



50EJ,EK,EW,EY024-068 Single-Package Rooftop Units Electric Cooling with Electric Heat Option 50 Hz

Installation, Start-Up and Service Instructions

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SAFETY CONSIDERATIONS

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

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

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

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

INSTALLATION

Step 1 — Provide Unit Support

⚠ CAUTION

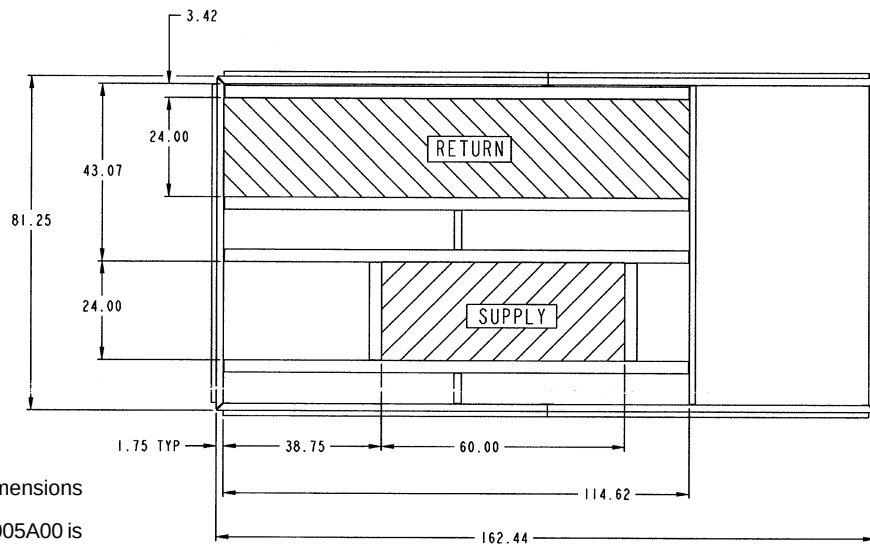
All panels must be in place when rigging. Unit is not designed for handling by fork truck.

ROOF CURB — Assemble and install accessory roof curb in accordance with instructions shipped with the curb. Accessory roof curb and information required to field fabricate a roof curb or horizontal adapter are shown in Fig. 1-4. Install insulation, cant strips, roofing, and counter flashing as shown. Ductwork can be secured to roof curb before unit is set in place.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a leak-proof seal. Install gasket supplied with the roof curb as shown in Fig. 1-4. Improperly applied gasket can result in air leaks and poor unit performance.

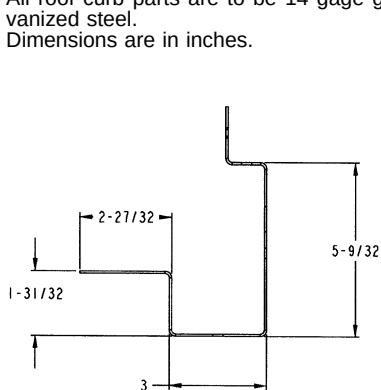
Curb should be level. This is necessary to permit unit drain to function properly. Unit leveling tolerance is shown in Fig. 1-4. Refer to Accessory Roof Curb Installation Instructions for additional information as required. When accessory roof curb is used, unit may be installed on class A, B, or C roof covering material.

ALTERNATE UNIT SUPPORT — When the curb or adapter cannot be used, support unit with sleepers using unit curb or adapter support area. If sleepers cannot be used, support long sides of unit (refer to Fig. 5-10) with equally spaced 100 mm × 100 mm (4-in. × 4-in.) pads as follows: 50EJ,EK,EW,EY024-034 units require a minimum of 3 pads on each side; 50EJ,EK,EW,EY044-068 units require a minimum of 4 pads on each side. Unit may sag if supported by corners only.

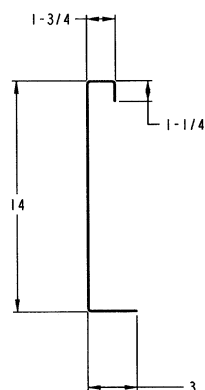


NOTES:

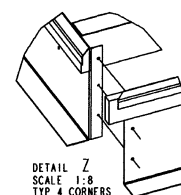
1. Unless otherwise specified, all dimensions are to outside of part.
2. Roof curb accessory CRRFCURB005A00 is shipped disassembled.
3. All roof curb parts are to be 14 gage galvanized steel.
4. Dimensions are in inches.



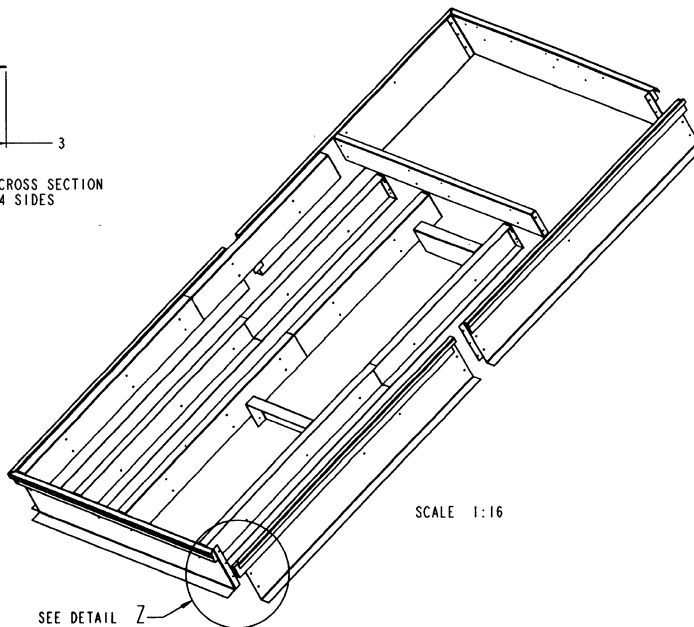
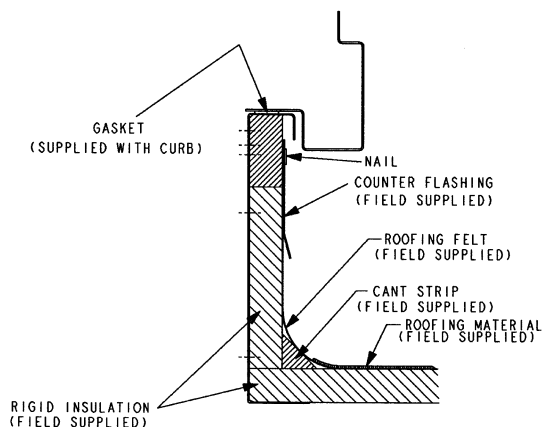
BASE RAIL CROSS SECTION
TYP 2 SIDES



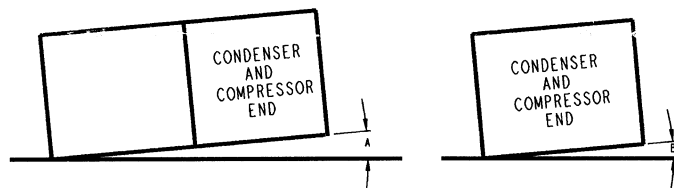
ROOF CURB CROSS SECTION
TYP 4 SIDES



DETAIL Z
SCALE 1:8
TYP 4 CORNERS



SCALE 1:16



DIMENSIONS*
(degrees and inches)

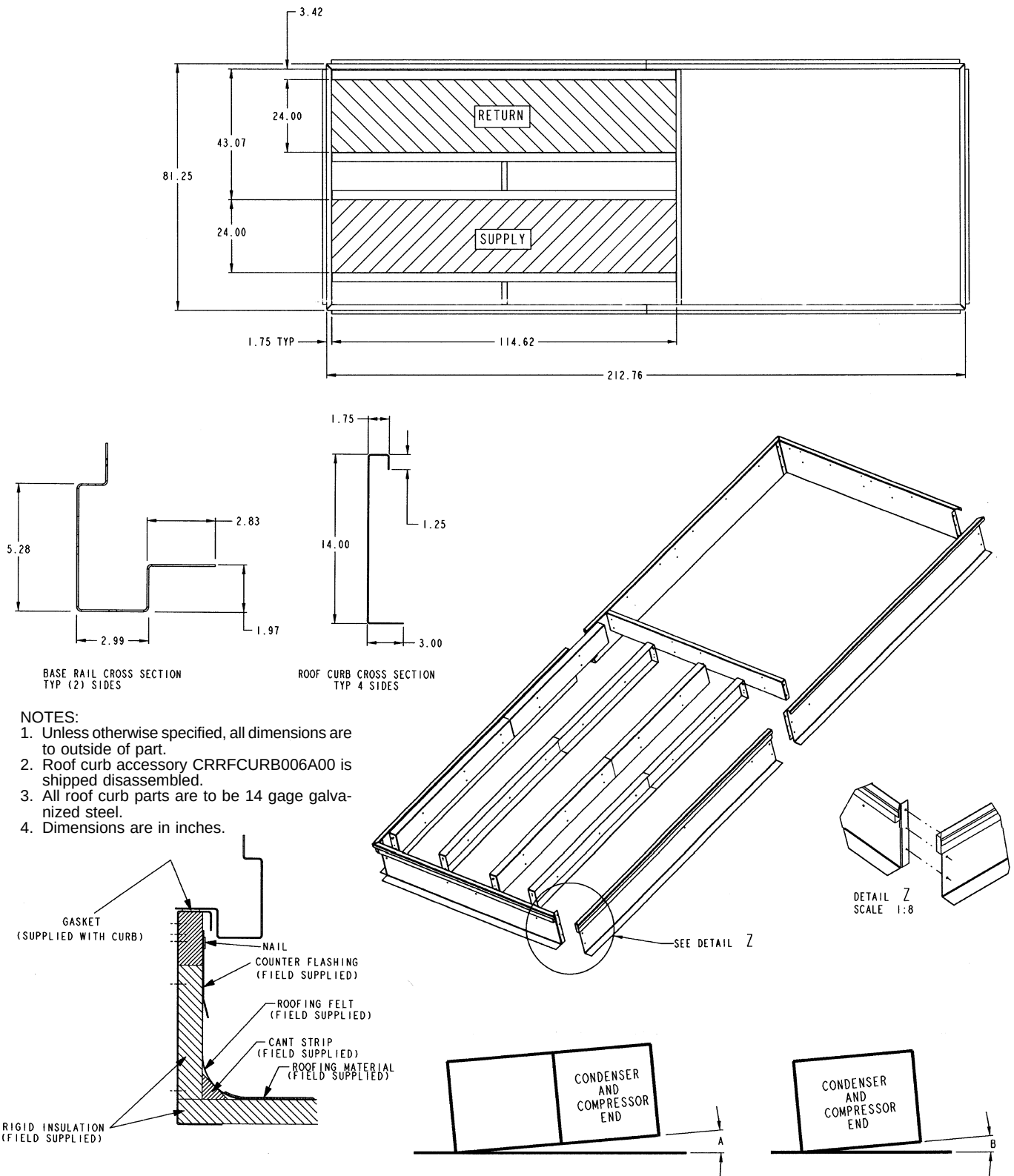
A		B	
Deg.	in.	Deg.	in.
1.0	2.9	.50	.75

UNIT LEVELING TOLERANCES

*From edge of unit to horizontal.

NOTE: To prevent standing water in the drain pan of the indoor section and the heat exchangers, **UNIT CAN ONLY BE PITCHED AS SHOWN.**

Fig. 1 — Roof Curb (Sizes 024-034)



DIMENSIONS*
(degrees and inches)

A		B	
Deg.	in.	Deg.	in.
1.0	2.9	.50	.75

UNIT LEVELING TOLERANCES

*From edge of unit to horizontal.

NOTE: To prevent standing water in the drain pan of the indoor section and the heat exchangers, **UNIT CAN ONLY BE PITCHED AS SHOWN.**

Fig. 2 — Roof Curb (Sizes 038 and 044)

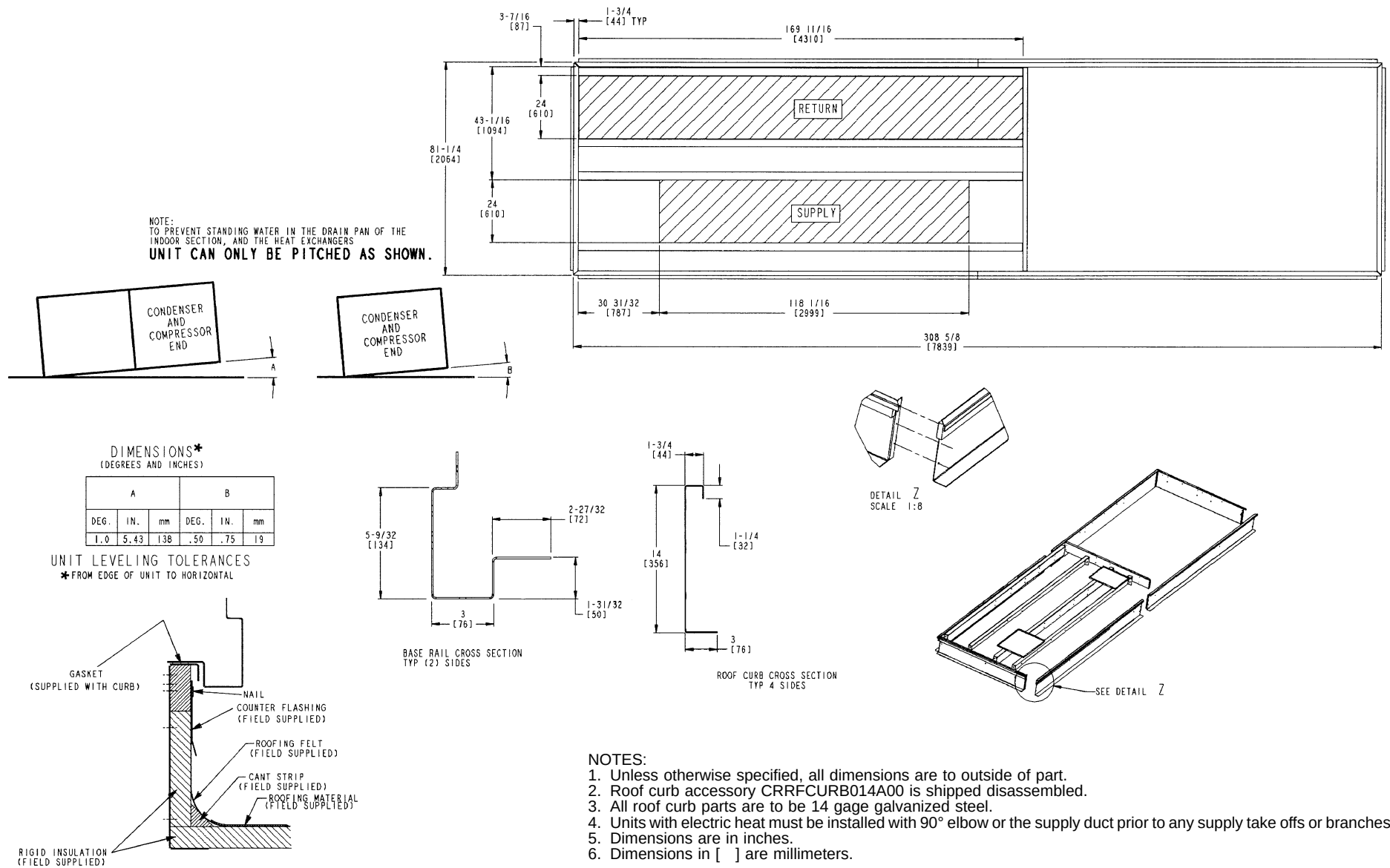


Fig. 3 — Roof Curb (50EJ,EK054-068, Reduced Supply Air)

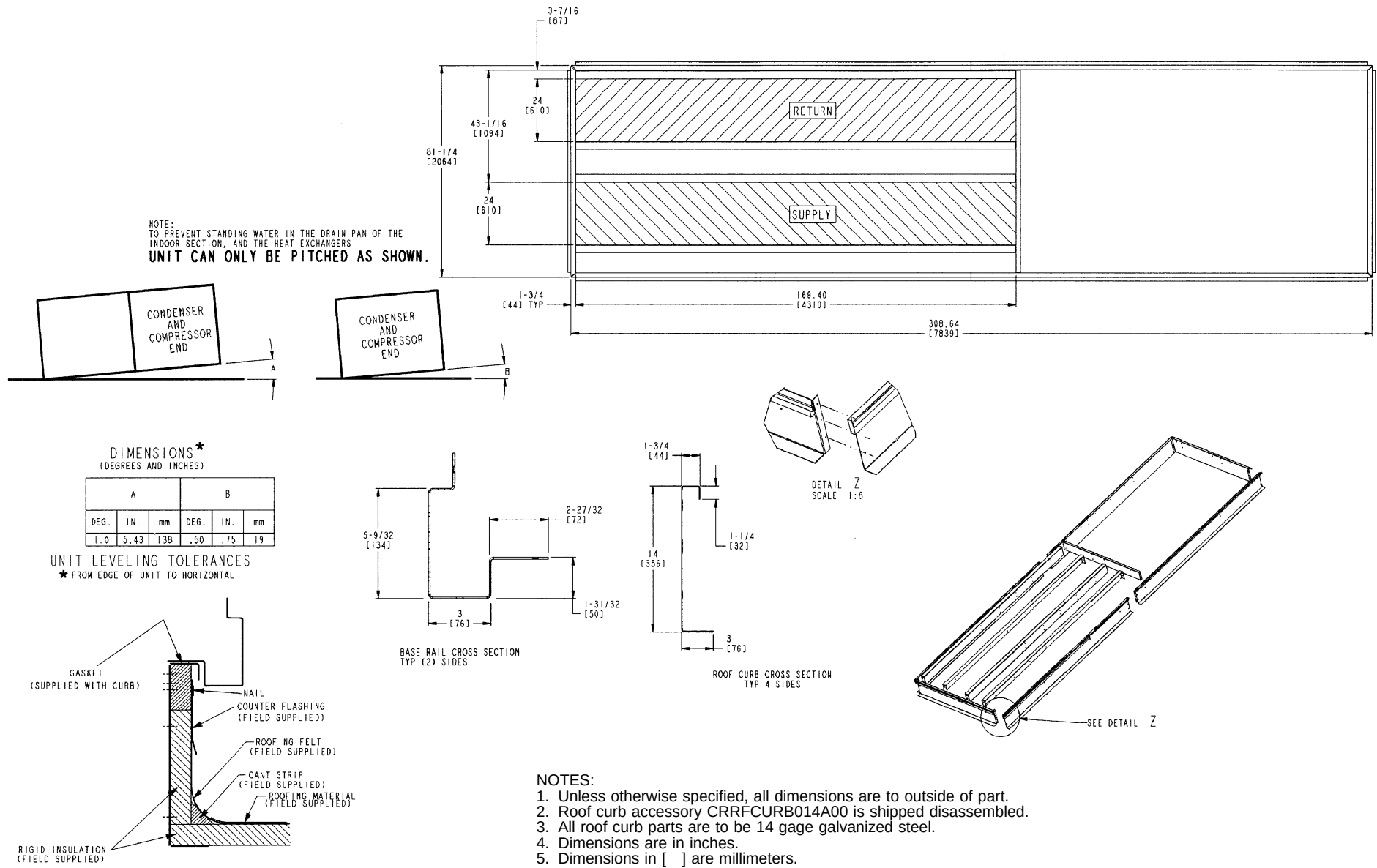
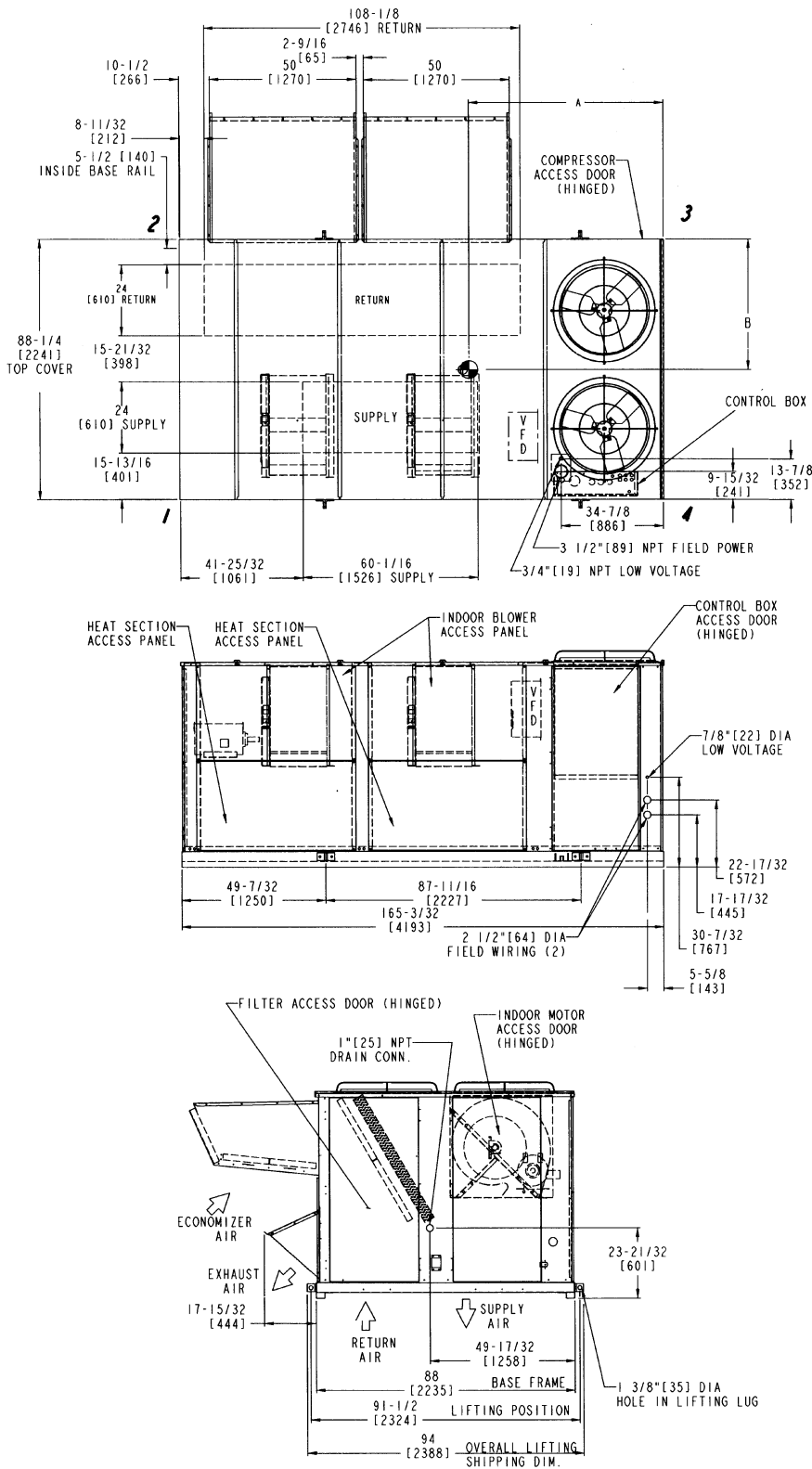


Fig. 4 — Roof Curb (50EJ,EK054-068, Full Supply Air)



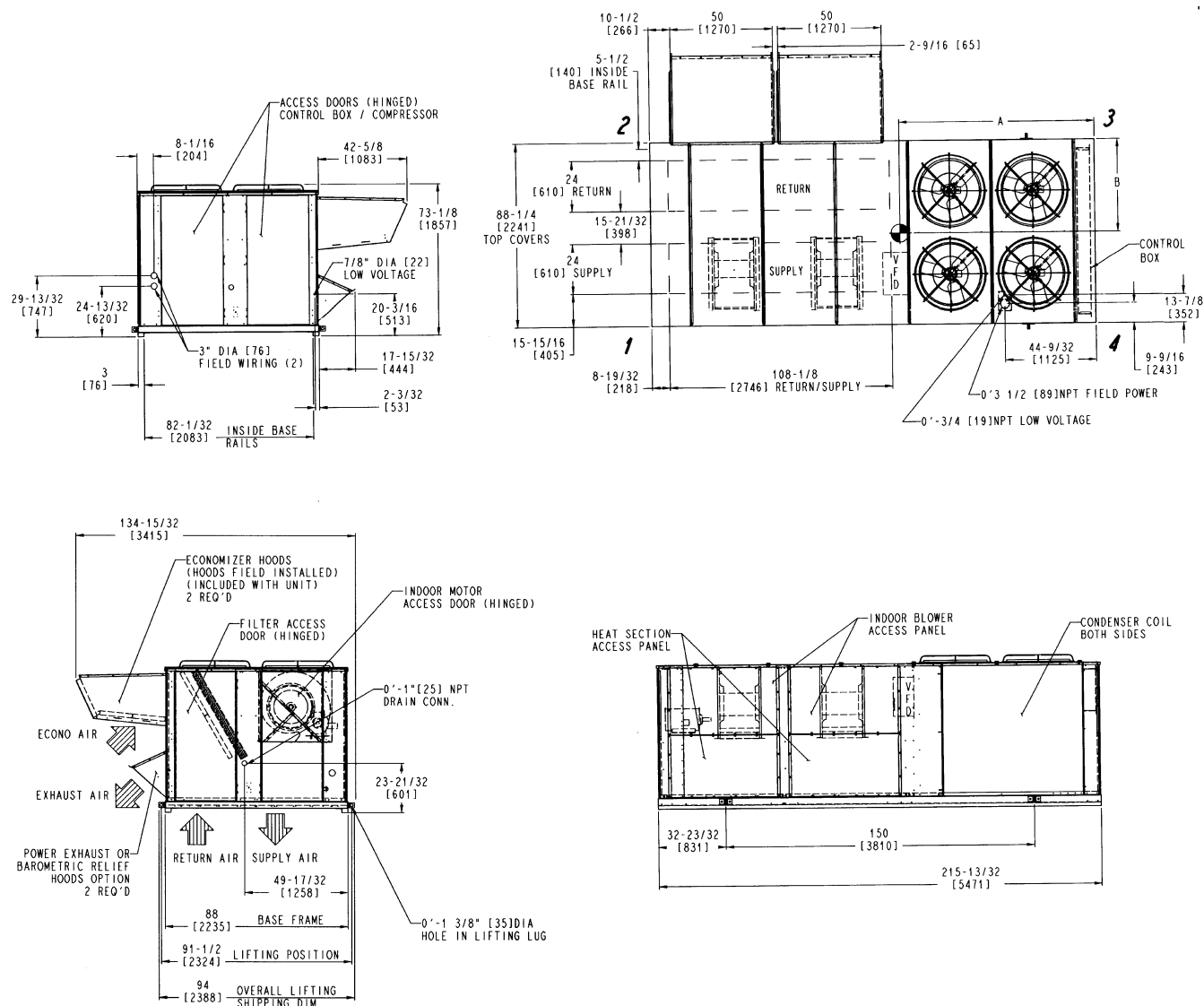
LEGEND

VFD — Variable Frequency Drive

NOTES:

1. Do not locate adjacent units with discharge facing economizer inlet. Minimum clearances to be:
Adjacent Units: 15'-0" [4572]
Top of Units: No Overhang
Condenser Coil: 4'-0" [1219]
Economizer Side: 6'-0" [1829]
Heat Side: 4'-0" [1219]
Filter Access Side: 15'-0" [4572]
(For removal of evaporator coil)
2. For smaller service and operational clearances, contact Carrier Application Engineering department.
3. Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on dunnage, it is recommended the ducts be supported by cross braces as done on the accessory roof curb.
4. For units with electric heat, a field-supplied 90-degree elbow must be installed in the supply ductwork below the unit discharge.
5. For side supply/return applications, a single return and supply ductwork connection is recommended for covering both return and both supply air openings.
6. Dimensions are in inches. Dimensions in [] are in millimeters.
7. For center of gravity and rigging information, see Fig. 11, page 13. For unit operating weights, see Tables 2A and 2B, pages 23 and 24.

Fig. 5 — Base Unit Dimensions, 50EJ,EK024-034



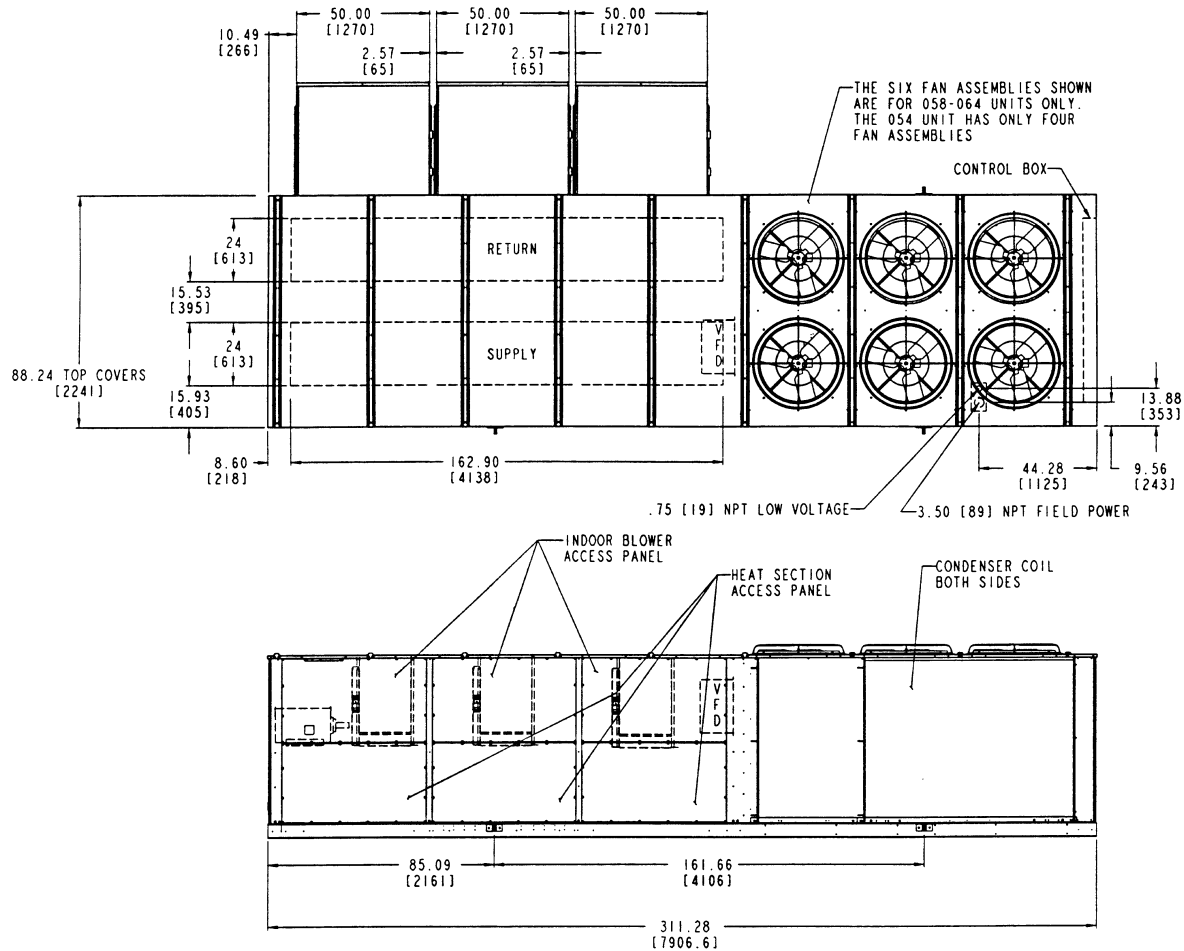
LEGEND

VFD — Variable Frequency Drive

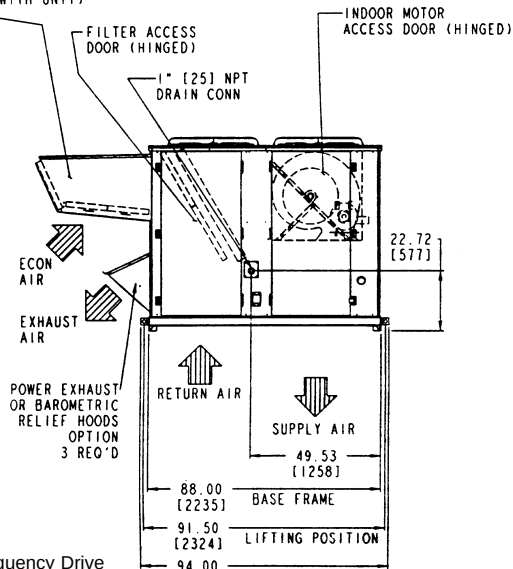
NOTES:

- Do not locate adjacent units with discharge facing economizer inlet. Minimum clearances to be:
Adjacent Units: 15'-0" [4572]
Top of Units: No Overhang
Condenser Coil: 4'-0" [1219]
Economizer Side: 6'-0" [1829]
Heat Side: 4'-0" [1219]
Filter Access Side: 15'-0" [4572]
(For removal of evaporator coil)
- For smaller service and operational clearances, contact Carrier Application Engineering department.
- Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on dunnage, it is recommended the ducts be supported by cross braces as done on the accessory roof curb.
- For units with electric heat, a field-supplied 90-degree elbow must be installed in the supply ductwork below the unit discharge.
- For side supply/return applications, a single return and supply ductwork connection is recommended for covering both return and both supply air openings.
- Dimensions are in inches. Dimensions in [] are in millimeters.
- For center of gravity and rigging information, see Fig. 11, page 13. For unit operating weights, see Tables 2A and 2B, page 23 and 24.

Fig. 6 — Base Unit Dimensions, 50EJ,EK038-044



ECONOMIZER HOODS
(HOODS FIELD INSTALLED)
3 REQ'D



LEGEND

VFD — Variable Frequency Drive

NOTES:

- Do not locate adjacent units with discharge facing economizer inlet. Minimum clearances to be:
Adjacent Units: 15'-0" [4572]
Top of Units: No Overhang
Condenser Coil: 4'-0" [1219]
Economizer Side: 6'-0" [1829]
Heat Side: 4'-0" [1219]
Filter Access Side: 15'-0" [4572]
(For removal of evaporator coil)
- For smaller service and operational clearances, contact Carrier Application Engineering department.
- Bottom ducts designed to be attached to accessory roof curb. If unit is mounted on dunnage, it is recommended the ducts be supported by cross braces as done on the accessory roof curb.
- For units with electric heat, a field-supplied 90-degree elbow must be installed in the supply ductwork below the unit discharge.
- For side supply/return applications, a single return and supply ductwork connection is recommended for covering both return and both supply air openings.
- Dimensions are in inches. Dimensions in [] are in millimeters.
- For center of gravity and rigging information, see Fig. 11, page 13. For unit operating weights, see Tables 2A and 2B, pages 23 and 24.

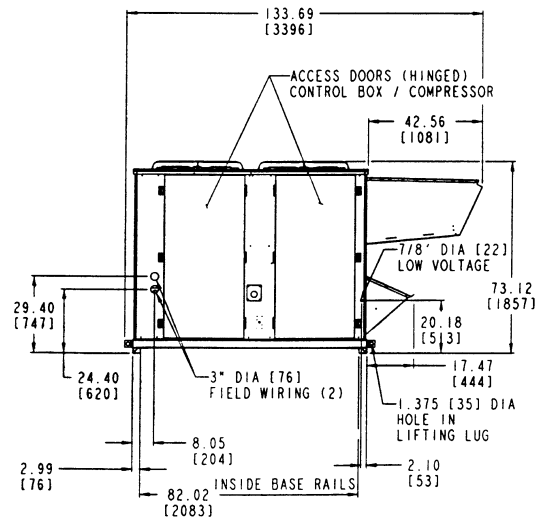


Fig. 7 — Base Unit Dimensions, 50EJ,EK054-068

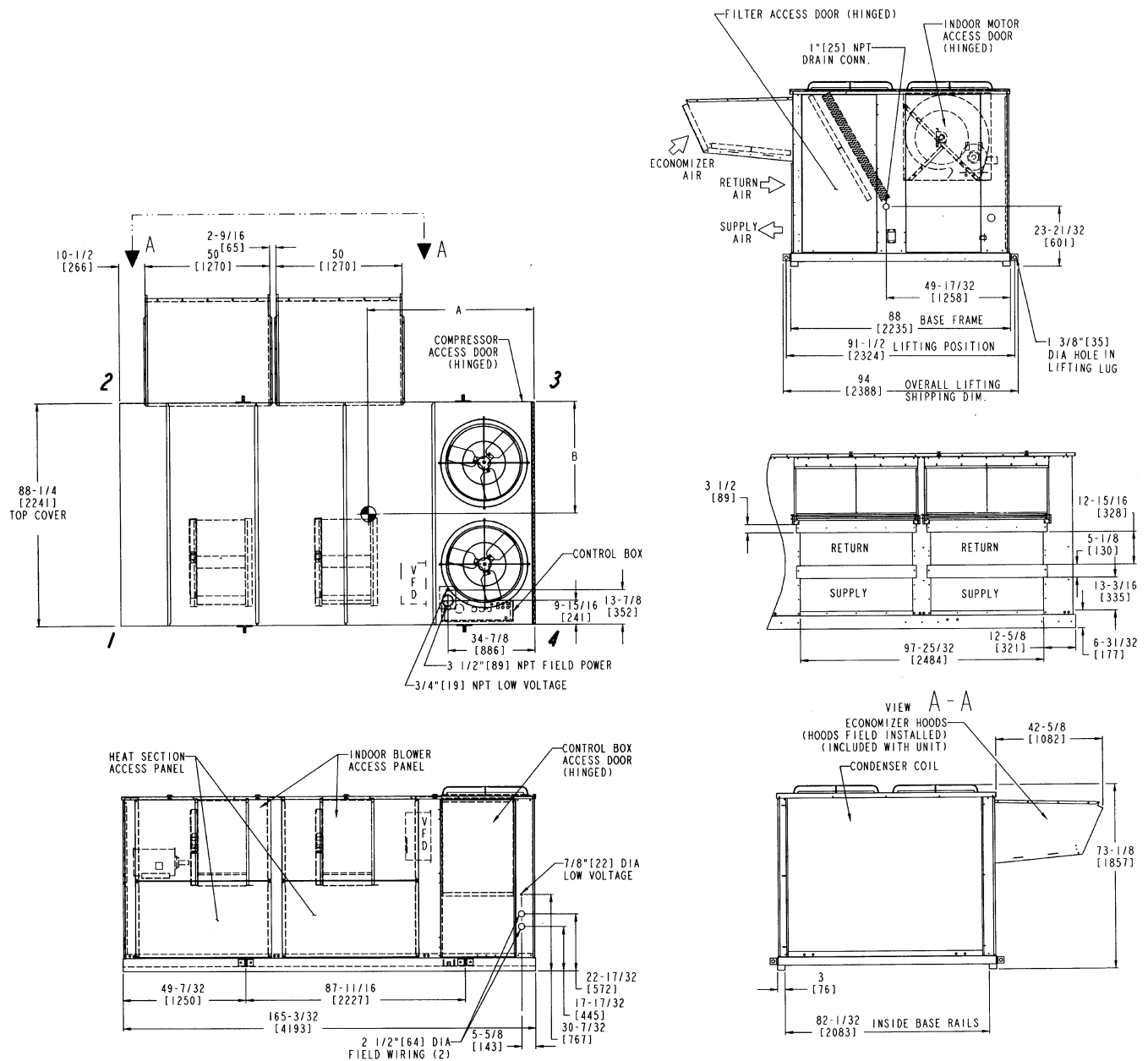


Fig. 8 — Base Unit Dimensions, 50EW,EY024-034

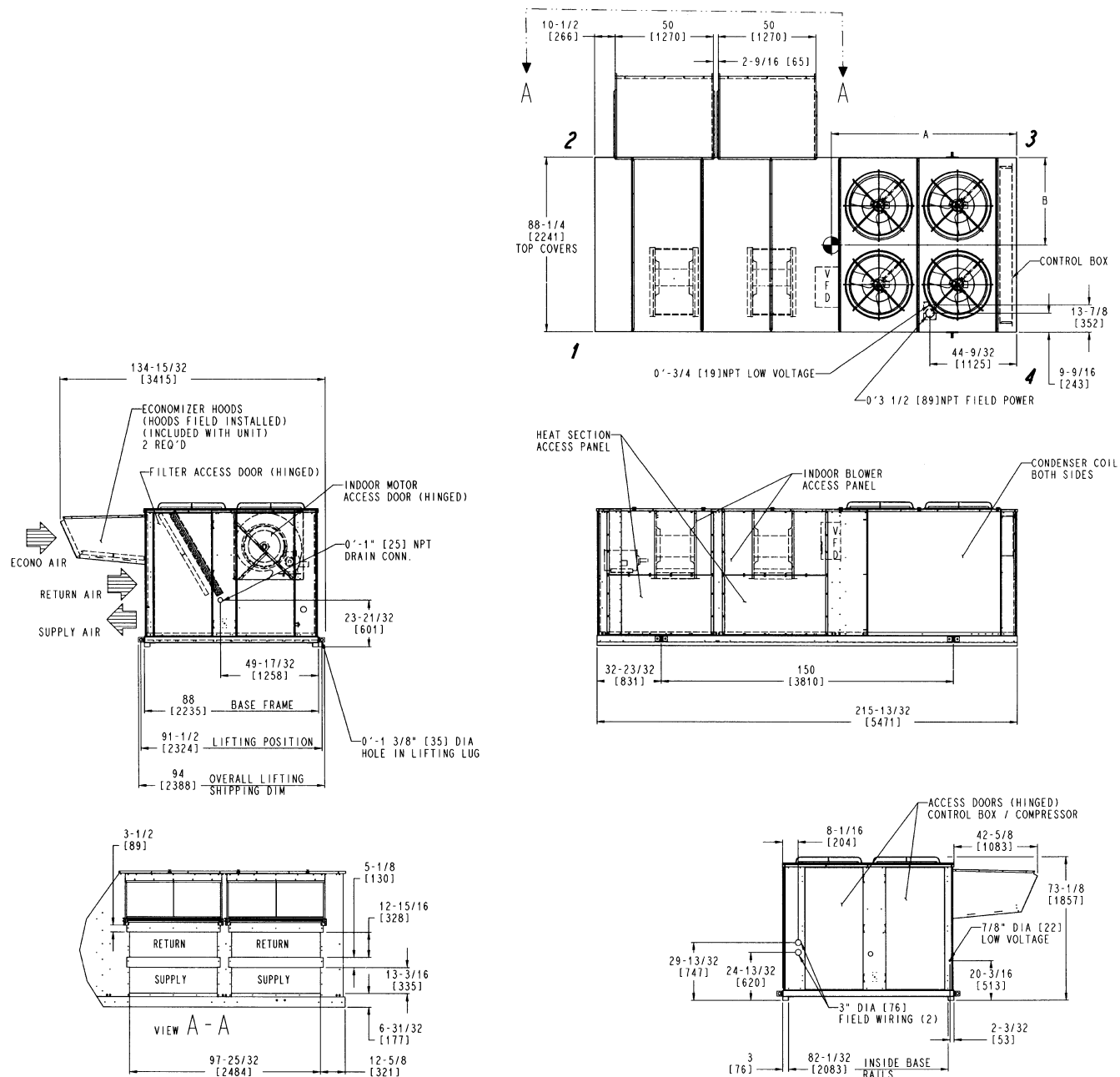


Fig. 9 — Base Unit Dimensions, 50EW,EY038,044

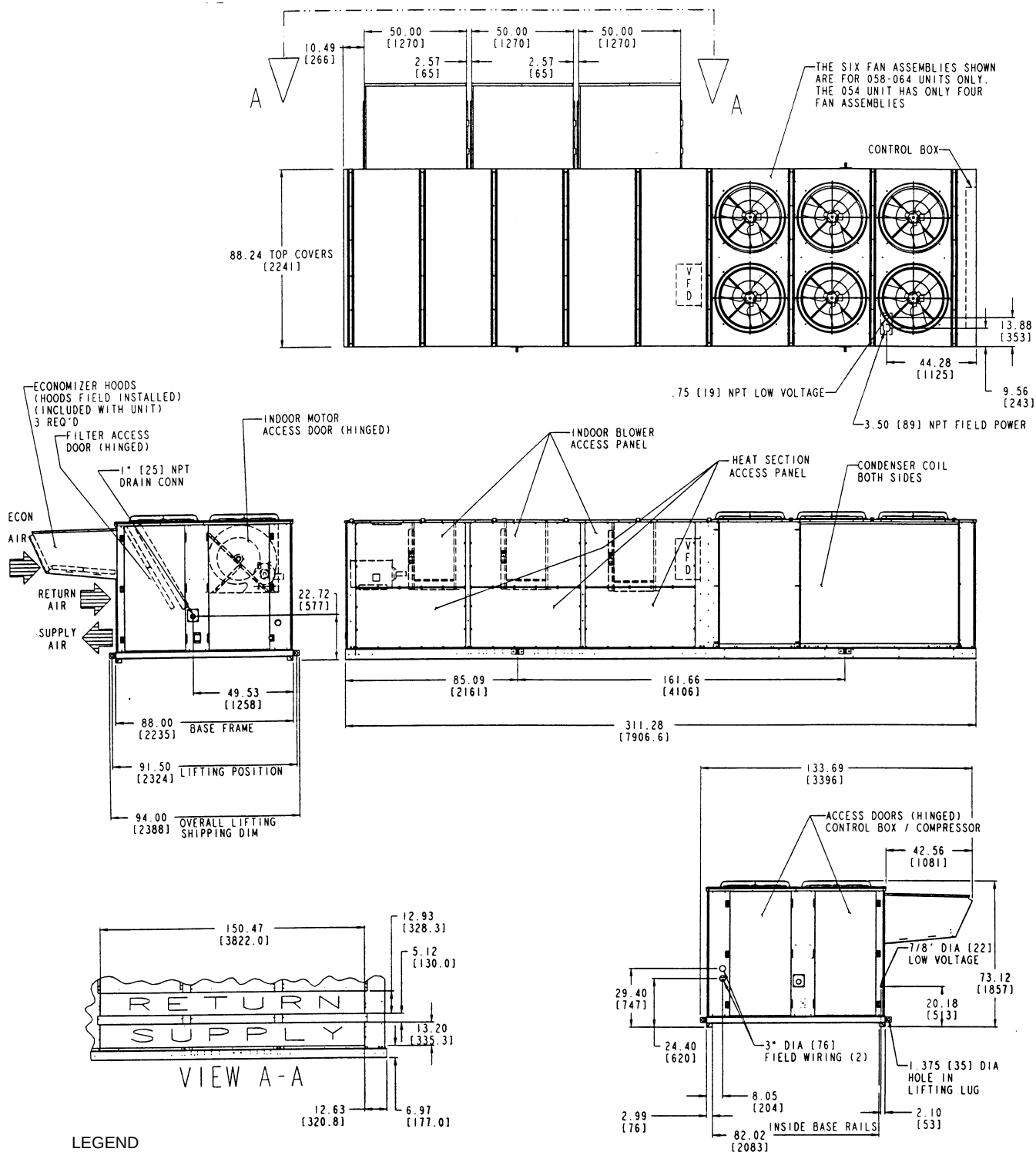


Fig. 10 — Base Unit Dimensions, 50EW,EY054-068

Step 2 — Rig and Place Unit — Inspect unit for transportation damage. File any claim with transportation agency. Keep unit upright, and do not drop. Use spreader bars over unit to prevent sling or cable damage. Rollers may be used to move unit across a roof. Level by using unit frame as a reference; leveling tolerance is shown in Fig. 1-4. See Fig. 11 for additional information. Unit weight is shown in Tables 1A-2B.

NOTE: On retrofit jobs, ductwork may be attached to old unit instead of roof curb. Be careful not to damage ductwork when removing old unit. Attach existing ductwork to roof curb instead of unit.

Four lifting lugs are provided on the unit base rails as shown in Fig. 5-10. Refer to rigging instructions on unit.

POSITIONING — Provide and maintain clearance around and above the unit to provide minimum distance from combustible materials, proper airflow, and service access. See Figs. 5-10.

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

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

ROOF MOUNT — Check building codes for weight distribution requirements. Unit weight is shown in Tables 2A and 2B.

Step 3 — Field Fabricate Ductwork — Secure all ducts to building structure. Use flexible duct connectors between unit and ducts as required. 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.

To attach ductwork to roof curb, insert ductwork approximately 254 to 279 mm (10 to 11 in.) up into the curb. Connect ductwork to 14-gage roof curb material using sheet metal screw driven from inside the duct.

⚠ WARNING

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

The units with electric heat require a 25 mm (1-in.) clearance for the first 610 mm (24 in.) of ductwork.

NOTE: A 90-degree elbow must be provided in the supply ductwork to comply with UL (Underwriters' Laboratories, U.S.A. Standard) codes for use with electric heat.

Outlet grilles must not lie directly below unit discharge.

⚠ WARNING

Failure to follow these instructions on clearances, 90-degree ductwork, and location of outlet grilles could result in personal injury and property damage from fire or falling objects.

All CV (constant volume) units are equipped with a supply air thermistor located in the indoor fan compartment. The sensor is used to measure supply-air temperature for economizer control.

Step 4 — Make Unit Duct Connections

50EJ,EK UNITS — Unit is shipped for through-the-bottom duct connections. Ductwork openings are shown in Fig. 5-7. **Attach all ductwork to roof curb.** Air distribution is shown in Fig. 12. Refer to installation instructions shipped with accessory roof curb for more information.

50EW,EY UNITS — Remove shipping covers from supply and return air openings. Attach field-supplied ductwork to unit. Connect to the unit with a single duct for both the supply and return. Splitting of the airflow into branch ducts should not be done at the unit. Sufficient duct length should be used prior to branching to ensure the air temperatures are well mixed within the ductwork. See Fig. 8-10 for duct opening dimensions. Secure all ducts to the building structure. See Fig. 13. Use flexible duct connectors between unit and ducts as required.

Install accessory barometric relief or power exhaust in the field-fabricated return ductwork. Refer to Step 9 — Position Power Exhaust/Barometric Relief Damper Hood section on page 42 for more information.

Step 5 — Trap Condensate Drain — See Fig. 5-10 and 14 for drain location. Condensate drain is open to the atmosphere and must be trapped to prevent freeze-up. Install a trapped drain at the drain location. One 1-in. Freeze Protection Thermostat (FPT) coupling is provided inside unit evaporator section for condensate drain connection. A trap at least 102 mm (4-in.) deep must be used.

Condensate pans are sloped so that water will completely drain from the condensate pan to comply with indoor air quality guidelines.

UNIT	CENTER OF GRAVITY				PERCENT OF TOTAL WEIGHT AT EACH CORNER			
	Inches		mm		1	2	3	4
	A	B	A	B				
50EJ,EK,EW,EY024	71.4	41.7	1814	1059	20.5%	22.8%	29.8%	26.9%
50EJ,EK,EW,EY028	68.5	43.6	1740	1107	20.6%	20.9%	29.5%	29.0%
50EJ,EK,EW,EY030	68.5	43.6	1740	1107	20.6%	20.9%	29.5%	29.0%
50EJ,EK,EW,EY034	68.5	43.6	1740	1107	20.6%	20.9%	29.5%	29.0%
50EJ,EK,EW,EY038	91.3	46.5	2319	1181	22.4%	20.0%	27.1%	30.4%
50EJ,EK,EW,EY044	87.8	46.5	2230	1181	21.6%	19.3%	27.9%	31.3%
50EJ,EK,EW,EY054	128.1	46.1	3254	1171	21.6%	19.6%	28.0%	30.8%
50EJ,EK,EW,EY058	124.6	45.4	3164	1153	20.8%	19.4%	29.0%	30.9%
50EJ,EK,EW,EY064	122.2	44.7	3104	1135	19.9%	19.3%	29.9%	30.8%
50EJ,EK,EW,EY068	120.6	44.6	3083	1133	19.6%	19.1%	30.2%	31.1%

LEGEND

VFD — Variable Frequency Drive

NOTES:

1.  Center of gravity.
2. Do not locate adjacent units with flue discharge facing economizer inlet. Minimum clearances to be:
Adjacent Units: 15'-0" [4572]
Top of Units: No overhang
Condenser Coil: 4'-0" [1219]
Economizer Side: 6'-0" [1829]
Heat Side: 4'-0" [1219]
Filter Access Side: 15'-0" [4572] (For Removal of Evaporator Coil)
3. For smaller service and operational clearances, contact Carrier Application Engineering department.
4. Bottom ducts designed to be attached to accessory roof curb. It is recommended that the ducts must be supported by cross braces as done on accessory roof curb.
5. Dimensions [] are in millimeters.
6. Dimensions are in inches.
7. Variable frequency drive (VFD) is only available for VAV (variable air volume) units.

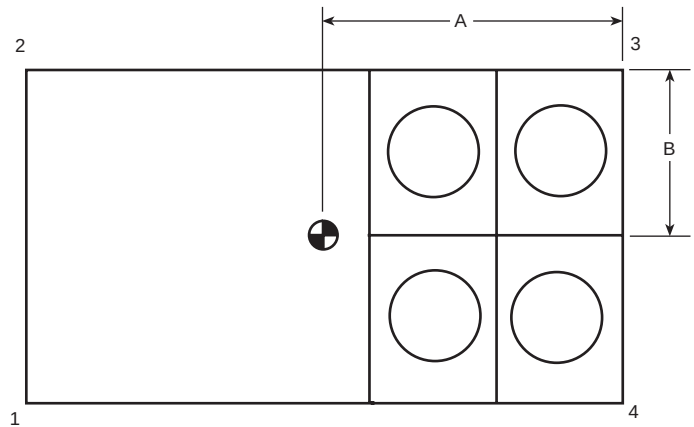


Fig. 11 — Center of Gravity and Corner Weight Percentages

RIGGING WEIGHTS — SI

50E_024-068 UNIT WEIGHTS

UNIT	MAXIMUM UNIT WEIGHTS (Kg)*									
	024	028	030	034	038	044	054	058	064	068
50EJ,EK	2292	2440	2365	2365	2603	2736	3608	3766	3937	4017
50EW,EY	2327	2534	2400	2400	2690	2736	3701	3859	4030	4110

*Includes outdoor-air hoods, filters, indoor-fan motor, modulating power exhaust, and variable frequency drive (VFD).

NOTES:

1. Sizes 024-044 include 227 kg and sizes 054-068 include 325 kg for modulating power exhaust.
2. Sizes 024-044 include 77 kg and sizes 054-068 include 116 kg for economizer hoods.
3. Economizer hood packaging includes 20.4 kg.

4. 50E()024-044 includes 50 kg and 50E()054-068 includes 75 kg for electric heaters.

5. For sizes 024-034 add 100 kg for copper coil.
6. For sizes 038-044 add 129 kg for copper coil.
7. For 054 size add 123 kg for copper coil.
8. For 058 size add 185 kg for copper coil.
9. For 064 size add 222 kg for copper coil.
10. For 068 size add 295 kg for copper coil.

RIGGING WEIGHTS — ENGLISH

50E_024-068 UNIT WEIGHTS

UNIT	MAXIMUM UNIT WEIGHTS (Lb)*									
	024	028	030	034	038	044	054	058	064	068
50EJ,EK	5052	5380	5214	5214	5738	6032	7954	8302	8680	8855
50EW,EY	5130	5586	5292	5292	5931	6032	8159	8507	8885	9060

*Includes outdoor-air hoods, filters, indoor-fan motor, modulating power exhaust, and variable frequency drive (VFD).

NOTES:

1. Sizes 024-044 include 500 lb and sizes 054-068 include 725 lb for modulating power exhaust.
2. Sizes 024-044 include 170 lb and sizes 054-068 include 255 lb for economizer hoods.
3. Economizer hood packaging includes 45 lb.

4. 50E()024-044 include 110 lb and 50E()054-068 include 165 lb for electric heaters.

5. For sizes 024-034 add 220 lb for copper coil.
6. For sizes 038-044 add 284 lb for copper coil.
7. For 054 size add 271 lb for copper coil.
8. For 058 size add 407 lb for copper coil.
9. For 064 size add 489 lb for copper coil.
10. For 068 size add 651 lb for copper coil.

Fig. 11 — Center of Gravity and Corner Weight Percentages (cont)

Table 1A — Physical Data (SI)

UNIT 50EJ,EK,EW,EY	024			028			030		
NOMINAL CAPACITY (kW) 50 Hz	67			81			91		
OPERATING WEIGHT	For operating weights, see Table 2A.								
COMPRESSOR Type Ckt 1 Ckt 2 Number of Refrigerant Circuits Oil (ml) (Ckt1, Ckt 2)	06D328 06D818 2 3400, 2600			06D328 06D328 2 3400 ea.			06D537 06D328 2 3400 ea.		
REFRIGERANT TYPE Operating Charge (kg) Circuit 1* Circuit 2	R-22 11.34 14.06			11.34 11.34			11.34 11.34		
CONDENSER COIL Quantity Rows...Fins/m Total Face Area (sq m)	Cross-Hatched 3/8" Copper Tubes, Aluminum Lanced, Aluminum Precoated, or Copper Fins 1 4...590 3.09								
CONDENSER FAN Nominal L/s 50 Hz Quantity...Diameter (mm) Motor kW	5470 2...762 .75			Propeller Type 5470 2...762 .75			5470 2...762 .75		
EVAPORATOR COIL Rows...Fins/mm Total Face Area (sq m)	Cross-Hatched 3/8" Copper Tubes, Aluminum Plate Fins, Intertwined Circuits 4...590 2.94								
EVAPORATOR FAN Quantity...Size (mm) Type Drive Nominal L/s 50 Hz Motor kW Motor Frame Size Motor Bearing Type Maximum Allowable r/s Motor Pulley Pitch Diameter (mm) Nominal Motor Shaft Diameter (mm) Fan Pulley Pitch Diameter (mm) Nominal Fan Shaft Diameter (mm) Belt, Quantity...Type Belt Length (mm) Pulley Center Line Distance (mm) Factory Speed Setting (r/s) 50 Hz	2...508 × 381 Belt 3540 3.73 7.46† 11.19 184T 215T 254T Ball 20 124 112 145 28 35 41 315 218 231 49 1...BX56 2...BX50 2...5VX530 1422 1270 1346 406-475 396-467 381-455 10.1 12.8 15.1			Centrifugal Type 2...508 × 381 Belt 4340 5.60 7.46† 11.19 213T 215T 254T Ball 20 137 155 140 35 35 41 315 282 221 49 1...BX56 1...5VX570 2...5VX530 1422 1448 1346 396-467 396-467 381-455 10.8 13.3 15.6			2...508 × 381 Belt 4815 7.46 11.19† 14.92 215T 254T 256T Ball 20 112 124 150 35 41 41 239 206 221 49 2...BX50 2...5VX500 2...5VX530 1270 1270 1346 396-467 381-455 381-455 11.8 14.7 16.4		
HIGH-PRESSURE SWITCH (kPa) Cutout Reset (Auto.)	2951 2206			2951 2206			2951 2206		
LOW-PRESSURE SWITCH (kPa) Cutout Reset (Auto.)	48 152			48 152			48 152		
RETURN-AIR FILTERS Quantity...Size (mm) (W x H x T)	10...508x610x51			10...508x610x51			10...508x610x51		
OUTDOOR-AIR FILTERS Quantity...Size (mm)	8...406 × 635 4...508 × 635								
POWER EXHAUST Motor Quantity...kW Fan, Diameter...Width (mm)	Direct Drive, 3-Speed, Single Phase Motor (Factory Wired For High Speed) and Forward Curved Fan 4...0.75 279...254								

LEGEND

Bhp — Brake Horsepower

*Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 044-068: Circuit 1 uses the left condenser coil, Circuit 2, the right. All units have intertwined evaporator coils.

†Motor and drive shown will deliver approximately 17.2 kPa (2.5 in. wg) net external static. For more information, see Tables 3A and 3B.

Table 1A — Physical Data (SI) (cont)

UNIT 50EJ,EK,EW,EY	034	038	044
NOMINAL CAPACITY (kW) 50 Hz	98	116	123
OPERATING WEIGHT	For operating weights see Table 2A.		
COMPRESSOR Type Ckt 1 Ckt 2 Number of Refrigerant Circuits Oil (ml) (Ckt1, Ckt 2)	06D537 06D537 2 3400 ea.	06D537 06D537 2 3400 ea.	06EA250 06EA250 2 6625 ea.
REFRIGERANT TYPE Operating Charge (kg) Circuit 1* Circuit 2	R-22 11.34 11.34	R-22 15.42 15.42	R-22 15.88 15.88
CONDENSER COIL Quantity Rows...Fins/m Total Face Area (sq m)	Cross-Hatched 3/8" Copper Tubes, Aluminum Lanced, Aluminum Precoated, or Copper Fins 1 4...590 3.09	Cross-Hatched 3/8" Copper Tubes, Aluminum Lanced, Aluminum Precoated, or Copper Fins 2 3...590 5.42	Cross-Hatched 3/8" Copper Tubes, Aluminum Lanced, Aluminum Precoated, or Copper Fins 2 3...590 5.42
CONDENSER FAN Nominal L/s 50 Hz Quantity...Diameter (mm) Motor kW	5470 2...762 .75	Propeller Type 11,740 4...762 1	11,740 4...762 .75
EVAPORATOR COIL Rows...Fins/mm Total Face Area (sq m)	Cross-Hatched 3/8" Copper Tubes, Aluminum Plate Fins, Intertwined Circuits 4...590 2.94	Cross-Hatched 3/8" Copper Tubes, Aluminum Plate Fins, Intertwined Circuits 3...590 3.22	Cross-Hatched 3/8" Copper Tubes, Aluminum Plate Fins, Intertwined Circuits 3...590 3.22
EVAPORATOR FAN Quantity...Size (mm) Type Drive Nominal L/s 50 Hz Motor kW Motor Frame Size Motor Bearing Type Maximum Allowable r/s Motor Pulley Pitch Diameter (mm) Nominal Motor Shaft Diameter (mm) Fan Pulley Pitch Diameter (mm) Nominal Fan Shaft Diameter (mm) Belt, Quantity...Type Belt Length (mm) Pulley Center Line Distance (mm) Factory Speed Setting (r/s) 50 Hz	2...508 x 381 Belt 5290 7.46 11.19† 14.92 215T 254T 256T Ball 20 112 145 150 35 41 41 229 231 221 49 2...BX50 2...5VX530 2...5VX530 1270 1346 1346 396-467 381-455 381-455 12.4 15.1 16.4	Centrifugal Type 2...508 x 381 Belt 5500 7.46 11.19† 14.92 S215T S254T S256T Ball 20 155 135 145 35 41 41 348 241 241 49 1...5VX610 2...5VX530 2...5VX530 1549 1346 1397 396-467 381-455 381-455 10.9 13.4 13.8	4...508 x 381 Belt 6600 11.19 14.92† 18.65 254T 256T 284T Ball 20 135 145 191 41 41 48 241 241 282 49 2...5VX530 2...5VX550 2...5VX590 1346 1397 1499 381-455 381-455 371-447 13.4 14.4 16.2
HIGH-PRESSURE SWITCH (kPa) Cutout Reset (Auto.)	2951 2206	2951 2206	2951 2206
LOW-PRESSURE SWITCH (kPa) Cutout Reset (Auto.)	48 152	48 152	48 152
RETURN-AIR FILTERS Quantity...Size (mm) (WxHxT)	10...508 x 610 x 51	10...508 x 610 x 51	10...508 x 610 x 51
OUTDOOR-AIR FILTERS Quantity...Size (mm)	8...406 x 635 4...508 x 635	8...406 x 635 4...508 x 635	8...406 x 635 4...508 x 635
POWER EXHAUST Motor Quantity...kW Fan, Diameter...Width (mm)	Direct Drive, 3-Speed, Single Phase Motor (Factory Wired For High Speed) and Forward Curved Fan 4...0.75 279...254		

LEGEND

Bhp — Brake Horsepower

*Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 044-068: Circuit 1 uses the left condenser coil, Circuit 2, the right. All units have intertwined evaporator coils.

†Motor and drive shown will deliver approximately 17.2 kPa (2.5 in. wg) net external static. For more information, see Tables 3A and 3B.

Table 1A — Physical Data (SI) (cont)

UNIT 50EJ,EK,EW,EY	054	058
NOMINAL CAPACITY (kW) 50 Hz	143	159
OPERATING WEIGHT	For operating weights see Table 2A.	
COMPRESSOR Quantity...Type (Ckt 1, Ckt 2) Number of Refrigerant Circuits Oil (ml) (Ckt 1, Ckt 2)	1...06EA265, 1...06EA250 2 9990, 6625	1...06EA275, 1...06A250 2 9990, 6625
REFRIGERANT TYPE Operating Charge (kg) Circuit 1* Circuit 2	R-22 23.0 21.1	
CONDENSER COIL Quantity Rows...Fins/m Total Face Area (sq m)	Cross-Hatched 3/8-in. Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins 1 3...590 6.19	
CONDENSER FAN Nominal L/s 50 Hz Quantity...Diameter (mm) Motor kW	Propeller Type 11 960 4...762 0.746	
EVAPORATOR COIL Rows...Fins/m Total Face Area (sq m)	Cross-Hatched 1/2-in. Copper Tubes, Aluminum Plate Fins, Intertwined Circuits 4...669 4.18	
EVAPORATOR FAN Quantity...Size (mm) Type Drive Nominal L/s 50 Hz Motor kW Motor Frame Size Motor Bearing Type Maximum Allowable r/s Motor Pulley Pitch Diameter (mm) Nominal Motor Shaft Diameter (mm) Fan Pulley Pitch Diameter (mm) Nominal Shaft Diameter (mm) Belt, Quantity...Type Belt, Length (mm) Pulley Center Distance (mm) Factory Speed Setting (r/s) 50 Hz	Centrifugal Type 3...508 x 381 Belt 7931 11.19 S254T 14.92 S256T 18.65 S284T Ball 20 119.38 154.94 205.74 41.28 41.28 47.63 281.94 281.94 317.50 49 2...5VX550 1397 386-444 10.3	
HIGH-PRESSURE SWITCH (kPa) Cutout Reset (Auto.)	2937 2206	
LOW-PRESSURE SWITCH (kPa) Cutout Reset (Auto.)	48 152	
RETURN-AIR FILTERS Quantity...Size (mm) (W x H x T)	16...508 x 610 x 51	
OUTDOOR-AIR FILTERS Quantity...Size (mm)	8...406 x 635 4...508 x 635	
POWER EXHAUST Motor Quantity...kW Fan, Diameter...Width (mm)	Direct Drive, 3-Speed, Single-Phase Motor (Factory-Wired for High Speed) and Forward Curved Fan 6...0.75 279...254	

LEGEND

Bhp — Brake Horsepower

*Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 044-068: Circuit 1 uses the left condenser coil, Circuit 2, the right. All units have intertwined evaporator coils.

†Motor and drive shown will deliver approximately 17.2 kPa (2.5 in. wg) net external static. For more information, see Tables 3A and 3B.

Table 1A — Physical Data (SI) (cont)

UNI T 50EJ,EK,EW,EY	064	068
NOMINAL CAPACITY (kW) 50 Hz	182	194
OPERATING WEIGHT	For operating weights see Table 2A.	
COMPRESSOR Quantity...Type (Ckt 1, Ckt 2) Number of Refrigerant Circuits Oil (ml) (Ckt 1, Ckt 2)	1...06EA275, 1...06EA265 2 9990, 9990	2...06EA275 2 9990, 9990
REFRIGERANT TYPE Operating Charge (kg) Circuit 1* Circuit 2	R-22 30.8 30.8	
CONDENSER COIL Quantity Rows...Fins/m Total Face Area (sq m)	Cross-Hatched 3/8-in. Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins 2 3...590 9.29	
CONDENSER FAN Nominal L/s 50 Hz Quantity...Diameter (mm) Motor kW	Propeller Type 17 940 6...762 0.746	
EVAPORATOR COIL Rows...Fins/m Total Face Area (sq m)	Cross-Hatched 1/2-in. Copper Tubes, Aluminum Plate Fins, Intertwined Circuits 4...669 4.47	
EVAPORATOR FAN Quantity...Size (mm) Type Drive Nominal L/s 50 Hz Motor kW Motor Frame Size Motor Bearing Type Maximum Allowable r/s Motor Pulley Pitch Diameter (mm) Nominal Motor Shaft Diameter (mm) Fan Pulley Pitch Diameter (mm) Nominal Shaft Diameter (mm) Belt, Quantity...Type Belt, Length (mm) Pulley Center Distance (mm) Factory Speed Setting (r/s) 50 Hz	Centrifugal Type 3...508 x 381 Belt 10 103 22.38 S286T 29.84 S324T Ball 20 134.62 205.74 238.76 47.63 47.63 53.98 231.14 317.50 345.44 49 3...5VX530 1346 2...5VX630 1600 1651 386-444 373-437 361-432 14.2 15.8 16.9	
HIGH-PRESSURE SWITCH (kPa) Cutout Reset (Auto.)	2937 2206	
LOW-PRESSURE SWITCH (kPa) Cutout Reset (Auto.)	48 152	
RETURN-AIR FILTERS Quantity...Size (mm) (W x H x T)	16...508 x 610 x 51	
OUTDOOR-AIR FILTERS Quantity...Size (mm)	8...406 x 635 4...508 x 635	
POWER EXHAUST Motor Quantity...kW Fan, Diameter...Width (mm)	Direct Drive, 3-Speed, Single-Phase Motor (Factory-Wired for High Speed) and Forward Curved Fan 6...0.75 279...254	

LEGEND

Bhp — Brake Horsepower

*Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 044-068: Circuit 1 uses the left condenser coil, Circuit 2, the right. All units have intertwined evaporator coils.

†Motor and drive shown will deliver approximately 17.2 kPa (2.5 in. wg) net external static. For more information, see Tables 3A and 3B.

Table 1B — Physical Data (English)

UNIT 50EJ,EK,EW,EY	024	028	030
NOMINAL CAPACITY (tons) 50 Hz	19	23	26
OPERATING WEIGHT	For operating weights see Table 2B.		
COMPRESSOR Type Ckt 1 Ckt 2 Number of Refrigerant Circuits Oil (oz) (Ckt 1, Ckt 2)	06D328 06D818 2 115, 88	06D328 06D328 2 115 ea.	06D537 06D328 2 115 ea.
REFRIGERANT TYPE Operating Charge (lb-oz) Circuit 1* Circuit 2	R-22		
	25-0 31-0	25-0 25-0	25-0 25-0
CONDENSER COIL Quantity Rows...Fins/in. Total Face Area (sq ft)	Cross-Hatched 3/8" Copper Tubes, Aluminum Lanced, Aluminum Precoated or Copper Fins		
	1 4...15 33.3	1 4...15 33.3	1 4...15 33.3
CONDENSER FAN Nominal Cfm 50 Hz Quantity...Diameter (in.) Motor Hp (1075 Rpm)	Propeller Type		
	11,590 2...30 1	11,590 2...30 1	11,590 2...30 1
EVAPORATOR COIL Rows...Fins/in. Total Face Area (sq ft)	Cross-Hatched 3/8" Copper Tubes, Aluminum Plate Fins, Intertwined Circuits		
	4...15 31.7	4...15 31.7	4...15 31.7
EVAPORATOR FAN Quantity...Size (in.) Type Drive Nominal Cfm 50 Hz Motor Hp Motor Frame Size Motor Bearing Type Maximum Allowable Rpm Motor Pulley Pitch Diameter Nominal Motor Shaft Diameter (in.) Fan Pulley Pitch Diameter (in.) Nominal Fan Shaft Diameter (in.) Belt, Quantity...Type Belt, Length (in.) Pulley Center Line Distance (in.) Factory Speed Setting (rpm) 50 Hz	Centrifugal Type		
	2...20x15 Belt 7,500 10† 15 S184T S215T S254T Ball 1200 4.9 1 1/8 12.4 1...BX56 56 16.0-18.7 558	2...20x15 Belt 9,200 10† 15 S213T S215T S254T Ball 1200 5.4 1 3/8 12.4 1...BX56 56 15.6-18.4 644	2...20x15 Belt 10,200 15† 20 S215T S254T S256T Ball 1200 4.9 1 5/8 8.7 2...5VX530 53 15.0-17.9 989
HIGH-PRESSURE SWITCH (psig) Cutout Reset (Auto.)	426 320		
LOW-PRESSURE SWITCH (psig) Cutout Reset (Auto.)	7 22		
RETURN-AIR FILTERS Quantity...Size (in.) (W x H x T)	10...20x24x2		
OUTDOOR-AIR FILTERS Quantity...Size (in.)	8...16x25 4...20x25		
POWER EXHAUST Motor, Quantity...Hp Fan, Diameter...Width (in.)	Direct Drive, 3-Speed, Single-Phase Motor (Factory-Wired For High Speed) and Forward Curved Fan 4...1 11...10		

*Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 044-068: Circuit 1 uses the left condenser coil, Circuit 2, the right. All units have intertwined evaporator coils.

†Motor and drive shown will deliver approximately 2.5 in. wg (17.2 kPa) net external static. For more information, see Tables 3A and 3B.

Table 1B — Physical data (English) (cont)

UNIT 50EJ,EK,EW,EY	034			038			044		
NOMINAL CAPACITY (tons) 50 Hz	28			33			35		
OPERATING WEIGHT	For operating weights see Table 2B.								
COMPRESSOR	06D537			06D537			06EA250		
Type Ckt 1	06D537			06D537			06EA250		
Type Ckt 2	06D537			06D537			06EA250		
Number of Refrigerant Circuits	2			2			2		
Oil (oz) (Ckt 1, Ckt 2)	115 ea.			115 ea.			224 ea.		
REFRIGERANT TYPE	R-22								
Operating Charge (lb-oz)	25-0			34-0			35-0		
Circuit 1*	25-0			34-0			35-0		
Circuit 2	25-0			34-0			35-0		
CONDENSER COIL	Cross-Hatched 3/8" Copper Tubes, Aluminum Lanced, Aluminum						Precoated or Copper Fins		
Quantity	1			2			2		
Rows...Fins/in.	4...15			3...15			3...15		
Total Face Area (sq ft)	33.3			58.3			58.3		
CONDENSER FAN	Propeller Type								
Nominal Cfm 50 Hz	11,590			22,544			24,880		
Quantity...Diameter (in.)	2...30			4...30			4...30		
Motor Hp (1075 Rpm)	1			1			1		
EVAPORATOR COIL	Cross-Hatched 3/8" Copper Tubes, Aluminum Plate Fins, Intertwined Circuits								
Rows...Fins/in.	4...15			3...15			3...15		
Total Face Area (sq ft)	31.7			34.7			34.7		
EVAPORATOR FAN	Centrifugal Type								
Quantity...Size (in.)	2...20 x 15			2...20 x 15			4...20 x 15		
Type Drive	Belt			Belt			Belt		
Nominal Cfm 50 Hz	11,200			11,662			14,000		
Motor Hp	10	15†	20	10	15†	20	15	20†	25
Motor Frame Size	S215T	S254T	S256T	S215T	S254T	S256T	S254T	S256T	S284T
Motor Bearing Type		Ball			Ball			Ball	
Maximum Allowable Rpm		1200			1200			1200	
Motor Pulley Pitch Diameter	4.4	5.7	5.9	6.1	5.3	5.7	5.3	5.7	7.5
Nominal Motor Shaft Diameter (in.)	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8
Fan Pulley Pitch Diameter (in.)	9.0	9.1	8.7	13.7	9.5	9.5	9.5	9.5	11.1
Nominal Fan Shaft Diameter (in.)		1 15/16			1 15/16			1 15/16	
Belt, Quantity...Type	2...BX50	2...5VX530	2...5VX530	1...5VX610	2...5VX530	2...5VX550	2...5VX530	2...5VX530	2...5VX590
Belt, Length (in.)	50	53	53	61	53	55	53	53	59
Pulley Center Line Distance (in.)	15.6-18.4		15.0-17.9	15.6-18.4		15.0-17.9		15.0-17.9	14.6-17.6
Factory Speed Setting (rpm) 50 Hz	747	907	985	657	805	875	888	862	968
HIGH-PRESSURE SWITCH (psig)	426			426			426		
Cutout	320			320			320		
Reset (Auto.)	320			320			320		
LOW-PRESSURE SWITCH (psig)	7			7			7		
Cutout	22			22			22		
Reset (Auto.)	22			22			22		
RETURN-AIR FILTERS	10...20 x 24 x 2			10...20 x 24 x 2			10...20 x 24 x 2		
Quantity...Size (in.) (W x H x T)	10...20 x 24 x 2			10...20 x 24 x 2			10...20 x 24 x 2		
OUTDOOR-AIR FILTERS	8...16 x 25			8...16 x 25			8...16 x 25		
Quantity...Size (in.)	4...20 x 25			4...20 x 25			4...20 x 25		
POWER EXHAUST	Direct Drive, 3-Speed, Single-Phase Motor (Factory-Wired For High Speed) and Forward Curved Fan								
Motor, Quantity...Hp	4...1			4...1			4...1		
Fan, Diameter...Width (in.)	11...10			11...10			11...10		

*Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 044-068: Circuit 1 uses the left condenser coil, Circuit 2, the right. All units have intertwined evaporator coils.

†Motor and drive shown will deliver approximately 2.5 in. wg (17.2 kPa) net external static. For more information, see Tables 3A and 3B.

Table 1B — Physical Data (English) (cont)

UNIT 50EJ,EK,EW,EY	054	058
NOMINAL CAPACITY (tons) 50 Hz	42	46.5
OPERATING WEIGHT	For operating weights see Table 2B.	
COMPRESSOR Quantity...Type (Ckt 1, Ckt 2) Number of Refrigerant Circuits Oil (oz) (Ckt 1, Ckt 2)	1...06EA265, 1...06EA250 2 304, 224	1...06EA275, 1...06EA250 2 304, 224
REFRIGERANT TYPE Operating Charge (lb-oz) Circuit 1* Circuit 2	R-22 50-11 46-8	
CONDENSER COIL Quantity Rows...Fins/in. Total Face Area (sq ft)	Cross-Hatched 3/8-in. Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins 1 3...15 66.6	1 3...15 100
CONDENSER FAN Nominal Cfm Quantity...Diameter (in.) Motor Hp (885 Rpm)	Propeller Type 25,333 4...30 1	38,000 6...30 1
EVAPORATOR COIL Rows...Fins/in. Total Face Area (sq ft)	Cross-Hatched 1/2-in. Copper Tubes, Aluminum Plate Fins, Intertwined Circuits 4...17 45	4...17 45
EVAPORATOR FAN Quantity...Size (in.) Type Drive Nominal Cfm 50 Hz Motor Hp Motor Frame Size Motor Bearing Type Maximum Allowable Rpm Motor Pulley Pitch Diameter Nominal Motor Shaft Diameter (in.) Fan Pulley Pitch Diameter (in.) Nominal Fan Shaft Diameter (in.) Belt, Quantity...Type Length (in.) Belt, Length (in.) Pulley Center Line Distance (in.) Factory Speed Setting (rpm) 50 Hz	Centrifugal Type 3...20 x 15 Belt 16,800 20† S256T Ball 1200 4.7 1 5/8 11.1 2...5VX550 55 15.2-17.5 618	
HIGH-PRESSURE SWITCH (psig) Cutout Reset (Auto.)	426 320	426 320
LOW-PRESSURE SWITCH (psig) Cutout Reset (Auto.)	7 22	7 22
RETURN-AIR FILTERS Quantity...Size (in.) (W x H x T)	16...20 x 24 x 2	16...20 x 24 x 2
OUTDOOR-AIR FILTERS Quantity...Size (in.)	8...16 x 25 4...20 x 25	8...16 x 25 4...20 x 25
POWER EXHAUST Motor, Quantity...Hp Fan, Diameter...Width (in.)	Direct Drive, 3-Speed, Single-Phase Motor (Factory-Wired for High Speed) and Forward Curved Fan 6...1 11...10	

*Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 044-068: Circuit 1 uses the left condenser coil, Circuit 2, the right. All units have intertwined evaporator coils.

†Motor and drive shown will deliver approximately 2.5 in. wg (17.2 kPa) net external static. For more information, see Tables 3A and 3B.

Table 1B — Physical data (English) (cont)

UNIT 50EJ,EK,EW,EY	064			068		
NOMINAL CAPACITY (tons) 50 Hz	53.5			57		
OPERATING WEIGHT	For operating weights see Table 2B.					
COMPRESSOR Quantity...Type (Ckt 1, Ckt 2) Number of Refrigerant Circuits Oil (oz) (Ckt 1, Ckt 2)	1...06EA275, 1...06EA265 2 304, 304			2...06EA275 2 304, 304		
REFRIGERANT TYPE Operating Charge (lb-oz) Circuit 1* Circuit 2	R-22 68-0 68-0			81-0 73-0		
CONDENSER COIL Quantity Rows...Fins/in. Total Face Area (sq ft)	Cross-Hatched 3⁄8-in. Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins 2 3...15 100			4...15 100		
CONDENSER FAN Nominal Cfm Quantity...Diameter (in.) Motor Hp (885 Rpm)	Propeller Type 38,000 6...30 1			38,000 6...30 1		
EVAPORATOR COIL Rows...Fins/in. Total Face Area (sq ft)	Cross-Hatched 1⁄2-in. Copper Tubes, Aluminum Plate Fins, Intertwined Circuits 4...17 48.1			4...17 48.1		
EVAPORATOR FAN Quantity...Size (in.) Type Drive Nominal Cfm 50 Hz Motor Hp Motor Frame Size Motor Bearing Type Maximum Allowable Rpm Motor Pulley Pitch Diameter Nominal Motor Shaft Diameter (in.) Fan Pulley Pitch Diameter (in.) Nominal Fan Shaft Diameter (in.) Belt, Quantity...Type Length (in.) Belt, Length (in.) Pulley Center Line Distance (in.) Factory Speed Setting (rpm) 50 Hz	Centrifugal Type 3...20 x 15 Belt 21,400 30† S286T Ball 1200 5.3 8.1 1⁄8 12.5 1¹⁄₁₆ 2...5VX630 63 14.7-17.2 945			3...20 x 15 Belt 22,800 30† S286T Ball 1200 5.9 8.1 1⁄8 9.5 1¹⁄₁₆ 3...5VX550 55 14.7-17.2 906		
	25 S284T	40 S324T		25 S284T	40 S324T	
	5.3	8.1	9.4	6.7	5.9	9.4
	1⁄8	1⁄8	2⁄8	1⁄8	1⁄8	2⁄8
	9.1	12.5	13.6	12.5	9.5	13.6
	3...5VX530	2...5VX630	2...5VX650	2...5VX610	3...5VX550	2...5VX650
	53	63	65	61	55	65
	14.7-17.2	14.7-17.2	14.2-17.0	14.7-17.2	14.7-17.2	14.3-17.0
	849	945	1012	782	906	1012
HIGH-PRESSURE SWITCH (psig) Cutout Reset (Auto.)	426 320			426 320		
LOW-PRESSURE SWITCH (psig) Cutout Reset (Auto.)	7 22			7 22		
RETURN-AIR FILTERS Quantity...Size (in.) (W x H x T)	16...20 x 24 x 2			16...20 x 24 x 2		
OUTDOOR-AIR FILTERS Quantity...Size (in.)	8...16 x 25 4...20 x 25			8...16 x 25 4...20 x 25		
POWER EXHAUST Motor, Quantity...Hp Fan, Diameter...Width (in.)	Direct Drive, 3-Speed, Single-Phase Motor (Factory-Wired for High Speed) and Forward Curved Fan 6...1 11...10					

*Sizes 024-034: Circuit 1 uses the lower portion of condenser coil, Circuit 2 uses the upper portion. Sizes 044-068: Circuit 1 uses the left condenser coil, Circuit 2, the right. All units have intertwined evaporator coils.

†Motor and drive shown will deliver approximately 2.5 in. wg (17.2 kPa) net external static. For more information, see Tables 3A and 3B.

Table 2A — 50E_024-068 Operating Weights (SI)

BASE UNIT WEIGHTS

UNIT	BASE UNIT WEIGHTS (Kg)*									
	024	028	030	034	038	044	054	058	064	068
50EJ,EK	1854	1893	1893	1893	2131	2233	2978	3091	3205	3284
50EW,EY	1889	1928	1928	1928	2218	2233	3071	3184	3298	3377

*Outdoor-air hoods and filters included in base unit weights; indoor-fan motors are NOT included.

**OPTIONS AND ACCESSORIES
(Weight Adders)**

OPTION/ ACCESSORY	OPTION/ACCESSORY WEIGHTS (Kg)									
	024	028	030	034	038	044	054	058	064	068
Barometric Relief	136	136	136	136	136	136	204	204	204	204
Power Exhaust	204	204	204	204	204	204	306	306	306	306
Modular Power Exhaust	227	227	227	227	227	227	329	329	329	329
Electric Heat	50	50	50	50	50	50	75	75	75	75
Cu Tube/Cu Fin Condenser Coil	100	100	100	100	129	129	123	185	222	295
Roof Curb (365 mm)	166	166	166	166	186	186	265	265	265	265

CV MOTOR WEIGHTS (400 V) (Kg)

MOTOR kW	STANDARD EFFICIENCY IFM
3.73	35
5.6	49
7.46	54
11.19	68
14.92	96
18.65	109
22.38	128
29.84	169

LEGEND

Cu — Copper
CV — Constant Volume
FIOP — Factory-Installed Option
IFM — Indoor-Fan Motor
VAV — Variable Air Volume
VFD — Variable Frequency Drive

VAV MOTOR WEIGHTS (400 V) (Kg)

MOTOR kW	STANDARD EFFICIENCY IFM
3.73	57
5.6	83
7.46	93
11.19	108
14.92	158
18.65	171
22.38	218
29.84	289

NOTES:

1. Base unit weight includes outdoor-air hoods. Base unit weight does NOT include indoor-fan motor. ADD indoor-fan motor, FIOPs, and accessories for TOTAL operating weight.
2. The VAV motor weights include indoor-fan motor and the VFD (variable frequency drive), compressor electric unloaders, VFD transducers, and associated wiring.

Table 2B — 50E_024-068 Operating Weights (English)

BASE UNIT WEIGHTS

UNIT	BASE UNIT WEIGHTS (Lb)*									
	024	028	030	034	038	044	054	058	064	068
50EJ,EK	4087	4173	4173	4173	4697	4923	6565	6815	7065	7240
50EW,EY	4165	4251	4251	4251	4890	4923	6770	7020	7270	7445

*Outdoor-air hoods and filters included in base unit weights; indoor-fan motors are NOT included.

**OPTIONS AND ACCESSORIES
(Weight Adders)**

OPTION/ ACCESSORY	OPTION/ACCESSORY WEIGHTS (lb)									
	024	028	030	034	038	044	054	058	064	068
Barometric Relief	300	300	300	300	300	300	450	450	450	450
Power Exhaust	450	450	450	450	450	450	675	675	675	675
Modular Power Exhaust	500	500	500	500	500	500	725	725	725	725
Electric Heat	110	110	110	110	110	110	165	165	165	165
Cu Tube/Cu Fin Condenser Coil	220	220	220	220	285	285	271	407	489	651
Roof Curb (14-in. curb)	365	365	365	365	410	410	585	585	585	585

CV MOTOR WEIGHTS (400 V) (Lb)

MOTOR HP	STANDARD EFFICIENCY IFM
5	78
7.5	107
10	118
15	150
20	212
25	240
30	283
40	372

VAV MOTOR WEIGHTS (400 V) (Lb)

MOTOR HP	STANDARD EFFICIENCY IFM
5	125
7.5	183
10	204
15	238
20	348
25	377
30	480
40	637

LEGEND

Cu — Copper
CV — Constant Volume
FIOP — Factory-Installed Option
HP — Horsepower
IFM — Indoor Fan Motor
VAV — Variable Air Volume
VFD — Variable Frequency Drive

NOTES:

1. Base unit weight includes outdoor-air hoods. Base unit weight does NOT include indoor-fan motor. ADD indoor-fan motor, FIOPs, and accessories for TOTAL operating weight.
2. The VAV motor weights include indoor fan motor and the VFD (variable frequency drive), compressor electric unloaders, VFD transducers, and associated wiring.

Table 3A — Evaporator Fan Motor Data (SI)

UNIT SIZE 50E	MOTOR kW	MOTOR SHAFT DIAMETER (mm)	FAN SHAFT SPEED, 50 Hz (r/s)	MOTOR SHEAVE	MOTOR SHEAVE PITCH DIAMETER (mm)	BUSHING DIAMETER (mm)	FAN SHEAVE	FAN SHEAVE PITCH DIAMETER (mm)	BUSHING DIAMETER (mm)	NEW BELT	BELT TENSION (Kg @6.35 mm)
024	3.73	28.58	10.0	BK55	124.46	None-29	1B5V124	314.96	B-49	BX56	17.1
	7.46	34.93	12.8	2BK50	111.76	None-35	2B5V86	218.44	B-49	(2) BX50	17.3
	11.19	41.28	15.2	2B5V56	144.78	B-41	2B5V90	231.14	B-49	(2) 5VX530	19.8
028	5.60	34.93	10.7	BK60H	137.16	H-35	1B5V124	314.96	B-49	BX56	21.4
	7.46	34.93	13.4	1B5V60	154.94	H-35	1B5V110	281.94	B-49	5VX570	24.5
	11.19	41.28	15.4	2B5V54	139.70	B-41	2B5V86	220.98	B-49	(2) 5VX530	20.3
030	7.46	34.93	11.8	2BK50	111.76	None-35	2B5V94	238.76	B-49	(2) BX50	17.5
	11.19	41.28	14.7	2B5V48	124.46	B-41	2B5V80	205.74	B-49	(2) 5VX500	22.0
	14.92	41.28	16.5	2B5V58	149.86	B-41	2B5V86	220.98	B-49	(2) 5VX530	24.2
034	7.46	34.93	12.3	2BK50	111.76	H-35	2B5V90	228.60	B-49	(2) BX50	17.4
	11.19	41.28	15.2	2B5V56	144.78	B-41	2B5V90	231.14	B-49	(2) 5VX530	19.8
	14.92	41.28	16.5	2B5V58	149.86	B-41	2B5V86	220.98	B-49	(2) 5VX530	24.2
038	7.46	34.93	10.8	1B5V60	154.94	None-35	1B5V136	347.98	B-49	5VX610	25.5
	11.19	41.28	13.6	2B5V52	134.62	B-41	2B5V94	241.30	B-49	(2) 5VX530	21.1
	14.92	41.28	14.6	2B5V56	144.78	B-41	2B5V94	241.30	B-49	(2) 5VX530	25.2
044	11.19	41.28	13.6	2B5V52	134.62	B-41	2B5V94	241.30	B-49	(2) 5VX530	21.1
	14.92	41.28	14.6	2B5V56	144.78	B-41	2B5V94	241.30	B-49	(2) 5VX550	25.2
	18.65	47.63	16.4	2B5V74	190.50	B-48	2B5V110	281.94	B-49	(2) 5VX590	25.1
054	11.19	41.28	10.3	2B5V46	119.38	B-41	2B5V110	281.94	B-49	(2) 5VX550	24.3
	14.92	41.28	13.4	2B5V60	154.94	B-41	2B5V110	281.94	B-49	(2) 5VX570	26.9
	18.65	47.63	15.8	2B5V80	205.74	B-48	2B5V124	317.50	B-49	(2) 5VX630	27.2
058	14.92	41.28	12.9	2B5V58	149.86	B-41	2B5V110	281.94	B-49	(2) 5VX570	27.7
	18.65	47.63	14.7	2B5V66	170.18	B-48	2B5V110	281.94	B-49	(2) 5VX590	30.9
	22.38	47.63	16.4	2B5V74	190.50	B-48	2B5V110	281.94	B-49	(2) 5VX590	31.6
064	18.65	47.63	14.2	3B5V52	134.62	B-48	3B5V90	231.14	B-49	(3) 5VX530	25.7
	22.38	47.63	15.8	2B5V80	205.74	B-48	2B5V124	317.50	B-49	(2) 5VX630	31.4
	29.84	53.98	16.9	2B5V94	238.76	B-54	2B5V136	345.44	B-49	(2) 5VX650	32.1
068	18.65	47.63	13.0	2B5V66	170.18	B-48	2B5V124	317.50	B-49	(2) 5VX610	31.5
	22.38	47.63	15.1	3B5V58	149.86	B-48	3B5V94	241.30	B-49	(3) 5VX550	27.7
	29.84	53.98	16.9	2B5V94	238.76	B-54	2B5V136	345.44	B-49	(2) 5VX650	32.1

NOTE: The fan shaft diameter is 49.21 mm.

Table 3B — Evaporator Fan Motor Data (English)

UNIT SIZE 50E	MOTOR HP	MOTOR SHAFT DIAMETER (in.)	FAN SHAFT SPEED, 50 Hz (rpm)	MOTOR SHEAVE	MOTOR SHEAVE PITCH DIAMETER (in.)	BUSHING DIAMETER (in.)	FAN SHEAVE	FAN SHEAVE PITCH DIAMETER (in.)	BUSHING DIAMETER (in.)	NEW BELT	BELT TENSION (Lb @.25 in. wg)
024	5	1.125	598	BK55	4.9	None-1.125	1B5V124	12.4	B-1.9375	BX56	8
	10	1.375	770	2BK50	4.4	None-1.375	2B5V86	8.6	B-1.9375	(2) BX50	8
	15	1.625	913	2B5V56	5.7	B-1.625	2B5V90	9.1	B-1.9375	(2) 5VX530	9
028	7.5	1.375	644	BK60H	5.4	H-1.375	1B5V124	12.4	B-1.9375	BX56	10
	10	1.375	802	1B5V60	6.1	H-1.375	1B5V110	11.1	B-1.9375	5VX570	11
	15	1.625	922	2B5V54	5.5	B-1.625	2B5V86	8.7	B-1.9375	(2) 5VX530	9
030	10	1.375	707	2BK50	4.4	None-1.375	2B5V94	9.4	B-1.9375	(2) BX50	8
	15	1.625	883	2B5V48	4.9	B-1.625	2B5V80	8.1	B-1.9375	(2) 5VX500	10
	20	1.625	989	2B5V58	5.9	B-1.625	2B5V86	8.7	B-1.9375	(2) 5VX530	11
034	10	1.375	737	2BK50	4.4	H-1.375	2B5V90	9.0	B-1.9375	(2) BX50	8
	15	1.625	913	2B5V56	5.7	B-1.625	2B5V90	9.1	B-1.9375	(2) 5VX530	9
	20	1.625	989	2B5V58	5.9	B-1.625	2B5V86	8.7	B-1.9375	(2) 5VX530	11
038	10	1.375	649	1B5V60	6.1	None-1.375	1B5V136	13.7	B-1.9375	5VX610	12
	15	1.625	813	2B5V52	5.3	B-1.625	2B5V94	9.5	B-1.9375	(2) 5VX530	10
	20	1.625	875	2B5V56	5.7	B-1.625	2B5V94	9.5	B-1.9375	(2) 5VX530	11
044	15	1.625	813	2B5V52	5.3	B-1.625	2B5V94	9.5	B-1.9375	(2) 5VX530	10
	20	1.625	875	2B5V56	5.7	B-1.625	2B5V94	9.5	B-1.9375	(2) 5VX550	11
	25	1.875	985	2B5V74	7.5	B-1.875	2B5V110	11.1	B-1.9375	(2) 5VX590	11
054	15	1.625	618	2B5V46	4.7	B-1.625	2B5V110	11.1	B-1.9375	(2) 5VX550	11
	20	1.625	802	2B5V60	6.1	B-1.625	2B5V110	11.1	B-1.9375	(2) 5VX570	12
	25	1.875	945	2B5V80	8.1	B-1.875	2B5V124	12.5	B-1.9375	(2) 5VX630	12
058	20	1.625	775	2B5V58	5.9	B-1.625	2B5V110	11.1	B-1.9375	(2) 5VX570	13
	25	1.875	880	2B5V66	6.7	B-1.875	2B5V110	11.1	B-1.9375	(2) 5VX590	14
	30	1.875	985	2B5V74	7.5	B-1.875	2B5V110	11.1	B-1.9375	(2) 5VX590	14
064	25	1.875	849	3B5V52	5.3	B-1.875	3B5V90	9.1	B-1.9375	(3) 5VX530	12
	30	1.875	945	2B5V80	8.1	B-1.875	2B5V124	12.5	B-1.9375	(2) 5VX630	14
	40	2.125	1012	2B5V94	9.4	B-2.125	2B5V136	13.6	B-1.9375	(2) 5VX650	15
068	25	1.875	782	2B5V66	6.7	B-1.875	2B5V124	12.5	B-1.9375	(2) 5VX610	14
	30	1.875	908	3B5V58	5.9	B-1.875	3B5V94	9.5	B-1.9375	(3) 5VX550	13
	40	2.125	1012	2B5V94	9.4	B-2.125	2B5V136	13.6	B-1.9375	(2) 5VX650	15

NOTE: The fan shaft diameter is 1¹⁵/₁₆ in.

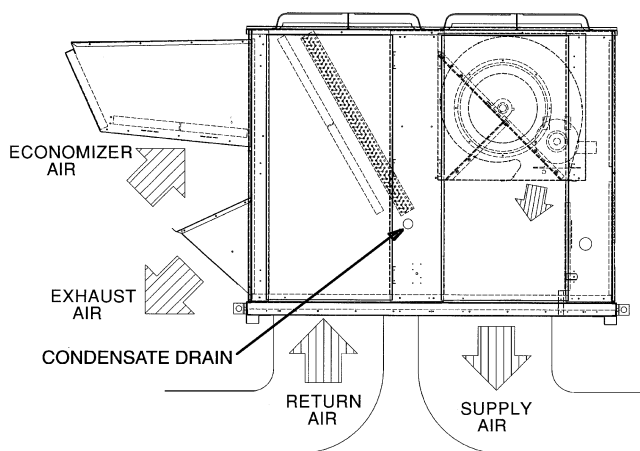


Fig. 12 — Air Distribution — Thru-the-Bottom

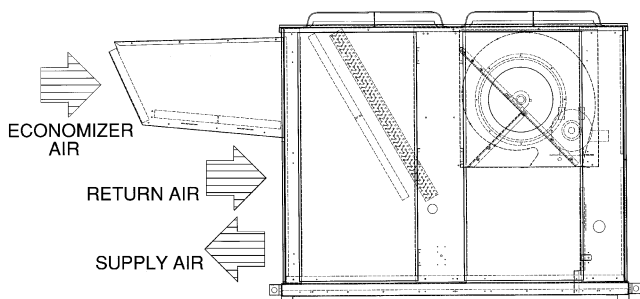


Fig. 13 — Air Distribution — Thru-the-Side

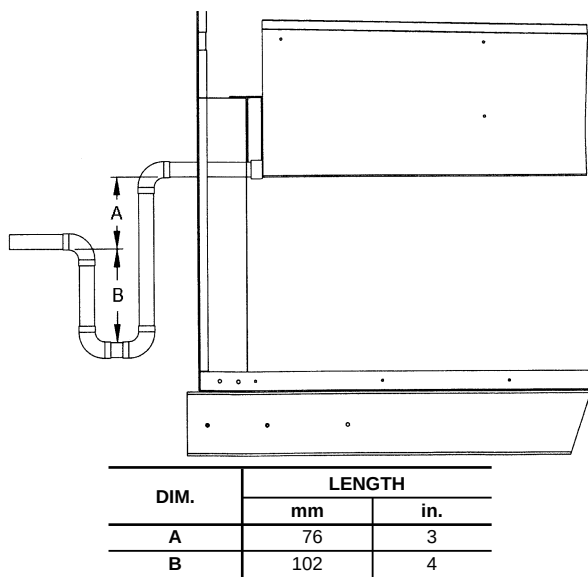


Fig. 14 — Condensate Drain Connections (Typical Roof Curb or Slab Mount Shown)

Step 6 — Controls Options — The control options that the units can provide are based on the following parameters: CV (constant volume) or VAV (variable air volume) operation; stand-alone unit with field-supplied sensors installed (CV or VAV); as a system via the Carrier Comfort System (TEMP or VVT® [Variable Volume and Temperature]); optional electronic expansion board installed (CV or VAV); linked to the Carrier Comfort Network; and availability of a computer and software (Comfort Works™ Building Supervisor, and Service Tool) or LID-2B accessory installed to access the base control board. See Table 4.

NOTE: Access to the base control board allows unit occupancy schedules, unit timeclock, and various set points to be changed from their factory-defined default settings.

THERMISTORS — All units are equipped with a supply-air thermistor (SAT) located in the supply fan discharge and an outdoor-air thermistor (OAT) located in the outdoor-air hood. Variable air volume units are supplied with a return-air thermistor (RAT) located on the return air damper support.

CONSTANT VOLUME APPLICATIONS — The units, as shipped, are operable as stand-alone units, using either a standard (mechanical or electronic) 2-stage heat, 2-stage cool thermostat, or with an electronic room sensor and a timeclock to establish unit start and stop times.

With a standard thermostat (programmable is optional), heating and cooling operation is set by space temperature.

With a space sensor and timeclock, the machine will operate at default values unless they are changed using appropriate input devices. The space sensor measures space temperature and may be equipped with a timed override feature, which allows unit operation during unoccupied periods.

The space sensors may be used in multiples of 4 to 9 to achieve space temperature averaging. The use of a space sensor also allows the unit to be turned on and off from a remote signal.

Features with Thermostat Control of Unit

- two-stage heating (if installed)
- two-stage cooling
- control of unit using Y1, Y2, W1, W2, and G thermostat inputs
- control of the indoor fan
- outdoor-air temperature/supply-air temperature monitoring
- control of an outdoor-air condenser fan based on outdoor air temperature
- control of modulating economizer damper to provide free cooling when outdoor conditions are suitable, using supply-air temperature as a control point
- control of the economizer damper and indoor fan to obtain unoccupied free cooling
- provide power exhaust output to an external power exhaust controller
- support a field test for field checkout
- control of 2 stages of CV power exhaust
- compressor Time Guard® override (power up and minimum off and on times)
- compressor lockout during low supply-air temperature

Additional features are provided by accessing the standard unit control board via software with a computer. These features are:

- electronic expansion board features (if installed)
- control board diagnostics
- ability to change supply-air set point (economizer control)
- ability to change high outdoor-air temperature lockout set point (economizer control)
- ability to change power exhaust set points

NOTE: A CV unit without a thermostat requires a field-supplied sensor for operation.

Features with Sensor Control of Unit (Stand-Alone Applications) — Unit control is limited to CV unoccupied default set points, 32 C (90 F) for cooling, 13 C (55 F) for heating. There are 2 sensor options available:

- T-55 sensor will monitor room temperature and provide unoccupied override capability (1 hour)
- T-56 sensor will monitor room temperature, provide unoccupied override capability (1 hour), and provide a temperature offset of 3° C (5° F).

Standard features are:

- support of remote occupied/unoccupied input to start and stop the unit
- cooling capacity control of 3 stages using economizer and 2 compressors to maintain space temperature to an occupied or unoccupied set point

Table 4 — Controls Options and Configurations (Non-Thermostat Applications)

UNIT CONFIGURATION	DEFAULT COOLING	DEFAULT HEATING
CV or VAV Unit with SPT Sensor	Unoccupied Cooling — 32 C (90 F) (SPT) Occupied Cooling — NA	Unoccupied Heating — 13 C (55 F) (SPT) Occupied Heating — NA
CV Unit with SPT Sensor and Remote Start/Stop Switch	Unoccupied Cooling — 32 C (90 F) (SPT) Occupied Cooling — 26 C (78 F) (SPT)	Unoccupied Heating — 13 C (55 F) (SPT) Occupied Heating — 20 C (68 F) (SPT)
VAV Unit Remote Start/Stop Switch Only	Unoccupied Cooling — 32 C (90 F) (RAT) Occupied Cooling — 13 C (55 F) (SAT)	Unoccupied Heating — 13 C (55 F) (RAT) Occupied Heating — 20 C (68 F) (RAT)*
VAV Unit with SPT Sensor and Remote Start/Stop Switch	Unoccupied Cooling — 32 C (90 F) (SPT) Occupied Cooling — 13 C (55 F) (SAT)	Unoccupied Heating — 13 C (55 F) (SPT) Occupied Heating — 20 C (68 F) (RAT)*

LEGEND

CV — Constant Volume **SAT** — Supply-Air Temperature
NA — Not Available **SPT** — Space Temperature
RAT — Return-Air Temperature **VAV** — Variable Air Volume

*With DIP Switch No. 5 configured to OPEN (Occupied Heat Enabled).

NOTE: Space temperature sensor and remote stop/switch are field-supplied.

- enable heating (if installed) or cooling during unoccupied periods as required to maintain space temperature within the unoccupied set points
- adjustment of space temperature set points of $\pm 3^{\circ}\text{C}$ (5°F) when using a T-56 sensor

Additional features with sensor control of unit (with computer access or LID-2B) are:

- 365-day timeclock with backup (supports minute, hour, day of week, date, month, and year)
- daylight savings time function
- occupancy control with 8 periods for unit operation
- holiday table containing up to 18 holiday schedules
- ability to initiate timed override from T-55 or T-56 sensors
- ability to use multiple space temperature sensors to average the space temperature
- supply air temperature reset for the supply air temperature set point
- temperature compensated start to calculate early start times before occupancy
- access to the Display, Maintenance, Configuration, Service, and Set Point data table through network software
- loadshed and demand limiting

When the unit is equipped with a field-supplied space temperature sensor and a remote contact closure (remote start/stop) on the base control board, the occupied default set points will monitor unit operation. The occupied default set points are 26 C (78 F) cooling and 20 C (68 F) heating (if electric heat is installed). See Fig. 15 for remote start/stop wiring.

NOTE: For units with a field-supplied space temperature sensor which have not had the base unit control board accessed via software to set an occupancy schedule, the remote start/stop closure will allow the unit to operate in the pre-configured occupied default set points (based on return-air temperature) of 26 C (78 F) cooling and 20 C (68 F) heating. Without this feature, the unit will control the unoccupied default set points of 32 C (90 F) cooling and 13 C (55 F) heating (if electric heat is installed).

An electronic expansion board may be field-installed to provide the following features:

- control of modulating economizer damper to maintain indoor air quality (IAQ) when outdoor conditions are suitable
- NOTE: The IAQ sensor must be set for current output (4 to 20 mA), not voltage output. Ensure the jumper on the sensor is in the upper position. See Fig. 16.
- provide discrete inputs for fan status, filter status, field-applied status, and demand limit
 - provide an output for the external alarm light indicator
 - provide power exhaust fire outputs for direct control of modulated power exhaust stages during fire or smoke modes
 - control of smoke control modes including evacuation, smoke purge, pressurization, and fire shutdown (modulating power exhaust required)
 - perform demand unit functions based on a field-supplied discrete input

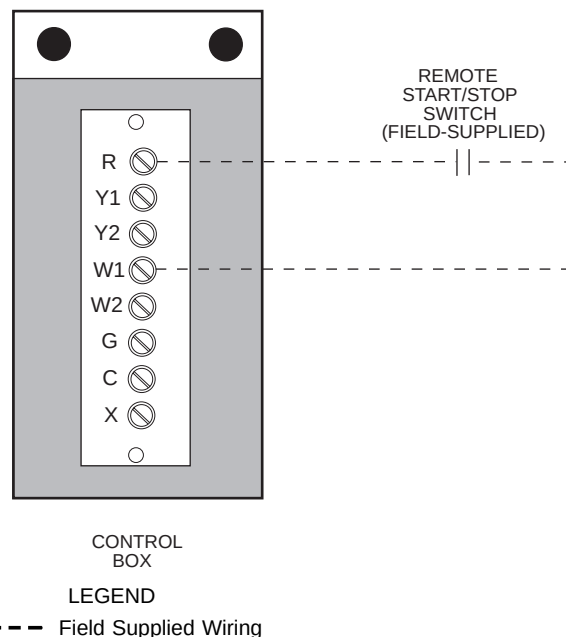


Fig. 15 — Field Control Remote Start/Stop (CV or VAV Units)

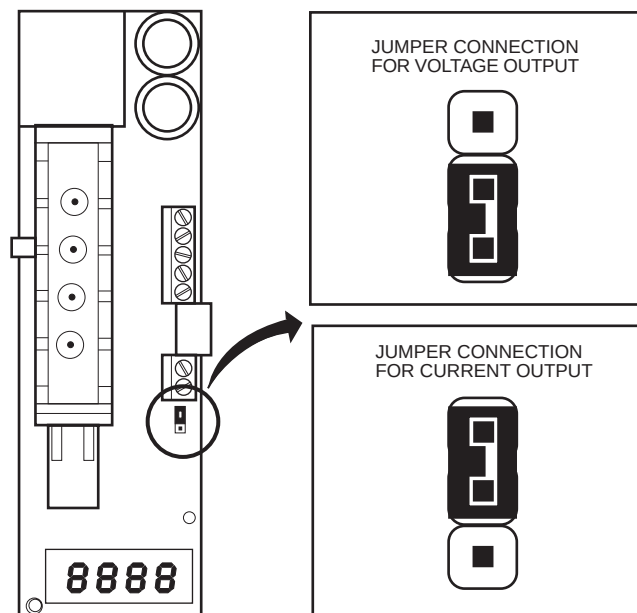


Fig. 16 — Indoor Air Quality Sensor Configuration

Features with Sensor Control of Unit (Network Applications) — The base control board provides, as standard, a connection for use with a Carrier VVT® (Variable Volume and Temperature) system and can also be integrated into a Carrier Comfort Network.

When the unit is accessed via a PC equipped with Comfort Works™, Building Supervisor, or Service Tool software or an accessory LID-2B interface device, the following features can be accessed:

- on-board timeclock can be programmed
- occupancy schedules can be programmed
- unit set points can be changed
- alarms can be monitored

This access is available on the base control board via a RJ-11 phone jack or a 3-wire connection to the communication bus. See Fig. 17. The timeclock has a 10-hour minimum back-up time to provide for unit power off for servicing unit or during unexpected power outages. For complete Carrier Comfort System (CCS) or Carrier Comfort Network (CCN) features and benefits, refer to the product literature.

When units with expansion boards are connected to the CCN, the following expansion board features can be utilized:

- perform Demand Limit functions based on CCN loadshed commands or the state of the discrete input
- alarm monitoring of all key parameters
- CCN protocol
- provides CCN IAQ participation

See Carrier TEMP or VVT® literature for complete TEMP (single zone) or VVT (multi-zone) application information. **VARIABLE AIR VOLUME (VAV) APPLICATIONS**

Features with Stand-Alone Applications — The units, as shipped, are operable as stand-alone units with the addition of a timeclock to establish unit start and stop times.

Heating and cooling in both on and off modes is controlled to default values by the base unit control. Set points may be changed with appropriate input devices.

The control has an on-board occupancy schedule which can be set using an input device and eliminate the need for an external timeclock.

During both the on and off periods, cooling operation is controlled to the supply air setting and heating is controlled to the return air setting (or to the optional space temperature sensor). During the on period, the supply fan runs continuously. During the off period, the supply fan will be activated if the return air sensor is outside of the set points and will run long enough to accurately sample the space temperature. The supply fan will then continue to run until any heating or cooling load is satisfied, at which point it will turn off.

The use of a space sensor will allow for supply air reset to conserve energy and maintain comfort. If equipped with an override feature, the sensor will allow operation during the off period for a fixed length of time.

Base unit control supports a heat interlock relay (field supplied) to fully open the VAV terminal devices during heating operation.

Standard features of a VAV unit with a remote start/stop switch are:

- control board diagnostics
- control of an outdoor condenser fan based upon outdoor air temperature
- control of modulating economizer to provide free cooling when outdoor conditions are suitable, using supply air temperature as a set point
- support of remote occupied/unoccupied input to start or stop the unit
- provide power exhaust output to an external power exhaust controller
- support supply air temperature reset to offset supply air set point
- support a field test for field check out
- support linkage to DAV (digital air volume) systems
- cooling capacity control of up to 6 stages plus economizer with compressors and unloaders to maintain supply air temperature set point during occupied periods
- control of one stage of heat to maintain supply air temperature at supply air set point during occupied periods
- provide a variable frequency drive (VFD) high voltage relay output to enable VFD
- control of heat interlock relay
- compressor Time Guard® override (power up, minimum off and on times)

With the addition of an accessory space temperature sensor, heating or cooling is enabled during unoccupied periods as required to maintain space temperature to within unoccupied set points.

Occupied heating is enabled or disabled by the position of DIP (dual in-line package) switch no. 5.

Additional features may be provided with electronic access to unit control board. These features are:

- additional control board diagnostics
- compressor lockout during low supply-air temperature
- electronic expansion board features (if installed)
- control of the economizer damper and indoor fan to option unoccupied free cooling
- 365-day timeclock with backup (supports minute, hour, day, month, and year)
- holiday table containing up to 18 holiday schedules
- occupancy control with 8 periods for unit operation
- support a set of display, maintenance, configuration, service, and set point data tables for interface with Building Supervisor, Comfort Works™, or Service Tool software or LID-2B accessory

CCN	— Carrier Comfort Network	N.O.	— Normally Open
COM	— Common	R	— Relay
D	— Diode	SIO	— Serial Input/Output
DIP	— Dual In-Line Package	SW	— Switch
LED	— Light-Emitting Diode	T	— Terminal
N.C.	— Normally Closed		

01 — Version 1.0
02 — Version 2.0
03 — Version 2.1
04 — Version 3.0
05 — Version 3.1

Fig. 17 — Control Board Diagram

When a VAV unit with a space temperature sensor is accessed via a computer, the following additional features are available:

- ability to initiate timed override from T-55 sensors
- ability to use multiple space temperature sensors to average space temperature
- temperature compensated start to calculate early start time before occupancy
- provide space temperature reset to reset the supply air set point upward when the temperature falls below the occupied cooling set point

An electronic expansion board may be field-installed to provide the following features:

- fan status
- filter status
- field-applied status
- demand limiting
- IAQ (indoor air quality) sensor
- OAQ (outdoor air quality) sensor
- alarm light
- fire unit shutdown
- fire pressurization
- fire evacuation
- fire smoke purge

When the unit is connected to the CCN (Carrier Comfort Network), the following expansion board features can be utilized:

- CCN IAQ participation
- CCN OAQ participation
- CCN demand limit participation
- modulated power exhaust override

A field-supplied T-55 space temperature sensor can be added to monitor room temperature and provide unoccupied override capability (1 hour).

When the unit is equipped with a field-supplied space temperature sensor and a remote contact closure (remote start/stop), the occupied default set points will monitor unit operation. The occupied default set points are 13 C (55 F) (supply air) cooling and 20 C (68 F) (return air temperature) heating (if electric heat is installed). See Fig. 15 for remote start/stop wiring.

NOTE: For units without a space temperature sensor and which have not had the base unit control board accessed via software to set an occupancy schedule, the remote start/stop closure will allow the unit to operate in the pre-configured occupied default set points of 13 C (55 F) (supply-air temperature) cooling and 20 C (68 F) (return-air temperature) heating. Without an occupancy schedule, the unit will control to the unoccupied default set points of 32 C (90 F) (return air) cooling and 13 C (55 F) (return air) heating (if electric heat is installed).

Features with Network Applications — The base control board provides, as standard, a connection for use with a Carrier Comfort System and can also be integrated into a Carrier Comfort Network. When the unit is accessed via a PC equipped with Comfort Works™, Building Supervisor, or Service Tool software or LID-2B accessory, the following features can be accessed:

- on-board timeclock can be programmed
- occupancy schedules can be programmed
- unit set points can be changed
- alarms can be monitored

This access is available on the base control board via a RJ-11 phone jack or a 3-wire connection to the communication bus. See Fig. 17. The timeclock has a 10-hour minimum back-up time to provide for unit power off for servicing unit or during unexpected power outages. For complete Carrier Comfort System (CCS) or Carrier Comfort Network (CCN) features and benefits, refer to the product literature.

Step 7 — Make Electrical Connections

POWER WIRING — Units are factory wired for the voltage shown on the unit nameplate. The main terminal block is suitable for use with aluminum or copper wires and is sized for single-point electric heat.

When installing units, provide a disconnect per local codes of adequate size (MOCP [maximum overcurrent protection] of unit is on the informative plate). All field wiring must comply with all local codes. Size wire based on MCA (minimum circuit amps) on the unit informative plate. See Fig. 18 for power wiring connections to the unit power terminal block and equipment ground.

Units have circuit breakers for compressors, fan motors, and control circuit. If required by local codes, provide an additional disconnect, per local codes requirements, of adequate size (Table 5). Whenever external electrical sources are used, unit must be electrically grounded in accordance with local codes, or, in absence of local codes with NEC ANSI C1-latest year (U.S.A. standard).

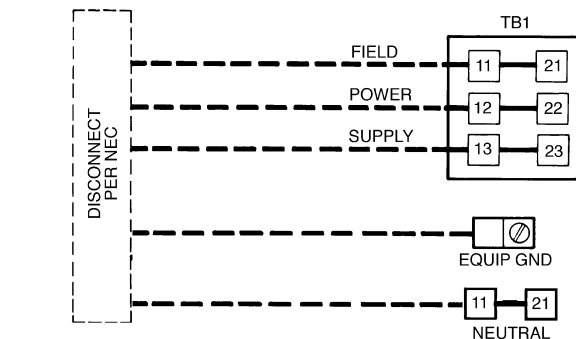
All field wiring must comply with local code requirements.

FIELD POWER SUPPLY — Unit is factory wired for voltage shown on nameplate. See Table 4 for electrical data.

Field wiring can be brought into the unit from bottom (through basepan and roof curb) or through side of unit (corner post next to control box).

A 3½-in. NPT coupling for field power wiring and a ¾-in. NPT coupling for 24-v control wiring are provided in the basepan. In the side post, there are two 63.5-mm (2½-in.) (sizes 024-034) or 76.2-mm (3-in.) (sizes 044-068) knockouts for the field power wiring. See Fig. 5-10. If control wiring is to be brought in through the side of unit, a 22.2-mm (7/8-in.) diameter hole is provided in the condenser side post next to the control box.

If disconnect box is mounted to corner post, be careful not to drill any screws into the condenser coil.



- LEGEND**
- EQUIP** — Equipment
 - GND** — Ground
 - kcmil** — Thousand Circular Mills
 - NEC** — National Electrical Code (U.S.A. Standard)
 - TB** — Terminal Block

NOTE: Maximum wire size for TB1 is 500 kcmil. See Table 5 for metric wire sizing.

Fig. 18 — Field Power Wiring Connections

Routing Through Bottom of Unit — If wiring is brought in through bottom of unit, use field-supplied watertight conduit to run power wiring from basepan out through bottom 88.9-mm (3½-in.) hole to the disconnect box and back into unit to the main control box.

Use strain relief going into control box through 63.5-mm (2½-in.) diameter hole provided. After wires are in unit control box, connect to power terminal block (see Power Wiring section on page 30).

Low-voltage wiring must be run in watertight conduit from the basepan to control box and through 22.2-mm (⅞-in.) diameter hole provided in bottom of unit control box. Field-supplied strain relief must be used going into the box. After wiring is in control box, make connections to proper terminals on terminal blocks (see Field Control Wiring section on this page).

Install conduit connector in unit basepan or side panel openings provided. Route power and ground lines through connector to connections in unit control box as shown on unit wiring diagram and Fig. 18.

Routing Through Side of Unit — Route power wiring in field-supplied watertight conduit into unit through 63.5-mm or 76.2-mm (2½- or 3-in.) hole provided in unit corner post. Strain relief (field supplied) must be used in hole.

Use field-supplied strain relief going into control box through 63.5-mm or 76.2-mm (2½- or 3-in.) diameter hole provided. After wires are in unit control box, connect to power terminal block (see Power Wiring section on page 30).

Bring low-voltage control wiring through factory-drilled 22.2-mm (⅞-in.) diameter hole in condenser side post. Use strain relief going into 22.2-mm (⅞-in.) diameter hole in bottom of unit control box.

After wiring is in control box, make connection to proper terminals on terminal blocks (see Field Control Wiring section on this page).

All Units

IMPORTANT: The VAV units use variable frequency drives, which generate, use, and can radiate radio frequency energy. If units are not installed and used in accordance with these instructions, they may cause radio interference. They have been tested and found to comply with limits of a Class A computing device as defined by FCC (Federal Communications Commission, U.S.A. Standard) regulations, Subpart J of Part 15, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

⚠ WARNING

The unit must be electrically grounded in accordance with local codes.

Affix crankcase-sticker (located in the installer's packet) to unit disconnect switch.

Operating voltage to compressor must be within voltage range indicated on unit nameplate. On 3-phase units, voltages between phases must be balanced within 2% and the current must be balanced within 10%.

Use the formula in Table 5 to determine the percentage of voltage imbalance.

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

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

FIELD CONTROL WIRING — Install either a Carrier-approved accessory thermostat or a CCN (Carrier Comfort Network) compatible temperature sensor. Thermostats are used on CV (constant volume) units only. Control box diagrams are shown in Fig. 19-21.

Thermostat Wiring (CV Only) — Install a Carrier-approved accessory thermostat assembly (per current price pages) according to the installation instructions included with the accessory or these instructions. Locate thermostat assembly on a solid wall in the conditioned space to sense average temperature.

Route thermostat cable or equivalent single leads of colored wire from the subbase terminals to the low-voltage connections as shown on unit label wiring diagram and in Fig. 22.

NOTE: For wire runs up to 15 m (50 ft), use no. 18 AWG (American Wire Gage, U.S.A. Standard) insulated wire (35 C minimum). For 15 to 23 m (50 to 75 ft), use no. 16 AWG insulated wire (35 C minimum). For over 23 m (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. See Table 6 for European Wire Conversions.

Set heat anticipators settings to 0.1 for all voltages. Settings may be changed slightly to provide a greater degree of comfort for a particular installation.

Sensor Wiring (CV or VAV) — The temperature sensor is wired into the unit control board. See Fig. 23.

The unit is controlled with a T-55 or T-56 (CV only) zone sensor. Terminal T1 (T-55 sensor) or TH (T-56 sensor) is connected to T1 of the base module board. Terminal T2 (T-55 sensor) or COM (T-56 sensor) is connected to T2 on the base module board. If a T-56 set point override sensor is used, the override connection SW on the sensor is connected to T3 on the base module board.

If more than one sensor is being used and averaged, sensors must be wired in multiples of 4 or 9. See Fig. 24.

Heat Interlock Relay (VAV Units) — VAV units require a field-supplied heat interlock relay (HIR) to drive the air terminal wide open when in heat mode. The HIR part number is HN61KK040.

Remote Field Control — A switch closure across terminals R and W1 on TB-3 will initiate the Occupied mode. This can be done manually (dry contact closure) as well as through a field-supplied timeclock.

Service Tool, Building Supervisor, and Comfort Works™ Software — Access the control board through the terminal marked CCN via a 3-wire bus.

IMPORTANT: The default bus address is 0. The default element number is 1. Refer to CCN literature to change the default values, if needed.

Table 5 — Electrical Data — 50EJ,EK,EW,EY024-068

UNIT 50EJ,EK, EW,EY	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY														
				No. 1		No. 2																									
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP†													
024	400-3-50	342	440	19.9	114	11.5	80	2	1	2.8	5	7.9	— 26.0	— 45.8	— 25 25	— 36.1	49.9 75.8	60 90													
													— 26.0	— 45.8	— 25 25	— 36.1	55.0 87.4	60 90													
													— 26.0	— 45.8	50 50	72.2 72.2	100.1 132.5	110 150													
													— 26.0	— 45.8	— 25 25	— 36.1	56.6 82.5	70 100													
													— 26.0	— 45.8	25 25	36.1 36.1	63.4 95.8	70 100													
													— 26.0	— 45.8	50 50	72.2 72.2	108.5 140.9	110 150													
											10	14.6	— 26.0	— 45.8	— 25 25	— 36.1	63.9 89.8	80 100													
													— 26.0	— 45.8	25 25	36.1 36.1	72.5 104.9	80 100													
													— 26.0	— 45.8	50 50	72.2 72.2	117.6 150.0	125 175													
													15	21.9	— 26.0	— 45.8	— 25 25	— 36.1	63.3 89.3	80 100											
															— 26.0	— 45.8	25 25	36.1 36.1	63.3 93.8	80 100											
															— 26.0	— 45.8	50 50	72.2 72.2	106.5 138.9	110 150											
028	400-3-50	342	440	19.9	114	19.9	114	2	1	2.8	7.5	13	— 26.0	— 45.8	— 25 25	— 36.1	63.3 89.3	80 100													
													— 26.0	— 45.8	— 25 25	— 36.1	63.3 93.8	80 100													
													— 26.0	— 45.8	50 50	72.2 72.2	106.5 138.9	110 150													
													10	14.6	— 26.0	— 45.8	— 25 25	— 36.1	64.9 90.9	80 110											
															— 26.0	— 45.8	25 25	36.1 36.1	64.9 95.8	80 110											
															— 26.0	— 45.8	50 50	72.2 72.2	108.5 140.9	110 150											
											15	21.9	— 26.0	— 45.8	— 25 25	— 36.1	72.2 98.2	90 110													
													— 26.0	— 45.8	— 25 25	— 36.1	72.5 104.9	90 110													
													— 26.0	— 45.8	50 50	72.2 72.2	117.6 150.0	125 175													
													030	400-3-50	342	440	25.6	120	19.9	114	2	1	2.8	10	14.6	— 26.0	— 45.8	— 25 25	— 36.1	72.1 98.1	90 110
																										— 26.0	— 45.8	— 25 25	— 36.1	72.1 98.1	90 110
																										— 26.0	— 45.8	50 50	72.2 72.2	108.5 140.9	110 150
15	21.9	— 26.0	— 45.8	— 25 25	— 36.1	79.4 105.4	100 125																								
		— 26.0	— 45.8	25 25	36.1 36.1	79.4 105.4	100 125																								
		— 26.0	— 45.8	50 50	72.2 72.2	117.6 150.0	125 175																								
20	28.7	— 26.0	— 45.8	— 25 25	— 36.1	86.2 112.2	110 125																								
		— 26.0	— 45.8	25 25	36.1 36.1	86.2 113.4	110 125																								
		— 26.0	— 45.8	50 50	72.2 72.2	126.1 158.5	150 175																								
		034	400-3-50	342	440	25.6	120	25.6	120	2	1	2.8												10	14.6	— 26.0	— 45.8	— 25 25	— 36.1	77.9 103.9	100 125
																										— 26.0	— 45.8	— 25 25	— 36.1	77.9 103.9	100 125
																										— 26.0	— 45.8	50 50	72.2 72.2	108.5 140.9	110 150
15	21.9												— 26.0	— 45.8	— 25 25	— 36.1	85.2 111.2	110 125													
													— 26.0	— 45.8	25 25	36.1 36.1	85.2 111.2	110 125													
													— 26.0	— 45.8	50 50	72.2 72.2	117.6 150.0	125 175													
20	28.7												— 26.0	— 45.6	— 25 25	— 36.1	92.0 118.0	110 125													
													— 26.0	— 45.8	25 25	36.1 36.1	92.0 118.0	110 125													
													— 26.0	— 45.8	50 50	72.2 72.2	126.1 158.5	150 175													

NOTE: See legend and notes on page 34.

Table 5 — Electrical Data — 50EJ,EK,EW,EY024-068 (cont)

UNIT 50EJ,EK, EW,EY	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY														
				No. 1		No. 2																									
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	KW	FLA	MCA	MOCPT†													
038	400-3-50	342	440	25.6	120	25.6	120	2	1	2.8	10	14.6	— 26.0	— 45.8	— —	— —	83.5 109.5	100 125													
													— 26.0	— 45.8	25 25	36.1 36.1	83.5 109.5	100 125													
													— 26.0	— 45.8	50 50	68.4 68.4	111.3 140.8	125 150													
													— 26.0	— 45.8	— —	— —	90.8 116.8	110 125													
													— 26.0	— 45.8	25 25	36.1 36.1	90.8 116.8	110 125													
													— 26.0	— 45.8	50 50	72.2 72.2	117.6 150.0	125 175													
											15	21.9	— 26.0	— 45.8	— —	— —	97.6 123.6	110 150													
													— 26.0	— 45.8	25 25	36.1 36.1	97.6 123.6	110 150													
													— 26.0	— 45.8	50 50	72.2 72.2	126.1 158.5	150 175													
													20	28.7	— 26.0	— 45.8	— —	— —	97.6 123.6	110 150											
															— 26.0	— 45.8	25 25	36.1 36.1	97.6 123.6	110 150											
															— 26.0	— 45.8	50 50	72.2 72.2	126.1 158.5	150 175											
044	400-3-50	342	440	28.8	173	28.8	173	4	1	2.8	15	21.9	— 26.0	— 45.8	— —	— —	98.0 124.0	125 150													
													— 26.0	— 45.8	25 25	36.1 36.1	98.0 124.0	125 150													
													— 26.0	— 45.8	50 50	72.2 72.2	117.6 150.0	125 175													
													20	28.7	— 26.0	— 45.8	— —	— —	104.8 130.8	125 150											
															— 26.0	— 45.8	25 25	36.1 36.1	104.8 130.8	125 150											
															— 26.0	— 45.8	50 50	72.2 72.2	126.1 158.5	150 175											
											25	37.4	— 26.0	— 45.8	— —	— —	113.5 139.5	125 150													
													— 26.0	— 45.8	25 25	36.1 36.1	113.5 139.5	125 150													
													— 26.0	— 45.8	50 50	72.2 72.2	137.0 169.4	150 175													
													054	400-3-50	342	440	43.6	223	30.8	173	4	1	2.8	15	21.9	38.94 —	66.64 —	— 37.5	— 54.1	118.4 157.2	150 200
																										— 38.94	— 68.64	37.5 37.5	54.1 54.1	118.4 157.3	150 200
																										— 38.94	— 68.64	75 75	108.3 108.3	135.6 184.3	150 200
20	28.7	38.94 —	68.64 —	— 37.5	— 54.1	125.2 164.1	150 200																								
		— 38.94	— 68.64	37.5 37.5	54.1 54.1	125.2 164.1	150 200																								
		— 38.94	— 68.64	75 75	108.3 108.3	144.1 192.8	150 200																								
25	37.4	— 38.94	— 68.64	— 37.5	— 54.1	133.9 172.8	175 200																								
		— 38.94	— 68.64	37.5 37.5	54.1 54.1	133.9 172.8	175 200																								
		— 38.94	— 68.64	75 75	108.3 108.3	155.0 —	175 —																								
		058	400-3-50	342	440	52.6	253	30.8	173	6	1	2.8												20	28.7	— 38.94	— 68.64	— —	— —	142.0 163.0	175 200
																										— 38.94	— 68.64	37.5 37.5	54.1 54.1	142.0 180.9	175 225
																										— 38.94	— 68.64	75 75	108.3 108.3	144.1 192.8	175 225
25	37.4												38.94 —	68.64 —	— 37.5	— 54.1	150.7 189.6	200 225													
													— 38.94	— 68.64	37.5 37.5	54.1 54.1	150.7 189.6	200 225													
													— 38.94	— 68.64	75 75	108.3 108.3	155.0 203.7	200 225													
30	43.8												— 38.94	— 68.64	— —	— —	157.1 196.0	200 225													
													— 38.94	— 68.64	37.5 37.5	54.1 54.1	157.1 196.0	200 225													
													— 38.94	— 68.64	75 75	108.3 108.3	163.0 211.7	200 225													

NOTE: See legend and notes on page 34.

Table 5 — Electrical Data — 50EJ,EK,EW,EY024-068 (cont)

UNIT 50EJ,EK, EW,EY	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE		COMPRESSOR				OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY	
				No. 1		No. 2												
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCPT†
064	400-3-50	342	440	52.6	253	43.6	223	6	1	2.8	25	37.4	—	—	—	—	163.5	200
													38.94	68.64	—	—	202.4	225
													—	—	37.5	54.1	163.5	200
													38.94	68.64	37.5	54.1	202.4	300
													—	—	75	108.3	163.5	200
													38.94	68.64	75	108.3	203.7	300
											30	43.8	38.94	68.64	—	—	169.9	200
													—	—	—	—	208.8	225
													38.94	68.64	37.5	54.1	169.9	200
													38.94	68.64	37.5	54.1	208.8	300
													38.94	68.64	75	108.3	169.9	200
													38.94	68.64	75	108.3	211.7	300
											40	63.0	—	—	—	—	189.1	225
													38.94	68.64	—	—	228.0	250
													—	—	37.5	54.1	189.1	225
													38.94	68.64	37.5	54.1	228.0	300
													—	—	75	108.3	189.1	300
													38.94	68.64	75	108.3	235.7	300
068	400-3-50	342	440	52.6	253	52.6	253	6	1	2.8	25	37.4	—	—	—	—	172.5	225
													38.94	68.64	—	—	211.4	225
													—	—	37.5	54.1	172.5	225
													38.94	68.64	37.5	54.1	211.4	300
													—	—	75	108.3	172.5	225
													38.94	68.64	75	108.3	211.4	300
											25	37.4	—	—	—	—	178.9	225
													38.94	68.64	—	—	217.8	225
													—	—	37.5	54.1	178.9	225
													38.94	68.64	37.5	54.1	217.8	300
													—	—	75	108.3	178.9	225
													38.94	68.64	75	108.3	217.8	300
											40	63.0	38.94	68.64	—	—	198.1	200
													—	—	—	—	237.0	250
													38.94	68.64	37.5	54.1	198.1	300
													38.94	68.64	37.5	54.1	237.0	300
													—	—	75	108.3	198.1	300
													38.94	66.64	75	108.3	237.0	300

LEGEND

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

*Heater capacity (kW) is based on heater voltage of 400 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly.

†Fuse or HACR circuit breaker.

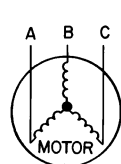
NOTES:

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

% Voltage Imbalance

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

EXAMPLE: Supply voltage is 400-3-50.



$$\begin{aligned} AB &= 393 \text{ v} \\ BC &= 403 \text{ v} \\ AC &= 396 \text{ v} \\ \text{Average Voltage} &= \frac{393 + 403 + 396}{3} \\ &= \frac{1192}{3} \\ &= 397 \end{aligned}$$

Determine maximum deviation from average voltage.

$$\begin{aligned} (AB) \quad 397 - 393 &= 4 \text{ v} \\ (BC) \quad 403 - 397 &= 6 \text{ v} \\ (AC) \quad 397 - 396 &= 1 \text{ v} \end{aligned}$$

Maximum deviation is 6 v.

Determine percent of voltage imbalance.

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{6}{397} \\ &= 1.5\% \end{aligned}$$

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

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

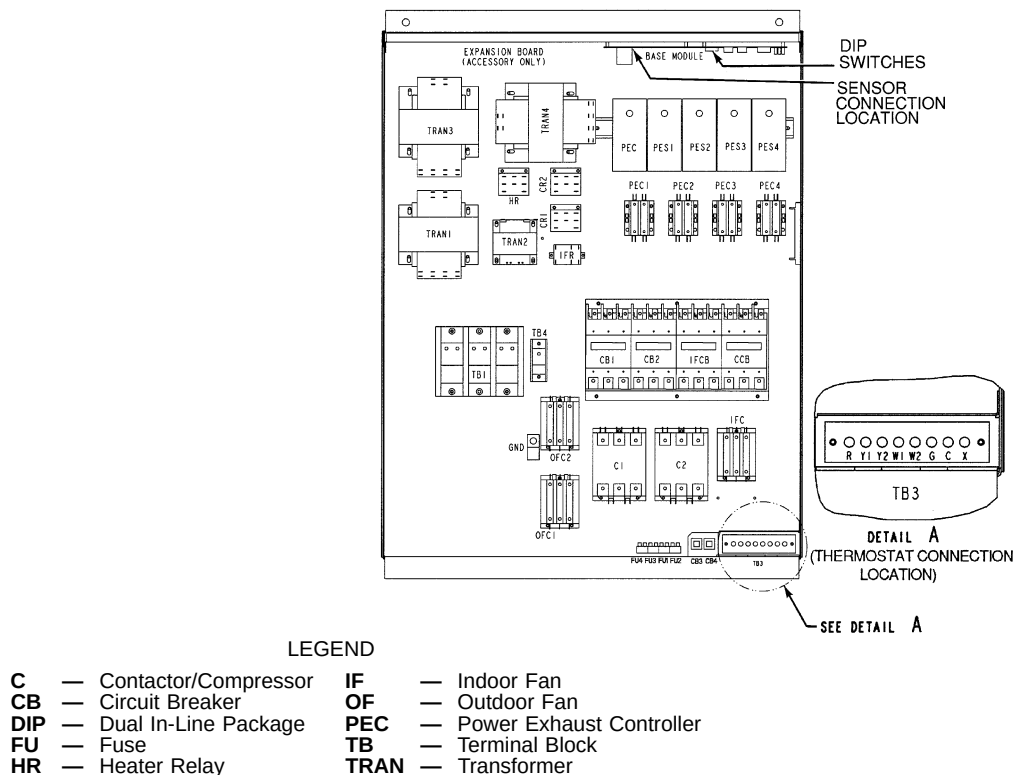


Fig. 19 — Control Box Diagram (Sizes 024-034 Shown)

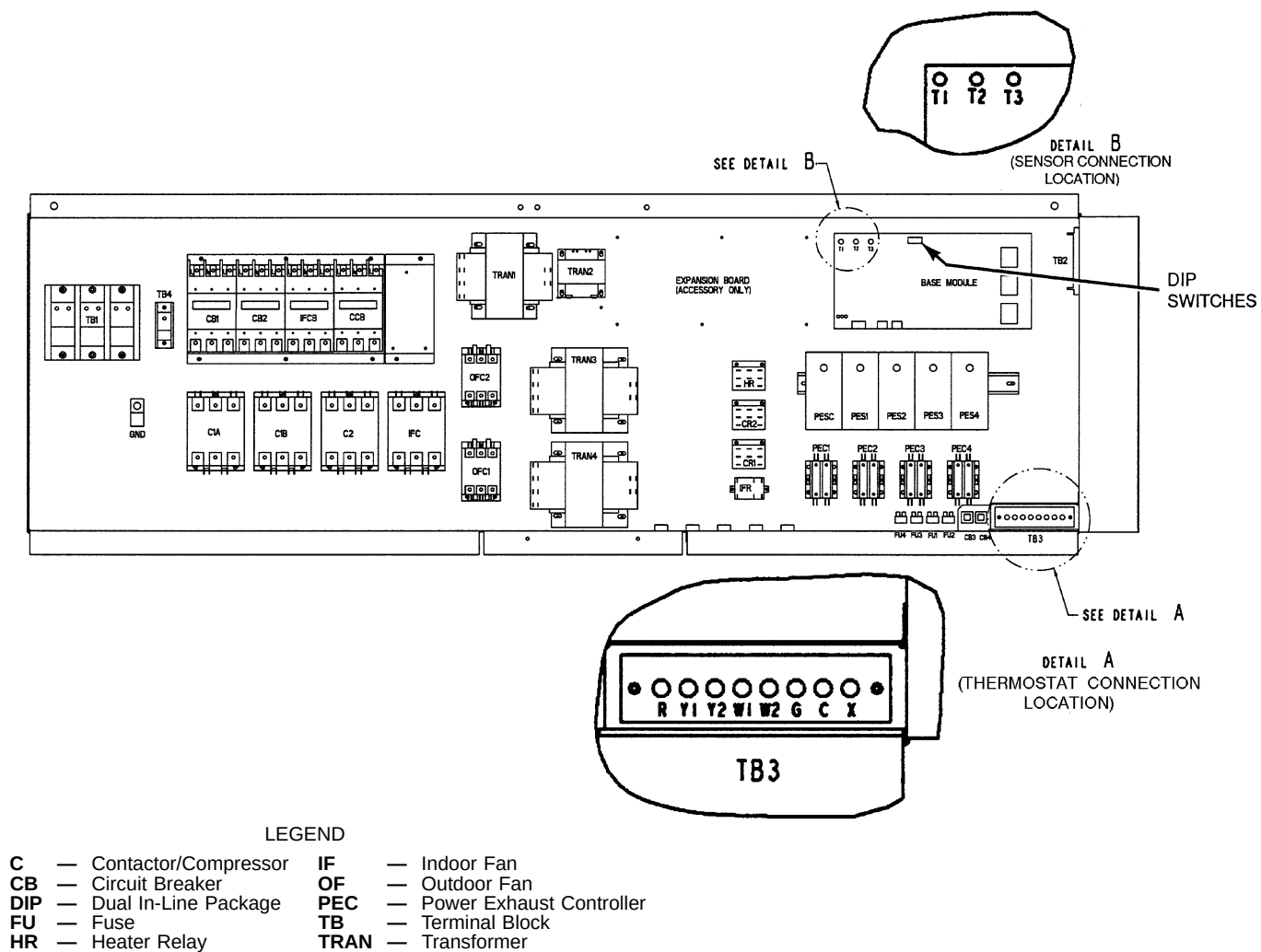
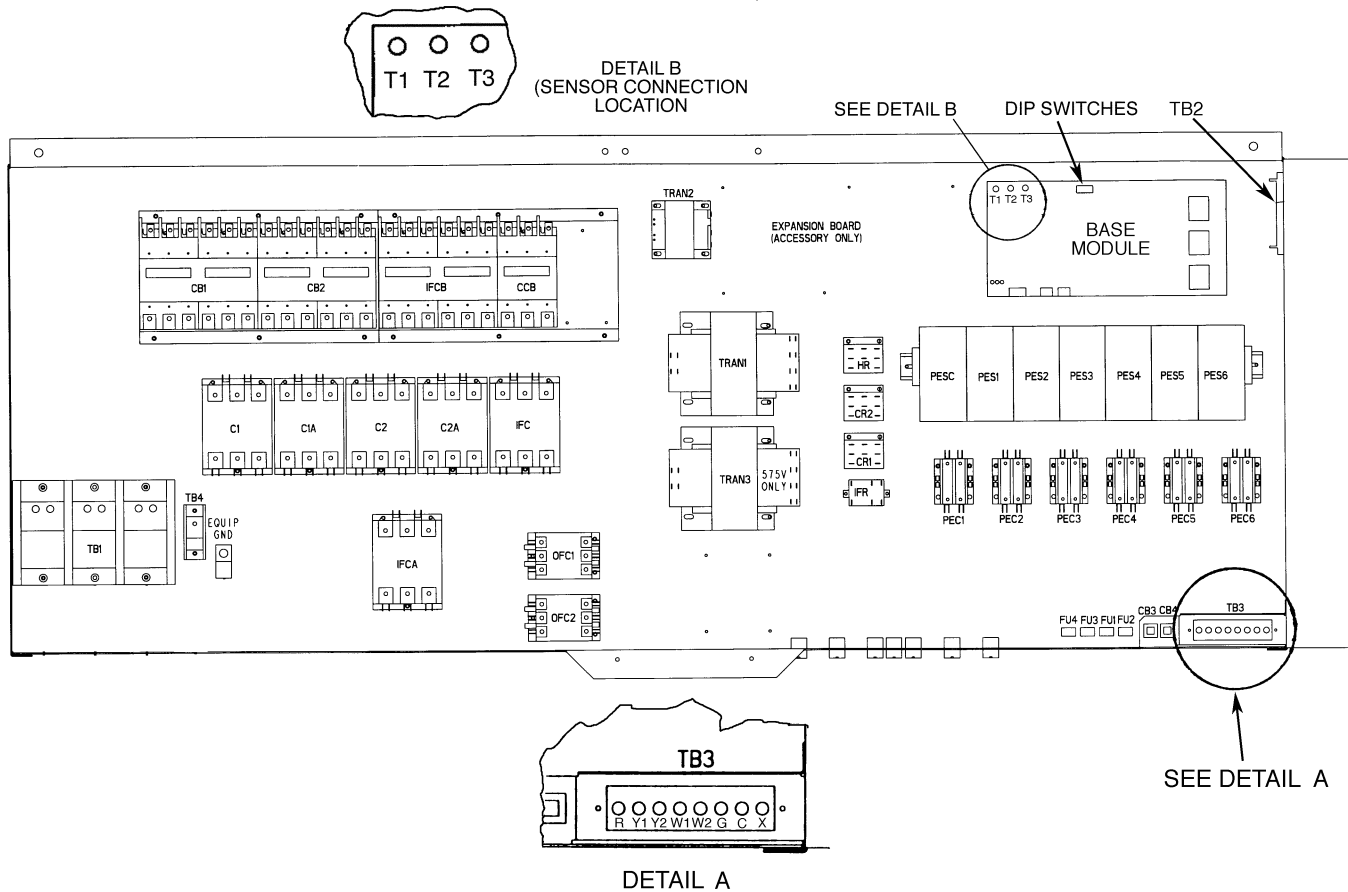


Fig. 20 — Control Box Diagram (Size 044 Shown)



LEGEND

C — Contactor/Compressor	IF — Indoor Fan
CB — Circuit Breaker	OF — Outdoor Fan
DIP — Dual In-Line Package	PEC — Power Exhaust Controller
FU — Fuse	TB — Terminal Block
HR — Heater Relay	TRAN — Transformer

Fig. 21 — Control Box Diagram (Sizes 058-068 Shown)

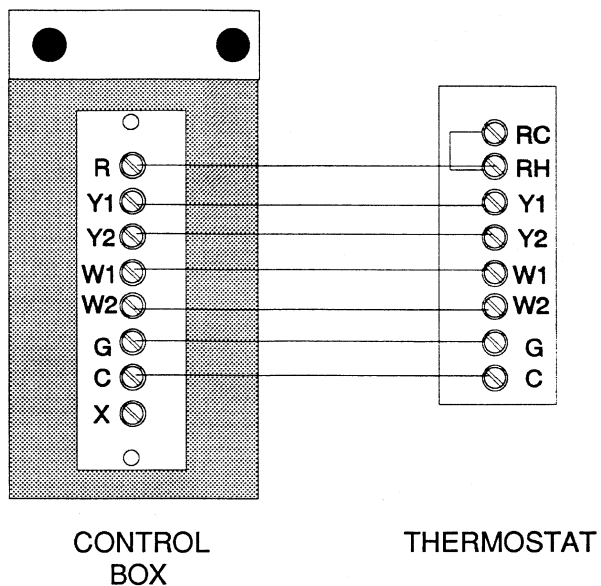
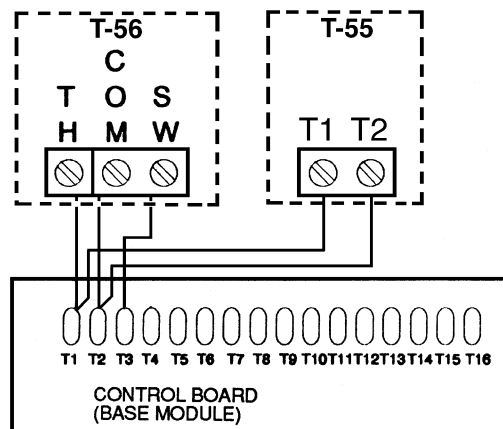


Fig. 22 — Field Control Thermostat Wiring



NOTE: Sensor part numbers are as follows:

T-55 — CEC0121448-01
T-56 — CEC0121503-01

Fig. 23 — Field Control Temperature Sensor Wiring (CV or VAV Units)

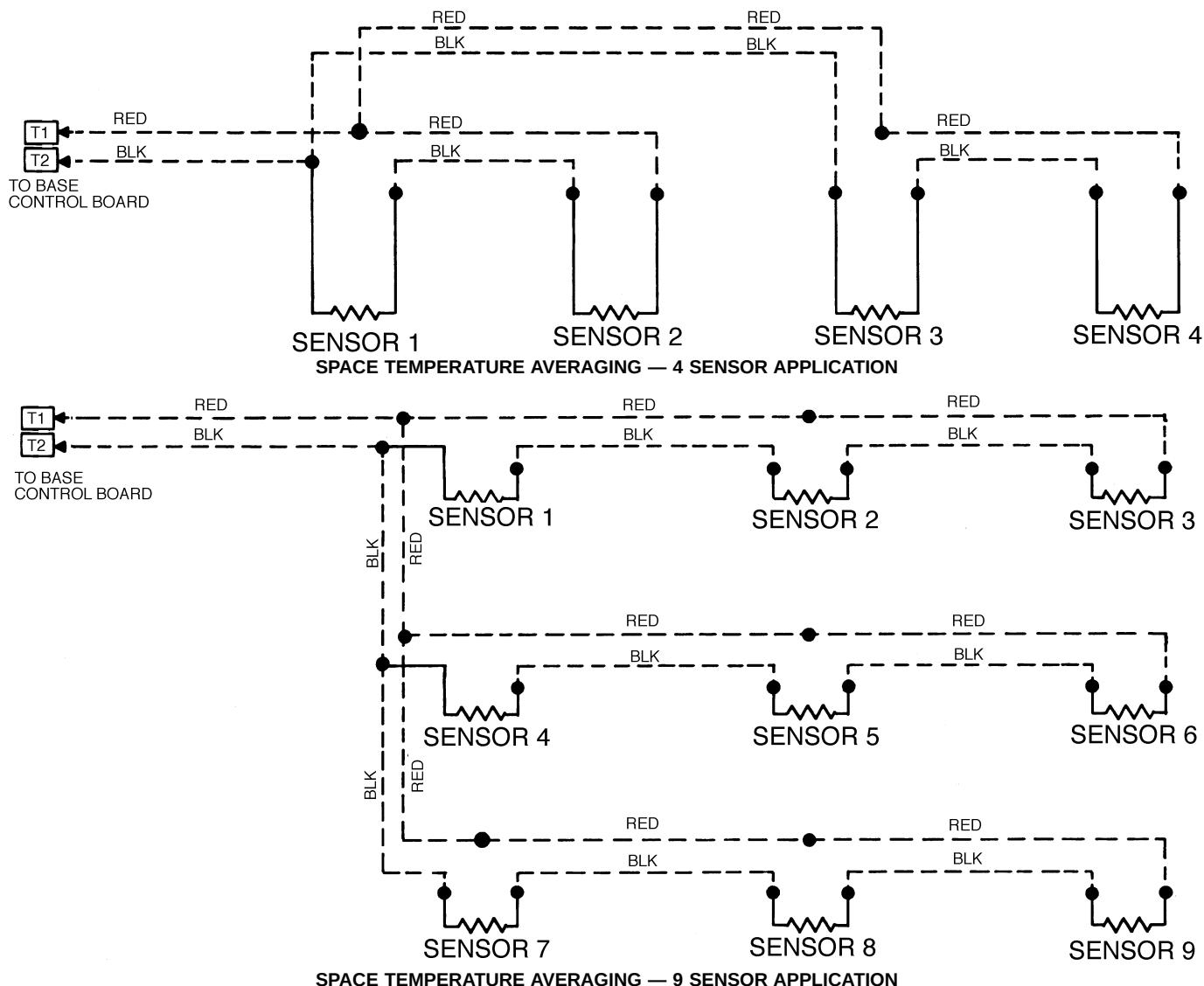


Fig. 24 — Space Temperature Averaging Wiring

Carrier Comfort Network Interface — The 50E units can be connected to the CCN. The communication bus wiring is supplied and installed in the field. Wiring consists of shielded, 3-conductor cable with drain wire.

The system elements are connected to the communication bus in a daisy chain arrangement. The positive pin of each system element communication connector must be wired to the positive pins of the system element on either side of it, the negative pins must be wired to the negative pins, and the signal pins must be wired to signal ground pins. Wiring connections for CCN should be made at the 3-pin plug (CCN) located at the base board. Consult CCN literature for further information.

Conductors and drain wire must be 20 AWG minimum stranded, tinned copper. Individual conductors must be insulated with PVC, PVC/nylon, vinyl, Teflon, or polyethylene. An aluminum/polyester 100% foil shield and an outer jacket of PVC, PVC/nylon, chrome vinyl, or Teflon with a minimum operating temperature range of -20 C to 60 C (-4 F to 140 F) is required. Table 7 lists cables that meet the requirements.

Table 6 — American/European Wire Conversions

AMERICAN		EUROPEAN
Industry Standard Size	American Conversion Size (mm ²)	Industry Standard Size (mm ²)
18 AWG	0.82	1.0
16 AWG	1.30	1.5
14 AWG	2.08	2.5
12 AWG	3.30	4.0
10 AWG	5.25	6.0
8 AWG	6.36	10.0
6 AWG	13.29	16.0
4 AWG	21.14	25.0
3 AWG	26.65	—
2 AWG	33.61	35.0
1 AWG	42.39	50.0
1/0 AWG	53.49	—
2/0 AWG	67.42	70.0
3/0 AWG	85.00	95.0
4/0 AWG	107.19	120.0
250 kcmil	126.64	150.0
300 kcmil	151.97	—
350 kcmil	177.90	185.0
400 kcmil	202.63	240.0
500 kcmil	253.29	300.0
600 kcmil	303.95	—

LEGEND

AWG — American Wire Gage, U.S.A. Standard
kcmil — Thousand Circular Mils

Table 7 — CCN Connection Approved Shielded Cables

MANUFACTURER	CABLE PART NO.
Alpha	2413 or 5463
American	A22503
Belden	8772
Columbia	02525

IMPORTANT: When connecting the CCN communication bus to a system element, use a color coding system for the entire network to simplify installation and checkout. See Table 8.

Table 8 — Color Code Recommendations

SIGNAL TYPE	CCN BUS CONDUCTOR INSULATION COLOR	CCN PLUG PIN NO.
Positive (+)	RED	1
Ground	WHITE	2
Negative (-)	BLACK	3

NOTE: If a cable with a different color scheme is selected, a similar color code should be adopted for the entire network.

At each system element, the shields of the communication bus cables must be tied together. If the communication bus is entirely within one building, the resulting continuous shield must be connected to a ground **at one point only**. If the communication bus cable exits from one building and enters another, the shields must be connected to grounds at the lightning suppressor in each building where the cable enters or exits the building (one point per building only).

To connect the unit to the network:

1. Turn off power to the control box.
2. Cut the CCN wire and strip the ends of the red (+), white (ground), and black (-) conductors. (If a different network color scheme is used, substitute appropriate colors.)
3. Remove the 3-pin male plug from the base module in the main control box, and connect the wires as follows:
 - a. Insert and secure the red (+) wire to terminal 1 of the 3-pin plug.
 - b. Insert and secure the white (ground) wire to terminal 2 of the 3-pin plug.
 - c. Insert and secure the black (-) wire to terminal 3 of the 3-pin plug.
4. Insert the plug into the existing 3-pin mating connector on the base module in the main control box.

Step 8 — Make Outdoor-Air Inlet Adjustments

ECONOMIZER

NOTE: If accessory power exhaust or barometric relief packages are being added to the unit, install power exhaust or barometric relief before installing economizer hoods.

Economizer Hood Assembly — The economizer hood is shipped in a package secured to the outside of the unit and must be field-assembled.

The 50EW,EY units are side supply and side return. The return duct limits access to economizer filters from below. Filter tracks (mounting angle without tabs) must be installed correctly to allow access to economizer filters from each side.

Units 024-048 have two hoods on every unit. Each hood has two lower filter tracks, one slotted side and one side without slots. Construct the assembly so that the slotted side is adjacent to the other hood when mounted on the unit.

Units 054-068 have 3 hoods on every unit. Each hood has two lower filter tracks, one slotted side and one side without slots. Construct the two outer hood assemblies so that the slotted sides are adjacent to the other hood when mounted on the unit.

NOTE: Before assembly of the economizer hood, check along the outer edges of the economizer assembly for any seal strip protruding past the flanges. Trim the excess seal strip so that it is flush with the economizer assembly flanges.

Perform the following procedure to assemble the economizer hood:

1. Apply black seal strip (provided in package) to outside top-edge of hood sides. Wrap seal strip over edge to cover top flange (6 hood sides). Make sure seal strip covers screw holes. Allow strip to overhang 3 mm ($\frac{1}{8}$ -in.) past the end opposite the mounting flange. See Fig. 25.
2. Assemble hood sides, top, and cross member with gasketed screws provided. See Fig. 26.
3. Attach 15 green speed clips (provided) to hood top.
4. Apply black seal strip (provided) to mounting flanges of hood sides being sure to cover mounting holes. See Fig. 27.

NOTE: Each hood assembly has one hood side with slots and one hood side without slots. On size 024-048 units, the two outer hood assemblies must have the hood sides with the slots located adjacent to each other when mounted on the unit. On size 054-068 units, the two outer hood assemblies must have the hood sides with the slots located adjacent to the center hood. The center hood assembly should have hood side with slots located on the left side.

5. Apply black seal strip (provided) to hood top mounting flange. Seal strip of hood top mounting flange must press tightly against seal strip of hood side mounting flanges. See Fig. 28.
6. Add gray foam strip (provided in package) to cross members on bottom tray. See Fig. 29.
7. Place gray foam strip (provided) on inside of slotted hood side between filter and cross member opposite the mounting end. See Fig. 30.
8. Attach gray foam strip (provided) to block-off baffle on outer face of flange. See Fig. 31.
9. Remove the screws on each end and along top of damper assembly of unit. Remove top 4 screws on each side of filter panel under damper assembly. Set hood assembly in place and attach to unit using these screws.
10. Attach accessory enthalpy bracket on hood side farthest from control box end. Locate bracket on inside upper right-hand corner of economizer hood using hood mounting holes. Mount outdoor-air thermistor to enthalpy bracket (if purchased). Attach and wire enthalpy assembly. Place quick connects on enthalpy wires.
11. Remove screws along bottom of damper assembly. Locate and mount blockoff baffle using these screws.
12. Assemble 2 filter tracks side-by-side with the assembled ends together.
13. Attach mounting angle (without tabs) to the assembled end of the filter track. See Fig. 32.
14. Attach 9 green speed clips (provided) to hood side panels without the slots. Engagement section of clip faces up and towards the outside of the hood side panels.
15. Attach remaining mounting angle (with tabs) to other end of the filter track with no. 10 screws provided. See Fig. 33.

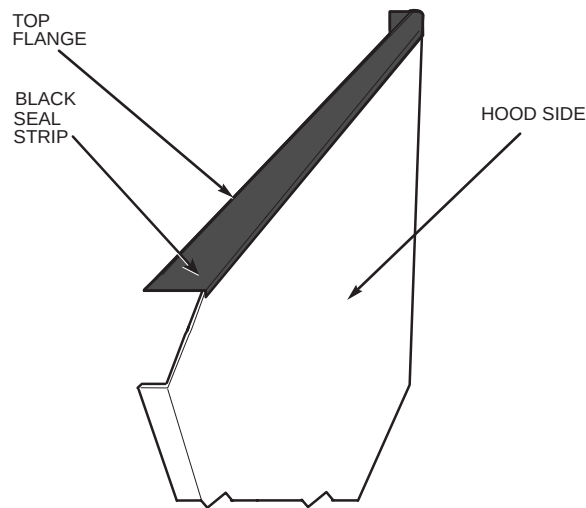


Fig. 25 — Adding Seal Strip to Top of Hood Sides

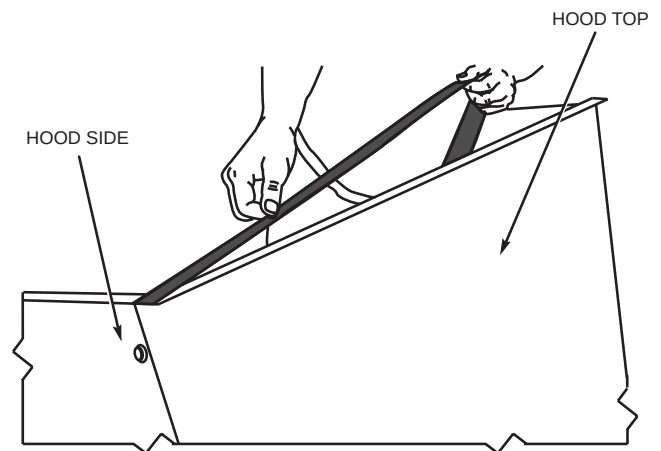
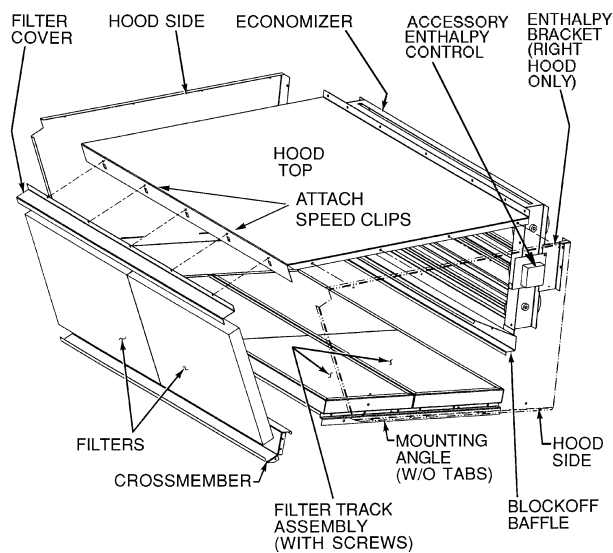


Fig. 28 — Adding Seal Strip to Hood Top Mounting Flange



NOTE: Left side economizer hood has mounting angle without tabs and filter track assembled end on the opposite side.

Fig. 26 — Economizer Hood Assembly (Right-Side Economizer Hood Shown)

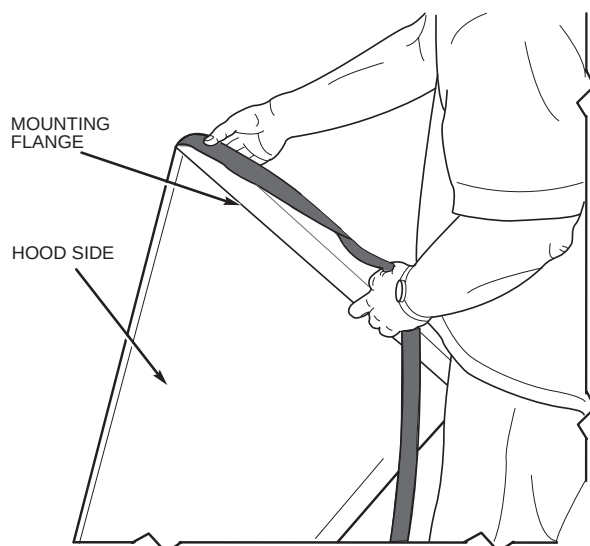


Fig. 27 — Adding Seal Strip to Mounting Flange of Hood Sides

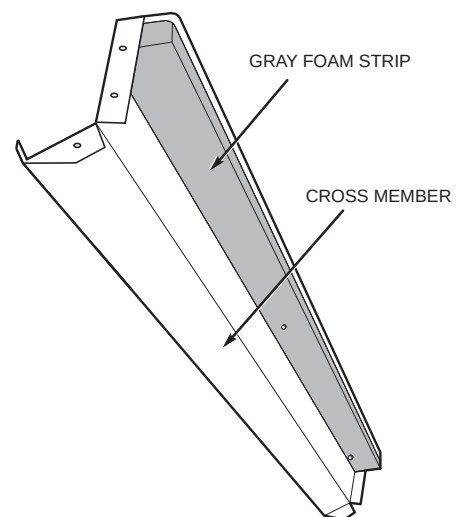


Fig. 29 — Adding Foam Strip to Cross Member

16. Place filter track assembly in bottom of hood by placing tabbed end into slotted side (with tab on bottom) and attaching opposite end to hood with speed clips and gasketed screws provided. Tabs can be hand bent after they have been inserted into the side.

NOTE: The filter track assembly end with screws should face away from the other hood when mounted on the unit. *Be sure the filters are installed with the airflow in the correct direction.*

NOTE: Tabs from both filter tracks will be in the same space. After one filter track has been inserted into hood side, bend the tabs so they will not interfere with installation of the center hood.

17. Attach black seal strip (provided) to filter cover. Seal strip should be applied centered over the holes of the one flange, making sure to fully cover holes and centered over the other large flange. See Fig. 34.
18. Slide two 508 × 635 mm (20 × 25-in.) filters into cross members of hood assembly. Attach filter cover over filters with screws and speed clips provided.

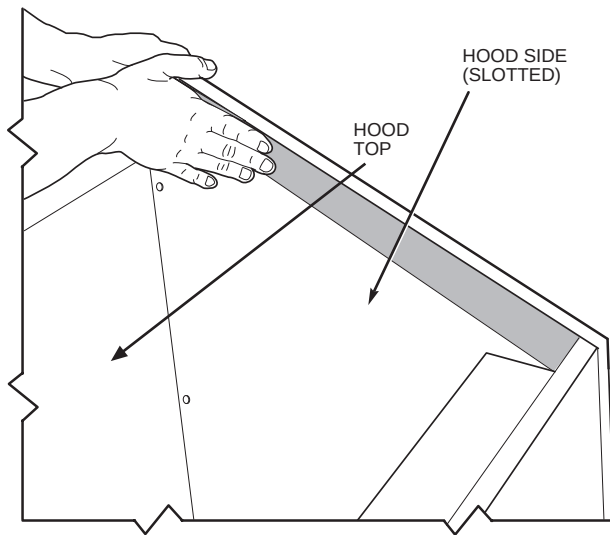


Fig. 30 — Adding Foam Strip to Hood Side

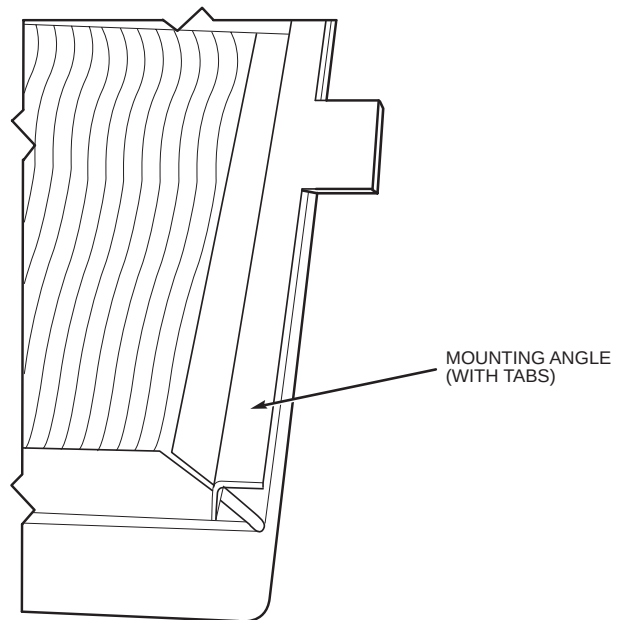


Fig. 33 — Mounting Angle (With Tabs) Attached to Filter Track Assembly

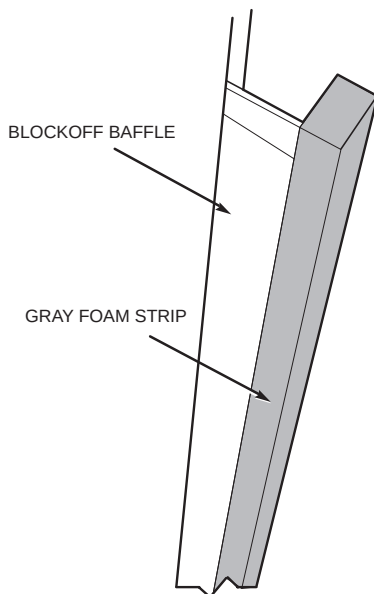


Fig. 31 — Adding Foam Strip to Blockoff Baffle

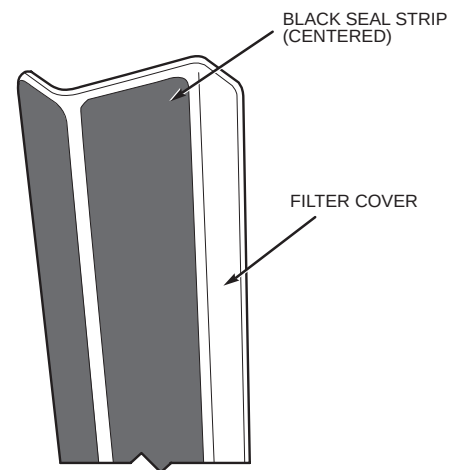


Fig. 34 — Attaching Seal Strip to Filter Cover

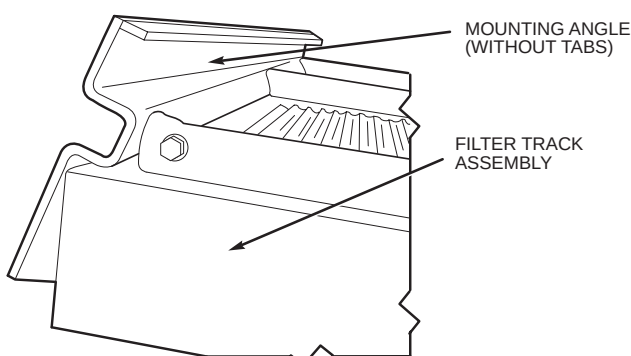


Fig. 32 — Mounting Angle (Without Tabs) Attached to Filter Track Assembly

Minimum Damper Position (MDP) Setting — Setting of the outdoor air damper position is performed in conjunction with a shortened version of the field-run test. This is performed by first opening DIP (Dual In-Line Package) switch no. 4, then no. 6. See Fig. 17 and the section Direct Digital Controls DIP Switch Configuration on page 48.

The outdoor-air damper closes. The control allows 90 seconds for the damper to close in case it is in the full open position. Next, the indoor-fan contactor will energize. The outdoor-air damper will remain at 0% for 30 seconds. It will then move to the 10% position for another 30 seconds.

This will be repeated at every 10% increment for 30 seconds until the damper reaches 100% open. Close DIP switch no. 4 during the 30 seconds immediately after the desired outdoor air MDP (minimum damper position). The 30-second time period is to allow time where DIP switch no. 4 can be closed. The default value of the minimum outdoor air damper position is 20%. If the desired minimum position is 30%, allow the damper position to go to 10% for 30 seconds, then 20% for 30 seconds, and when it reaches 30% close DIP switch no. 4 during the 30-second period following the 30% position.

The minimum outdoor air damper position is now set. Close DIP switch no. 6.

ECONOMIZER SETTINGS

Accessory Enthalpy Control (Fig. 35) — The control (HH57AC077) is mounted in the economizer hood. See Fig. 26. The enthalpy setting adjustment is on the enthalpy control. For maximum benefit of outdoor air, set enthalpy control to A. See Fig. 36 and 37.

ENTHALPY CONTROL INSTALLATION — The outdoor air enthalpy control is installed on the inside panel of the outdoor air hood. The enthalpy control should be mounted when the outdoor air hoods are assembled. To install the control, perform the following procedure:

1. Turn off all power. Ensure disconnect is locked out.
2. Remove the economizer inlet filters from the bottom of the right hand economizer hood. See Fig. 26. See Fig. 38 for economizer details.
3. Mount the outdoor air enthalpy sensor inside the right economizer hood on the right side panel of the hood, adjacent to the outside-air thermistor.
4. Locate the red, violet, and brown wires near the outdoor air thermistor. Remove the splice from the red and violet wires. Remove the cap from the brown wire.
5. Install a ¼-in. push on terminal (field-supplied) on the violet and brown wires.
6. Connect a ¼-in. push on terminal (field-provided) to one end of a 18-gage, 6-in. jumper wire (field-provided). Connect the other end to the red wire and attach a ¼-in. push on connector (field provided).
7. Connect the red wire with the jumper to terminal TR1. Connect the jumper to terminal 2. Connect the brown wire to terminal TR. Connect the violet wire to terminal 3. All connections are on the enthalpy control.
8. Replace economizer filters.
9. Return power to unit.

Accessory Differential Enthalpy Control — The control (HH57AC077), in conjunction with the accessory enthalpy sensor (HH57AC078), controls economizer operation according to the differential enthalpy. The control is mounted in the economizer hood. The sensor is mounted in the return duct (50EJ,EK) or return air plenum (50EW,EY).

Differential Enthalpy Sensor Installation — To install the sensor, perform the following procedure:

1. Turn off all power. Ensure disconnect is locked out.
2. Remove the economizer inlet filters from the bottom of the right hand economizer hood. See Fig. 26.
3. Remove the factory-installed, 620-ohm jumper between terminals SR and + on the enthalpy control located inside the outdoor air hood.
4. Connect the violet wire from the enthalpy sensor kit to the + terminal on the enthalpy control. Connect the blue wire from the enthalpy sensor kit to the SR terminal on the enthalpy control.
5. Turn the enthalpy control set point potentiometer clockwise past the “D” setting on the enthalpy control to configure the control to operate on differential enthalpy. See Fig. 36.
6. Remove the return-air enthalpy sensor from the accessory package. Using the screws provided, mount the sensor inside the return duct near the unit. Do not locate the control too far from the unit, or the wires will not reach from the sensor to the control. On 50EW,EY units, the enthalpy sensor can be installed in the return air section of the unit, under the return air dampers.

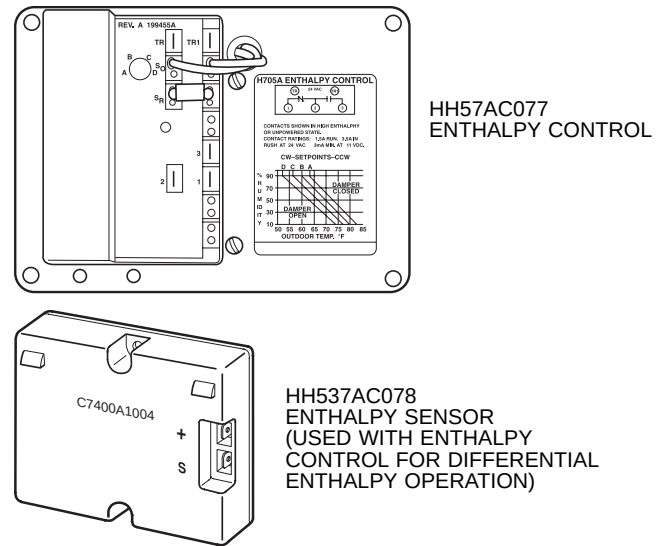
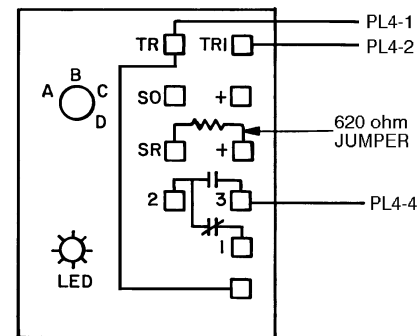
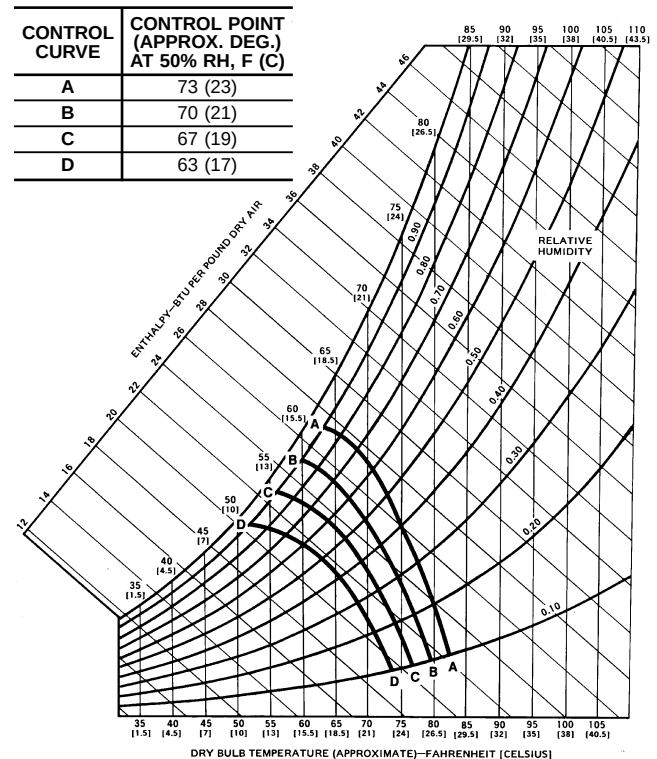


Fig. 35 — Differential Enthalpy Control and Sensor



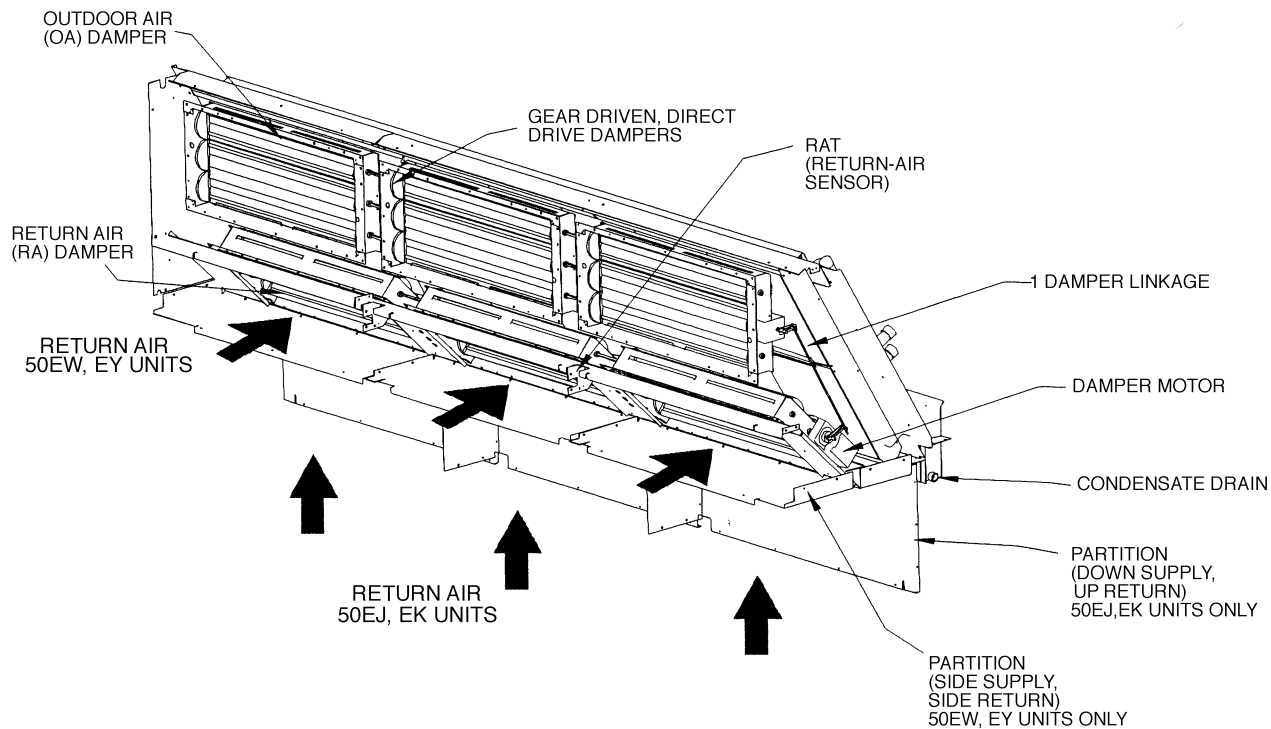
NOTE: Switches shown in high enthalpy state. Terminals 2 and 3 close on enthalpy decrease.

Fig. 36 — Wire Connections for Solid State Enthalpy Control (HH57AC077)



RH — Relative Humidity

Fig. 37 — Psychrometric Chart for Enthalpy Control



NOTE: Partitions shown indicate both side supply (50EW,EY) and vertical supply 50EJ,EK) units.

Fig. 38 — Economizer Details

7. Route the wires from the enthalpy sensor to the return air enthalpy control through the holes on the inside of the hinged filter access panel. The holes are blocked by plug buttons which should be removed.
8. Use field-supplied wire ties to attach the violet wire to the + terminal and the blue wire to the SR terminal.
9. Replace economizer filters.
10. Return power to unit.

Disable Economizer — For applications where the economizer will not be used (areas of high humidity), the economizer should be disabled. To disable the economizer, perform the following:

1. Turn off power. Lock out disconnect.
2. Locate the OAT (outdoor air thermistor) in the right hand outdoor air damper area.
3. Locate the splice connecting the violet wire coming from T24 on the base module board to the red wire coming from T29 on the base module board. Remove the wire nut and break the red to violet wire splice.
4. Cap off both wires. When the connection is broken the base module interprets the enthalpy as not acceptable and economizer operation is disabled.

Step 9 — Position Power Exhaust/Barometric Relief Damper Hood — All electrical connections have been made and adjusted at the factory. The power exhaust blowers and barometric relief dampers are shipped assembled and tilted back into the unit for shipping. Brackets and extra screws are shipped in shrink wrap around the dampers.

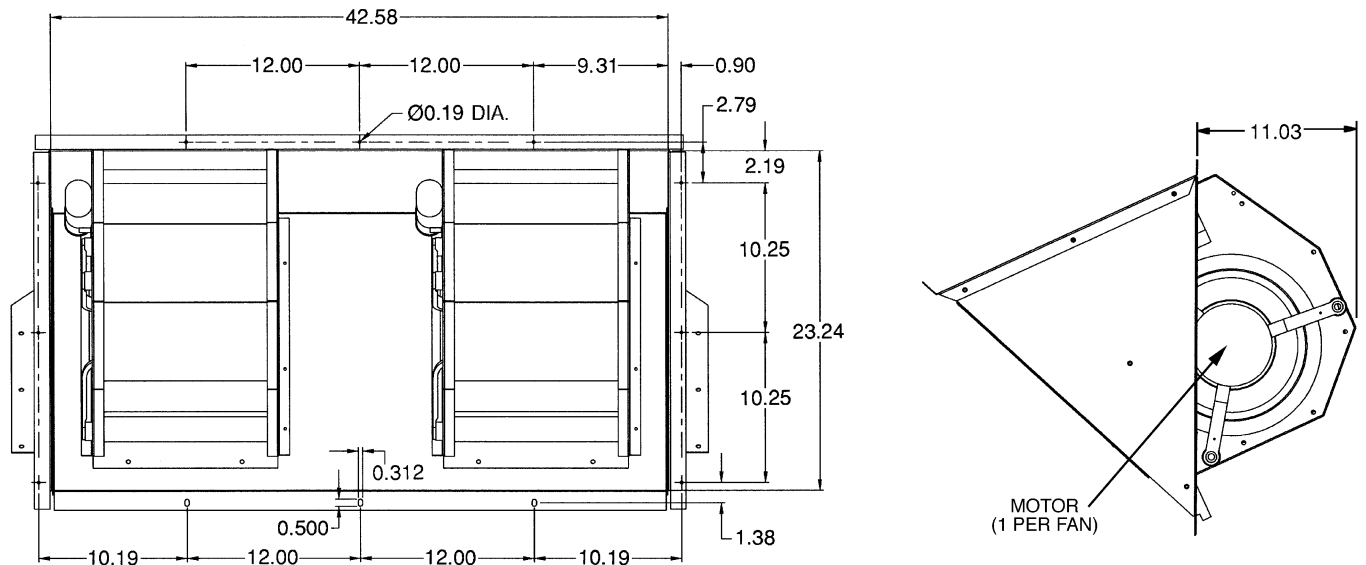
If ordered, each unit will have 4 (sizes 024-044) or 6 (sizes 054-068) power exhaust blowers or barometric relief dampers.

1. Remove 9 screws holding each damper assembly in place. See Fig. 39. Each damper assembly is secured with 3 screws on each side and 3 screws along the bottom. Save screws.
2. Pivot each damper assembly outward until edges of damper assembly rest against inside wall of unit.

⚠ CAUTION

Be careful when tilting blower assembly. Hoods and blowers are heavy and can cause injury if dropped.

3. Secure each damper assembly to unit with 6 screws across top (3 screws provided) and bottom (3 screws from Step 1) of damper.
4. With screws saved from Step 1, install brackets on each side of damper assembly.
5. Remove tape from damper blades.



NOTES:

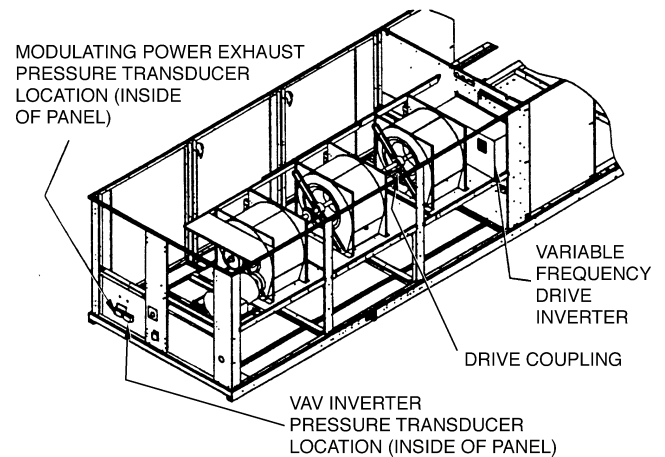
1. Unless otherwise specified, all dimensions are to outside of part.
2. Dimensions are in inches.
3. On 50EW,EY units, accessory power exhaust or barometric relief must be mounted in the field-supplied return ductwork.

Fig. 39 — Barometric Relief Damper and Power Exhaust Mounting Details

VAV DUCT PRESSURE TRANSDUCER — The VAV duct pressure transducer (VAV inverter pressure transducer) is located behind the filter access door on the lower inner panel. See Fig. 40. A section of field-supplied 6 mm (¼-in.) plastic tubing must be run from the high-pressure tap on the differential pressure switch and connected to a field-supplied tap in the supply-air duct. The tap is usually located ⅔ of the way out on the main supply duct. Remove plug button in panel to route tubing.

VAV BUILDING PRESSURE TRANSDUCER — The VAV building pressure transducer (modulating power exhaust pressure transducer) is located behind the filter access door on the inner panel. See Fig. 40. A section of field-supplied 6 mm (¼-in.) plastic tubing must be run from the high-pressure tap on the differential pressure switch to the conditioned space. The pressure tube must be terminated in the conditioned space where a constant pressure is required. This location is usually in an entrance lobby so that the building exterior doors will open and close properly. Remove plug button in panel to route tubing.

The low-pressure tap is factory-routed to the atmosphere. For a positive-pressure building, route the high tap to building air and the low tap to the atmosphere. For a negative-pressure building, route the high tap to the atmosphere and the low tap to building air.



VAV — Variable Air Volume

Fig. 40 — Pressure Transducer Locations (Units 054-068 Shown)

MOTORMASTER® III CONTROL INSTALLATION

Install Field-Fabricated Wind Baffles — Wind baffles must be field-fabricated for all units to ensure proper cooling cycle operation at low-ambient temperatures. See Fig. 41 for baffle details. Use 20-gage, galvanized sheet metal, or similar corrosion-resistant metal for baffles. Use field-supplied screws to attach baffles to unit. Screws should be ¼-in. diameter and ⅝-in. long. Holes for wind baffles are pre-punched in the unit sheet metal.

⚠ CAUTION

To avoid damage to the refrigerant coils and the electrical components, use recommended screw sizes only.

The wind baffles attach to flanges formed on the outer sheet metal of the unit corner post. The other end of the baffle is attached to the center panel between the condenser coil and the indoor section. Two baffles are required.

Install Motormaster III Controls — Only one Motormaster III control is required per unit.

Motor — One outdoor-fan motor (OFM) must be changed out in the field to accommodate the Motormaster III accessory. The replacement motor part no. is HD52AK652.

On size 024-034 units, the Motormaster-controlled OFM is located at the right side of the unit looking from the compressor end. The other OFM is controlled to shut off at 55 F (13 C) and on at 65 F (18 C) outdoor-air temperature and does NOT need to be changed out. The no. 1 and 2 OFMs are intended to run at all ambients.

On size 038-054 units, the Motormaster-controlled OFM is no. 3 OFM, which is located at the left side of the unit looking from the compressor end and the second motor back. The no. 4 OFM is controlled to shut off at 55 F (13 C) and on at 65 F (18 C) outdoor-air temperature and does NOT need to be changed out. The no. 1 and 2 OFMs are intended to run at all ambients.

On size 058-068 units, the Motormaster-controlled OFM is no. 3 OFM, which is located at the left side of the unit looking from the compressor end and the second motor back. The no. 4, 5, and 6 OFMs are controlled to shut off at 55 F (13 C) and on at 65 F (18 C) outdoor-air temperature and does NOT need to be changed out. The no. 1 and 2 OFMs are intended to run at all ambients.

Sensor — Install the thermistor for sensor input control in the location shown in Fig. 42A-42D. Connect sensor leads to the violet and gray control signal leads on the Motor-master III control.

Signal Selection Switch — Remove the cover of the Motor-master III control. Set the switch to accept the thermistor sensor input signal. Set the frequency to match the unit power supply (50/60 Hz).

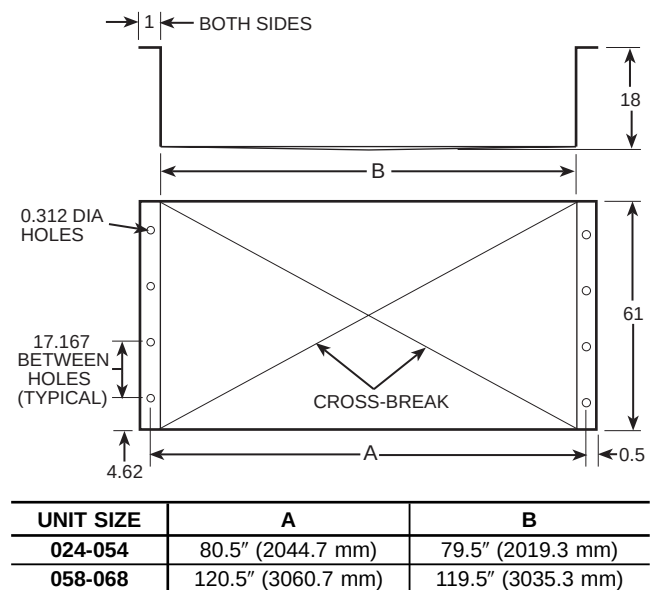
Motormaster III Control — The recommended mounting location is in the indoor fan section, mounted on the panel that separates the indoor and outdoor sections. On VAV units, this location is next to the VFD.

Do not route the Motormaster III control wiring next to the VFD on VAV units. Use a separate connector through the partition when wiring to the outdoor-fan motor.

Motormaster III Electrical Connections — When replacing the OFM, reconnect the black, yellow, and blue wires from the outdoor fan contactor to the black, yellow, and blue wires of the Motormaster III control, respectively. Run new wires from the red, orange, and brown wires to the leads of the new OFM. Connect the green wire from the control to ground.

⚠ WARNING

To avoid possibility of electrical shock and personal injury, turn off all power to unit before making electrical connections.



NOTE: All dimensions are in inches. Material: 20 gage galvanized steel or other non-corrosive material.

Fig. 41 — Motormaster III Control Baffle Details

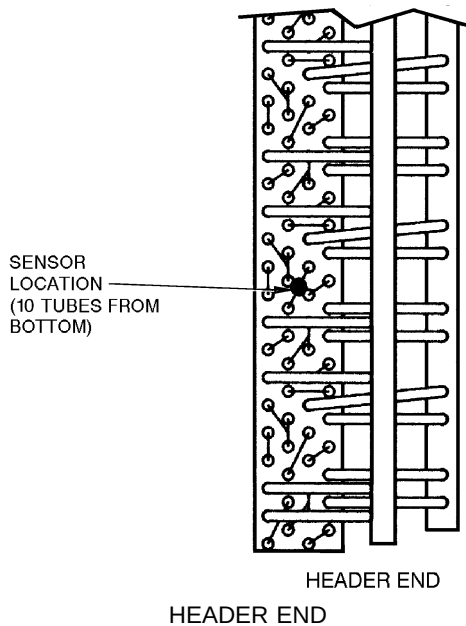


**Fig. 42A — Motormaster® III Sensor Location
(Sizes 024-034)**

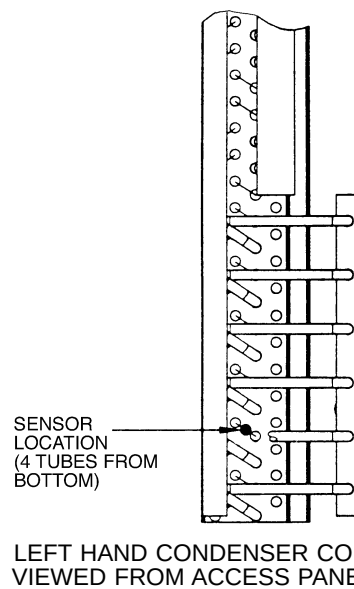


**Fig. 42C — Motormaster III Sensor Location
(Sizes 054-064)**

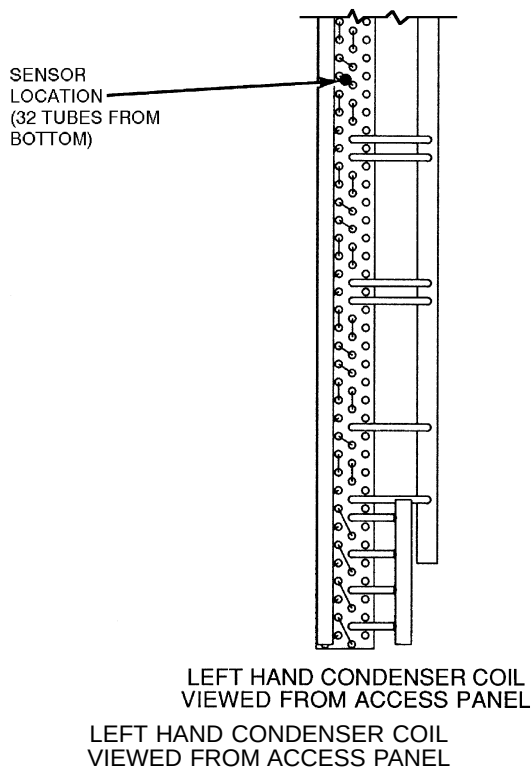


**Fig. 42B — Motormaster III Sensor Location
(Size 044)**

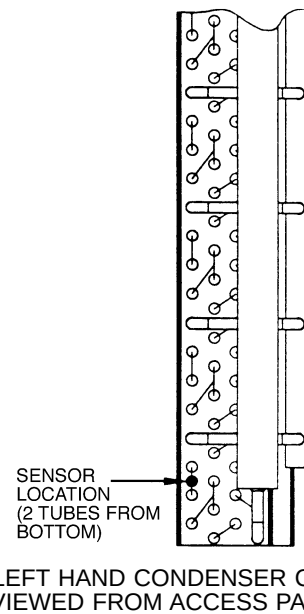


**Fig. 42D — Motormaster III Sensor Location
(Size 068)**

START-UP

Use the following information and Start-Up Checklist on pages CL-1 and CL-2 to check out unit PRIOR to start-up.

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

Compressor Mounting — Loosen the compressor hold-down bolts until sidewise movement of the washer under each holddown bolt head can be obtained. Do not loosen completely as bolts are self-locking and will maintain adjustment.

Service Valves — Ensure that the suction, discharge, and liquid line service valves are open. Damage to the compressor could result if they are left closed.

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

Refrigerant Service Ports — Each refrigerant system has one suction port located in the top of the compressor motor casing. All units also have one service port on the liquid line valve and one on the compressor discharge valve. Be sure that caps on the ports are tight.

Variable Frequency Drive (VFD) — The variable frequency drives are factory set. These settings include factory-installed jumpers and software configurations. The only configured set point is duct static pressure. An Operation Manual is shipped with each VAV unit. This manual should be used to adjust the drive for each particular application.

NOTE: The VFD will always provide the proper phase sequence to the indoor-fan motor. The indoor-fan motor operates in proper rotation regardless of the phase sequence to the unit. If, upon start-up, the outdoor fans operate backwards but the indoor fan operates in the correct direction, reverse any two leads to the main terminal block. All fans will then operate in the correct direction.

To set the duct static pressure, perform the following steps. The factory setting is zero. The duct transducer has a range from 0.000 to 1.245 kPa (0 to 5 in. wg.) The transducer output is 4 to 20 mA, therefore, 0.000 to 1.245 kPa (0 to 5 in. wg) is proportional to the 4 to 20 mA and must be expressed to the VFD in terms of percentage of the frequency range. To do this, refer to Table 8. The set point value is a percentage of the maximum output frequency. Locate the duct static pressure closest to that desired and use the corresponding set point value. If necessary, interpolation between duct static pressures is permissible.

To set the VFD, the VFD must be powered up; however, since it is located near the indoor air fan, operation of the fan is not desirable. To disable the fan, perform the following procedure:

1. Open the indoor fan circuit breaker.
2. Remove the jumper between CC and ST on the terminal strip of the VFD (see Fig. 43).
3. Close the indoor fan circuit breaker. The VFD now is powered but the fan will not operate.
4. On the front of the VFD is a keypad and display which will be used to enter the set point. To access this field, press the “PRG” key until the display reads “S.PrG” (Speed Group Parameters). Press the arrow key until “Sr1” is displayed. This is the VFD set point listed in Table 9.
5. Press the “READ/WRITE” key. The set point value will be displayed. Use the up-arrow or down-arrow key to adjust the set point value to the value desired.
6. Press the “READ/WRITE” key again to enter the new value.
7. Check the factory default values.

IMPORTANT: The Carrier factory default values for the VFD may be different than the default values of the manufacturer. Refer to the Carrier literature when checking default values. The following default values have been changed from the manufacturer settings to more closely match the VFD operation to a Carrier VAV unit.

SETUP PARAMETERS (Item 6, Point 1, Output Frequency) — The default value should be 0.

JUMP FREQUENCY GROUP (Item 7, PID Set Point Control Select) — The default value is 1.

JUMP FREQUENCY GROUP (Item 8, Proportional Gain) — The default value is 100.

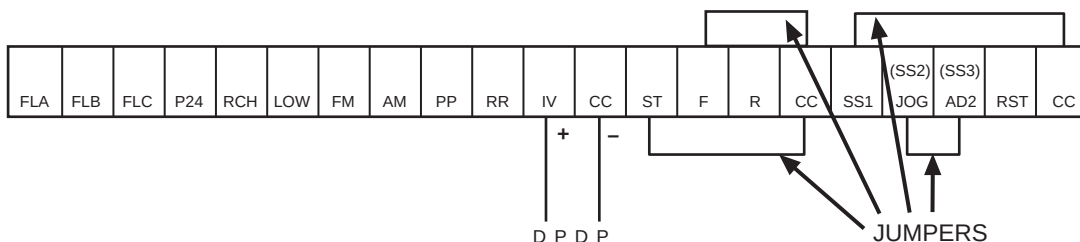
JUMP FREQUENCY GROUP (Item 9, Integral Gain) — The default value is 50.

SPEED GROUP PARAMETERS (Item 2, Multi-Speed Run Frequency No. 1) — The factory setting is 30.

SPEED GROUP PARAMETERS (Item 2, Fire Speed Override Frequency) — The factory setting is 60.

8. Open the indoor fan circuit breaker.
9. Replace the jumper between CC and ST on the terminal strip of the VFD.
10. Close the indoor fan circuit breaker; the VFD now is powered and the fan will operate.

NOTE: Any field measurement of supply fan amps must be taken with a true RMS meter between the fan circuit breaker and fan contactor (upstream of VFD).



NOTE: Terminal strip is located inside the VFD at the bottom.

Fig. 43 — VFD Factory-Installed Jumpers

Table 9 — VFD Supply Air Pressure Set Point

PRESSURE		CONTROL (mA)	VFD SET POINT
kPa	in. wg		
0.000	0	4.0	0
0.062	0.25	4.8	3
0.124	0.50	5.6	6
0.187	0.75	6.4	9
0.249	1.00	7.2	12
0.311	1.25	8.0	15
0.373	1.50	8.8	18
0.435	1.75	9.6	21
0.498	2.00	10.4	24
0.560	2.25	11.2	27
0.622	2.50	12.0	30
0.684	2.75	12.8	33
0.747	3.00	13.6	36
0.809	3.25	14.4	39
0.871	3.50	15.2	42

VFD — Variable Frequency Drive

NOTE: For values above 0.871 kPa (3.50 in. wg) extrapolation from table is permissible.

Power Exhaust — The optional non-modulating power exhaust (CV only) is a two-stage design where the operation of the exhaust fans is linked to economizer position. When the supply fan is running and the economizer is 25% open, the base module closes contacts, activating 2 exhaust fans (sizes 054-068, 3 exhaust fans). When the economizer position reaches 75% open, the base module activates the other 2 exhaust fans (sizes 054-068, 3 exhaust fans). The fans will turn off when the economizer closes below the same points. The economizer position set points that trigger the exhaust fans can be modified, but only through use of the Service Tool, Comfort Works™, or Building Supervisor Software. If single-stage operation is desired, adjust the economizer set points to identical values at the desired point to activate all exhaust fans.

The modulating power exhaust (VAV standard, CV optional) is controlled by a modular electronic sequencer system. This system consists of a model R353 signal input module and 4 model S353 staging modules (sizes 054-068, 6 staging modules). The signal input module receives a 0 to 10 vdc signal from the building pressure transducer, which is mounted adjacent to the supply static transducer behind the filter access panel. The modules are mounted just below the unit control board. The left module is the R353, and the 4 or 6 modules on the right are S353 modules for stages 1 through 4 or 6. On the unit wiring label, the R353 is designated PES0, and the S353 modules are designated PES1 through PES4 (PE56 for sizes 054-068).

The building pressure transducer range is -0.124 to 0.124 kPa (-0.5 to $+0.5$ in. wg). It is powered by a 0 to 10 vdc signal. A factory-installed hose at the “Lo” connection leads to atmosphere, and a field-supplied hose must be connected to the “Hi” connection and led into the building to a point where building pressure is to be controlled (positive-pressure building). There is a plug button in the bulkhead just above the transducers, for use in leading the hoses into the building via the return air ductwork.

There are 3 adjustments at the R353 module, all of which have been factory set. In the center of the circuit board is a set of 4 pins with a jumper, labeled J2. This determines the mode of operation. The bottom 2 pins must be jumpered for direct operation. Direct operation means that the staging modules are activated in sequence as the input signal increases.

At the upper right corner of the board is a set of 5 pins and jumper, which determines the time constant for the control. The time constant is the delay in response built into the controls. The jumper should be on the middle or bottom 2 pins, for the maximum time constant. The delay can be decreased, if desired, by moving the jumper progressively upward, always jumpering adjacent pins.

At the lower left corner of the board below the terminal strip is a resistor marked R27. This must be removed in order to obtain the 0 to 10 vdc signal output. There will not be a resistor on a factory-supplied module, but a resistor may be present on a replacement module and must be removed.

The R353 module has a terminal block with 7 connections available for wiring. The 2 right-hand terminals are for the 24 vac and common connections. The next 2 terminals are for the 0 to 10 vdc signal. Consult the wiring label for wire identification if replacing the module. The 3 left-hand terminals are not used for this application.

The S353 module has an LED (light-emitting diode), a set of 4 jumper pins, and 2 potentiometers. The LED will light whenever the module is activated, providing a visual indication of the number of exhaust fans running. The jumper pins are arranged in a square format. Two jumpers are used to determine the mode of operation (direct or reverse). The 2 jumpers must be arranged horizontally for direct action (factory set).

At the top of the module are 2 potentiometers. The left potentiometer adjusts the **offset**. The right potentiometer adjusts **differential**. The potentiometers are factory set for a nominal 0 in. wg building pressure.

The **offset** set point is defined as the point at which a module turns off a fan, and is measured in terms of percent of the input signal. For control purposes, 0 offset is at an arbitrary “floor” which is established at 10% of the input signal, or 1 vdc. In this example, the first stage will turn off at 30% (3 vdc), and the offset potentiometer will be set at 20%. The second stage will turn off at 50% signal (5 vdc), and the offset potentiometer will be set at 40%. The fourth stage is at the maximum 75% offset, which equates to 85% signal or 8.5 vdc. The offset potentiometer is calibrated in 10% increments.

Table 10 relates building pressure to signal level.

Table 10 — Potentiometer Signal Levels

BUILDING PRESSURE		SIGNAL LEVEL (vdc)
in. wg	kPa	
-0.50	-0.124	2
-0.25	-0.062	4
0.00	0.000	6
0.25	0.062	8
0.50	0.124	10

If the building pressure is controlled at 0 in. wg, offset of the first stage should be set at 50%, which equates to 60% of the input signal, or 6 vdc. The other stages can then be set as desired between 50% and 75%.

The default offset set points for modulating power exhaust are shown in Table 11A (sizes 024-044) and Table 11B (sizes 054-068).

**Table 11A — Power Exhaust Default Set Points
(Sizes 024-044)**

STAGE	OFFSET	DIFFERENTIAL	OFF VOLTAGE	ON VOLTAGE	OFF STATIC PRESSURE	
					in. wg	kPa
1	50%	3%	6.0	6.3	0.00	0.000
2	55%	3%	6.5	6.8	0.06	0.015
3	60%	3%	7.0	7.3	0.12	0.030
4	64%	3%	7.4	7.7	0.18	0.045

**Table 11B — Power Exhaust Default Set Points
(Sizes 054-068)**

STAGE	OFFSET	DIFFERENTIAL	OFF VOLTAGE	ON VOLTAGE	OFF STATIC PRESSURE	
					in. wg	kPa
1	50%	3%	6.0	6.3	0.00	0.000
2	55%	3%	6.5	6.8	0.06	0.015
3	60%	3%	7.0	7.3	0.12	0.030
4	65%	3%	7.5	7.8	0.18	0.045
5	70%	3%	8.0	8.3	0.25	0.062
6	75%	3%	8.5	8.8	0.31	0.077

The **differential** set point is the difference between the turn off point and the turn on point for each module. It also is calibrated in terms of percent of input signal, and has a range of 1% to 7%. The differential potentiometer is calibrated in 1% increments, and is factory set at approximately 3%. It is recommended to leave the set point at 3%, to minimize cycling of the fans.

The offset and differential potentiometers have been factory set for atmospheric pressure. Do not change these settings until there is some experience with the building. In most cases the factory settings will be satisfactory. However, if the building pressure is not being maintained as desired, then some minor adjusting on a trial and error basis can be made.

Direct Digital Controls DIP Switch Configuration — The Direct Digital Control (DDC) board must be configured for each application. The DDC board is configured through the DIP switches located on the board. There are 8 DIP switches which configure 8 different applications of the DDC. See Table 12. DIP switch 1 is on the left of the block. DIP switch 8 is on the right of the block. To set a DIP switch, push the switch with suitable tool (small-blade screwdriver). The open side of the DIP switch is marked “OPEN.” When the rocker switch is on the “OPEN” side of the switch, the switch is open. Factory settings are shown in Table 13.

The DIP switch configurations for the unit control software are as follows:

- DIP switch 1 configures the unit to operate as a VAV or CV unit
- DIP switch 2 configures the unit to use a space sensor (VAV units) or a thermostat (CV units)
- DIP switch 3 configures the DDC for use with an electronic expansion board
- DIP switch 4 is used to field test the unit
- DIP switch 5 is used to enable occupied heating (VAV units) or specify the type of power exhaust (CV units)
- DIP switch 6 configures the Time Guard® override and, when used with the field test function, sets the minimum damper position
- DIP switch 7 configures the unit’s fan for gas heat or electric heat
- DIP switch 8 configures the unit for heat pump or air conditioner operation

Crankcase Heater(s) — Heater(s) is energized as long as there is power to the unit, except when the compressors are operating.

IMPORTANT: Unit power must be on for 24 hours prior to start-up. Otherwise, damage to compressor may result.

Evaporator Fan — Fan belt and fixed pulleys are factory-installed. See Tables 14-19 for Fan Performance Data. See Tables 20A and 20B for Air Quantity Limits. See Table 21 for Motor Limitation data. See Tables 22A-22D for Fan Performance Power Exhaust data. Be sure that fans rotate in the proper direction. Static pressure drop for power exhaust, barometric relief damper, and electric heat is negligible. To alter fan performance, see Evaporator Fan Performance Adjustment section on page 65.

Condenser Fans and Motors — Fans and motors are factory set. Refer to Condenser-Fan Adjustment section (page 67) as required.

The VFD will always provide the proper phase sequence to the indoor-fan motor to operate in the proper rotation regardless of the phase sequence to the unit. If on start-up, the outdoor fans operate backwards but the indoor fan operates in the correct direction, reverse any two leads to the unit main terminal block and all fans will operate in the correct direction

Return-Air Filters — Check that correct filters are installed in filter tracks. See Tables 1A and 1B. Do not operate unit without return-air filters.

Table 12 — DIP Switch Configuration

SETTING	1	2	3	4	5	6	7	8
OPEN	VAV	VAV — Space Sensor Installed	Expansion Board	Field Test ON	VAV — Occupied Heat Enabled	Time Guard® Override ON	Gas Heat	Heat Pump Operation
		CV — CCN or Sensors Used			CV — Modulated Power Exhaust	IN CONJUNCTION WITH FIELD TEST — Set Minimum Damper Position		
CLOSED	CV	VAV — No Space Sensor	Base Control Board Only	Field Test OFF	VAV — Occupied Heat Disabled	Time Guard Override OFF	Electric Heat	Air Conditioner Operation
		CV — Thermostat			CV — Constant Volume Power Exhaust			

LEGEND

CCN — Carrier Comfort Network
CV — Constant Volume
VAV — Variable Air Volume

NOTES:

1. The OPEN side of the DIP switch is marked "OPEN." When the rocker switch is on the "OPEN" side of the switch, the switch is OPEN.
2. The configuration of DIP switches 2 and 5 are dependent on DIP switch 1. If DIP switch 1 is set to OPEN (VAV operation), then DIP switches 2 and 5 will configure VAV functions.
3. When the unit is field-tested (DIP switch 4 to OPEN), the function of DIP switch 6 changes and it is used to set the minimum damper position.

Table 13 — DIP Switch Factory Settings

UNIT	1	2	3	4	5	6	7	8
50EJ,EW	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
50EK,EY	Open	Closed	Closed	Closed	Closed	Closed	Closed	Closed

Filter Replacement — To replace filters, open filter access door (marked with label). Remove inner access panel. Remove plastic filter retainer in between filter tracks by sliding and pulling outward. Remove first filter by sliding it out of the opening in filter track. Locate filter removal tool, which is shipped next to the return air dampers. Use the filter removal tool to remove the remaining filters.

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

Economizer Adjustment — Remove filter access panel. Check that outdoor-air damper is closed and return-air damper is open.

Economizer operation and adjustment is described in Sequence of Operation and Make Outdoor Air Inlet Adjustments sections (this page and page 38), respectively.

Sequence of Operation

NOTE: Unit is shipped with default values that can be changed through Service Tool, Building Supervisor, or Comfort Works™ software. See Table 23 for default values.

COOLING, CONSTANT VOLUME (CV) UNITS — On power up, the control module will activate the initialization software of the control board. The initialization software then reads DIP switch no. 1 position to determine CV or VAV operation. Next, DIP switch no. 2 is read to determine if the control is thermostat or sensor type operation. If switch 2 is open, then sensors are employed. If switch no. 2 is closed, thermostat is employed. Initialization clears all alarms and alerts, remaps the input/output database for CV operation, sets maximum heat stages to 2, and sets maximum cool stages to 3. The control reads DIP switch no. 3 and if open, then it sets the internal flag for expansion mode operation.

The first time power is sent to the control board after a power outage, power up takes 5 minutes plus a random 1 to 63 seconds.

Table I4 — Fan Performance, 50EJ,EK024-034 — Vertical Discharge Units (SI)

FOR EW,EY UNITS, REDUCE NET AVAILABLE EXTERNAL STATIC PRESSURE BY 75 PA

AIRFLOW (L/s)	AVAILABLE EXTERNAL STATIC PRESSURE (Pa)															
	50		100		150		200		250		300		350		400	
	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW
1900	5.4	0.60	6.7	0.80	7.8	1.10	8.7	1.30	9.6	1.60	10.4	1.90	11.1	2.10	11.8	2.40
2400	6.0	0.80	7.2	1.10	8.2	1.40	9.1	1.70	10.0	2.00	10.7	2.20	11.4	2.50	12.1	2.80
2800	6.7	1.20	7.8	1.50	8.8	1.80	9.6	2.10	10.4	2.40	11.1	2.70	11.8	3.00	12.5	3.30
3300	7.5	1.70	8.5	2.00	9.3	2.30	10.2	2.60	10.9	2.90	11.6	3.30	12.3	3.60	12.9	3.90
3800	8.2	2.20	9.2	2.60	10.0	2.90	10.7	3.20	11.5	3.60	12.1	3.90	12.8	4.30	13.4	4.60
3900	8.4	2.40	9.3	2.70	10.1	3.10	10.9	3.40	11.6	3.70	12.3	4.10	12.9	4.40	13.5	4.80
4200	9.1	2.90	9.9	3.20	10.7	3.60	11.4	4.00	12.0	4.30	12.7	4.70	13.3	5.00	13.9	5.40
4700	9.9	3.70	10.6	4.00	11.4	4.40	12.0	4.80	12.7	5.20	13.3	5.50	13.9	5.90	14.4	6.30
5200	10.7	4.60	11.4	5.00	12.1	5.30	12.7	5.70	13.3	6.10	13.9	6.50	14.5	6.90	15.0	7.30
5700	11.5	5.60	12.2	6.00	12.8	6.40	13.4	6.80	14.0	7.20	14.6	7.70	15.1	8.10	15.6	8.50
5900	12.0	6.10	12.6	6.60	13.2	7.00	13.8	7.40	14.4	7.80	14.9	8.30	15.4	8.70	15.9	9.10
6100	12.4	6.70	13.0	7.20	13.6	7.60	14.2	8.00	14.7	8.50	15.3	8.90	15.8	9.30	16.3	9.80
6500	13.0	7.70	13.6	8.10	14.2	8.60	14.7	9.00	15.3	9.50	15.8	9.90	16.3	10.40	16.8	10.80
6600	13.3	8.00	13.8	8.50	14.4	8.90	14.9	9.40	15.5	9.80	16.0	10.30	16.4	10.70	16.9	11.20
7100	14.1	9.50	14.7	9.90	15.2	10.40	15.7	10.90	16.2	11.30	16.7	11.80	17.2	12.30	17.6	12.70

AIRFLOW (L/s)	AVAILABLE EXTERNAL STATIC PRESSURE (Pa)															
	450		500		550		600		650		700		750		800	
	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW
1900	12.4	2.70	13.0	3.00	13.6	3.30	14.2	3.60	14.7	3.90	15.3	4.20	15.8	4.60	16.3	4.90
2400	12.7	3.10	13.3	3.40	13.9	3.80	14.5	4.10	15.0	4.40	15.5	4.70	16.0	5.10	16.5	5.40
2800	13.1	3.60	13.7	4.00	14.2	4.30	14.8	4.60	15.3	5.00	15.8	5.30	16.3	5.60	16.8	6.00
3300	13.5	4.30	14.1	4.60	14.6	4.90	15.1	5.30	15.6	5.60	16.1	6.00	16.6	6.30	17.1	6.70
3800	13.9	5.00	14.5	5.30	15.0	5.70	15.5	6.00	16.0	6.40	16.5	6.80	17.0	7.10	17.4	7.50
3900	14.1	5.20	14.6	5.50	15.1	5.90	15.6	6.20	16.1	6.60	16.6	7.00	17.1	7.30	17.5	7.70
4200	14.4	5.80	15.0	6.10	15.5	6.50	16.0	6.90	16.5	7.30	16.9	7.60	17.4	8.00	17.8	8.40
4700	15.0	6.70	15.5	7.10	16.0	7.50	16.5	7.90	16.9	8.20	17.4	8.60	17.8	9.00	18.3	9.40
5200	15.5	7.70	16.0	8.10	16.5	8.50	17.0	8.90	17.4	9.40	17.9	9.80	18.3	10.20	18.7	10.60
5700	16.1	8.90	16.6	9.30	17.1	9.70	17.5	10.20	18.0	10.60	18.4	11.00	18.8	11.40	19.2	11.80
5900	16.4	9.50	16.9	10.00	17.4	10.40	17.8	10.80	18.2	11.20	18.7	11.70	19.1	12.10	19.5	12.50
6100	16.7	10.20	17.2	10.60	17.7	11.10	18.1	11.50	18.5	11.90	18.9	12.40	19.4	12.80	19.8	13.20
6500	17.2	11.30	17.7	11.70	18.1	12.10	18.5	12.60	19.0	13.00	19.4	13.50	19.8	13.90	—	—
6600	17.4	11.60	17.8	12.10	18.3	12.50	18.7	13.00	19.1	13.40	19.5	13.90	19.9	14.30	—	—
7100	18.1	13.20	18.5	13.70	18.9	14.10	19.3	14.60	19.7	15.10	—	—	—	—	—	—

AIRFLOW (L/s)	AVAILABLE EXTERNAL STATIC PRESSURE (Pa)					
	850		900		950	
	r/s	BkW	r/s	BkW	r/s	BkW
1900	16.7	5.20	17.2	5.50	17.6	5.90
2400	17.0	5.70	17.4	6.10	17.9	6.40
2800	17.2	6.30	17.7	6.70	18.1	7.00
3300	17.5	7.00	18.0	7.40	18.4	7.80
3800	17.9	7.90	18.3	8.20	18.7	8.60
3900	18.0	8.10	18.4	8.50	18.8	8.80
4200	18.3	8.80	18.7	9.20	19.1	9.60
4700	18.7	9.80	19.1	10.20	19.5	10.60
5200	19.2	11.00	19.6	11.40	20.0	11.80
5700	19.6	12.30	20.0	12.70	—	—
5900	19.9	13.00	—	—	—	—
6100	—	—	—	—	—	—
6500	—	—	—	—	—	—
6600	—	—	—	—	—	—
7100	—	—	—	—	—	—

LEGEND

BkW — Motor Brake (Output) Power (kW)
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
r/s — Fan Wheel Speed, Revolutions per Second

NOTES:

1. Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 51 mm (2-in.) filters.
2. Conversion — Bhp to Watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$

3. Variable air volume (VAV) units will operate down to 9.39 L/s per kW (70 cfm/ton). Performance at 9.39 L/s per kW is limited to unloaded operation and may be additionally limited by edb and ewb conditions.
4. Maximum fan speed is 20 r/s.

Table 15 — Fan Performance, 50EJ,EK038,044 — Vertical Discharge Units (SI)

FOR EW,EY UNITS, REDUCE NET AVAILABLE EXTERNAL STATIC PRESSURE BY 125 PA

AIRFLOW (L/s)	AVAILABLE EXTERNAL STATIC PRESSURE (Pa)															
	50		100		150		200		250		300		350		400	
	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW
3800	7.5	1.60	8.3	2.10	9.1	2.40	9.8	2.70	10.5	3.00	11.2	3.30	11.8	3.60	12.5	3.90
4200	8.2	2.10	8.9	2.70	9.7	3.00	10.3	3.40	11.0	3.70	11.6	4.00	12.2	4.30	12.8	4.60
4700	8.9	2.80	9.6	3.50	10.3	3.80	10.9	4.10	11.5	4.40	12.1	4.80	12.7	5.10	13.2	5.40
5200	9.7	3.50	10.3	4.30	10.9	4.60	11.5	5.00	12.1	5.30	12.7	5.70	13.2	6.00	13.7	6.40
5600	10.5	4.30	11.1	5.20	11.6	5.60	12.2	6.00	12.7	6.30	13.2	6.70	13.7	7.10	14.2	7.40
6100	11.3	5.20	11.8	6.30	12.3	6.70	12.8	7.10	13.3	7.50	13.8	7.80	14.3	8.20	14.8	8.60
6600	12.0	6.30	12.5	7.50	13.0	7.90	13.5	8.30	14.0	8.70	14.5	9.10	14.9	9.50	15.4	9.90
7100	12.8	7.50	13.3	8.90	13.8	9.30	14.2	9.70	14.7	10.10	15.1	10.50	15.5	11.00	16.0	11.40
7600	13.6	8.80	14.1	10.40	14.5	10.80	14.9	11.30	15.4	11.70	15.8	12.10	16.2	12.50	16.6	13.00
8000	14.4	10.20	14.8	12.10	15.3	12.50	15.7	13.00	16.1	13.40	16.5	13.80	16.9	14.30	17.2	14.70
8500	15.2	11.80	15.6	13.90	16.0	14.40	16.4	14.80	16.8	15.30	17.2	15.70	17.5	16.20	17.9	16.60
9000	16.0	13.50	16.4	15.90	16.8	16.40	17.1	16.80	17.5	17.30	17.9	17.80	18.2	18.20	18.6	18.70
9400	16.8	15.40	17.2	18.10	17.5	18.50	17.9	19.00	18.2	19.50	18.6	20.00	18.9	20.50	19.3	21.00

AIRFLOW (L/s)	AVAILABLE EXTERNAL STATIC PRESSURE (Pa)															
	450		500		550		600		650		700		750		800	
	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW
3800	13.0	4.20	13.6	4.60	14.2	4.90	14.7	5.20	15.3	5.60	15.8	5.90	16.3	6.20	16.8	6.60
4200	13.4	5.00	13.9	5.30	14.5	5.60	15.0	6.00	15.5	6.30	16.0	6.70	16.5	7.00	17.0	7.40
4700	13.8	5.80	14.3	6.10	14.8	6.50	15.3	6.80	15.8	7.20	16.3	7.60	16.8	7.90	17.2	8.30
5200	14.2	6.70	14.7	7.10	15.2	7.50	15.7	7.80	16.2	8.20	16.6	8.60	17.1	9.00	17.5	9.30
5600	14.7	7.80	15.2	8.20	15.7	8.60	16.1	8.90	16.6	9.30	17.0	9.70	17.4	10.10	17.8	10.50
6100	15.2	9.00	15.7	9.40	16.1	9.80	16.6	10.20	17.0	10.60	17.4	11.00	17.8	11.40	18.2	11.80
6600	15.8	10.30	16.2	10.70	16.7	11.10	17.1	11.50	17.5	12.00	17.9	12.40	18.3	12.80	18.7	13.20
7100	16.4	11.80	16.8	12.20	17.2	12.60	17.6	13.00	18.0	13.50	18.4	13.90	18.8	14.30	19.1	14.80
7600	17.0	13.40	17.4	13.80	17.8	14.30	18.1	14.70	18.5	15.10	18.9	15.60	19.3	16.00	19.6	16.50
8000	17.6	15.20	18.0	15.60	18.4	16.10	18.7	16.50	19.1	17.00	19.4	17.40	19.8	17.90	—	—
8500	18.3	17.10	18.6	17.60	19.0	18.00	19.3	18.50	19.7	18.90	—	—	—	—	—	—
9000	18.9	19.20	19.3	19.70	19.6	20.10	19.9	20.60	—	—	—	—	—	—	—	—
9400	19.6	21.40	19.9	21.90	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (L/s)	AVAILABLE EXTERNAL STATIC PRESSURE (Pa)					
	850		900		950	
	r/s	BkW	r/s	BkW	r/s	BkW
3800	17.3	6.90	17.7	7.30	18.2	7.60
4200	17.4	7.70	17.9	8.10	18.3	8.50
4700	17.7	8.70	18.1	9.00	18.5	9.40
5200	17.9	9.70	18.4	10.10	18.8	10.50
5600	18.3	10.90	18.7	11.30	19.1	11.70
6100	18.6	12.20	19.0	12.60	19.4	13.00
6600	19.1	13.60	19.4	14.00	19.8	14.50
7100	19.5	15.20	19.9	15.60	—	—
7600	20.0	16.90	—	—	—	—
8000	—	—	—	—	—	—
8500	—	—	—	—	—	—
9000	—	—	—	—	—	—
9400	—	—	—	—	—	—

LEGEND

BkW — Motor Brake (Output) Power (kW)
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
r/s — Fan Wheel Speed, Revolutions per Second

NOTES:

1. Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 51 mm (2-in.) filters.
2. Conversion — Bhp to Watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$

3. Variable air volume (VAV) units will operate down to 9.39 L/s per kW (70 cfm/ton). Performance at 9.39 L/s per kW is limited to unloaded operation and may be additionally limited by edb and ewb conditions.
4. Maximum fan speed is 20 r/s.

Table 16 — Fan Performance, 50EJ,EK054-068 — Vertical Discharge Units (SI)

FOR EW,EY UNITS, REDUCE NET AVAILABLE EXTERNAL STATIC PRESSURE BY 125 PA

AIRFLOW (L/s)	AVAILABLE EXTERNAL STATIC PRESSURE (Pa)															
	50		100		150		200		250		300		350		400	
	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW
4,721	7	2.00	8	2.49	9	2.96	9	3.41	10	3.87	11	4.32	11	4.78	12	5.24
5,665	7	2.95	9	3.53	9	4.07	10	4.59	11	5.10	11	5.61	12	6.11	12	6.62
7,082	9	4.86	10	5.58	11	6.23	11	6.85	12	7.46	12	8.05	13	8.64	14	9.22
7,554	9	5.63	10	6.40	11	7.09	12	7.75	12	8.39	13	9.01	13	9.63	14	10.24
8,026	10	6.48	11	7.30	11	8.03	12	8.73	13	9.40	13	10.05	14	10.70	14	11.33
8,498	10	7.41	11	8.27	12	9.05	12	9.78	13	10.49	14	11.17	14	11.85	15	12.51
8,970	10	8.42	11	9.33	12	10.15	13	10.92	13	11.66	14	12.37	15	13.08	15	13.77
9,442	11	9.51	12	10.47	13	11.33	13	12.14	14	12.91	14	13.66	15	14.40	15	15.12
9,914	11	10.69	12	11.69	13	12.59	14	13.44	14	14.25	15	15.04	15	15.80	16	16.56
10,386	12	11.96	13	13.00	13	13.95	14	14.83	15	15.68	15	16.50	16	17.30	16	18.08
10,858	12	13.32	13	14.41	14	15.39	14	16.32	15	17.20	16	18.06	16	18.89	17	19.70
11,330	13	14.77	13	15.90	14	16.93	15	17.90	15	18.82	16	19.71	17	20.57	17	21.41
11,803	13	16.31	14	17.50	15	18.57	15	19.57	16	20.53	16	21.45	17	22.35	17	23.22
12,275	13	17.96	14	19.90	15	20.30	16	21.34	16	22.34	17	23.30	17	24.23	18	25.13
12,747	14	19.70	15	20.98	15	22.13	16	23.22	17	24.25	17	25.24	18	26.20	18	27.15

AIRFLOW (L/s)	AVAILABLE EXTERNAL STATIC PRESSURE (Pa)															
	450		500		550		600		650		700		750		800	
	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW	r/s	BkW
4,721	12	5.70	13	6.16	13	6.63	13	7.11	14	7.59	14	8.07	15	8.56	15	9.05
5,665	13	7.12	13	7.63	14	8.14	14	8.66	15	9.17	15	9.69	15	10.22	16	10.74
7,082	14	9.80	14	10.38	15	10.96	15	11.53	16	12.11	16	12.69	16	13.27	17	13.86
7,554	14	10.84	15	11.44	15	12.05	16	12.65	16	13.25	16	13.85	17	14.45	17	15.05
8,026	15	11.97	15	12.59	16	13.22	16	13.84	16	14.47	17	15.09	17	15.71	18	16.33
8,498	15	13.17	16	13.82	16	14.47	16	15.12	17	15.77	17	16.41	18	17.06	18	17.70
8,970	16	14.46	16	15.14	16	15.81	17	16.49	17	17.16	18	17.82	18	18.49	18	19.16
9,442	16	15.83	16	16.54	17	17.24	17	17.94	18	18.63	18	19.32	18	20.01	19	20.70
9,914	16	17.30	17	18.03	17	18.76	18	19.48	18	20.20	18	20.92	19	21.63	19	22.34
10,386	17	18.85	17	19.62	18	20.37	18	21.12	18	21.86	19	22.60	19	23.34	19	24.07
10,858	17	20.50	18	21.29	18	22.07	18	22.85	19	23.62	19	24.38	19	25.14	20	25.90
11,330	17	22.25	18	23.06	18	23.87	19	24.67	19	25.47	19	26.26	20	27.04	—	—
11,803	18	24.09	18	24.93	19	25.77	19	26.60	19	27.42	20	28.24	—	—	—	—
12,275	18	26.03	19	26.90	19	27.77	20	28.62	20	29.47	—	—	—	—	—	—
12,747	19	28.07	19	28.97	19	29.87	20	30.75	—	—	—	—	—	—	—	—

AIRFLOW (L/s)	AVAILABLE EXTERNAL STATIC PRESSURE (Pa)					
	850		900		950	
	r/s	BkW	r/s	BkW	r/s	BkW
4,721	15	9.54	16	10.04	16	10.54
5,665	16	11.27	16	11.80	17	12.34
7,082	17	14.44	17	15.03	18	15.61
7,554	18	15.66	18	16.26	18	16.87
8,026	18	16.96	18	17.58	19	18.21
8,498	18	18.35	19	18.99	19	19.64
8,970	19	19.82	19	20.49	19	21.16
9,442	19	21.39	19	22.08	20	22.76
9,914	19	23.05	20	23.76	—	—
10,386	—	—	—	—	—	—
10,858	—	—	—	—	—	—
11,330	—	—	—	—	—	—
11,803	—	—	—	—	—	—
12,275	—	—	—	—	—	—
12,747	—	—	—	—	—	—

LEGEND

BkW — Motor Brake (Output) Power (kW)
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
r/s — Fan Wheel Speed, Revolutions per Second
VAV — Variable Air Volume

NOTES:

- Fan performance is based on dry coils, economizer, roof curb, cabinet losses, and clean 51 mm (2-in.) filters.
- Conversion — BkW to Watts:

$$\text{Watts} = \frac{\text{BkW}}{\text{Motor efficiency}}$$
- Variable air volume (VAV) units will operate down to 1.02 L/s/1000 kW in the cooling mode. Performance at 1.02 L/s/1000 kW is limited to unloaded operation and may be additionally limited by edb and ewb conditions.
- Maximum fan speed is 20 r/s.

Table 17 — Fan Performance, 50EJ,EK024-034 — Vertical Discharge Units (English)

FOR EW,EY UNITS, REDUCE NET AVAILABLE EXTERNAL STATIC PRESSURE BY 0.3 IN. WG

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	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
4,000	322	0.77	401	1.09	466	1.43	523	1.78	575	2.13	622	2.50	666	2.87	707	3.25
5,000	361	1.14	433	1.50	494	1.86	548	2.23	598	2.62	643	3.00	686	3.40	726	3.80
6,000	403	1.62	468	2.01	526	2.41	577	2.81	624	3.21	668	3.62	709	4.04	748	4.46
7,000	448	2.22	508	2.65	561	3.08	609	3.50	654	3.93	696	4.37	736	4.81	773	5.25
8,000	495	2.97	549	3.42	599	3.88	645	4.33	687	4.79	727	5.25	765	5.71	801	6.18
8,250	507	3.18	560	3.64	609	4.10	654	4.56	696	5.02	735	5.49	773	5.96	809	6.43
9,000	543	3.85	593	4.34	639	4.82	682	5.30	723	5.78	761	6.27	797	6.76	832	7.24
10,000	592	4.90	638	5.41	682	5.91	722	6.42	760	6.93	797	7.44	832	7.95	865	8.46
11,000	642	6.10	685	6.64	725	7.17	764	7.70	800	8.24	835	8.77	868	9.30	900	9.84
12,000	693	7.48	733	8.04	771	8.60	807	9.15	841	9.71	874	10.26	906	10.82	937	11.38
12,500	718	8.23	757	8.80	794	9.37	829	9.94	862	10.51	895	11.08	926	11.64	956	12.21
13,000	744	9.03	781	9.62	817	10.20	851	10.78	884	11.36	915	11.93	946	12.51	975	13.09
13,750	783	10.32	818	10.92	852	11.52	885	12.12	917	12.71	947	13.31	977	13.90	1005	14.50
14,000	795	10.77	831	11.38	864	11.98	896	12.59	928	13.19	958	13.79	987	14.39	1015	14.99
15,000	847	12.71	880	13.34	912	13.96	943	14.59	972	15.21	1001	15.83	1029	16.45	1056	17.08

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	746	3.64	783	4.03	818	4.44	852	4.85	884	5.26	916	5.68	946	6.11	975	6.54
5,000	764	4.21	800	4.62	834	5.04	868	5.46	900	5.89	930	6.33	960	6.77	989	7.22
6,000	785	4.89	820	5.32	854	5.76	886	6.21	918	6.65	948	7.11	977	7.56	1006	8.02
7,000	809	5.70	843	6.16	876	6.61	908	7.08	939	7.54	968	8.01	997	8.49	1025	8.96
8,000	836	6.65	869	7.12	901	7.60	932	8.08	962	8.57	991	9.05	1019	9.55	1046	10.04
8,250	843	6.91	876	7.39	908	7.87	938	8.36	968	8.84	997	9.34	1025	9.83	1052	10.33
9,000	865	7.74	898	8.23	929	8.73	959	9.23	988	9.74	1016	10.24	1043	10.75	1070	11.27
10,000	897	8.98	928	9.49	958	10.01	987	10.53	1016	11.06	1043	11.58	1070	12.11	1096	12.64
11,000	931	10.37	961	10.91	990	11.45	1018	11.99	1046	12.54	1073	13.08	1099	13.63	1124	14.18
12,000	967	11.94	996	12.49	1024	13.06	1051	13.62	1078	14.18	1104	14.75	1129	15.31	1154	15.88
12,500	985	12.78	1014	13.35	1041	13.92	1068	14.49	1094	15.07	1120	15.64	1145	16.22	1169	16.80
13,000	1004	13.67	1032	14.25	1059	14.83	1086	15.42	1111	16.00	1137	16.59	1161	17.17	1185	17.76
13,750	1033	15.09	1060	15.69	1087	16.29	1112	16.88	1138	17.48	1162	18.08	1186	18.68	—	—
14,000	1043	15.59	1070	16.19	1096	16.79	1122	17.40	1147	18.00	1171	18.60	1195	19.21	—	—
15,000	1083	17.70	1109	18.32	1134	18.94	1159	19.56	1183	20.19	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
4,000	1004	6.97	1032	7.41	1059	7.86
5,000	1017	7.67	1045	8.12	1072	8.58
6,000	1034	8.49	1061	8.96	1087	9.43
7,000	1052	9.44	1079	9.93	1105	10.42
8,000	1073	10.54	1099	11.04	1125	11.55
8,250	1079	10.84	1105	11.34	1130	11.85
9,000	1096	11.78	1122	12.30	1147	12.82
10,000	1122	13.18	1147	13.71	1171	14.25
11,000	1149	14.73	1173	15.29	1197	15.84
12,000	1178	16.45	1202	17.03	—	—
12,500	1193	17.38	—	—	—	—
13,000	—	—	—	—	—	—
13,750	—	—	—	—	—	—
14,000	—	—	—	—	—	—
15,000	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb

NOTES:

- Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters.
- Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$
- Variable air volume (VAV) units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.
- Maximum fan speed is 1200 rpm.

Table 18 — Fan Performance, 50EJ,EK038,044 — Vertical Discharge Units (English)

For EW,EY UNITS, REDUCE NET AVAILABLE EXTERNAL STATIC PRESSURE BY 0.5 IN. WG

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	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
8,000	448	2.18	498	2.87	544	3.25	589	3.64	631	4.04	671	4.44	710	4.86	747	5.27
9,000	492	2.87	537	3.68	580	4.09	621	4.50	660	4.92	698	5.35	734	5.78	769	6.22
10,000	537	3.69	578	4.63	617	5.07	655	5.50	692	5.95	727	6.39	761	6.85	795	7.30
11,000	582	4.65	620	5.75	657	6.20	692	6.66	726	7.13	759	7.60	792	8.07	823	8.55
12,000	629	5.75	664	7.02	698	7.50	730	7.98	763	8.47	794	8.96	824	9.45	854	9.95
13,000	675	7.00	708	8.48	739	8.98	770	9.48	800	9.99	830	10.50	859	11.01	887	11.53
14,000	722	8.42	753	10.11	782	10.63	811	11.16	840	11.69	868	12.22	895	12.75	922	13.29
15,000	770	10.00	798	11.94	826	12.48	853	13.03	880	13.57	907	14.13	932	14.68	958	15.24
16,000	817	11.76	844	13.96	870	14.53	896	15.09	922	15.66	947	16.23	971	16.81	995	17.38
17,000	865	13.70	890	16.19	915	16.78	940	17.37	964	17.95	988	18.54	1011	19.14	1034	19.73
18,000	913	15.83	937	18.64	961	19.25	984	19.85	1007	20.46	1030	21.07	1052	21.68	1074	22.30
19,000	961	18.16	984	21.32	1006	21.94	1029	22.56	1050	23.19	1072	23.82	1093	24.45	1115	25.08
20,000	1009	20.69	1031	24.22	1052	24.86	1074	25.50	1095	26.15	1115	26.80	1136	27.45	1156	28.10

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	783	5.70	818	6.13	852	6.56	884	7.00	916	7.45	947	7.90	978	8.36	1007	8.82
9,000	803	6.66	836	7.11	869	7.56	900	8.02	930	8.48	960	8.95	989	9.42	1018	9.90
10,000	827	7.77	858	8.23	889	8.70	919	9.18	948	9.66	977	10.15	1005	10.64	1032	11.13
11,000	854	9.03	884	9.51	913	10.00	941	10.50	969	11.00	997	11.50	1024	12.01	1050	12.52
12,000	883	10.45	911	10.96	939	11.47	967	11.98	993	12.50	1020	13.02	1046	13.54	1071	14.07
13,000	914	12.05	942	12.57	968	13.10	994	13.63	1020	14.17	1045	14.71	1070	15.25	1094	15.79
14,000	948	13.83	974	14.37	999	14.92	1024	15.47	1049	16.02	1073	16.58	1096	17.14	1120	17.70
15,000	983	15.80	1007	16.36	1032	16.92	1056	17.49	1079	18.06	1102	18.64	1125	19.21	1148	19.79
16,000	1019	17.96	1043	18.54	1066	19.13	1089	19.71	1111	20.30	1134	20.89	1156	21.49	1177	22.08
17,000	1057	20.33	1079	20.93	1102	21.53	1124	22.14	1145	22.75	1167	23.35	1188	23.97	—	—
18,000	1096	22.91	1117	23.53	1138	24.15	1160	24.78	1180	25.40	—	—	—	—	—	—
19,000	1135	25.72	1156	26.36	1176	26.99	1197	27.63	—	—	—	—	—	—	—	—
20,000	1176	28.75	1196	29.41	—	—	—	—	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
8,000	1036	9.29	1065	9.76	1092	10.24
9,000	1046	10.38	1073	10.87	1100	11.36
10,000	1059	11.63	1086	12.13	1112	12.64
11,000	1076	13.03	1102	13.55	1127	14.07
12,000	1096	14.60	1121	15.13	1145	15.67
13,000	1118	16.34	1142	16.89	1165	17.45
14,000	1143	18.26	1166	18.83	1188	19.40
15,000	1170	20.37	1192	20.96	—	—
16,000	1199	22.68	—	—	—	—
17,000	—	—	—	—	—	—
18,000	—	—	—	—	—	—
19,000	—	—	—	—	—	—
20,000	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb

NOTES:

- Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters.
- Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$
- Variable air volume (VAV) units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.
- Maximum fan speed is 1200 rpm.

Table 19 — Fan Performance, 50EJ,EK054-068 — Vertical Discharge Units (English)

For EW,EY UNITS, REDUCE NET AVAILABLE EXTERNAL STATIC PRESSURE BY 0.5 IN. WG

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	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
10,000	397	2.68	463	3.34	516	3.97	560	4.58	600	5.18	635	5.79	668	6.40	699	7.02
12,000	446	3.96	510	4.73	562	5.46	606	6.15	645	6.84	680	7.52	713	8.19	744	8.87
15,000	520	6.51	582	7.47	632	8.35	675	9.19	714	10.00	749	10.79	781	11.58	812	12.36
16,000	545	7.55	606	8.58	656	9.51	699	10.39	737	11.25	772	12.08	804	12.91	834	13.72
17,000	571	8.69	631	9.78	680	10.77	722	11.70	760	12.60	795	13.48	827	14.34	857	15.19
18,000	596	9.94	655	11.09	704	12.13	746	13.11	784	14.06	818	14.98	850	15.88	880	16.77
19,000	622	11.29	680	12.50	728	13.60	770	14.63	808	15.62	842	16.59	874	17.53	904	18.46
20,000	648	12.75	705	14.03	752	15.18	794	16.27	831	17.31	865	18.31	897	19.30	927	20.27
21,000	674	14.33	730	15.67	777	16.88	818	18.02	855	19.10	889	20.16	921	21.18	950	22.19
22,000	700	16.03	755	17.43	802	18.70	842	19.89	879	21.02	913	22.12	944	23.19	974	24.24
23,000	726	17.85	780	19.31	826	20.64	867	21.88	903	23.06	937	24.20	968	25.32	997	26.41
24,000	752	19.79	806	21.32	851	22.70	891	23.99	927	25.22	961	26.41	992	27.57	1021	28.71
25,000	779	21.87	831	23.45	876	24.89	916	26.24	952	27.52	985	28.75	1015	29.96	1044	31.13
26,000	805	24.07	857	25.72	901	27.21	940	28.61	976	29.94	1009	31.23	1039	32.47	1068	33.69
27,000	832	26.41	883	28.12	926	29.67	965	31.12	1000	32.50	1033	33.83	1063	35.13	1092	36.39

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)															
	1.8		2.0		2.2		2.4		2.6		2.8		3.0		3.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
10,000	728	7.64	755	8.26	781	8.89	806	9.53	830	10.17	853	10.82	876	11.47	897	12.13
12,000	773	9.55	800	10.23	826	10.92	851	11.61	875	12.30	898	12.99	920	13.70	941	14.40
15,000	840	13.14	867	13.91	893	14.69	918	15.46	941	16.24	964	17.01	986	17.79	1008	18.57
16,000	863	14.53	890	15.34	916	16.15	940	16.95	964	17.76	987	18.56	1009	19.37	1030	20.18
17,000	886	16.04	913	16.88	938	17.72	963	18.56	987	19.39	1009	20.23	1031	21.06	1053	21.90
18,000	909	17.65	936	18.53	961	19.40	986	20.27	1009	21.14	1032	22.00	1054	22.87	1075	23.73
19,000	932	19.38	958	20.29	984	21.20	1008	22.10	1032	23.00	1055	23.89	1076	24.79	1098	25.68
20,000	955	21.23	982	22.17	1007	23.11	1031	24.05	1055	24.98	1077	25.90	1099	26.83	1120	27.75
21,000	978	23.19	1005	24.17	1030	25.15	1054	26.12	1078	27.08	1100	28.04	1122	28.99	1143	29.95
22,000	1001	25.27	1028	26.29	1053	27.31	1077	28.31	1101	29.31	1123	30.30	1145	31.28	1166	32.27
23,000	1025	27.48	1051	28.54	1076	29.59	1100	30.63	1124	31.66	1146	32.68	1168	33.70	1189	34.72
24,000	1048	29.82	1074	30.92	1100	32.00	1124	33.08	1147	34.14	1169	35.20	1191	36.25	—	—
25,000	1072	32.89	1096	33.42	1123	34.55	1147	35.66	1170	36.76	1192	37.85	—	—	—	—
26,000	1095	34.89	1121	36.06	1146	37.22	1170	38.37	1193	39.51	—	—	—	—	—	—
27,000	1119	37.62	1145	38.84	1170	40.04	1194	41.22	—	—	—	—	—	—	—	—

AIRFLOW (Cfm)	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)					
	3.4		3.6		3.8	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
10,000	918	12.79	938	13.46	958	14.13
12,000	962	15.11	982	15.82	1002	16.54
15,000	1028	19.36	1049	20.14	1068	20.93
16,000	1051	20.99	1071	21.80	1090	22.61
17,000	1073	22.73	1093	23.57	1113	24.41
18,000	1096	24.59	1116	25.46	1135	26.32
19,000	1118	26.57	1138	27.47	1158	28.36
20,000	1141	28.67	1161	29.59	1180	30.51
21,000	1163	30.90	1183	31.85	—	—
22,000	—	—	—	—	—	—
23,000	—	—	—	—	—	—
24,000	—	—	—	—	—	—
25,000	—	—	—	—	—	—
26,000	—	—	—	—	—	—
27,000	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
Edb — Entering Dry Bulb
Ewb — Entering Wet Bulb
VAV — Variable Air Volume

NOTES:

- Fan performance is based on wet coils, economizer, roof curb, cabinet losses, and clean 2-in. filters.
- Conversion — Bhp to watts:

$$\text{Watts} = \frac{\text{Bhp} \times 746}{\text{Motor efficiency}}$$
- Variable air volume (VAV) units will operate down to 70 cfm/ton. Performance at 70 cfm/ton is limited to unloaded operation and may be additionally limited by edb and ewb conditions.
- Maximum fan speed is 1200 rpm.

Table 20A — Air Quantity Limits, 50E024-044

UNIT 50EJ,EK,EW,EY	MINIMUM HEATING AIRFLOW		MINIMUM COOLING AIRFLOW (VAV)		MINIMUM COOLING AIRFLOW (CV)		MAXIMUM AIRFLOW	
	L/s	CFM	L/s	CFM	L/s	CFM	L/s	CFM
024	2,800	6,000	900	2000	2800	6,000	4,700	10,000
028	3,500	7,500	1200	2500	3500	7,500	5,900	12,500
030	3,900	8,250	1300	2750	3900	8,250	6,500	13,750
034	4,200	9,000	1400	3000	4200	9,000	7,100	15,000
044	5,600	12,000	1900	4000	5600	12,000	9,400	20,000

LEGEND

CV — Constant Volume
VAV — Variable Air Volume

NOTE: VAV units will operate down to 9.39 L/s per kW (70 cfm/ton) in the cooling mode. Performance at 9.39 L/s per kW (70 cfm/ton) is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

Table 20B — Air Quantity Limits, 50E054-068

UNIT 50EJ,EK,EW,EY	MINIMUM HEATING AIRFLOW		MINIMUM COOLING AIRFLOW (VAV)		MINIMUM COOLING AIRFLOW (CV)		MAXIMUM AIRFLOW	
	L/s	CFM	L/s	CFM	L/s	CFM	L/s	CFM
054	7,100	15,000	5,000	10,500	5,950	12,600	9,900	21,000
058	7,100	15,000	6,500	13,750	6,600	13,950	11,000	23,250
064	7,600	16,050	7,100	15,000	7,600	16,050	12,650	26,750
068	8,100	17,100	7,700	16,250	8,100	17,100	12,700	27,000

LEGEND

CV — Constant Volume
VAV — Variable Air Volume

NOTE: VAV units will operate down to 9.39 L/s per kW (70 cfm/ton) in the cooling mode. Performance at 9.39 L/s per kW (70 cfm/ton) is limited to unloaded operation and may be additionally limited by edb and ewb conditions.

Table 21 — Motor Limitations

STANDARD EFFICIENCY MOTORS						
Nominal		Maximum		Maximum Amps	Maximum Watts	Maximum Efficiency
Bhp	BkW	Bhp	BkW	400		
5	3.73	5.9	4.40	7.9	5,030	87.5
7.5	5.60	9.5	7.09	12.0	8,008	88.5
10	7.46	11.8	8.80	14.6	9,836	89.5
15	11.19	18.0	13.43	21.9	14,756	91.0
20	14.92	23.4	17.46	28.7	19,183	91.0
25	18.65	29.4	21.93	37.4	23,918	91.7
30	22.38	34.7	25.89	48.0	28,015	92.4
40	29.84	42.0	31.33	55.0	33,690	93.0

LEGEND

Bhp — Brake Horsepower
BkW — Motor Brake (Output) Power (kW)

NOTE: Extensive motor and electrical testing on the Carrier units has ensured that the full kW and horsepower range of the motor can be utilized with confidence. Using your fan motors up to the kW and horsepower ratings shown on the Motor Limitations table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Table 22A — Fan Performance — Power Exhaust (50 Hz) (SI)
50EJ,EK,EW,EY024-044 (70.3 Through 140.7 kW)

AIRFLOW (L/s)	LOW SPEED			MEDIUM SPEED			HIGH SPEED		
	400 v			400 v			400 v		
	ESP	BkW	kW	ESP	BkW	kW	ESP	BkW	kW
2556	120	1.29	1.93	—	—	—	—	—	—
2635	110	1.31	1.97	140	1.39	2.09	—	—	—
2713	100	1.33	2.00	130	1.42	2.13	—	—	—
2792	100	1.34	2.02	130	1.44	2.16	—	—	—
2871	90	1.36	2.04	120	1.46	2.20	—	—	—
2949	90	1.38	2.07	110	1.49	2.23	—	—	—
3028	80	1.39	2.09	100	1.50	2.26	130	1.72	2.58
3107	80	1.41	2.12	90	1.52	2.29	120	1.74	2.61
3185	70	1.44	2.16	80	1.54	2.31	110	1.76	2.64
3343	—	—	—	70	1.59	2.38	100	1.78	2.67
3500	—	—	—	50	1.63	2.45	80	1.82	2.74
3657	—	—	—	40	1.67	2.51	60	1.89	2.84
3815	—	—	—	30	1.71	2.56	50	1.93	2.90
3972	—	—	—	20	1.74	2.62	40	1.97	2.96
4129	—	—	—	—	—	—	30	2.01	3.02
4286	—	—	—	—	—	—	20	2.05	3.08
4444	—	—	—	—	—	—	10	2.07	3.11
4601	—	—	—	—	—	—	10	2.09	3.14

LEGEND

BkW — Brake Kilowatts
ESP — External Static Pressure (Pa)
kW — Input Kilowatts to Motor

Table 22B — Fan Performance — Power Exhaust (50 Hz) (SI)
50EJ,EK,EW,EY054-068 (175.9 Through 228.6 kW)

AIRFLOW (L/s)	LOW SPEED			MEDIUM SPEED			HIGH SPEED		
	400 v			400 v			400 v		
	ESP	BkW	kW	ESP	BkW	kW	ESP	BkW	kW
3777	130	1.43	2.880	—	—	—	—	—	—
4013	105	1.48	2.980	—	—	—	—	—	—
4249	95	1.51	3.040	122	1.63	3.280	—	—	—
4485	85	1.55	3.115	105	1.67	3.360	142	1.92	3.860
4721	75	1.59	3.205	90	1.71	3.450	117	1.96	3.940
4957	35	1.67	3.360	75	1.76	3.550	105	2.00	4.020
5193	—	—	—	57	1.81	3.640	85	2.03	4.080
5429	—	—	—	42	1.86	3.740	70	2.09	4.220
5665	—	—	—	30	1.90	3.830	55	2.14	4.320
5901	—	—	—	22	1.94	3.900	42	2.19	4.420
6137	—	—	—	15	1.97	3.970	32	2.23	4.500
6373	—	—	—	—	—	—	15	2.28	4.600
6609	—	—	—	—	—	—	12	2.31	4.660
6845	—	—	—	—	—	—	7	2.33	4.690
7082	—	—	—	—	—	—	—	—	—

LEGEND

BkW — Brake Kilowatts
ESP — External Static Pressure (Pa)
kW — Input Kilowatts to Motor

Table 22C — Fan Performance — Power Exhaust (50 Hz) (English)
50EJ,EK,EW,EYJ024-044 (20 Through 40 Tons)

AIRFLOW (Cfm)	LOW SPEED			MEDIUM SPEED			HIGH SPEED		
	400 v			400 v			400 v		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
5417	0.49	1.72	1933	—	—	—	—	—	—
5583	0.44	1.75	1968	0.57	1.87	2095	—	—	—
5750	0.41	1.79	2002	0.54	1.90	2130	—	—	—
5917	0.39	1.80	2020	0.51	1.93	2164	—	—	—
6083	0.37	1.82	2043	0.47	1.96	2199	—	—	—
6250	0.35	1.85	2072	0.44	1.99	2234	—	—	—
6417	0.33	1.87	2095	0.41	2.01	2257	0.51	2.30	2581
6583	0.31	1.89	2124	0.38	2.04	2286	0.48	2.33	2610
6750	0.28	1.93	2159	0.34	2.06	2315	0.45	2.35	2639
7083	—	—	—	0.28	2.13	2384	0.39	2.38	2674
7417	—	—	—	0.21	2.18	2448	0.33	2.45	2743
7750	—	—	—	0.15	2.24	2512	0.26	2.53	2836
8083	—	—	—	0.11	2.29	2564	0.21	2.59	2899
8417	—	—	—	0.08	2.33	2616	0.16	2.64	2957
8750	—	—	—	—	—	—	0.12	2.69	3021
9083	—	—	—	—	—	—	0.08	2.75	3084
9417	—	—	—	—	—	—	0.05	2.78	3113
9750	—	—	—	—	—	—	0.03	2.80	3137

LEGEND

Bhp — Brake Horsepower
ESP — External Static Pressure (in. wg)
Watts — Input Watts to Motor

Table 22D — Fan Performance — Power Exhaust (50 Hz) (English)
50EJ,EK,EW,EY054-068 (50 Through 65 Tons)

AIRFLOW (Cfm)	LOW SPEED			MEDIUM SPEED			HIGH SPEED		
	400 v			400 v			400 v		
	ESP	Bhp	Watts	ESP	Bhp	Watts	ESP	Bhp	Watts
8,000	0.52	2.57	2880	—	—	—	—	—	—
8,500	0.42	2.66	2980	—	—	—	—	—	—
9,000	0.38	2.71	3040	0.49	2.93	3280	—	—	—
9,500	0.34	2.78	3115	0.42	3.00	3360	0.57	3.44	3860
10,000	0.30	2.86	3205	0.36	3.08	3450	0.47	3.51	3940
10,500	0.14	3.00	3360	0.30	3.17	3550	0.42	3.59	4020
11,000	—	—	—	0.23	3.25	3640	0.34	3.64	4080
11,500	—	—	—	9.16	3.34	3740	0.28	3.76	4220
12,000	—	—	—	0.12	3.42	3830	0.22	3.85	4320
12,500	—	—	—	0.09	3.48	3900	0.17	3.94	4420
13,000	—	—	—	0.06	3.54	3970	0.13	4.01	4500
13,500	—	—	—	—	—	—	0.06	4.10	4600
14,000	—	—	—	—	—	—	0.05	4.16	4660
14,500	—	—	—	—	—	—	0.03	4.18	4690
15,000	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
ESP — External Static Pressure (in. wg)
Watts — Input Watts to Motor

The TSTAT function performs a thermostat based control by monitoring Y1, Y2, W1, W2, and G inputs. These functions control stages cool1, cool2, heat1, heat2, and the indoor fan, respectively. If the TSTAT function is not selected, the control determines the occupancy state based on the system time schedules or with remote occupied/unoccupied input. If Temperature Compensated Start is active, the unit will be controlled as in the Occupied mode. User defined set points are shown in Table 23.

Table 24 lists the software link points addressable by Dataport or Datalink, Carrier devices that allow access to unit control by non-Carrier energy management systems.

The occupied or unoccupied comfort set points must be selected and the space temperature offset input will be used, if present. The Occupied Heat set point (OHSP) default value is 20 C (68 F). The Occupied Cool set point (OCSP) default value is 26 C (78 F). The Unoccupied Heat set point (UHSP) default value is 13 C (55 F). The Unoccupied Cool set point (UCSP) value is 32 C (90 F). The control board will set appropriate operating mode and fan control. The control board will turn on indoor fan, if in Occupied mode, or determine if unit is in Unoccupied mode and the space temperature is outside of the unoccupied comfort set points (Unoccupied Heat or Unoccupied Cool).

The control board will then monitor space temperature against comfort set points and control heating or cooling stages as required. If the system is in the Occupied mode, the economizer will operate as required. If the system is in Unoccupied mode, the system will perform nighttime free cool and IAQ (indoor air quality) pre-occupancy purge as required (when functions are enabled via software). Whenever the DX (direct expansion) cooling is requested, the outdoor fan will operate.

The control board will operate economizer, run diagnostics to monitor alarms/alerts at all times, and respond to CCN communications to perform any configured network POC (product outboard control) functions such as time and outdoor-air temperature broadcast and Global occupancy broadcast. When the optional expansion I/O board is employed, it will: perform periodic scan and maintain database of expanded I/O points, perform Fire/Smoke control (power exhaust required); and if in Occupied mode perform IAQ control and monitor fan, filter, demand limit, and field-applied status (with accessories).

If thermostats are used to energize the G input, the control will turn on indoor fan without delay and open economizer dampers to minimum position.

If thermostats are used to deenergize the G input, the control board will turn off indoor fan without any delay and close economizer dampers.

When cooling, G must be energized before cooling can operate. The control board determines if outdoor conditions are suitable for economizer cooling using the standard outdoor air thermistor. For economizer to function for free cooling, the enthalpy must be low, the outdoor air must equal to or less than the High Outdoor Air Temperature Lockout (OATL), default is 18 C (65 F), the SAT (supply-air temperature) thermistor is NOT in alarm, and outdoor air reading is available. When these conditions are satisfied, the control board will use economizer as the first stage of cooling.

When Y1 input is energized, the economizer will be modulated to maintain SAT at the defined set point. The default is 13 C (55 F). When SAT is above the set point, the economizer will be 100% open. When SAT is below the set point, the economizer will modulate between minimum and 100% open position. When Y2 is energized, the control will turn on compressor no. 1 and continue to modulate economizer as described above. If the Y2 remains energized and the SAT reading remains above the set point for 15 minutes, compressor no. 2 will turn on. If Y2 is deenergized at any time, only the last stage of compression that was energized will be turned off. If outdoor conditions are not suitable for economizer cooling, the economizer will go to minimum position and cycle compressor no. 1 and 2 based on demand from Y1 and Y2 respectively. The compressors will be locked out when the SAT temperature is too low (less than 4 C (40 F) for compressor no. 1 and less than 7 C (45 F) for compressor no. 2.) After a compressor is locked out, it can restart after normal time guard period.

The Time Guard® function maintains a minimum off time of 5 minutes, a minimum ON time of 10 seconds, and a minimum delay before starting the second compressor of 10 seconds.

When heating, the heat stages respond to the demand from W1 and W2 of the thermostat input. Heating and cooling will be mutually locked out on demand on a first call basis. The heating and the cooling functions cannot be operating simultaneously.

COOLING, VARIABLE AIR VOLUME (VAV) UNITS — On power up, the control module will activate the initialization software of the control board. The initialization software then reads DIP switch no. 1 position to determine CV or VAV operation. Initialization clears all alarms and alerts, re-maps the input/output database for VAV operation, sets maximum heat stages to 1 and sets maximum cool stages to 6. The control reads DIP switch no. 3 and if open, then it sets the internal flag for expansion mode operation.

The control board will determine if an interface (linkage) is active and if the unit will operate in a Digital Air Volume (DAV) mode. In a DAV system, the room terminals are equipped with microprocessor controls that give commands to the base unit module. If an interface is active, the control will replace local comfort set points, space and return air temperatures and occupancy status with the linkage data supplied.

The control board will determine occupancy status from Time Schedules (if programmed), Remote Occupied/Unoccupied input, global occupancy, or DAV. If temperature compensated start is active, the unit will be controlled as in the Occupied mode.

NOTE: The temperature compensated start is a period of time calculated to bring the unit on while unoccupied to reach the occupied set point when occupancy occurs.

The control board will set the appropriate operating mode and fan control. The control board will turn VFD on if Occupied mode is evident.

For units equipped with a start/stop switch only (no space temperature sensor), if unoccupied and valid return-air temperature reading is available (either from a sensor or DAV), the control will monitor return-air temperature against Unoccupied Heat and Cool set points.

Table 23 — User Defined Set Points

SET POINT	FORMAT	DESCRIPTION	LIMITS	DEFAULT	
OHSP	xx.xF	Occupied Heat Set Point	13 to 27 C (55 to 80 F)	20 C	68 F
OCSP	xx.xF	Occupied Cool Set Point	13 to 27 C (55 to 80 F)	26 C	78 F
UHSP	xx.xF	Unoccupied Heat Set Point	4 to 27 C (40 to 80 F)	13 C	55 F
UCSP	xx.xF	Unoccupied Cool Set Point	24 to 35 C (75 to 95 F)	32 C	90 F
SASP	xx.xF	Supply Air Set Point	7 to 21 C (45 to 70 F)	13 C	55 F
OATL	xx.xF	Hi OAT Lockout Temperature	13 to 35 C (55 to 75 F)	18 C	65 F
NTLO	xx.xF	Unoccupied OAT Lockout Temperature	4 to 21 C (40 to 70 F)	10 C	50 F
RTIO	xx.x	Reset Ratio	0 to 10	3	3
LIMT	xx.x^F	Reset Limit	0° to 11° C (0° to 20° F)	5.6° C	10° F
MDP	xxx%	Minimum Damper Position	0 to 100%	20%	20%
LOWMDP	xxx%	Low Temperature Minimum Damper Position Override	0 to 100%	100%	100%
IAQS	xxxx	IAQ Set Point	1 to 5000 PPM	650 PPM	650 PPM
UHDB	xx.x^F	Unoccupied Heating Deadband	0° to 6° C (0° to 10° F)	0.56° C	1° F
UCDB	xx.x^F	Unoccupied Cooling Deadband	0° to 6° C (0° to 10° F)	0.56° C	1° F
LTMP	xx.xF	Low Temp. Min. Position	-18 to 38 C (0 to 100 F)	-12 C	10 F
HTMP	xx.xF	High Temp. Min. Position	-18 to 38 C (0 to 100 F)	2 C	35 F
PES1	xx.xF	CV Power Exhaust Stage 1 Point	0 to 100%	25%	25%
PES2	xx.xF	CV Power Exhaust Stage 2 Point	0 to 100%	75%	75%

LEGEND

CV — Constant Volume
 IAQ — Indoor Air Quality
 OAT — Outdoor Air Temperature

Table 24 — Software Control Link Points

SET POINT	DESCRIPTION	SET POINT	DESCRIPTION
SPT	Space Temperature	CV DATA	
SAT	Supply-Air Temperature	HS2	Heat Stage 2
RAT	Return-Air Temperature	STO	Space Temp Offset
OAT	Outside-Air Temperature	CVPE1	CV Power Exhaust Stg 1
CLSP	Control Set Point	CVPE2	CV Power Exhaust Stg 2
CCAP	Cooling % Total Capacity	VAV DATA	
HCAP	Heating % Total Capacity	HIR	Heat Interlock Relay
ECOS	Economizer Active	SPTRESET	Space Temp Reset
SFSTAT	Supply Fan Status	CMP1	Compressor 1
SF	Fan Relay	CMP1SAFE	Compressor 1 Safety
ECONPOS	Economizer Position	CMP2	Compressor 2
IQMP	Min. Damper Position	CMP2SAFE	Compressor 2 Safety
PEXE	Pwr Exhaust Enable	ULD1	Unloader 1
FLTS	Filter Status	ULD2	Unloader 2
FAS	Field Applied Status	OFC1	Outdoor Fan 1
RMT OCC	Remote Occupied Mode	OFC2	Outdoor Fan 2
GENERAL DATA		Y1	Y1 — Call for Cool 1
HS1	Heat Stage 1	Y2	Y2 — Call for Cool 2
ENTH	Enthalpy	W1	W1 — Call for Heat 1
IAQI	Indoor Air Quality	W2	W2 — Call for Heat 2
IAQO	Outdoor Air Quality	G	G — Call for Fan
SATRES	SAT Reset	CDEVCODE	CONQUEST DEVICE CODE
ALMLIGHT	Alarm Warning Light	CDEVURST	CONQUEST UNIT RESET
DL	Demand Limit Switch	CDEVBCAK	CONQUEST BROADCAST ACK
EVAC	Evacuation	PE1	Mod Power Exhaust Stg 1
PRES	Pressurization	PE2	Mod Power Exhaust Stg 2
PURG	Smoke Purge	PE3	Mod Power Exhaust Stg 3
FSD	Fire Shutdown	PE4	Mod Power Exhaust Stg 4
		PE5	Mod Power Exhaust Stg 5
		PE6	Mod Power Exhaust Stg 6

For units with a start-stop switch and a space temperature sensor, the control board will start the VFD whenever SPT is outside of the set points (Unoccupied Heat or Unoccupied Cool). The VFD may also be started by nighttime thermostat via remote Occupied/Unoccupied input or by a temperature compensated start algorithm. When VFD is running in a normal mode, the control will start heating or cooling as required to maintain SAT (supply-air temperature) at the supply air set point plus the reset (when enabled). The reset value is determined by SAT reset and/or space temperature reset algorithms. The SPT (space temperature) reset is only available when enabled through software.

When cooling, the control will energize the power exhaust enable output to the external power exhaust controller, when power exhaust is used.

If occupied, the control will perform economizer control (economizer control same as described above for CV units). If unoccupied, the control will perform nighttime free cool and IAQ pre-occupancy purge as required (when enabled through software). When DX (direct expansion) cooling is called, the outdoor fans will always operate.

The control will run continuous diagnostics for alarms/alerts; respond to CCN communications and perform any configured network POC (product outboard controls) functions such as time and OAT (outdoor-air temperature) broadcast and global broadcast; and perform Fire/Smoke control if equipped with power exhaust.

ELECTRIC HEATING, CONSTANT VOLUME UNITS — The control module is powered by 24 vac. If the unit is controlled with a room sensor, the fan will run continuously in the Occupied mode, with the outside-air damper in the minimum position. If the unit is controlled through a room thermostat (with FAN set to AUTO), upon a call for heat the first stage of heat is energized, the indoor-fan motor will turn on, and the outdoor-air damper will move to the minimum position. Upon a call for additional heat (if the unit is equipped with a two-stage heater), the second stage of heat is energized. When the call for heat is satisfied, the heaters will deenergize. The indoor-fan motor will also deenergize (unless controlled by a room sensor) and the outdoor-air damper will move to the closed position.

If the unit is controlled with a room sensor the fan will not run in the Unoccupied mode. Upon a call for heat, the electric heat is energized, the indoor-fan motor will turn on, and the outdoor-air damper will move to the Unoccupied IAQ position (generally set to closed in the Unoccupied mode). The IAQ feature is enabled through system software. When the call for heat is satisfied, the heaters and indoor-fan motor will deenergize and the outdoor-air damper will move to the closed position (if open).

ELECTRIC HEATING, VARIABLE AIR VOLUME UNITS — The control board is powered by 24 vac. When there is a call for heating (from Morning Warm-Up, Unoccupied, or Occupied modes), power is sent from the control module to energize the first stage of electric heat. A field-supplied heat interlock relay signals for the air terminals to fully open. In the Occupied mode, the indoor-fan motor will operate continuously and the outdoor-air dampers will be in the minimum position. In the Unoccupied mode, the indoor-fan motor will be off, but will energize upon the call for heat. The outdoor-air dampers will move to the IAQ unoccupied position (generally set to zero in the Unoccupied mode). The duct pressure sensor will signal to the variable frequency drive to operate at full speed. When the call for heat is satisfied, the heaters will deenergize.

NOTE: The HIR is not needed in a DAV (digital air volume) system.

If the unit is in the Unoccupied mode, the indoor-fan motor will deenergize and the outdoor-air damper will move to the closed position (if open).

Variable air volume (VAV) occupied heat is controlled by return-air temperature (RAT) using a 5k thermistor located just below the outdoor air dampers. A VAV unit without a space temperature sensor is also controlled by RAT. A VAV unit with a space temperature sensor has unoccupied heat controlled by space temperature (SPT).

MORNING WARM-UP (VAV only with PC Accessed/CCN Operation) — Morning warm-up occurs when the control has been programmed to turn on heat prior to the Occupied mode to be ready for occupancy mode. Morning warm-up is a condition in VAV systems that occurs when the Temperature Compensated Start algorithm calculates a biased occupied start time and the unit has a demand for heating. The warm-up will continue into the occupied period as long as there is a need for heat. During warm-up, the unit can continue heating into the occupied period, even if occupied heating is disabled. When the heating demand is satisfied, the warm-up condition will terminate. To increase or decrease the heating demand, use Service Tool software to change the Occupied Heating set point.

NOTE: To utilize Morning Warm-Up mode, the unit occupancy schedule must be accessed via Service Tool, Building Supervisor, or ComfortWorks™ software or accessory LID-2B. The PC can access the base control board via the 3-wire communication bus or via an RJ-11 connection to the CCN terminal on the base control board. See Fig. 17.

For current software (Version 3.0 or later), the Low Temperature Minimum Damper Position Override (LOWMDP) has a 0 to 100% limit, with a default of 100%. Think of the LOWMDP as a second minimum damper position. This LOWMDP limit change requires access to the unit software with a computer equipped with Building Supervisor, Service Tool, or ComfortWorks™ software, or an LID-2B accessory.

When the LOWMDP is in effect the outdoor dampers will remain at the LOWMDP position (typically set to “0%” closed) during heating, even in the “occupied” period. For the LOWMDP to be in effect the LOWMDP must be less than the minimum damper position (MDP). For VAV applications the RAT (return-air temperature) must be less than the OHSP minus 1.12° C (2° F). The following table summarizes the operational requirements and controlling factors for occupied heat and morning warm-up.

Occupied Heat and Morning Warm-Up Operation Requirements and Controlling Factors

SOFTWARE VERSION	OCCUPIED HEAT ENABLED VIA	MORNING WARM-UP MAY START DURING	TEMPERATURE CONDITION FOR HEAT TO START
3.0 and 3.1	DIP Switch No. 5	Smart start or within 10 minutes	RAT < OHSP

OHSP — Occupied Heat Set Point
 RAT — Return-Air Temperature
 SAT — Supply-Air Temperature

MORNING WARM-UP (VAV Only with Stand-Alone Operation) — When the unit operates in stand-alone mode, morning warm-up occurs when the unit is energized in Occupied mode and return-air temperature (RAT) is below 20 C (68 F), the default value. Warm-up will not terminate until the RAT reaches 20 C (68 F). The (HIR) heat interlock relay output is energized during morning warm-up. (A field-installed 24-vac heat interlock relay is required.) The output will be energized until the morning warm-up cycle is complete. Refer to Fig. 44 for heat interlock relay wiring.

SPACE TEMPERATURE RESET SENSOR (VAV Only) — An accessory space temperature sensor (T-55 or T-56 without offset) on the control module is required. The space temperature reset function must be enabled. Space temperature reset is used to reset the SAT (supply-air temperature) set point of a VAV system higher, as the SPT (space temperature) falls below the OSCP (Occupied Cool set point). As the space temperature falls below the OSCP, the SAT will be reset upward as a function of the RTIO (reset ratio). (Default is 3.) The RTIO is expressed in degrees change in SAT per degree of SPT change. A LIMIT (reset limit) will exist which

will limit the maximum number of degrees the SAT may be raised. (Default is 5.6° C [10 F].) Both the RTIO and the LIMIT are user definable. The sequence of operation is as follows:

1. The on/off status of the unit supply fan is determined.
2. If the fan is “on,” the sequence will check if the system is occupied.
3. If the system is occupied, the sequence will determine if the reset option is enabled.
4. If the reset option is enabled, the sequence will read the space temperature and compare it to the OSCP (Occupied Cool set point). If the temperature is below the OSCP, the algorithm will compute the reset value and compare this value against the LIMIT. If it is greater than the LIMIT, the sequence will use the LIMIT as the reset value. See Fig. 45.

NOTE: A computer equipped with Building Supervisor, Service Tool or ComfortWorks™ software or an accessory LID-2B is required to enable this function.

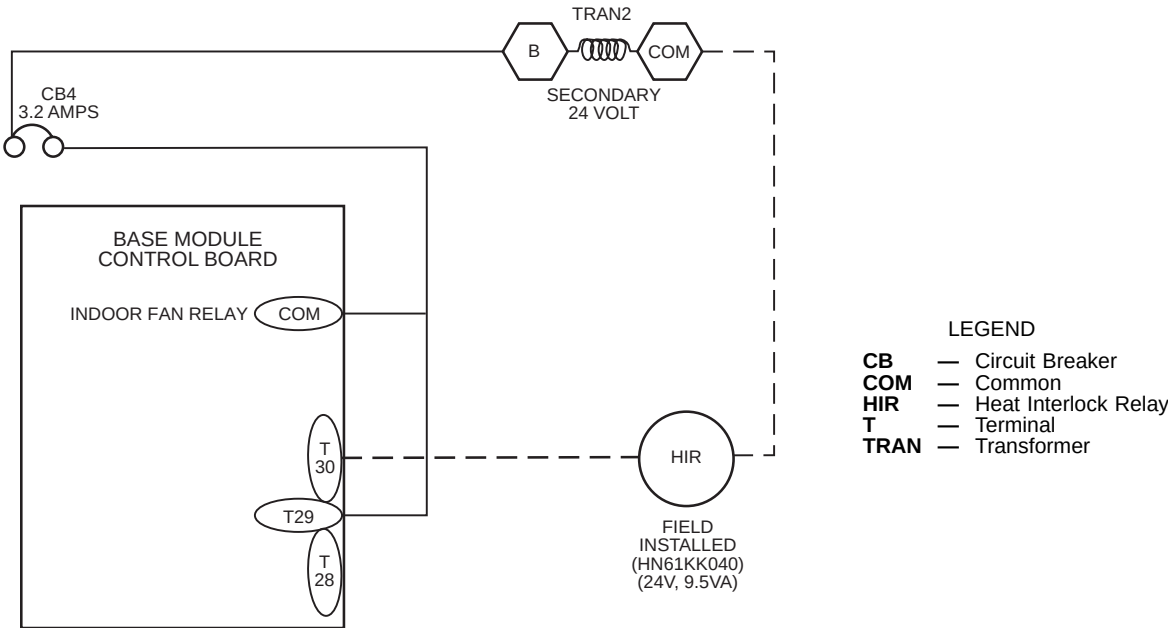
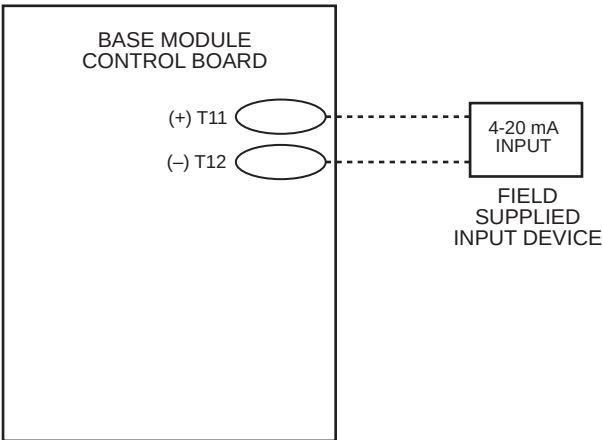


Fig. 44 — Heat Interlock Relay Wiring



LEGEND
T — Terminal

NOTE: The 4 to 20 mA input is a field-supplied non-Carrier EMS (Energy Management System) device.

mA INPUT	RESET	
	DEG. C	DEG. F
4	0.00	0.00
5	0.70	1.25
6	1.40	2.50
7	2.10	3.75
8	2.80	5.00
9	3.50	6.25
10	4.20	7.50
11	4.90	8.75
12	5.60	10.00
13	6.30	11.25
14	7.00	12.50
15	7.70	13.75
16	8.40	15.00
17	9.10	16.25
18	9.80	17.50
19	10.50	18.75
20	11.20	20.00

Fig. 45 — Space Temperature Reset Wiring

Space Temperature Reset Example — (This function must be enabled.) The occupied cooling set point is set to 22.8 C (73 F). The RTIO is set to 5. The Reset Limit is set to 11.2° C (20° F). The RTIO determines how many degrees C (or F) the temperature is reset. At 22.2 C (72 F), the supply temperature will be reset 2.8° C (5° F) higher. At 21.7 C (71 F), the supply temperature will be reset 5.6° C (10° F) higher. At 21.1 C (70 F), the supply temperature will be reset 8.4° C (15° F) higher. At 20.6 C (69 F), the supply temperature will be reset 11.2° C (20° F) higher and the LIMT will have been reached.

SUPPLY-AIR TEMPERATURE RESET (VAV) — Supply-air temperature reset is used to reset the SAT utility. A 4 to 20 mA signal (field-supplied) is required. The reset option does not require enabling.

POWER EXHAUST OPERATION — Power exhaust has two options (Constant Volume and Modulating) that have the following sequence of operation:

The first stage of constant volume (CV) power exhaust is enabled when the indoor fan has been energized and the desired damper position for the economizer increases above the CV power exhaust set point (PES1). The default for PES1 is set at 25%. The second stage of power exhaust is enabled when the desired damper position for the economizer increases above the second CV power exhaust set point (PES2). The default for PES2 is set at 75%. Each stage is disabled when the desired damper position decreases below the respective set points.

The modulating power exhaust is enabled when the indoor fan is energized and the building pressure has exceeded the individual sequencer set points. The default set points are 9.9 Pa (0.04 in. wg) (6.3 vdc) for stage 1, 24.9 Pa (0.10 in. wg) (6.8 vdc) for stage 2, 39.8 Pa (0.16 in. wg) (7.3 vdc) for stage 3, 57.1 Pa (0.23 in. wg) (7.8 vdc) for stage 4, 72.0 Pa (0.29 in. wg) (8.3 vdc) for stage 5, and 86.9 Pa (0.35 in. wg) (8.8 vdc) for stage 6 power exhaust sequencer. Each stage also requires that the building pressure is reduced until it drops below the disable set point. The default set points are 0 Pa (0 in. wg) (6.0 vdc) for stage 1, 14.9 Pa (0.060 in. wg) (6.5 vdc) for stage 2, 32.3 Pa (0.13 in. wg) (7.0 vdc) for stage 3, 47.2 Pa (0.19 in. wg) (7.5 vdc) for stage 4, 47.5 Pa (0.25 in. wg) (8.0 vdc) for stage 5, and 62.4 (0.31 in. wg) 8.5 vdc) for stage 6 power exhaust sequencer. Both of these set points are changed at the specific controlling sequencer.

SMOKE CONTROL MODES — The 50EJ,EK,EW,EY units with an optional expansion board perform fire and smoke control modes. The expansion board provides 4 modes which can be used to control smoke within the conditioned area. The modes of operation are fire shutdown, pressurization, evacuation, and smoke purge. See Table 25.

SMOKE DETECTOR — A smoke detector can be used to initiate fire shutdown. This can be accomplished by a set of normally closed pilot relay contacts which will interrupt

power from the 24-v transformer, secondary “B” terminal to the control circuit breaker (CB4). See Fig. 46. The wire that connects these two points is white and labeled “W78.”

The smoke detector may be mounted in the return air duct or the supply duct. Carrier does not make recommendations as to specific smoke detector location due to liability considerations.

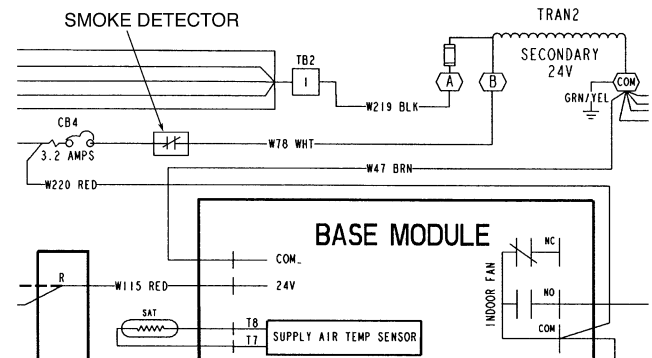


Fig. 46 — Field-Supplied Smoke Detector Wiring

INDOOR AIR QUALITY CONTROL — The accessory expansion board and accessory IAQ sensor are required for IAQ control. The Carrier sensors operate with a 4 to 20 mA signal. The 4 to 20 mA signal is connected to T11 (+) and T12 (–) on the expansion board for the IAQ sensor, and T13 (+) and T14 (–) on the expansion board for the OAQ (Outdoor Air Quality) sensor. The sensor is field-mounted and wired to the expansion board installed in the unit main control box. The IAQ sensor must be powered by a field-supplied 24-v power supply (ungrounded). Do not use the unit 24-v power supply to power the sensor.

Once installed, the sensor must be enabled. The sensor is configured with default values which may be changed through network access software. To work properly, the IAQ sensor high and low reference points for the sensor that is used must match the configured values. The expansion board reacts to a 4 to 20 mA signal from the IAQ sensor. The low reference (4 mA output) must be configured to the minimum IAQ sensor reading. The high reference (20 mA output) must be configured to the maximum IAQ sensor reading.

The IAQ sensor can be configured to either low or high priority. The priority value can be changed by the user. The default is low.

Low priority — When the priority is set to low, the initial control is to the IAQ set point, but the outside air damper position will change to its minimum position when the following conditions occur:

- CV units with sensor — when the space temperature is greater than the occupied cooling set point plus 1.1° C (2° F) or when the space temperature is less than the occupied heating set point minus 1.1° C (2° F).

Table 25 — Smoke Control Modes

DEVICE	PRESSURIZATION	SMOKE PURGE	EVACUATION	FIRE SHUTDOWN
Economizer	100%	100%	100%	0%
Indoor Fan/VFD	ON	ON	OFF	OFF
Power Exhaust (all outputs)	OFF	ON	ON	OFF
Heat Stages	OFF	OFF	OFF	OFF
HIR	ON	ON	OFF	OFF

LEGEND

HIR — Heat Interlock Relay
VFD — Variable Frequency Drive

- VAV units and CV units with thermostat — when the supply-air temperature is less than the supply-air temperature set point minus 4.5° C (8° F) or when the supply-air temperature is greater than the supply air temperature set point plus 2.8° C (5° F) for 4 minutes.
- When the outdoor air quality is greater than the outdoor air quality set point (ppm).

High priority — When the priority is set to high, the IAQ set point controls the outside-air damper exclusively, with no regard to comfort conditioning.

CAPACITY CONTROL, COOLING — The cooling capacity staging tables are shown in Tables 26 and 27.

**Table 26 — Cooling Capacity Staging Table
CV Units with 2 Compressors**

STAGES	0	1 ECONOMIZER	2	3
Compressor 1	Off	Off	On	On
Compressor 2	Off	Off	Off	On

NOTE: On CV units that require additional unloading, add suction pressure unloaders on compressor 1 only.

**Table 27 — Cooling Capacity Staging Table
VAV Units with 2 Compressors
and 2 Unloaders***

STAGES	0	1	2	3	4	5	6
Compressor 1	Off	On	On	On	On	On	On
Unloader 1	Off	On	On	Off	On	On	Off
Unloader 2	Off	On	Off	Off	On	Off	Off
Compressor 2	Off	Off	Off	Off	On	On	On

*Size 044 units have only 1 unloader.

FIELD TEST — The field test program is initiated by moving up DIP switch no. 4 to the OPEN position. The outdoor-air damper will close. The control allows 90 seconds for the damper to close in case it was in the full open position. Next, the indoor-fan contactor will be energized, and the outside-air damper will begin to open to its default value of 20% and stay at that position for a short period of time. The outdoor-air damper will then open to its full open position and stay at that position for a short period of time. The outdoor-air damper will then close.

If the unit is equipped with power exhaust, stage 1 will be energized for 5 seconds. If the unit is configured for stage 2 of power exhaust, stage 2 will be energized for 5 seconds after the first stage is deenergized.

The first stage of heat will be energized for 30 seconds, after which the second stage heat will be energized for an additional 30 seconds. Heat is then deenergized.

The last step is the Cooling mode. Outdoor-fan contactor no. 1 is energized. This is followed by each stage of cooling energized with a 10-second delay between stages. After this is complete, outdoor-fan contactor no. 2 is energized for 10 seconds.

The compressors will now deenergize, followed by the outdoor-fan contactors and indoor-fan contactors.

The field test is then complete.

TIME GUARD® CIRCUIT — The Time Guard function (built into the rooftop's control module board) maintains a minimum off time of 5 minutes, a minimum on time of 10 seconds, and a 10-second delay between compressor starts.

CRANKCASE HEATER — The unit main power supply must remain on to provide crankcase heater operation. The crankcase heater in each compressor keeps oil free of refrigerant while compressor is off.

HEAD PRESSURE CONTROL — Each unit has a fan cycling, outdoor thermostat to shut off outdoor-fan motor(s) at 13 C (55 F) (one outdoor-fan motor on size 024-034 units, 2 outdoor-fan motors on size 044 units, and 3 outdoor-fan motors on size 054-068 units). The head pressure control permits the unit to operate with correct condensing temperatures down to 2 C (35 F) outdoor-air temperature.

MOTORMASTER® III CONTROL — The Motormaster III Solid-State Head Pressure Control is a field-installed accessory, fan speed control device actuated by a temperature sensor. The Motormaster III control is specifically designed for use on Carrier equipment and controls the outdoor-fan motor speed in response to the saturated condensing temperature. For outdoor temperatures down to -29 C (-20 F), the Motormaster III control maintains condensing temperature at 38 C (100 F).

SERVICE

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Turn off accessory heater power switch if applicable. Electrical shock could cause personal injury.

Service Access — All unit components can be reached through clearly labelled hinged access doors. These doors are not equipped with tiebacks, so if heavy duty servicing is needed, either remove them or prop them open to prevent accidental closure.

Each door is held closed with 3 latches. The latches are secured to the unit with a single ¼-in. - 20 x ½-in. long bolt. See Fig. 47.

To open, loosen the latch bolt using a ⅞-in. wrench. Pivot the latch so it is not in contact with the door. Open the door. To shut, reverse the above procedure.

NOTE: Disassembly of the top cover may be required under special service circumstances. It is very important that the orientation and position of the top cover be marked on the unit prior to disassembly. This will allow proper replacement of the top cover onto the unit and prevent rainwater from leaking into the unit.

IMPORTANT: After servicing is completed, make sure door is closed and relatched properly, and that the latches are tight. Failure to do so can result in water leakage into the evaporator section of the unit.

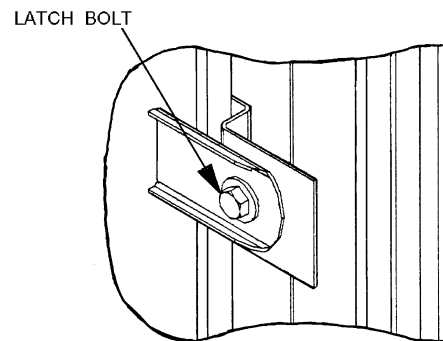


Fig. 47 — Door Latch

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

EVAPORATOR COIL — Remove access panels and clean as required with a commercial coil cleaner.

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

CONDENSATE DRAIN — Check and clean each year at start of cooling season. In winter, keep drains and traps dry.

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

NOTE: The unit requires industrial grade throwaway filters capable of withstanding face velocities up to 3.175 m/s (625 fpm).

OUTDOOR-AIR INLET SCREENS — Clean screens with steam or hot water and a mild detergent. Do not use throw-away filters in place of screens. See Fig. 26 for location of screens (filter track assembly).

Lubrication

COMPRESSORS — Each compressor is charged with the correct amount of oil at the factory. The correct oil charge is shown in Tables 1A and 1B. If oil is visible in the compressor sight glass, check unit for operating readiness as described in Start-Up section, then start the unit. Observe oil level and add oil, if required, to bring oil level in compressor crankcase up to between $\frac{1}{4}$ and $\frac{1}{3}$ of sight glass during steady operation.

If oil charge is above $\frac{1}{3}$ sight glass, do not remove any oil until the compressor crankcase heater has been energized for at least 24 hours with compressor off.

When additional oil or a complete charge is required, use only Carrier-approved compressor oil:

Petroleum Specialties, Inc. Cryol 150
 Texaco, Inc. Capella WF-32
 Witco Chemical Corp. Suniso 3GS

IMPORTANT: Do not use reclaimed oil or oil that has been exposed to the atmosphere. Refer to Carrier Standard Service Techniques Manual, Chapter 1, Refrigerants section, for procedures to add or remove oil.

FAN SHAFT BEARINGS — Lubricate the bearings at least twice annually with suitable bearing grease. Do not over grease. Typical lubricants are listed below:

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

*Preferred lubricant because it contains rust and oxidation inhibitors.

CONDENSER AND EVAPORATOR-FAN MOTOR BEARINGS — The condenser and evaporator-fan motors have permanently-sealed bearings, so no field lubrication is necessary.

Evaporator Fan Performance Adjustment (Fig. 48)

Fan motor pulleys are factory set for speed shown in Tables 1A and 1B (factory speed setting).

To change fan speeds, change pulleys.

To align fan and motor pulleys:

1. Shut off unit power supply.
2. Loosen fan shaft pulley bushing.
3. Slide fan pulley along fan shaft.
4. Make angular alignment by loosening motor from mounting plate.
5. Retighten pulley.

IMPORTANT: Check to ensure that the unit drive matches the duct static pressure in Tables 14-19.

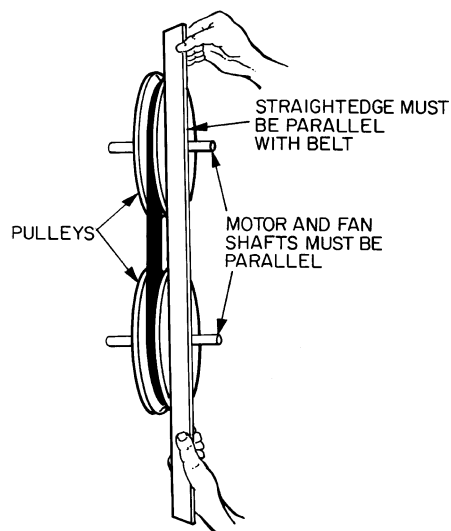


Fig. 48 — Evaporator-Fan Pulley Alignment and Adjustment

Evaporator Fan Coupling Assembly — If the coupling has to be removed for other blower assembly component repair or replacement, it is critical that the coupling be reassembled and aligned correctly to prevent premature failures.

REASSEMBLING THE COUPLING INTO THE UNIT (FIG. 49)

1. Prior to re-assembling the coupling, loosen the 4 bearing mounting bolts, which secure the 2 bearings on either side of the coupling. Remove the drive belts.
2. Re-assemble the coupling with the bearings loose, following the procedure described below. This allows the coupling to find its own self-alignment position.
3. Check the hub-to-shaft fit for close-fitted clearances. Replace hubs if high clearances are seen.
4. Check the key for close-fitted clearances on the sides and 0.39 mm (0.015 in.) over the top of the key. Replace key if necessary.
5. Be sure that hub flanges, flex members, spacer, and hardware are clean and free of oil.
6. Place the flanges onto the shafts with the hub facing outward. Do not tighten the setscrews at this time.

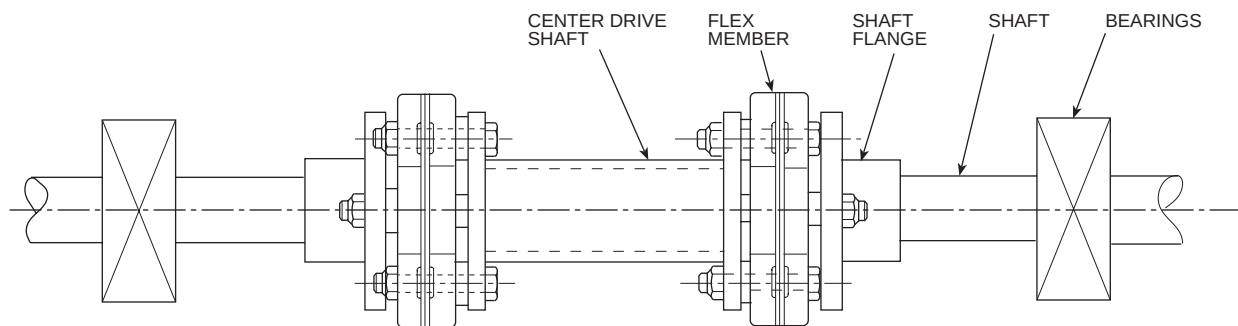


Fig. 49 — Evaporator Fan Coupling

7. Outside of the unit, assemble the flex members to the center drive shaft with 4 bolts and nuts. The flex members have collars that need to be inserted into the drive shaft flange's smaller hole.
8. Assemble the flex member/drive shaft assembly to one of the shaft flanges, using 2 bolts and nuts. Slide the other shaft flange towards the assembly and assemble using 2 bolts and nuts. If the shafts are not overly misaligned, the collar in the flex member should line up with the shaft flange holes.
9. Torque nuts properly to 128.8-135.6 N-m (95 to 100 ft-lb). Do not turn a coupling bolt. Always turn the nut. Always use thread lubricant or anti-seize compound to prevent thread galling.
10. The ends of the shafts should be flush with the inside of the shaft flange. Torque set screws to 33.9 N-m (25 ft-lb.)
11. After assembly is complete, slowly rotate the shafts by hand for 30 to 60 seconds.
12. Tighten the bearing mounting bolts, using care not to place any loads on the shaft which would cause flexure to the shafts.
13. Re-install drive belts. (Refer to the Belt Tension Adjustment section, this page).
14. Visually inspect the assembly. If the shafts are overly misaligned, the drive shaft flange will not be parallel with the shaft flanges.
15. Recheck nut torque after 1 to 2 hours of operation. Bolts tend to relax after being initially torqued.

Evaporator Fan Service and Replacement

1. Turn off unit power.
2. Remove supply-air section panels.
3. Remove belt and blower pulley.
4. Loosen set screws in blower wheels.
5. Remove locking collars from bearings.
6. Remove shaft.
7. Remove venturi on opposite side of bearing.
8. Lift out wheel.
9. Reverse above procedure to reinstall fan.
10. Check and adjust belt tension as necessary.

Belt Tension Adjustment — To adjust belt tension:

1. Shut off unit power supply.
2. Loosen motor mount nuts and bolts.
3. Loosen fan motor nuts. See Fig. 50.
4. Turn motor jacking bolts to move motor mounting plate left or right for proper belt tension. A slight bow should be present in the belt on the slack side of the drive while running under full load.
5. Tighten nuts.
6. Adjust bolts and nut on mounting plate to secure motor in fixed position. Recheck belt tension after 24 hours of operation. Adjust as necessary.

See Tables 3A and 3B for proper tension values.

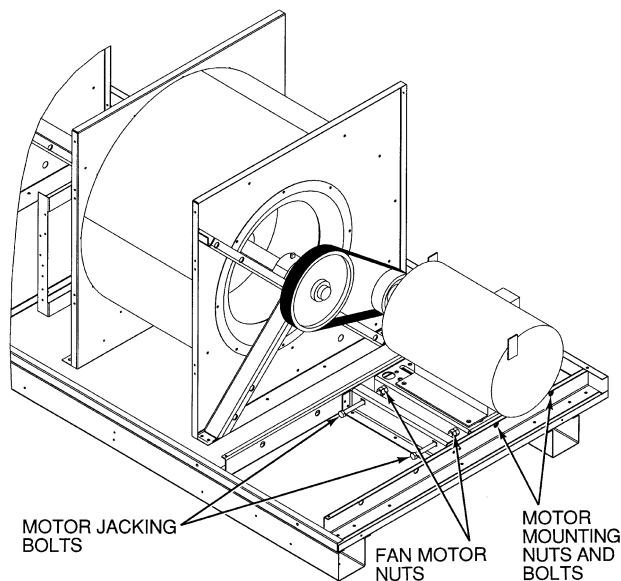


Fig. 50 — Belt Tension Adjustment

Condenser-Fan Adjustment

1. Shut off unit power supply.
2. Remove fan guard.
3. Loosen fan hub setscrews.
4. Adjust fan height on shaft using a straightedge placed across venturi and measure per Fig. 51.
5. Tighten setscrews and replace fan guard.
6. Turn on unit power.

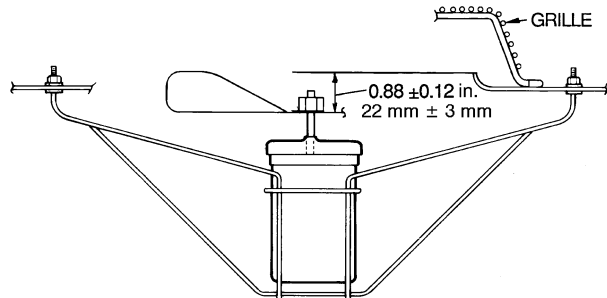


Fig. 51 — Condenser-Fan Adjustment

Evaporator-Fan Motor Replacement

1. Shut off unit power supply.
2. Remove upper outside panel and open hinged door to gain access to motor.
3. Fully retract motor plate adjusting bolts.
4. Loosen the 2 rear (nearest the evaporator coil) motor plate nuts.
5. Remove the 2 front motor plate nuts and carriage bolts.
6. Slide motor plate to the rear (toward the coil) and remove fan belt(s).
7. Slide motor plate to the front and hand tighten one of the rear motor plate nuts (tight enough to prevent the motor plate from sliding back but loose enough to allow the plate to pivot upward).
8. Pivot the front of the motor plate upward enough to allow access to the motor mounting hex bolts and secure in place by inserting a prop.
9. Remove the nuts from the motor mounting hex bolts and remove motor.
10. Reverse above steps to install new motor.

Power Failure — The economizer dampers have a spring return design. In event of power failure, dampers will return to fully closed position until power is restored.

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate and in Table 1. Refer to Carrier GTAC II; Module 5; Charging, Recovery, Recycling, and Reclamation section for charging methods and procedures.

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

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

NO CHARGE — Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant (refer to Tables 1A and 1B).

LOW CHARGE COOLING — Using appropriate cooling charging chart (see Fig. 52 and 53), add or remove refrigerant until conditions of the appropriate chart are met. Note

that charging chart is different from those normally used. An accurate pressure gage and temperature sensing device are required. Measure liquid line pressure at the liquid line service valve using pressure gage. Connect temperature sensing device to the liquid line near the liquid line service valve and insulate it so that outdoor ambient temperature does not affect reading.

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

Using the above pressure and temperature readings, find the intersect point on the appropriate cooling charging chart. Refer to appropriate chart to determine correct suction temperature. If intersection point on chart is above the curve, add refrigerant. If intersection point on chart is below curve, carefully recover some of the charge. Recheck suction pressure as charge is adjusted.

Filter Drier — Replace whenever refrigerant system is exposed to atmosphere.

Thermostatic Expansion Valve (TXV) — Each circuit has one. It is nonadjustable and is factory set to maintain 5 to 7° C (10 to 13° F) superheat leaving the evaporator coil. The TXV controls flow of liquid refrigerant to the evaporator coils.

Protective Devices

COMPRESSOR PROTECTION

Overcurrent — Each compressor has one manual reset, calibrated trip, magnetic circuit breaker. Do not bypass connections or increase the size of the circuit breaker to correct trouble. Determine the cause and correct it before resetting the breaker.

Overtemperature — Each 06D type compressor (size 024-034 units only) has an internal protector to protect it against excessively high discharge gas temperatures.

Crankcase Heater — Each compressor has a crankcase heater to prevent absorption of liquid refrigerant by oil in the crankcase when the compressor is idle. Since power for the crankcase heaters is drawn from the unit incoming power, main unit power must be on for the heaters to be energized.

IMPORTANT: After a prolonged shutdown or service job, energize the crankcase heaters for 24 hours before starting the compressors.

EVAPORATOR-FAN MOTOR PROTECTION — A manual reset, calibrated trip, magnetic circuit breaker protects against overcurrent. Do not bypass connections or increase the size of the breaker to correct trouble. Determine the cause and correct it before resetting the breaker. If the evaporator-fan motor is replaced with a different horsepower motor, re-sizing of the circuit breaker is required. Contact Carrier Application Engineering.

CONDENSER-FAN MOTOR PROTECTION — Each condenser-fan motor is internally protected against overtemperature.

HIGH- AND LOW-PRESSURE SWITCHES — If either switch trips, or if the compressor overtemperature switch activates, that refrigerant circuit will be automatically locked out. See Compressor Lockout Logic section on page 68.

FREEZE PROTECTION THERMOSTAT (FPT) — An FPT is located on the evaporator coil for each circuit. It detects frost build-up and turns off the compressor, allowing the coil to clear. Once the frost has melted, the compressor can be reenergized.

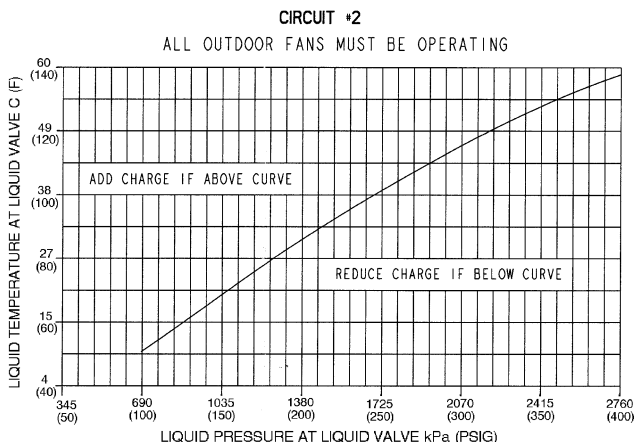
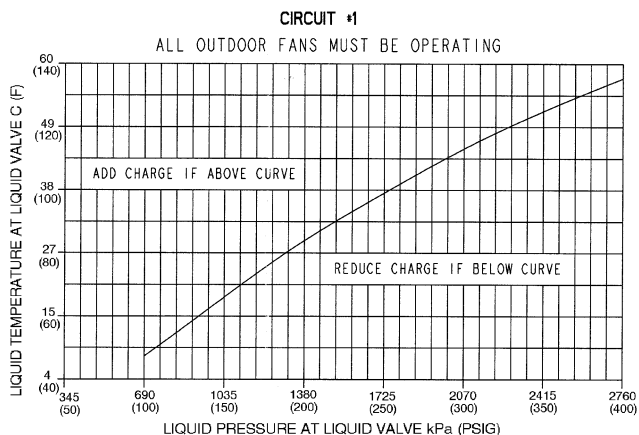


**Fig. 52 — Cooling Charging Chart,
Sizes 024-034**

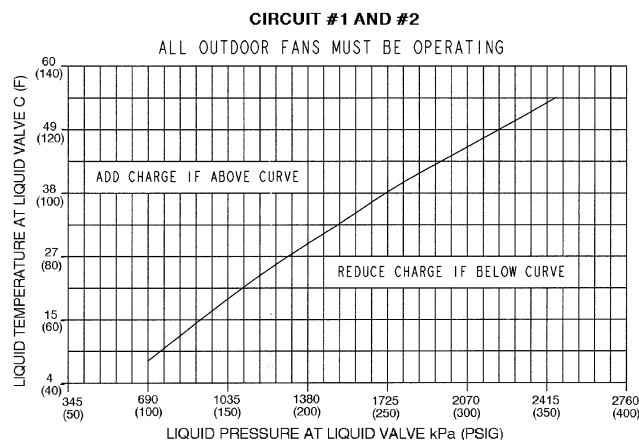


**Fig. 53 — Cooling Charging Chart,
Sizes 044-068**

Relief Devices — All units have relief devices to protect against damage from excessive pressures (i.e., fire). These devices are installed on the suction line, liquid line, and on the compressor.

Power Circuit — A typical power wiring schematic is shown in Fig. 54.

Control Circuit, 24-V — This control circuit is protected against overcurrent by a 3.2-amp circuit breaker (CB4). Breaker can be reset. If it trips, determine cause of trouble before resetting. A typical 24-v control wiring schematic is shown in Fig. 55 and 56.

Control Circuit, 120-V — This control circuit is protected against overcurrent by a 5.0-amp circuit breaker (CB3). Breaker can be reset. If it trips, determine cause of trouble before resetting. A typical 120-v control wiring schematic is shown in Fig. 57 and 58.

Compressor Lockout Logic — If any of the safeties trip, the circuit will automatically reset (providing the safety has reset) and restart the compressor in 15 minutes. If any of the safeties trip 3 times within a 90-minute period, then the circuit will be locked out and will require manual resetting by turning off either the unit disconnect or the control circuit breaker, or opening the thermostat.

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

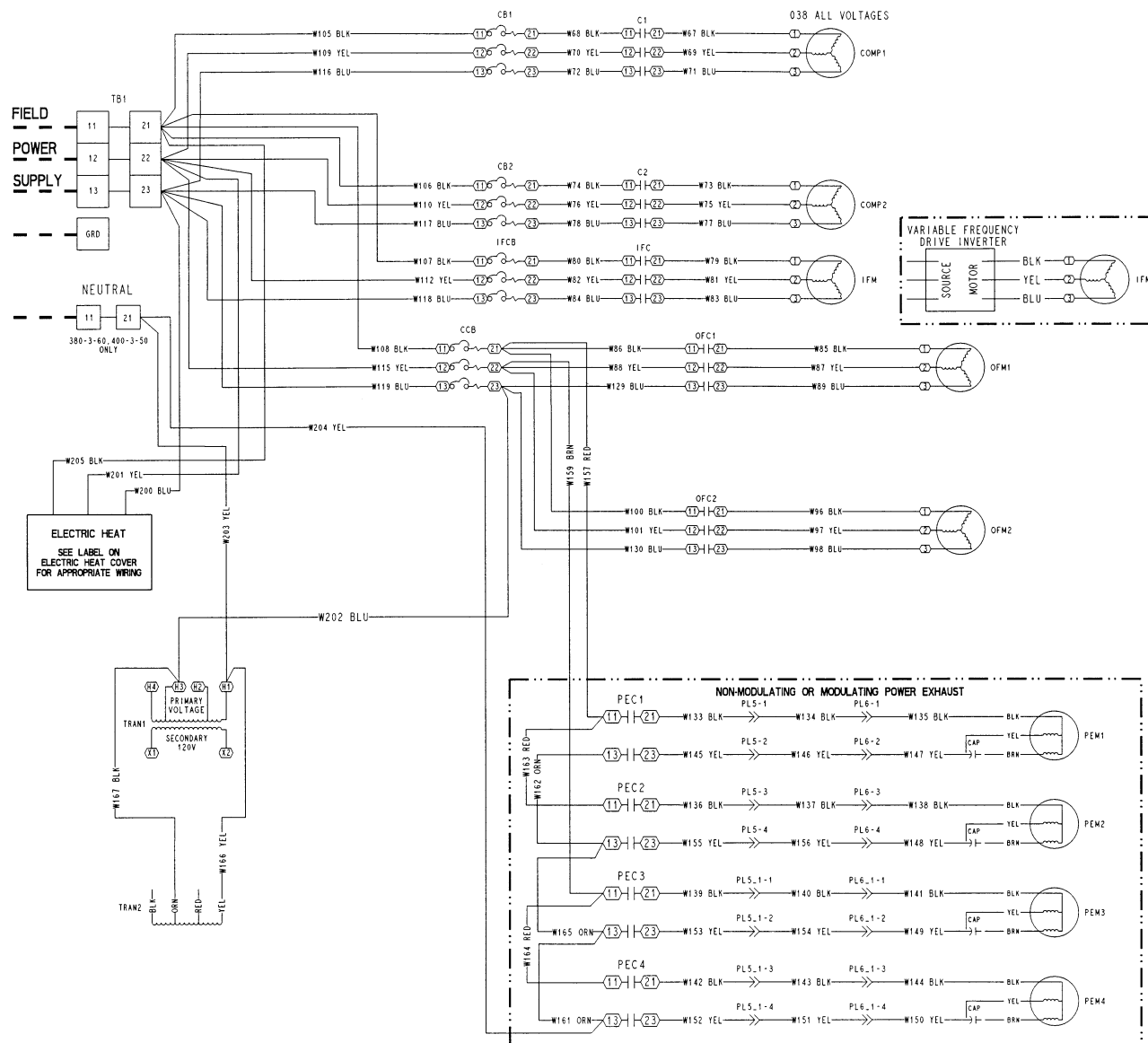


Fig. 54 — Typical Power Schematic

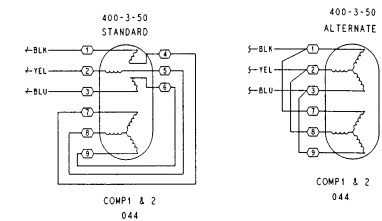
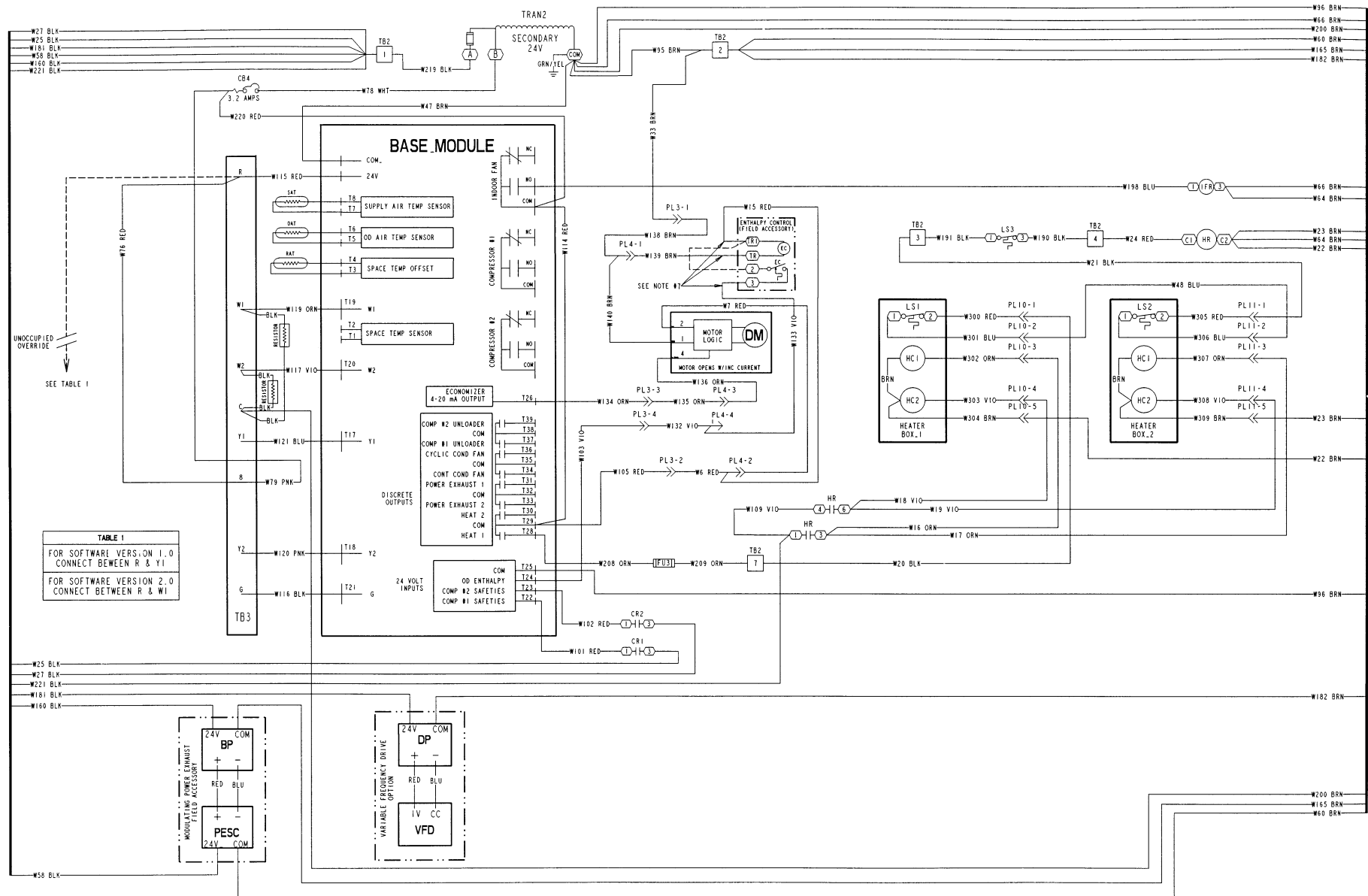


Fig. 55 — Typical 24-v Control Circuit (Constant Volume Units)



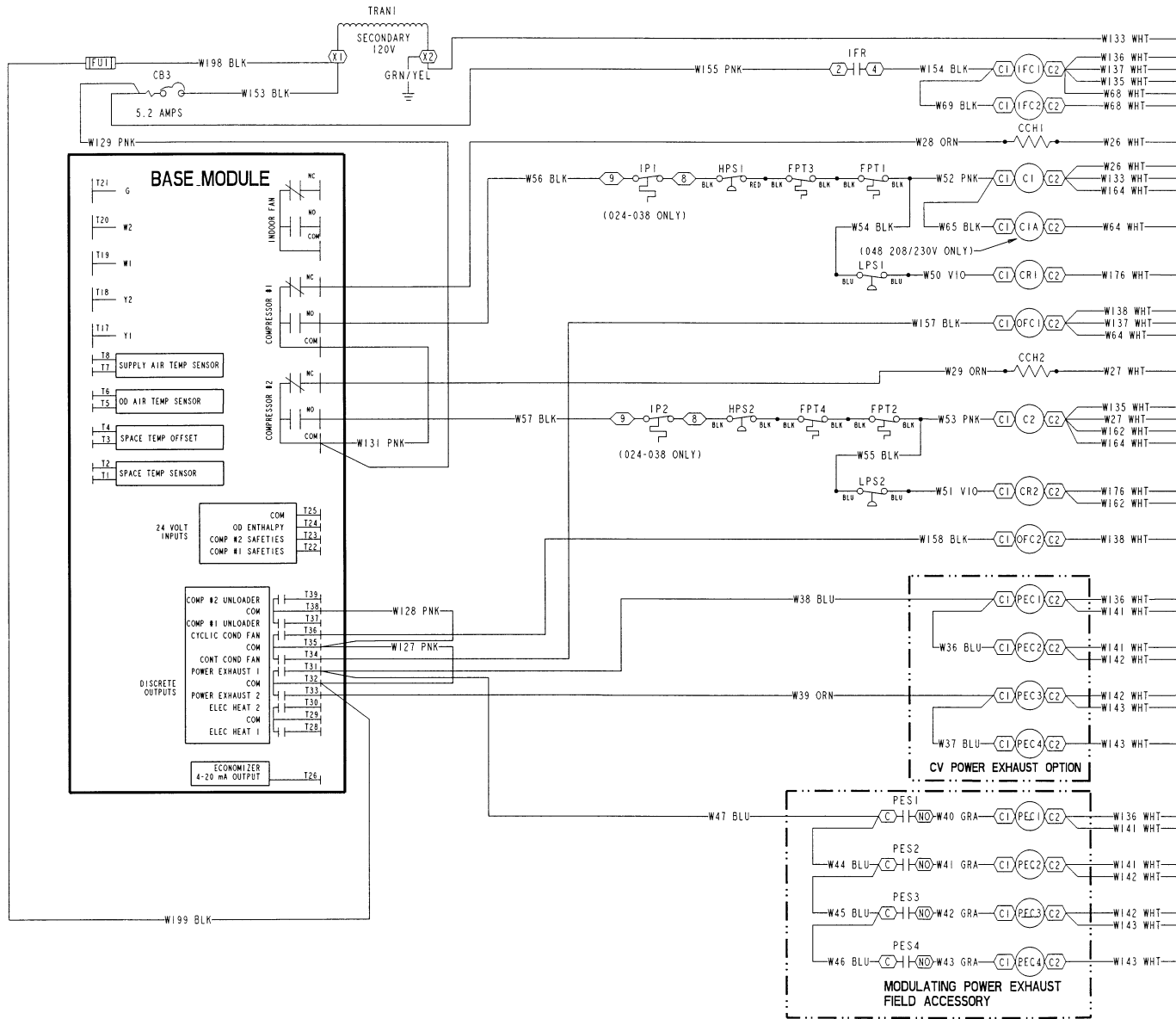


Fig. 57 — Typical 120-v Control Circuit (Constant Volume Units)

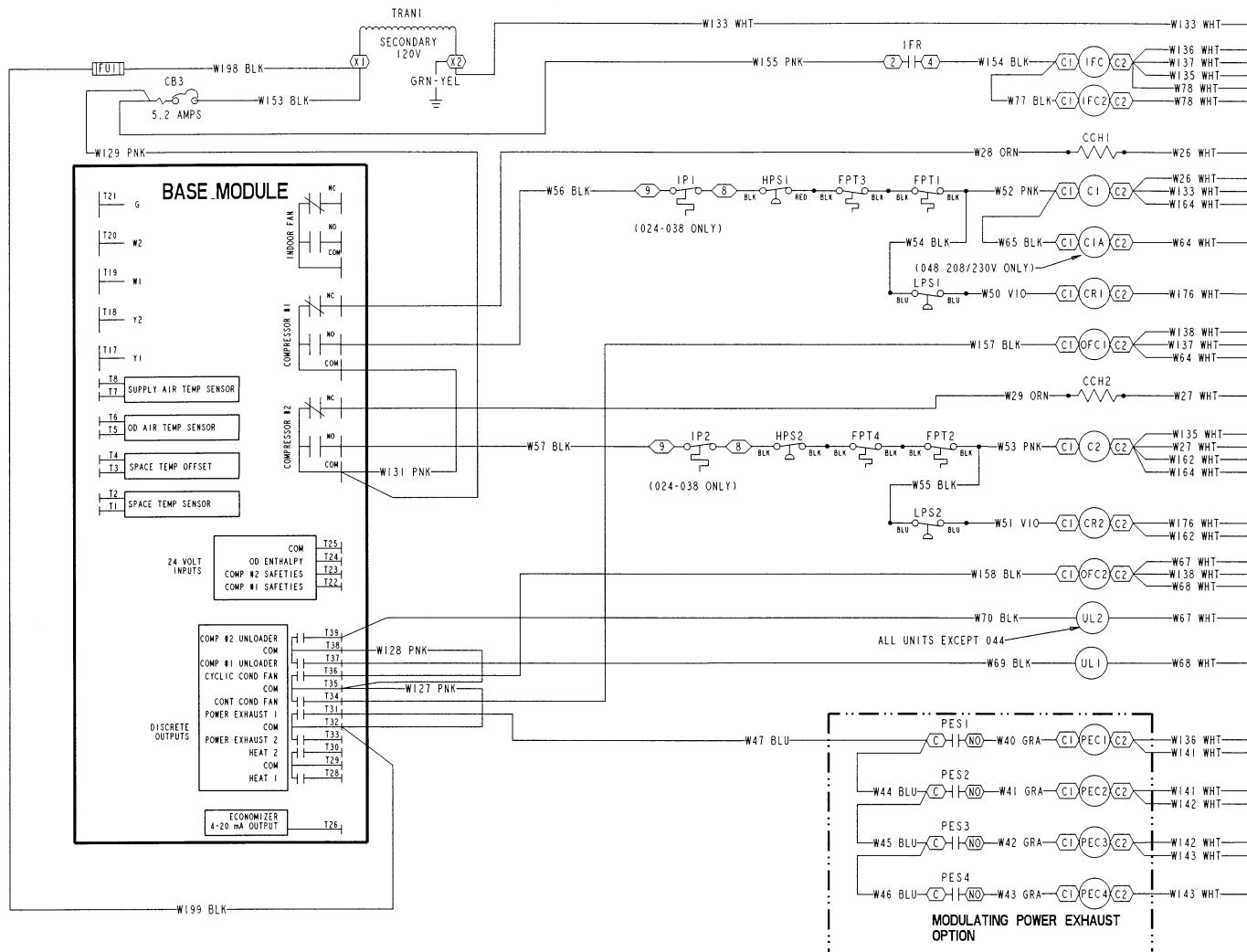


Fig. 58 — Typical 120-v Control Circuit (Variable Air Volume Units)

LEGEND AND NOTES FOR FIG. 54-58

LEGEND

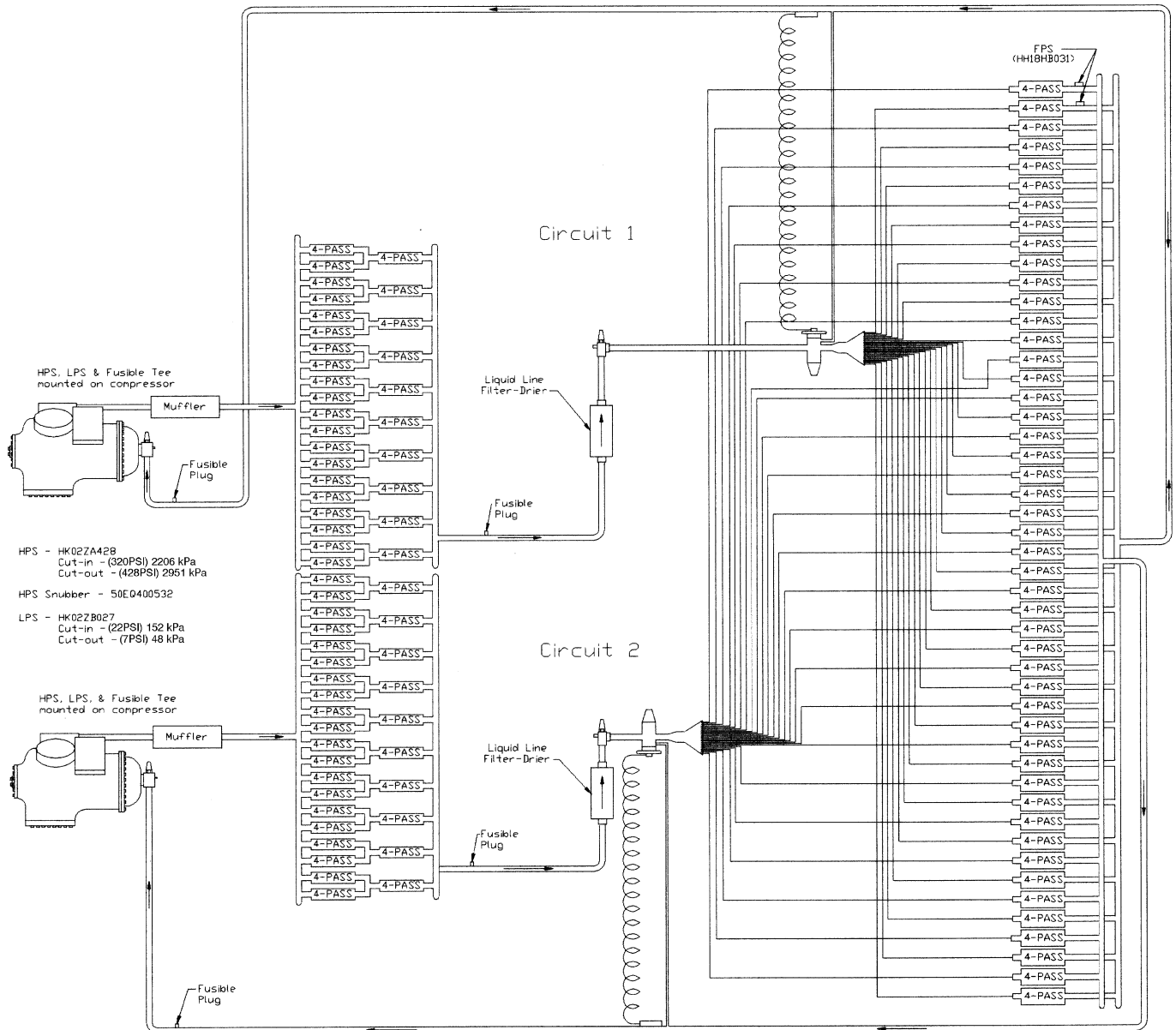
AHA — Adjustable Heat Anticipator	IFCB — Indoor Fan Circuit Breaker	TB — Terminal Block
BP — Building Pressure	IFM — Indoor-Fan Motor	TC — Thermostat Cooling
C — Contactor, Compressor	IFR — Indoor-Fan Relay	TH — Thermostat Heating
CB — Circuit Breaker	IP — Internal Protector	TRAN — Transformer
CC — Cooling Compensator	LPS — Low-Pressure Switch	VFD — Variable Frequency Drive
CCB — Controller Circuit Breaker	LS — Limit Switch	 Terminal (Marked)
CCH — Crankcase Heater	NC — Normally Closed	 Terminal (Unmarked)
COM — Communication	NO — Normally Open	 Terminal Block
COMP — Compressor Motor	OAT — Outdoor-Air Thermistor	 Splice
CR — Control Relay	OFC — Outdoor-Fan Contactor	 Factory Wiring
DM — Damper Motor	OFM — Outdoor-Fan Motor	 Field Wiring
DP — Duct Pressure	PEC — Power Exhaust Contactor	 To Indicate Common Potential Only.
EC — Enthalpy Control	PEM — Power Exhaust Motor	 Not to Represent Wiring
FPT — Freeze Protection Thermostat	PES — Power Exhaust Sequencer	
FU — Fuse	PESC — Power Exhaust Sequencer Controller	
HC — Heater Contactor	PL — Plug Assembly	
HPS — High-Pressure Switch	RAT — Return-Air Thermistor	
HR — Heater Relay	SAT — Supply-Air Thermistor	

NOTES:

1. Connect to H3 for 380 V and 400 V units.
2. Connect TRAN2 to orange lead for 400 V units.
3. Circuit breaker must trip amps are equal to or less than 156% FLA for CB1 and CB2. All others are 140%.
4. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
5. Compressors and/or fan motors are thermally protected.
6. Three phase motors are protected against primary single phasing conditions.
7. Red wire and violet wire are spliced together at the factory. The brown wire has a wire nut added at the factory.

TROUBLESHOOTING

Typical refrigerant circuiting diagrams are shown in Fig. 59-63.



LEGEND

FPS — Freeze Protection Switch
HPS — High-Pressure Switch
LPS — Low-Pressure Switch

**Fig. 59 — Typical Refrigerant Circuiting
(50EJ,EK,EW,EY024-034)**

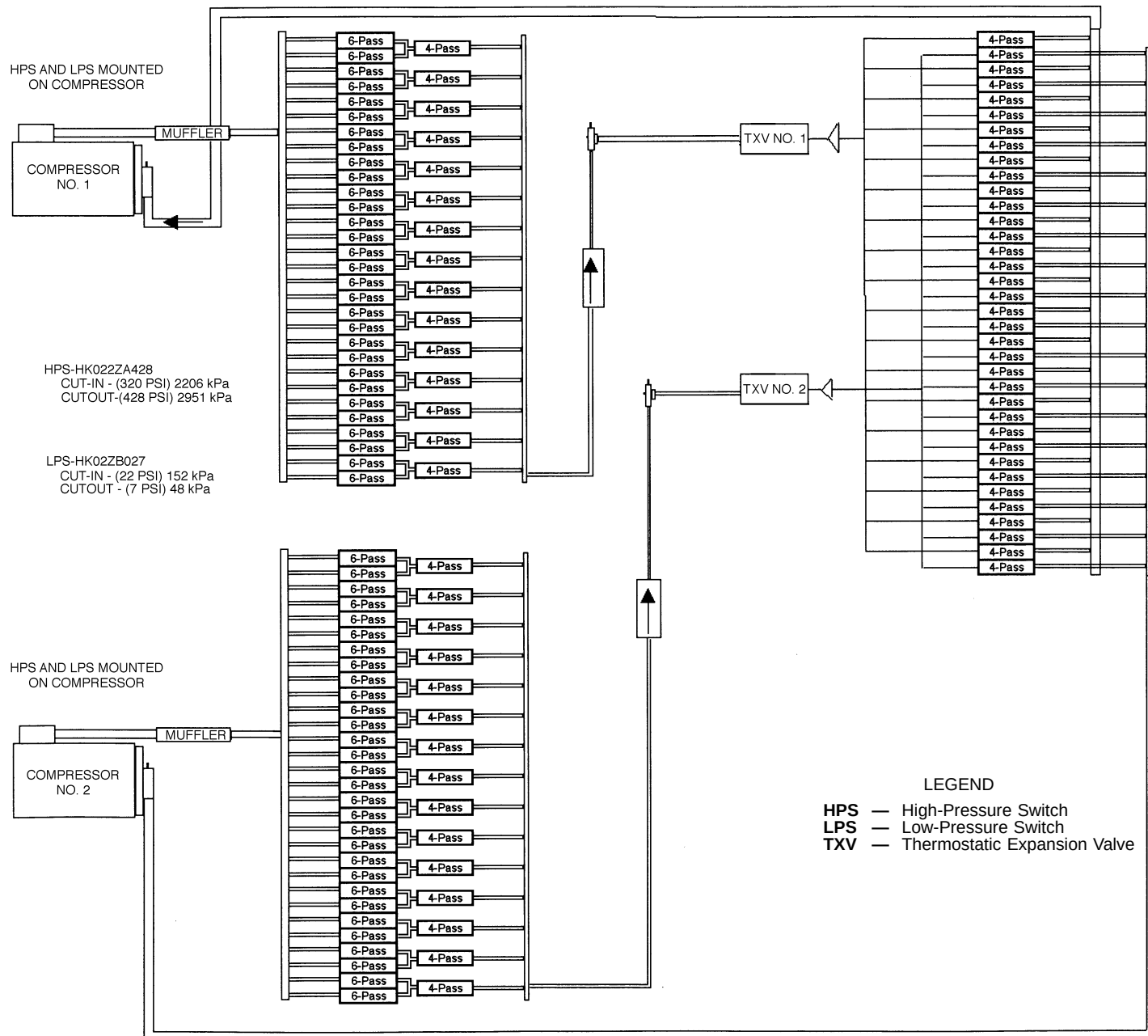


**Fig. 63 — Typical Refrigerant Circuiting
(50EJ,EK,EW,EY068)**

Diagnostic LEDs (Light-Emitting Diodes) — There are 3 LEDs (red, yellow, and green) on the lower right hand side of the control board. The red light is used to check unit operation and alarms. A constant pulse is normal unit operation. A series of quick blinks indicates an alarm. Refer

to Table 28 below for a description of alarms. The yellow LED blinks during transmission with the CCN (Carrier Comfort Network). The green LED blinks during transmission with the expansion board.

Table 28 — Control Board LED Alarms

LED BLINKS	ERROR CODE	DESCRIPTION	TROUBLESHOOTING COMMENTS
1	—	Normal Operation	The expansion board and control board flash the red LED in one-second intervals when the board is operating properly.
2	HF-13	Compressor 1 Safety	The high or low pressure safety switch for compressor no. 1 has opened for 3 seconds. The error will be cleared and compressor no. 1 will be allowed to turn on in 15 minutes. If the safeties have been tripped 3 times in 90 minutes, compressor no. 1 will be locked out until the control board has been manually reset.
3	HF-14	Compressor 2 Safety	The high or low pressure safety switch for compressor no. 2 has opened for 3 seconds. The error will be cleared and compressor no. 2 will be allowed to turn on in 15 minutes. If the safeties have been tripped 3 times in 90 minutes, compressor no. 2 will be locked out until the control board has been manually reset.
4	HF-15	Thermostat Failure	The thermostat is calling for both heating and cooling at the same time. The unit will operate on a first call basis and will automatically reset.
5	HF-05	SAT Thermistor Failure	The supply-air temperature (SAT) sensor has failed. First check for wiring errors, then replace sensor.
6	HF-06	OAT Thermistor Failure	The outside-air temperature (OAT) sensor has failed. First check for wiring errors, then replace sensor.
7	HF-03	Space Temp. Sen. Failure	The space temperature sensor has failed. First check for wiring errors, then replace sensor.
8	HF-12	RAT Thermistor Failure	The return-air temperature (RAT) sensor has failed. Ensure that the unit is a VAV unit. If NOT a VAV unit set DIP switch position 1 to the closed position and reset power. Then check for wiring errors. Finally, replace sensor.
9	SE-05	Loss of Communications with Expansion board	Communications between the expansion board and the control board have been interrupted. Ensure that an expansion board is installed and wired using the wire harness supplied with the expansion module. If an expansion board is not used ensure that DIP switch position 3 is in the closed position, and reset power.
10	HF-16	Control Board Failure	Generated when hardware has failed on control board. Replace the control board.
11	HF-17	Expansion Board Failure	Generated when hardware has failed on the expansion board. Replace the expansion board.

LEGEND

DIP — Dual In-Line Package
LED — Light-Emitting Diode
VAV — Variable Air Volume

Tables 29-31 show the input and output channel designations.

Table 29 — I/O Channel Designations Base Module — CV

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	SPT (CCN) — 10K Ω Thermistor	T23-25	Compressor 2 Safety — DI (24 vac)
T3-4	STO (CCN) — 10K Ω Thermistor	T24-25	Outside Air Enthalpy — DI (24 vac)
T5-6	OAT — 5K Ω Thermistor	T26-27	Economizer Pos. — AO (4-20 mA)
T7-8	SAT — 5K Ω Thermistor	T28-29	Heat 1 Relay — DO (24 vac)
T9-10	—	T30-29	Heat 2 Relay — DO (24 vac)
T11-12	SAT Reset — AI (4 to 20 mA)	T31-32	CV Power Exhaust 1/Modulating Power Exhaust — DO (115 vac)
T13-14	—	T33-32	CV Power Exhaust 2 — DO (115 vac)
T15-16	—	T34-35	Condenser Fan — DO (115 vac)
T17-25	Y1 or Remote Start/Stop — DI (24 vac)	T36-35	OFC2 — DO (115 vac)
T18-25	Y2 — DI (24 vac)	T37-38	—
T19-25	W1 — DI (24 vac)	T39-38	—
T20-25	W2 — DI (24 vac)	K1	Indoor Fan Relay — DO (LV)
T21-25	G — DI (24 vac)	K2	Compr. 1 — DO (HV)
T22-25	Compressor 1 Safety — DI (24 vac)	K3	Compr. 2 — DO (HV)

Table 30 — I/O Channel Designations Base Module — VAV

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	SPT (CCN) — 10K Ω Thermistor	T23-25	Compressor 2 Safety — DI (24 vac)
T3-4	RAT — 5K Ω Thermistor	T24-25	Outside Air Enthalpy — DI (24 vac)
T5-6	OAT — 5K Ω Thermistor	T26-27	Economizer Pos. — AO (4-20 mA)
T7-8	SAT — 5K Ω Thermistor	T28-29	Heat 1 Relay — DO (24 vac)
T9-10	—	T30-29	Heat Interlock Relay — DO (24 vac)
T11-12	SAT Reset — AI (4 to 20 mA)	T31-32	Modulated Power Exhaust — DO (115 vac)
T13-14	—	T33-32	—
T15-16	—	T34-35	Condenser Fan — DO (115 vac)
T17-25	Remote Start/Stop — DI (24 vac)	T36-35	OFC2 — DO (115 vac)
T18-25	—	T37-38	Unloader 1 — DO (115 vac)
T19-25	—	T39-38	Unloader 2 — DO (115 vac)
T20-25	—	K1	Indoor Fan Relay — DO (LV)
T21-25	—	K2	Compr. 1 (HV)
T22-25	Compressor 1 Safety — DI (24 vac)	K3	Compr. 2 — DO (HV)

Table 31 — I/O Channel Designations Expansion Module (Field-Installed) — CV and VAV

TERMINAL NO.	ASSIGNMENT	TERMINAL NO.	ASSIGNMENT
T1-2	—	T23-25	Fire — Evacuation — DI (24 vac)
T3-4	—	T24-25	Fire — Smoke Purge — DI (24 vac)
T5-6	—	T26-27	—
T7-8	—	T28-29	—
T9-10	—	T30-29	Alarm Light Indicator — DO (24 vac)
T11-12	IAQ Indoor — AI (4 to 20 mA)	T31-32	Power Exhaust Fire No. 1 — DO (115 vac)
T13-14	IAQ Outdoor — AI (4 to 20 mA)	T33-32	Power Exhaust Fire No. 2 — DO (115 vac)
T15-16	—	T34-35	Power Exhaust Fire No. 3 — DO (115 vac)
T17-25	Fan Status — DI (24 vac)	T36-35	Power Exhaust Fire No. 4 — DO (115 vac)
T18-25	Filter Status — DI (24 vac)	T37-38	—
T19-25	Field Applied Status — DI (24 vac)	T39-38	—
T20-25	Demand Limit — DI (24 vac)	K1	—
T21-25	Fire — Unit Shutdown — DI (24 vac)	K2	—
T22-25	Fire — Pressurization — DI (24 vac)	K3	—

LEGEND (Tables 29-31)

AI	— Analog Input	LV	— Low Voltage
AO	— Analog Output	OAT	— Outdoor-Air Temperature
CCN	— Carrier Comfort Network	OFC	— Outdoor Fan Contactor
CV	— Constant Volume	RAT	— Return-Air Temperature
DI	— Direct Input	SAT	— Supply-Air Temperature
DO	— Direct Output	SPT	— Space Temperature
HV	— High Voltage	STO	— Space Temperature Offset
IAQ	— Indoor Air Quality	T	— Terminal
K Ω	— Kilo-Ohms	VAV	— Variable Air Volume

NOTE: For 4 to 20 mA signals, all even numbered terminals are negative (–) polarity, and all odd numbered terminals are positive (+) polarity.

SERVICE TRAINING

Packaged Service Training programs are an excellent way to increase your knowledge of the equipment discussed in this manual, including:

- Unit Familiarization
- Maintenance
- Installation Overview
- Operating Sequence

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[] Packaged Service Training [] Classroom Service Training

START-UP CHECKLIST

MODEL NO.: _____

SERIAL NO.: _____

DATE: _____

TECHNICIAN: _____

PRE-START-UP:

- ☐ VERIFY THAT DIP SWITCH SETTINGS ARE CORRECT
- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ REMOVE ALL COMPRESSOR SHIPPING HOLDDOWN BOLTS AND BRACKETS PER INSTRUCTIONS
- ☐ VERIFY INSTALLATION OF ECONOMIZER HOOD
- ☐ VERIFY INSTALLATION OF ALL OPTIONS AND ACCESSORIES
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS
- ☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
- ☐ CHECK THAT INDOOR-AIR FILTERS ARE CLEAN AND IN PLACE
- ☐ VERIFY THAT UNIT IS LEVEL WITHIN TOLERANCES FOR PROPER CONDENSATE DRAINAGE
- ☐ CHECK FAN WHEELS AND PROPELLERS FOR LOCATION IN HOUSING/ORIFICE, AND VERIFY SET SCREW IS TIGHT
- ☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED
- ☐ VERIFY THAT SUCTION, DISCHARGE, AND LIQUID LINE SERVICE VALVES ON EACH CIRCUIT ARE OPEN

START-UP

ELECTRICAL

SUPPLY VOLTAGE L1-L2 _____ L2-L3 _____ L3-L1 _____

COMPRESSOR AMPS — COMPRESSOR NO. 1 L1 _____ L2 _____ L3 _____

— COMPRESSOR NO. 2 L1 _____ L2 _____ L3 _____

SUPPLY FAN AMPS (CV) _____ EXHAUST FAN AMPS _____
(VAV) _____*

*VAV fan supply amps reading must be taken with a true RMS meter for accurate readings.

ELECTRIC HEAT AMPS (IF SO EQUIPPED) L1 _____ L2 _____ L3 _____

- ☐ ADJUST VARIABLE FREQUENCY DRIVE (VFD) TO APPLICATION REQUIREMENTS

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ C (F) DB (Dry-Bulb)

RETURN-AIR TEMPERATURE _____ C (F) DB _____ C (F) WB (Wet-Bulb)

COOLING SUPPLY AIR _____ C (F)

ELECTRIC HEAT SUPPLY AIR (IF SO EQUIPPED) _____ C (F)

PRESSURES

REFRIGERANT SUCTION CIRCUIT NO. 1 _____ kPa (PSIG) CIRCUIT NO. 2 _____ kPa (PSIG)

REFRIGERANT DISCHARGE CIRCUIT NO. 1 _____ kPa (PSIG) CIRCUIT NO. 2 _____ kPa (PSIG)

- ☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS ON PAGE 68

START-UP CHECKLIST (cont)

GENERAL

- ☐ SET ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS
- ☐ ENSURE DRIVES OPERATE WITHIN LIMITS OF FAN PERFORMANCE TABLES

HIGH-PRESSURE SWITCH SETTING _____ kPa (PSIG)
LOW-PRESSURE SWITCH SETTING _____ kPa (PSIG)
MOTOR PULLEY PART NUMBER _____
FAN PULLEY PART NUMBER _____
BELT PART NUMBER _____
BELT SIZE _____ mm (in.)
FILTER QUANTITY _____
FILTER SIZES _____ mm (in.)

ADDITIONAL NOTES:

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE