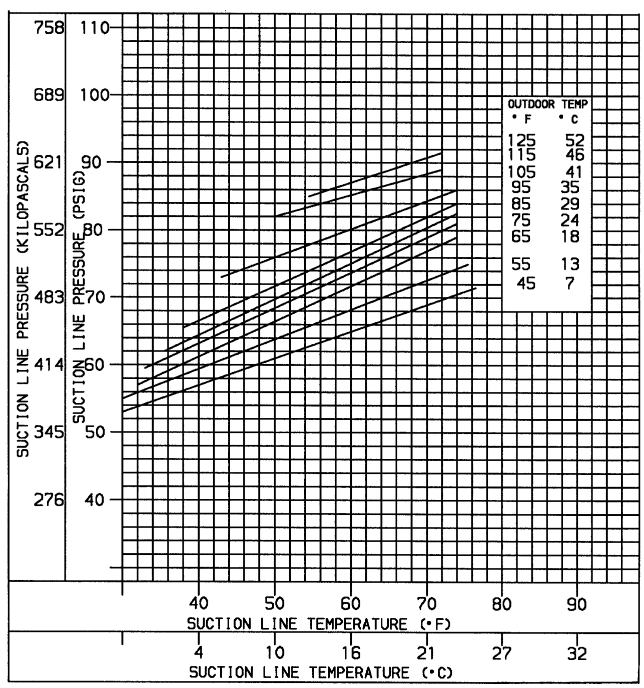


Fig. 45 — Cooling Charging Chart, Standard 48HJ005

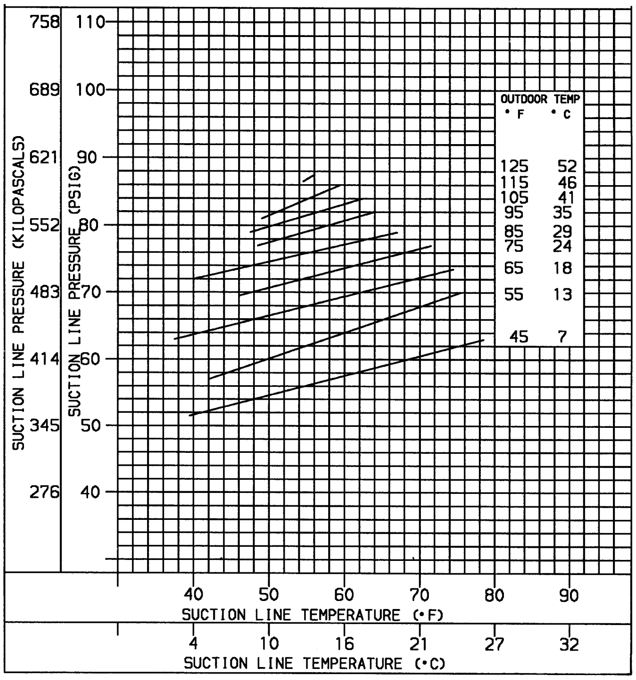


Fig. 46 — Cooling Charging Chart, Standard 48HJ006

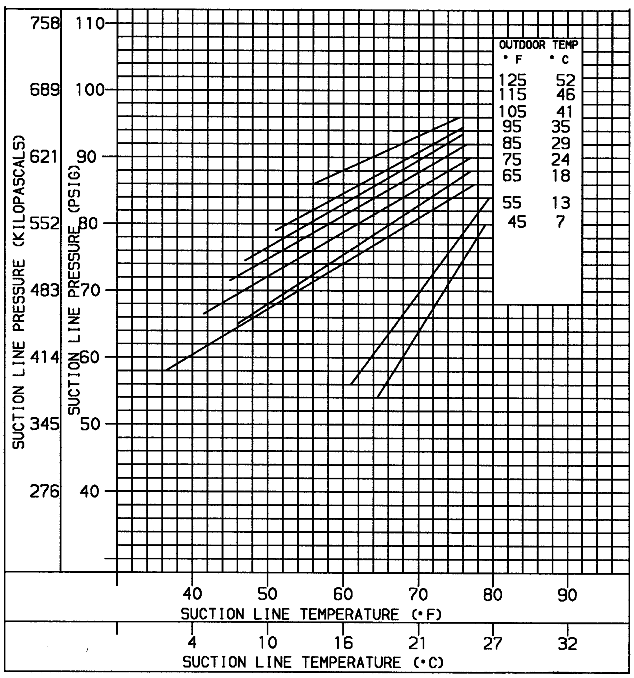


Fig. 47 — Cooling Charging Chart, Standard 48HJ007

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

Example (Fig. 46):

Outdoor Temperature. . . . . .75 F
Suction Pressure. . . . . 70 psig
Suction Temperature should be. . . . . .48 F
(Suction temperature may very ± 5 F.)

If a charging device is used, temperature and pressure readings must be accomplished using the charging charts.

TO USE COOLING CHARGING CHARTS, UNITS WITH MOISTUREMISER DEHUMIDIFICTION PACKAGE — Refer to charts (Fig. 48-51) to determine the proper leaving condenser pressure and temperature.

Example (Fig. 48):

Leaving Condenser Pressure. . . . . 250 psig
Leaving Condenser Temperature . . . . 105 F

NOTE: The MoistureMiser subcooler MUST be energized to use the charging charts.

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

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

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

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

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

Limit Switch — Remove blower access panel (Fig. 5). Limit switch is located on the fan deck.

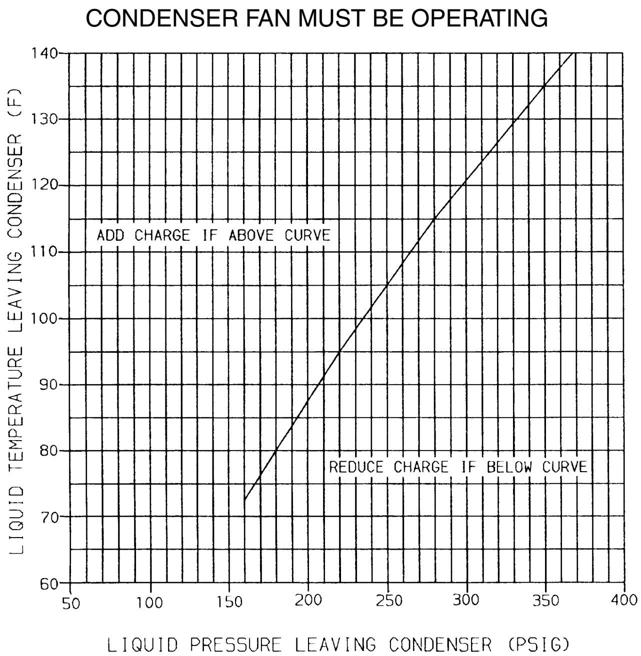


Fig. 48 — Cooling Charging Chart, 48HJ004 with Optional MoistureMiser Dehumidification Package

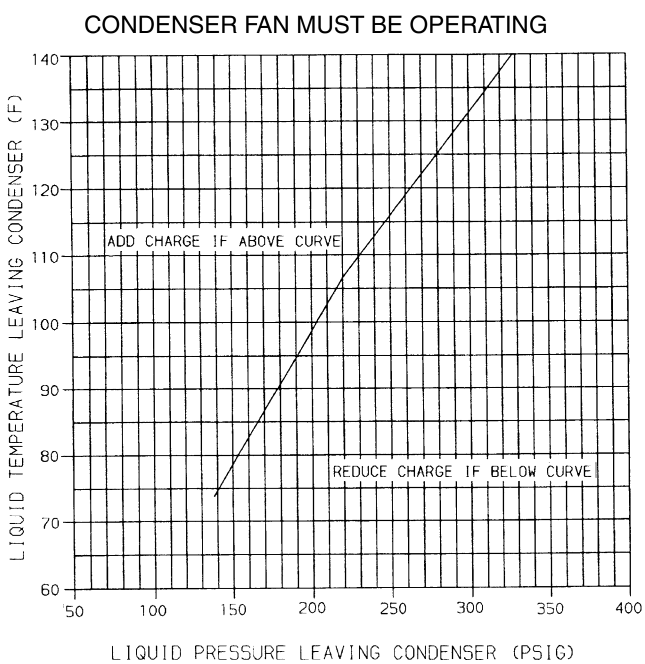


Fig. 49 — Cooling Charging Chart, 48HJ005 with Optional MoistureMiser Dehumidification Package

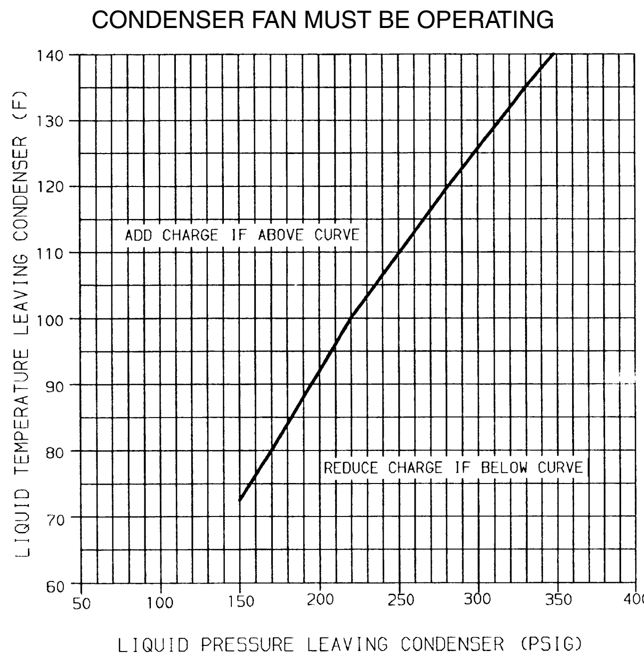


Fig. 50 — Cooling Charging Chart, 48HJ006 with Optional MoistureMiser Dehumidification Package

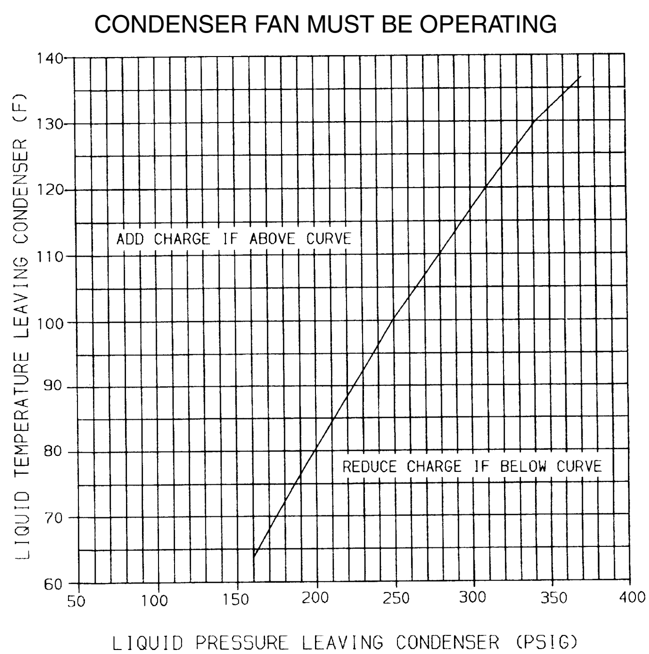


Fig. 51 — Cooling Charging Chart, 48HJ007 with Optional MoistureMiser Dehumidification Package

Burner Ignition — Unit is equipped with a direct spark ignition 100% lockout system. Integrated Gas Unit Controller (IGC) is located in the control box (Fig. 10). A single LED on the IGC provides a visual display of operational or sequential problems when the power supply is uninterrupted. The LED can be observed through the viewport. When a break in power occurs, the IGC will be reset (resulting in a loss of fault history) and the evaporator fan on/off times delay will be reset. During servicing, refer to the label on the control box cover or Table 29 for an explanation of LED error code descriptions.

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

Table 29 — LED Error Code Description*

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

LEGEND

LED — Light-Emitting Diode

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

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

IMPORTANT: Refer to Troubleshooting Tables 30-36 for additional information.

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

⚠ CAUTION

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

REMOVAL AND REPLACEMENT OF GAS TRAIN (See Fig. 52 and 53)

1. Shut off manual gas valve.
2. Shut off power to unit, tag disconnect.
3. Remove compressor access panel.
4. Slide out burner compartment side panel.
5. Disconnect gas piping at unit gas valve.
6. Remove wires connected to gas valve. Mark each wire.
7. Remove induced-draft motor, ignitor, and sensor wires at the Integrated Gas Unit Controller (IGC).
8. Remove the 2 screws that attach the burner rack to the vestibule plate.
9. Remove the gas valve bracket.
10. Slide the burner tray out of the unit (Fig. 53).
11. To reinstall, reverse the procedure outlined above.

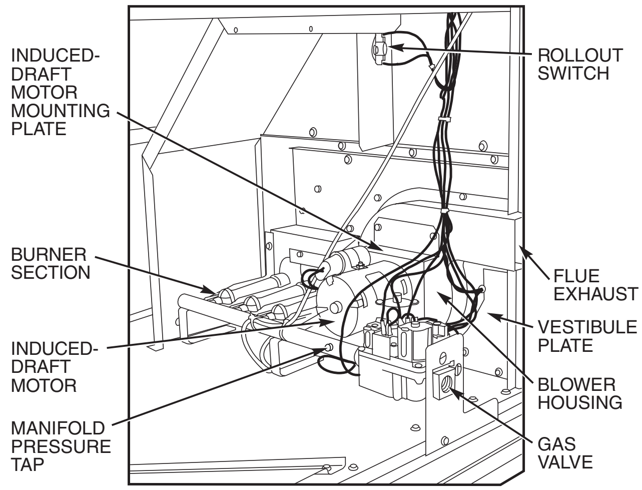


Fig. 52 — Burner Section Details

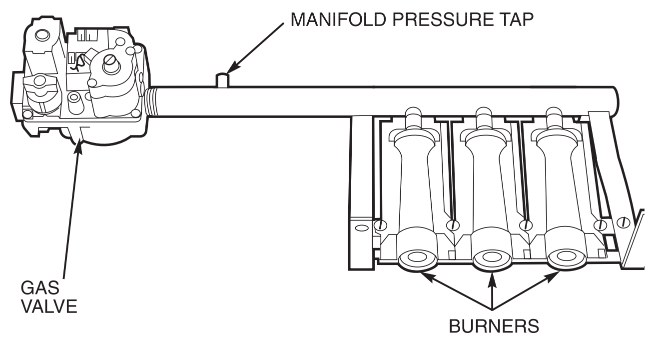
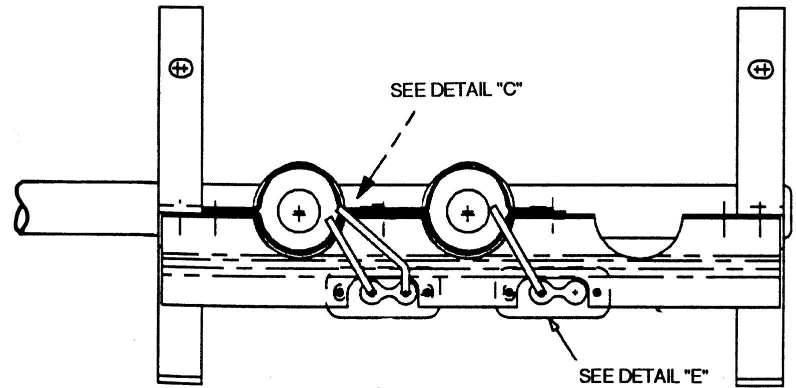


Fig. 53 — Burner Tray Details

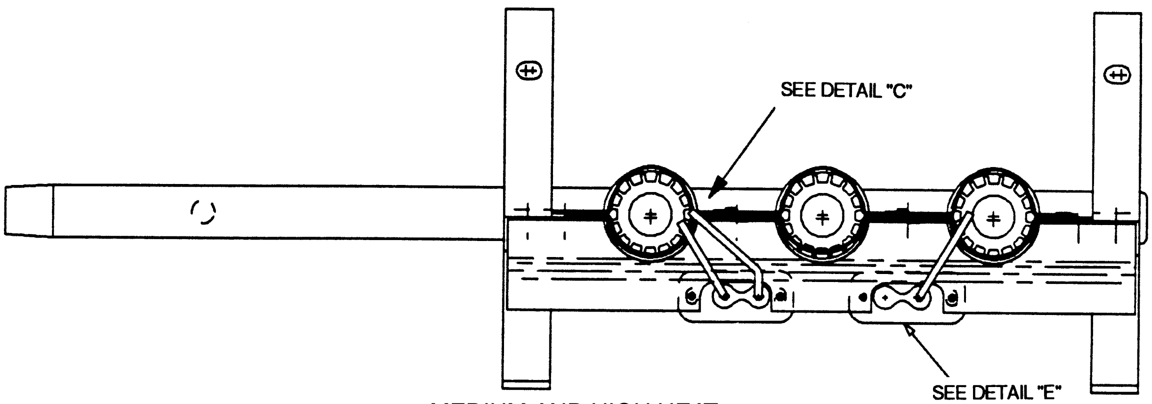
CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described above.
2. Inspect burners and, if dirty, remove burners from rack.
3. Using a soft brush, clean burners and cross-over port as required.
4. Adjust spark gap. See Fig. 54.
5. Reinstall burners on rack.
6. Reinstall burner rack as described above.

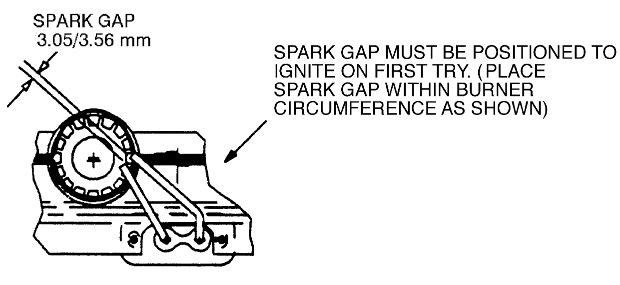
Replacement Parts — A complete list of replacement parts may be obtained from any Carrier distributor upon request. Refer to Fig. 55 for a typical unit wiring schematic.



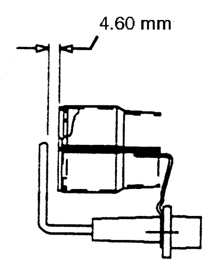
LOW HEAT
48HJE004, 48HJD005-007 — 72,000 BTUH INPUT



MEDIUM AND HIGH HEAT
48HJE005-007, 48HJF004 — 115,000 BTUH INPUT
48HJF005-007 — 150,000 BTUH INPUT



DETAIL "C"



DETAIL 'E'

Fig. 54 — Spark Gap Adjustment

TROUBLESHOOTING

Refer to Tables 30-36 for troubleshooting details.

Table 30 — LED Error Code Service Analysis

SYMPTOM	CAUSE	REMEDY
Hardware failure. (LED OFF)	Loss of power to control module (IGC).	Check 5 amp fuse on IGC, power to unit, 24-v circuit breaker, and transformer. Units without a 24-v circuit breaker have an internal overload in the 24-v transformer. If the overload trips, allow 10 minutes for automatic reset.
Fan ON/OFF delay modified (LED/FLASH)	High limit switch opens during heat exchanger warm-up period before fan-on delay expires.	Ensure unit is fired on rate and temperature rise is correct.
	Limit switch opens within three minutes after blower-off delay timing in Heating mode.	Ensure units' external static pressure is within application guidelines.
Limit switch fault. (LED 2 flashes)	High temperature limit switch is open.	Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is in accordance with the range on the unit nameplate.
Flame sense fault. (LED 3 flashes)	The IGC sensed flame that should not be present.	Reset unit. If problem persists, replace control board.
4 consecutive limit switch faults. (LED 4 flashes)	Inadequate airflow to unit.	Check operation of indoor (evaporator) fan motor and that supply-air temperature rise agrees with range on unit nameplate information.
Ignition lockout. (LED 5 flashes)	Unit unsuccessfully attempted ignition for 15 minutes.	Check ignitor and flame sensor electrode spacing, gaps, etc. Ensure that flame sense and ignition wires are properly terminated. Verify that unit is obtaining proper amount of gas.
Induced-draft motor fault. (LED 6 flashes)	IGC does not sense that induced-draft motor is operating.	Check for proper voltage. If motor is operating, check the speed sensor plug/IGC Terminal J2 connection. Proper connection: PIN 1— White, PIN 2 — Red, PIN 3 — Black.
Rollout switch fault. (LED 7 flashes)	Rollout switch has opened.	Rollout switch will automatically reset, but IGC will continue to lock out unit. Check gas valve operation. Ensure that induced-draft blower wheel is properly secured to motor shaft. Reset unit at unit disconnect.
Internal control fault. (LED 8 flashes)	Microprocessor has sensed an error in the software or hardware.	If error code is not cleared by resetting unit power, replace the IGC.

⚠ WARNING

If the IGC must be replaced, be sure to ground yourself to dissipate any electrical charge that may be present before handling new control board. The IGC is sensitive to static electricity and may be damaged if the necessary precautions are not taken.

IMPORTANT: Refer to heating troubleshooting for additional heating section troubleshooting information.

LEGEND

IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode

Table 31 — Heating Service Analysis

PROBLEM	CAUSE	REMEDY
Burners will not ignite.	Misaligned spark electrodes.	Check flame ignition and sensor electrode positioning. Adjust as needed.
	No gas at main burners.	Check gas line for air purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to relight unit.
		Check gas valve.
	Water in gas line.	Drain water and install drip leg to trap water.
	No power to furnace.	Check power supply, fuses, wiring, and circuit breaker.
	No 24 v power supply to control circuit.	Check transformer. Transformers with internal overcurrent protection require a cool-down period before resetting. Check 24-v circuit breaker; reset if necessary.
	Miswired or loose connections.	Check all wiring and wirenut connections.
	Burned-out heat anticipator in thermostat.	Replace thermostat.
	Broken thermostat wires.	Run continuity check. Replace wires, if necessary.
Inadequate heating.	Dirty air filter.	Clean or replace filter as necessary.
	Gas input to unit too low.	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure or replace with correct orifices.
	Unit undersized for application.	Replace with proper unit or add additional unit.
	Restricted airflow.	Clean filter, replace filter, or remove any restrictions.
	Blower speed too low.	Use high speed tap, increase fan speed, or install optional blower, as suitable for individual units, Adjust pulley.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
	Too much outdoor air.	Adjust minimum position.
		Check economizer operation.
Poor flame characteristics.	Incomplete combustion (lack of combustion air) results in: Aldehyde odors, CO (carbon monoxide), sooting flame, or floating flame.	Check all screws around flue outlets and burner compartment. Tighten as necessary.
		Cracked heat exchanger.
		Overfired unit — reduce input, change orifices, or adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary.
		Check orifice to burner alignment.
Burners will not turn off.	Unit is locked into Heating mode for a one minute minimum.	Wait until mandatory one minute time period has elapsed or reset power to unit.

Table 32 — Durablade Economizer Service Analysis

PROBLEM	CAUSE	REMEDY
Damper does not open.	Evaporator fan not on.	Check wiring between G on connection board and evaporator-fan contactor.
	No power to economizer motor.	1. Check that SW3 is making proper contact with the damper blade. 2. Check continually across R1 coil. If not connect, replace relay R1. 3. Check diode D18. If diode is not functioning properly, replace D18. 4. Check wiring in economizer relay pack. (See unit label diagram.)
	Economizer motor failure.	If there is 24 vac power at the motor terminals, but motor is not operating, replace motor.
Economizer operation limited to minimum position.	OAT or EC set too high.	1. Set at correct temperature (3 F below indoor space temperature). 2. Check OAT or EC by setting set point above outdoor temperature or humidity level. If switch does not close, replace OAT or EC.
	Check wiring of economizer relay packs.	1. Check continuity across relay R2 coil. If not connected, replace R2 relay. 2. Check continuity across relay R3 coil. If not connected, replace R3 relay.
	Check SAT.	If supply-air temperature is over 57 F, switch T2 should be closed. If not, replace SAT.
Damper does not close.	Incorrect wiring or wiring defects.	1. Check switches 2 and 4. If non-operational, replace. 2. Check diode D19. If diode D19 is not functioning properly, replace. 3. Check wiring on economizer and on economizer relay pack. (See unit label diagram.)
	Check SAT.	If supply-air thermostat is below 52 F, switch T1 should be closed. If not, replace SAT.
	Economizer motor failure.	If there is 24 vac power at motor terminals, but motor is not operating, replace the motor.

LEGEND

EC — Enthalpy Control
OAT — Outdoor-Air Thermostat
SAT — Supply-Air Thermostat
SW — Switch

Table 33 — EconoMi$er Flash Code Identification

	FLASH CODE	CAUSE	ACTION TAKEN BY ECONOMI$ER
	Constant On	Normal operation	Normal operation.
	Constant Off	No power	No operation.
	Continuous Flash	CONFIG button pushed and held between 3 and 9 seconds	Outdoor air damper is stroked fully open, then closed (automatic test procedure takes 3 minutes to complete).
Critical Fault	**Flash One**	Control board fault	System shutdown.
	Flash Two	Thermostat fault (i.e., Y2 without Y1)	System shutdown until corrected.
	Flash Three	Actuator fault	Revert to mechanical cooling only.
	Flash Four	Supply air temperature sensor fault	Continue operation with damper at minimum position. Revert to mechanical cooling only.
	Flash Five	Outdoor air temperature sensor fault	Continue operation with damper at minimum position. Disable mechanical cooling lockout.
Non-Critical Fault	**Flash Six**	Outdoor air humidity sensor fault	Continue operation with dry bulb or dry bulb differential switchover.
	Flash Seven	Return air temperature sensor fault	Continue operation with single enthalpy EconoMi$er switchover or dry bulb EconoMi$er switchover (without humidity sensor).
	Flash Eight	Return air humidity sensor fault	Continue operation with single enthalpy, differential dry bulb, or dry bulb EconoMi$er switchover.
	Flash Nine	Carbon Dioxide (CO_2) sensor fault	Continue operation without ventilation control.
	Flash Ten	Onboard adjustment potentiometer fault	Continue operation with default potentiometer settings.

Table 34 — EconoMi$er Troubleshooting

PROBLEM	POTENTIAL CAUSE	REMEDY
Damper Does Not Open	Indoor (Evaporator) Fan is Off	Check to ensure that 24 vac is present at Terminal C1 (Common Power) on the IFC (Indoor Evaporator Fan Contactor) or that 24 vac is present at the IFO (Indoor Evaporator Fan On) terminal. Check whether 24 vac is present at PL 6-1 (red wire) and/or PL6-3 (black wire). If 24 vac is not present, check wiring (see unit label diagram). Check proper thermostat connection to G on the connection board.
	No Power to EconoMi$er Controller	Check to ensure that 24 vac is present across Terminals 24 VAC and 24 V COM on the EconoMi$er control. If 24 vac is not present, check wiring (see unit label diagram). If 24 vac is present, STATUS light should be on constantly.
	No Power to G Terminal	If IFM is on, check to ensure 24 vac is present on G Terminal of the EconoMi$er controller. If 24 vac is not present, check wiring (see unit label diagram).
	Controller Fault	If STATUS light is flashing one flash, the EconoMi$er controller is experiencing a fault condition. Cycle power to the controller. If condition continues, replace the EconoMi$er controller.
	Thermostat Fault	If STATUS light is flashing two flashes, the EconoMi$er controller senses the thermostat is wired incorrectly. Check wiring between the thermostat and the connection board in the electrical panel. The fault condition is caused by Y2 being energized before Y1.
	Actuator Fault	Check the wiring between the EconoMi$er controller and the actuator. Hold CONFIG button between 3 and 10 seconds to verify the actuator's operation. (This process takes 3 minutes to complete.)
EconoMi$er Operation Limited to Minimum Position	Minimum Position Set Incorrectly	Verify that the MIN POS (%) is set greater than zero. Adjust MIN POS (%) to 100% to verify operation, and then set to correct setting.
	EconoMi$er Changeover Set Point Set Too High or Too Low	Set at correct value. See Table 3.
	Supply Air Temperature Sensor Faulty	If STATUS light is flashing 4 flashes, Supply Air Temperature Sensor is faulty. Check wiring or replace sensor.
	Outdoor Air Temperature Sensor Faulty	If STATUS light is flashing 5 flashes, Outdoor Air Temperature Sensor is faulty. Check wiring or replace sensor.
Damper Position Less than Minimum Position Set Point	Supply Air Low Limit Strategy Controlling	The supply-air temperature is less than 45 F, causing the minimum position to be decreased. Refer to the Start-Up instructions. Verify correct setting of MIN POS (%). If correct, EconoMi$er is operating correctly.
Damper Does Not Return to Minimum Position	CO_2 Ventilation Strategy Controlling	If a CO_2 sensor is being used, and the damper position is greater than minimum position, the ventilation control strategy is controlling. Refer to the Start-Up instructions. EconoMi$er is operating correctly.
Damper Does Not Close on Power Loss	Damper Travel is Restricted	Check to ensure the damper is not blocked.

LEGEND

IFM — Indoor Fan Motor
PL — Plug

Table 35 — MoistureMiser Dehumidification Subcooler Service Analysis

PROBLEM	CAUSE	REMEDY
Subcooler will not energize.	No power to control transformer from evaporator-fan motor.	Check power source and evaporator-fan relay. Ensure all wire connections are tight.
	No power from control transformer to liquid line solenoid valve	1. Fuse open; check fuse. Ensure continuity of wiring. 2. Low-pressure switch open. Cycle unit off and allow low-pressure switch to reset. Replace switch if it will not close. 3. Transformer bad; check transformer.
	Liquid line solenoid valve will not operate.	1. Solenoid coil defective; replace. 2. Solenoid valve stuck open; replace.
Subcooler will not deenergize.	Liquid line solenoid valve will not open.	Valve is stuck closed; replace valve.
Low system capacity.	Low refrigerant charge or frosted evaporator coil.	1. Check charge amount. Charge per Fig. 47-51. 2. Evaporator coil frosted; check and replace low-pressure switch if necessary.
Loss of compressor superheat conditions with subcooler energized.	Thermostatic expansion valve (TXV).	1. Check TXV bulb mounting, and secure tightly to suction line. 2. Replace TXV if stuck open or closed.

Table 36 — Cooling Service Analysis

PROBLEM	CAUSE	REMEDY
Compressor and condenser fan will not start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay.	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
	Thermostat setting too high.	Lower thermostat setting below room temperature.
Compressor will not start but condenser fan runs.	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor.
	Defective run/start capacitor, overload, start relay.	Determine cause and replace.
	One leg of 3-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor cycles (other than normally satisfying thermostat).	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor.	Replace and determine cause.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor or capacitor.	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
Compressor operates continuously.	Dirty air filter.	Replace filter.
	Unit undersized for load.	Decrease load or increase unit size.
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge.	Locate leak, repair, and recharge.
	Leaking valves in compressor.	Replace compressor.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive head pressure.	Dirty air filter.	Replace filter.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharged.	Recover excess refrigerant.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling.	Determine cause and correct.
Head pressure too low.	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
Excessive suction pressure.	High heat load.	Check for source and eliminate.
	Compressor valves leaking.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction pressure too low.	Dirty air filter.	Replace filter.
	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Outdoor ambient below 25 F.	Install low-ambient kit.
Evaporator fan will not shut off.	Time off delay not finished.	Wait for 30-second off delay.

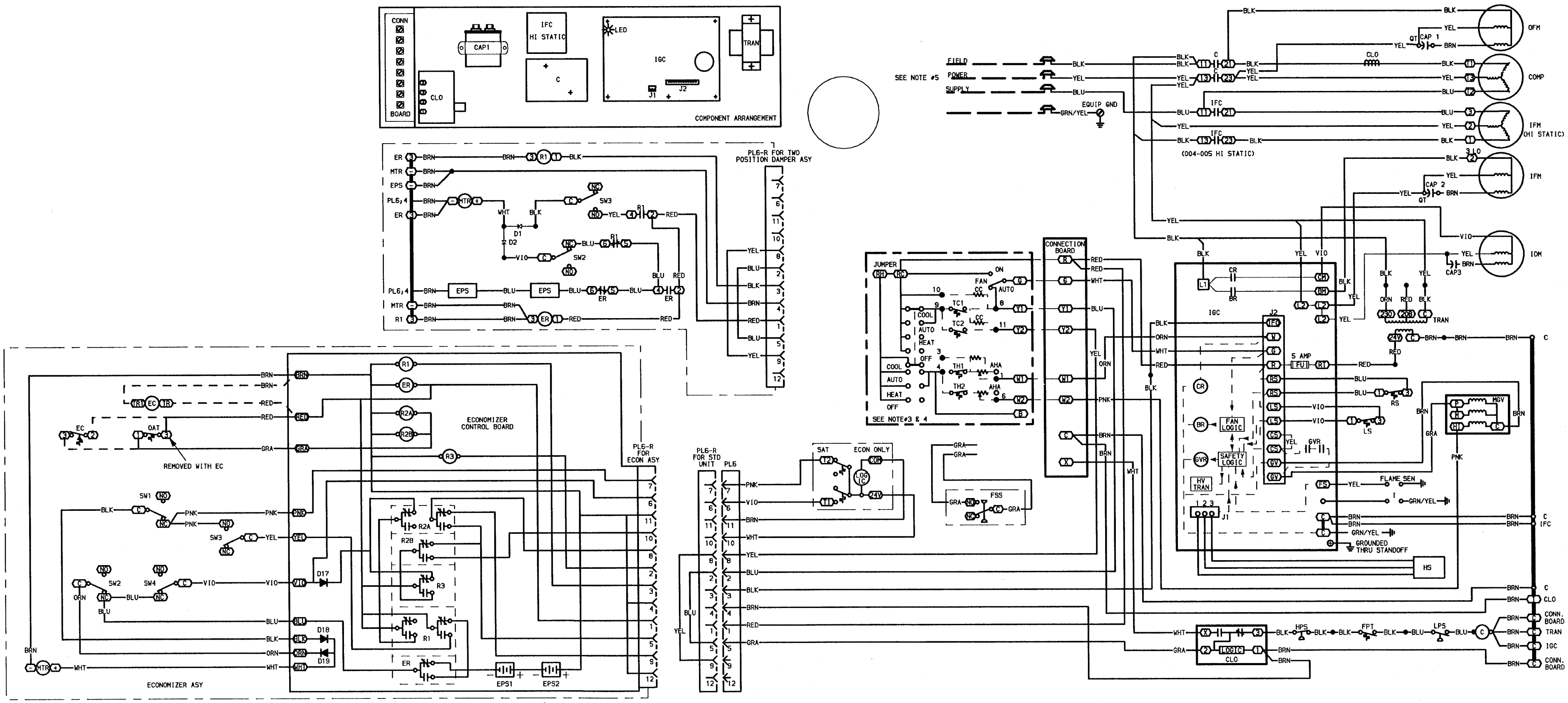


Fig. 55 — Typical Wiring Schematic and Component Arrangement (208/230 3-Phase Unit Shown)

LEGEND AND NOTES FOR FIG. 55

AHA	— Adjustable Heat Anticipator
C	— Contactor, Compressor
CAP	— Capacitor
CC	— Cooling Compensator
CLO	— Compressor Lockout
COMP	— Compressor Motor
D	— Diode
EC	— Enthalpy Control
ECON	— Economizer
EPS	— Emergency Power Supply
EQUIP	— Equipment
ER	— Economizer Relay
FPT	— Freeze-Protection Thermostat
FSS	— Filter-Status Switch
FU	— Fuse
GND	— Ground
GVR	— Gas Valve Relay
HPS	— High-Pressure Switch
HS	— Hall-Effect Sensor
HV	— High Voltage
I	— Ignitor
IDM	— Induced-Draft Motor
IFC	— Indoor (Evaporator) Fan Contactor
IFM	— Indoor (Evaporator) Fan Motor
IGC	— Integrated Gas Unit Controller
LED	— Light-Emitting Diode
LPS	— Low-Pressure/Loss-of-Charge Switch
LS	— Limit Switch
MGV	— Main Gas Valve
MTR	— Motor
OAT	— Outdoor-Air Thermostat
OFM	— Outdoor (Condenser) Fan Motor
P	— Plug
PL	— Plug Assembly
QT	— Quadruple Terminal
R	— Relay
RS	— Rollout Switch
SAT	— Supply-Air Thermostat
SEN	— Sensor
SW1	— Switch Fully Open
SW2	— Switch Fully Closed
SW3	— Switch Minimum Vent Position
SW4	— Switch Maximum Vent Position
TC	— Thermostat-Cooling
TH	— Thermostat-Heating
TRAN	— Transformer

Field Splice
x Marked Wire
x Terminal (Marked)
Terminal (Unmarked)
x Terminal Block
Splice
Splice (Marked)
Factory Wiring
Field Control Wiring
Field Power Wiring
Accessory or Optional Wiring
To indicate common potential only. Not to represent wiring.

NOTES FOR FIG. 55

1. If any of the original wire furnished must be replaced, it must be replaced with Type 90 C wire or its equivalent.
2. Three-phase motors are protected under primary single-phasing conditions.
3. Thermostats: HH07AT170, 172
   Subbase: HH93AZ176, 177, 178 and 179
4. Set heat anticipator at .14 amp for first stage and .14 amp for second stage.
5. Use copper conductors only.
6. TRAN is wired for 230 v unit. If unit is to be run with 208 v power supply, disconnect BLK wire from 230 v tap and connect to 208 v tap (RED). Insulate end of 230 v tap.

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 ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT

☐ REMOVE ALL SHIPPING HOLDDOWN BOLTS AND BRACKETS PER INSTALLATION INSTRUCTIONS

☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTALLATION INSTRUCTIONS

☐ CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS

☐ CHECK GAS PIPING FOR LEAKS

☐ CHECK THAT RETURN INDOOR-AIR FILTER IS CLEAN AND IN PLACE

☐ VERIFY THAT UNIT INSTALLATION IS LEVEL

☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS

III. START-UP

ELECTRICAL

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

TEMPERATURES

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

PRESSURES

GAS INLET PRESSURE	__________	IN. WG		
GAS MANIFOLD PRESSURE	__________	IN. WG (HI FIRE)		
REFRIGERANT SUCTION	__________	PSIG	__________	°F
REFRIGERANT DISCHARGE	__________	PSIG	__________	°F

☐ VERIFY REFRIGERANT CHARGE USING CHARGING TABLES

☐ VERIFY THAT 3-PHASE SCROLL COMPRESSOR ROTATING IN CORRECT DIRECTION

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE