



# Installation Instructions

NOTE: Read the entire instruction manual before starting the installation.

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
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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, including ANSI (American National Standards Institute) Z223.1. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

It is important to recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies hazards which could result in personal injury or death.

CAUTION is used to identify unsafe practices, which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

**⚠ DANGER**

**ELECTRICAL SHOCK HAZARD**

Failure to follow this warning will result in personal injury or death.

Before performing service or maintenance operations on unit, turn off main power switch to unit and install lock(s) and lockout tag(s). Ensure electrical service to rooftop unit agrees with voltage and amperage listed on the unit rating plate. Unit may have more than one power switch.

**⚠ WARNING**

**UNIT OPERATION AND SAFETY HAZARD**

Failure to follow this warning could cause personal injury, death and/or equipment damage.

R-410A refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on R-410A refrigerant equipment.

**⚠ WARNING**

**PERSONAL INJURY AND ENVIRONMENTAL HAZARD**

Failure to follow this warning could cause personal injury or death.

Relieve pressure and recover all refrigerant before system repair or final unit disposal.

Wear safety glasses and gloves when handling refrigerants. Keep torches and other ignition sources away from refrigerants and oils.

**⚠ CAUTION**

**PERSONAL INJURY HAZARD**

Failure to follow this caution may result in personal injury. Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing air conditioning equipment.

**MODEL NUMBER NOMENCLATURE AND DIMENSIONS**

See Fig. 1 for 50KCQ model number nomenclature. See Fig. 2 and 3 for unit dimensional drawings. Figure 4 shows service clearance dimensions. See Fig. 5 for base rail details. See Fig. 6 for thru-the-base charts.

**Rated Indoor Airflow (cfm)**

Table 1 lists the rated indoor airflow used for the AHRI efficiency rating for the units covered in this document.

**Table 1 — Rated Indoor Index (cfm)**

MODEL NUMBER	RATED INDOOR AIRFLOW (cfm)
50KCQ*A04	1225
50KCQ*A05	1700
50KCQ*A06	1750

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
5	0	K	C	Q	A	0	4	A	0	A	5	-	0	A	0	A	0

**Unit/Series Model**  
50KC – Packaged 14 SEER  
Rooftop

Q = Heat Pump

**Refrig. Systems Options**  
A – Standard One-Stage Cooling Models

**Cooling Tons**  
04 – 3 ton  
05 – 4 ton  
06 – 5 ton

**Sensor Options**  
A = None  
B = RA Smoke Detector  
C = SA Smoke Detector  
D = RA + SA Smoke Detector  
E = CO<sub>2</sub>  
F = RA Smoke Detector and CO<sub>2</sub>  
G = SA Smoke Detector and CO<sub>2</sub>  
H = RA + SA Smoke Detector and CO<sub>2</sub>  
J = Condensate Overflow Switch (electromech controls only)  
K = Condensate Overflow Switch and RA Smoke Detectors  
L = Condensate Overflow Switch and RA and SA Smoke Detectors

**Indoor Fan Options**  
0 = Direct Drive X13 Motor  
2 = Medium Static Option – Belt Drive  
3 = High Static Option – Belt Drive

**Note: On single phase (-3 voltage code) models, the following are not available as a factory installed option:**

- Coated Coils or Cu Fin Coils
- Louvered Hail Guards
- Economizer or 2 Position Damper
- Powered 115 Volt Convenience Outlet

**Packaging and Seismic Compliant**  
0 = Standard  
1 = LTL

**Electrical Options**  
A = None  
C = Non-Fused Disconnect  
D = Thru-The-Base Connections  
F = Non-Fused Disconnect and Thru-The-Base Connections

**Service Options**  
0 = None  
1 = Unpowered Convenience Outlet  
2 = Powered Convenience Outlet  
3 = Hinged Panels  
4 = Hinged Panels, Unpowered Convenience Outlet  
5 = Hinged Panels, Powered Convenience Outlet

**Intake / Exhaust Options**  
A = None  
B = Temperature Economizer with Barometric Relief  
F = Enthalpy Economizer with Barometric Relief  
K = 2-Position Damper  
U = Temp Ultra Low Leak Economizer with Baro Relief  
W = Enthalpy Ultra Low Leak Econo with Baro Relief

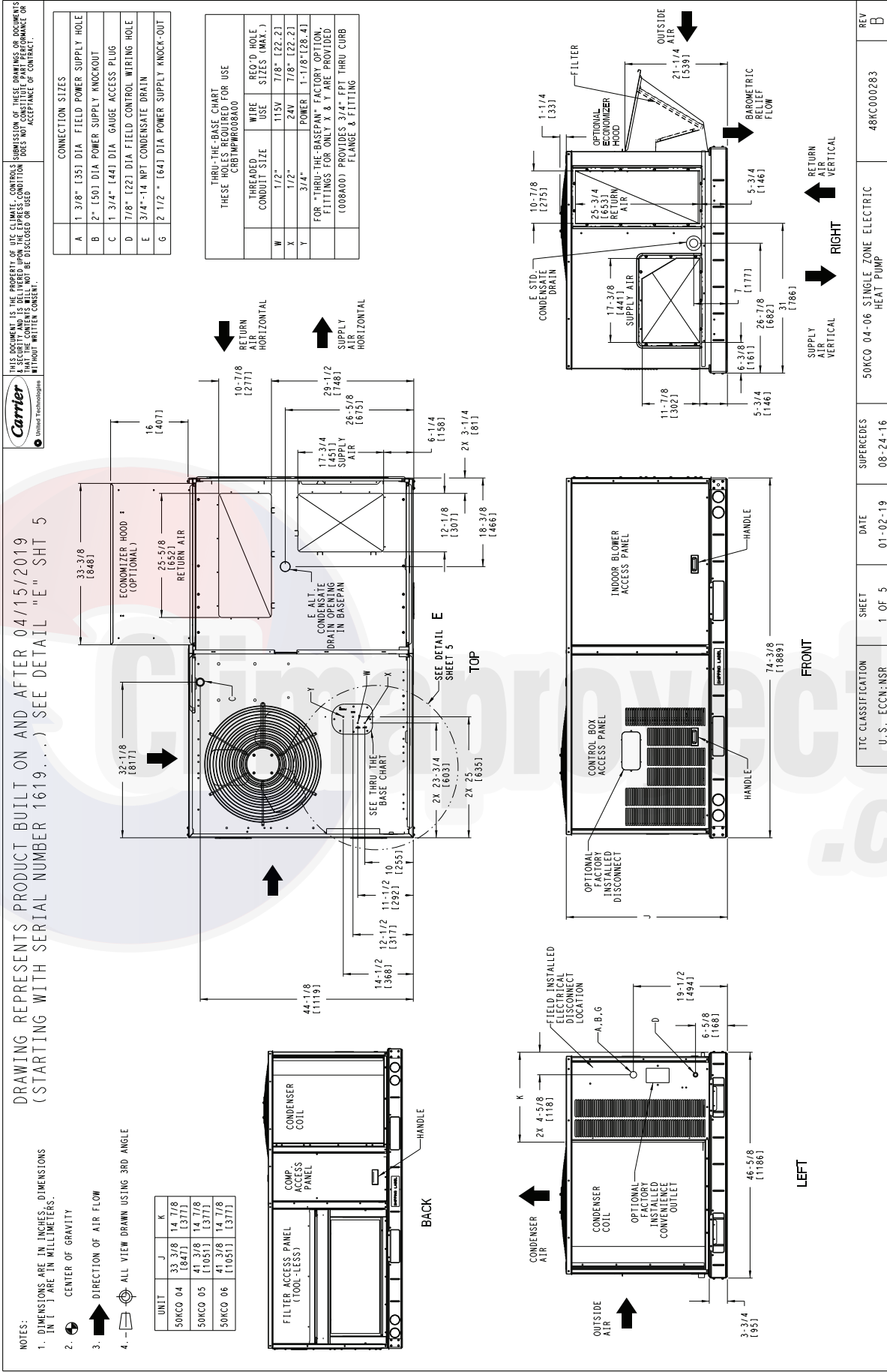
**Base unit controls**  
0 = Electromechanical Controls can be used with W7212 EconoMiSer IV (Non-Fault Detection and Diagnostic)  
1 = PremierLink Controller  
2 = RTU Open Multi-Protocol Controller  
6 = Electromechanical – can be used with W7220 EconoMiSer X (with Fault Detection and Diagnostic)

**Design Revision**  
Factory Assigned

**Voltage**  
1 = 575/3/60      5 = 208-230/3/60  
3 = 208-230/1/60      6 = 460/3/60

**Coil Options (Outdoor – Indoor – Hailguard)**  
A = Al/Cu – Al/Cu  
B = Precoat Al/Cu – Al/Cu  
C = E-coat Al/Cu – Al/Cu  
D = E-coat Al/Cu – E-coat Al/Cu  
E = Cu/Cu – Al/Cu  
F = Cu/Cu – Cu/Cu  
M = Al/Cu – Al/Cu – Louvered hail Guards  
N = Precoat Al/Cu – Al/Cu – Louvered Hail Guards  
P = E-coat Al/Cu – Al/Cu – Louvered Hail Guards  
Q = E-coat Al/Cu – E-coat Al/Cu – Louvered Hail Guards  
R = Cu/Cu – Al/Cu – Louvered Hail Guards  
S = Cu/Cu – Cu/Cu – Louvered Hail Guards

**Fig. 1 — 50KCQ04-06 Model Number Nomenclature (Example)**



**Fig. 2 — Dimensional Drawing for Units Built On and After 4/15/19**

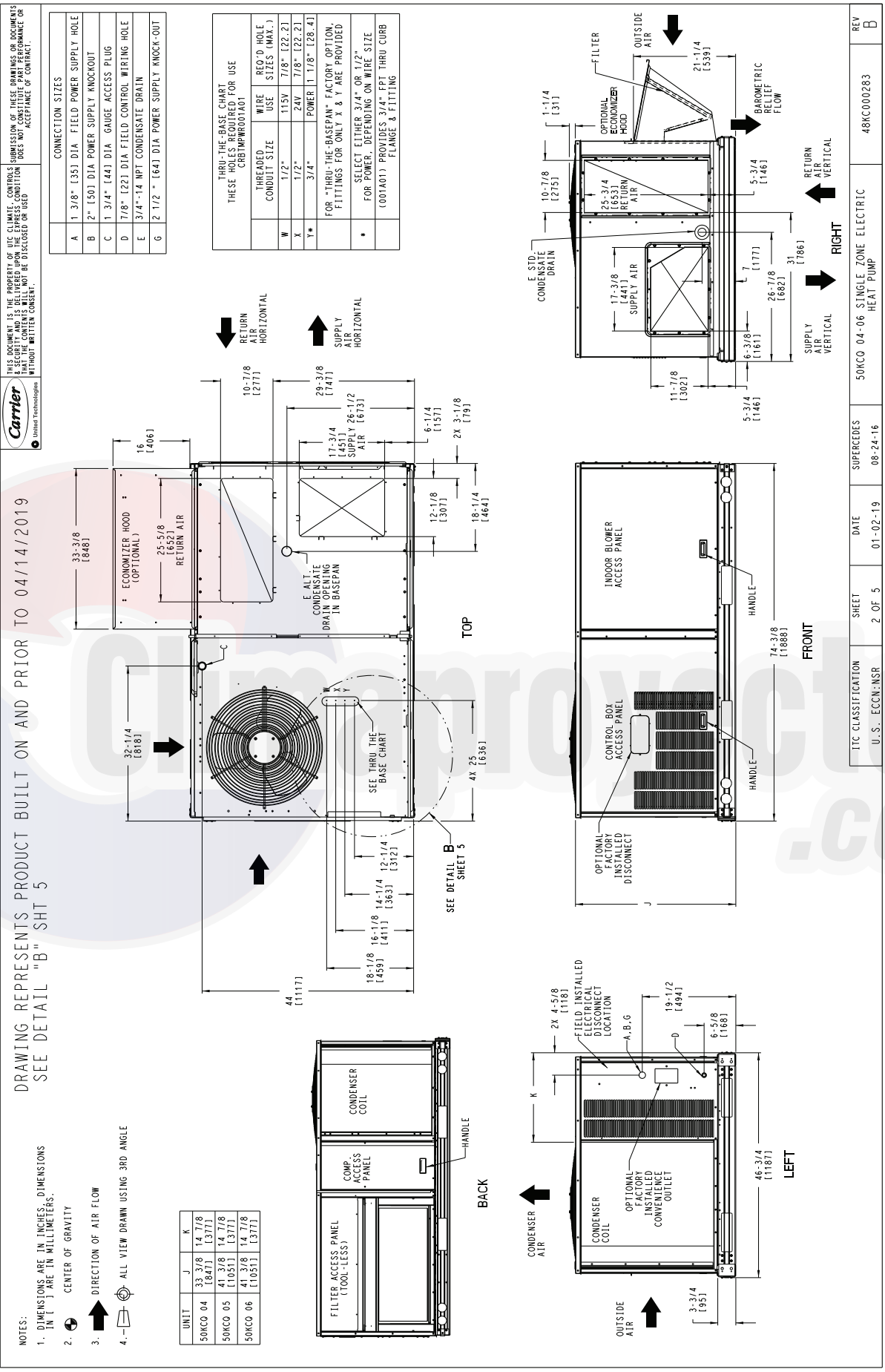
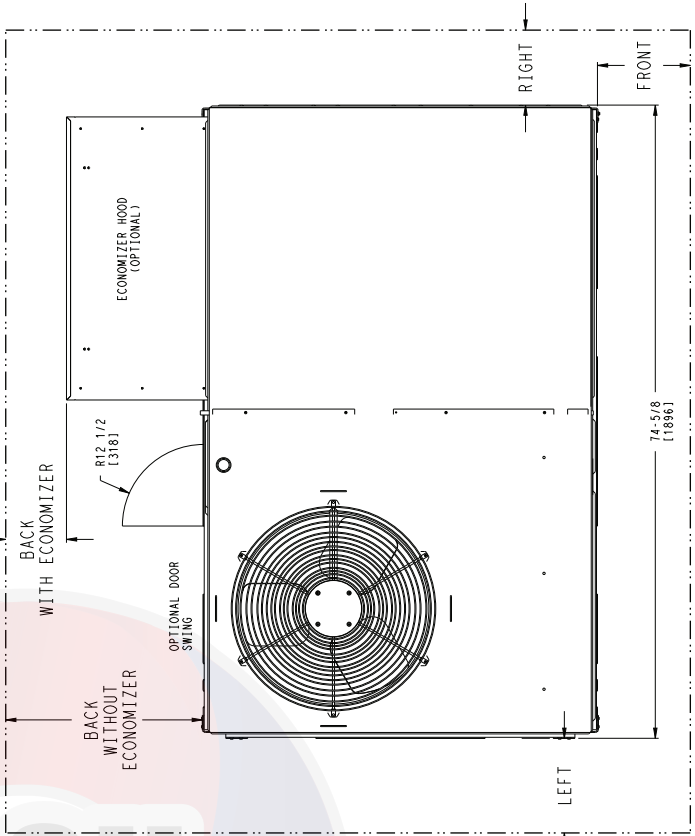


Fig. 3 — Dimensional Drawing for Units Built Prior to 4/15/19

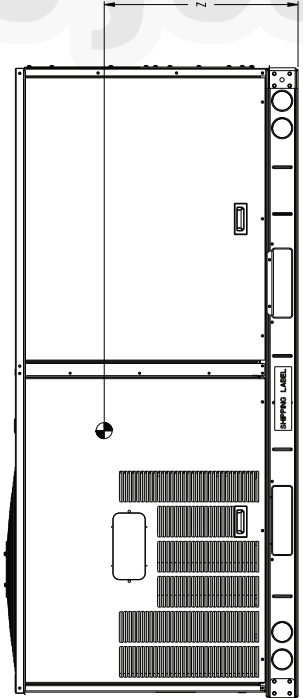
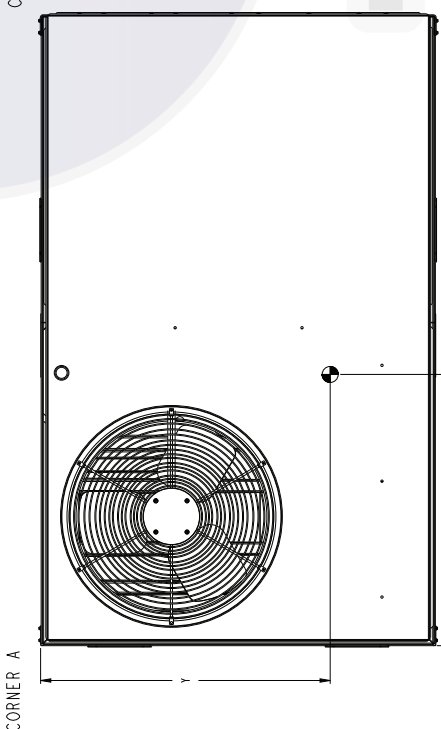
UNIT	STD. UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		HEIGHT	
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z	Z
50KCO 04	495	224	130	59	118	53	130	59	35 3/8	[888]	23 3/8	[594]	18 3/8	[467]
50KCO 05	580	263	161	73	147	66	130	59	142	64	35 1/2	[902]	21 7/8	[551]
50KCO 06	610	276	165	75	152	69	141	64	152	69	35 3/4	[908]	22 1/2	[571]

\* STANDARD UNIT WEIGHT IS WITHOUT ELECTRIC HEAT AND WITHOUT PACKAGING. FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.



NOTES:  
 1. FOR ALL MINIMUM CLEARANCES LOCAL CODES OR JURISDICTIONS MAY PREVAIL.

SURFACE	SERVICE WITH CLEARANCE		OPERATING CLEARANCE
	CONDUCTIVE BARRIER	NONCONDUCTIVE BARRIER	
FRONT	48 [1219mm]	36 [914mm]	18 [457mm]
LEFT	48 [1219mm]	42 [1067mm]	18 [457mm]
BACK	48 [1219mm]	42 [1067mm]	18 [457mm]
BACK W/HOOD	36 [914mm]	36 [914mm]	18 [457mm]
RIGHT	36 [914mm]	36 [914mm]	18 [457mm]
TOP	72 [1829mm]	72 [1829mm]	72 [1829mm]



ITC CLASSIFICATION	SHEET	DATE	REV
U.S. - ECCN: NSR	3 OF 5	01-02-19	B

SUPERCEDES	50KCO 04-06 SINGLE ZONE ELECTRIC HEAT PUMP
DATE	08-24-16

ITC CLASSIFICATION	SHEET	DATE	REV
U.S. - ECCN: NSR	3 OF 5	01-02-19	B

Fig. 4 — Corner Weights and Clearances

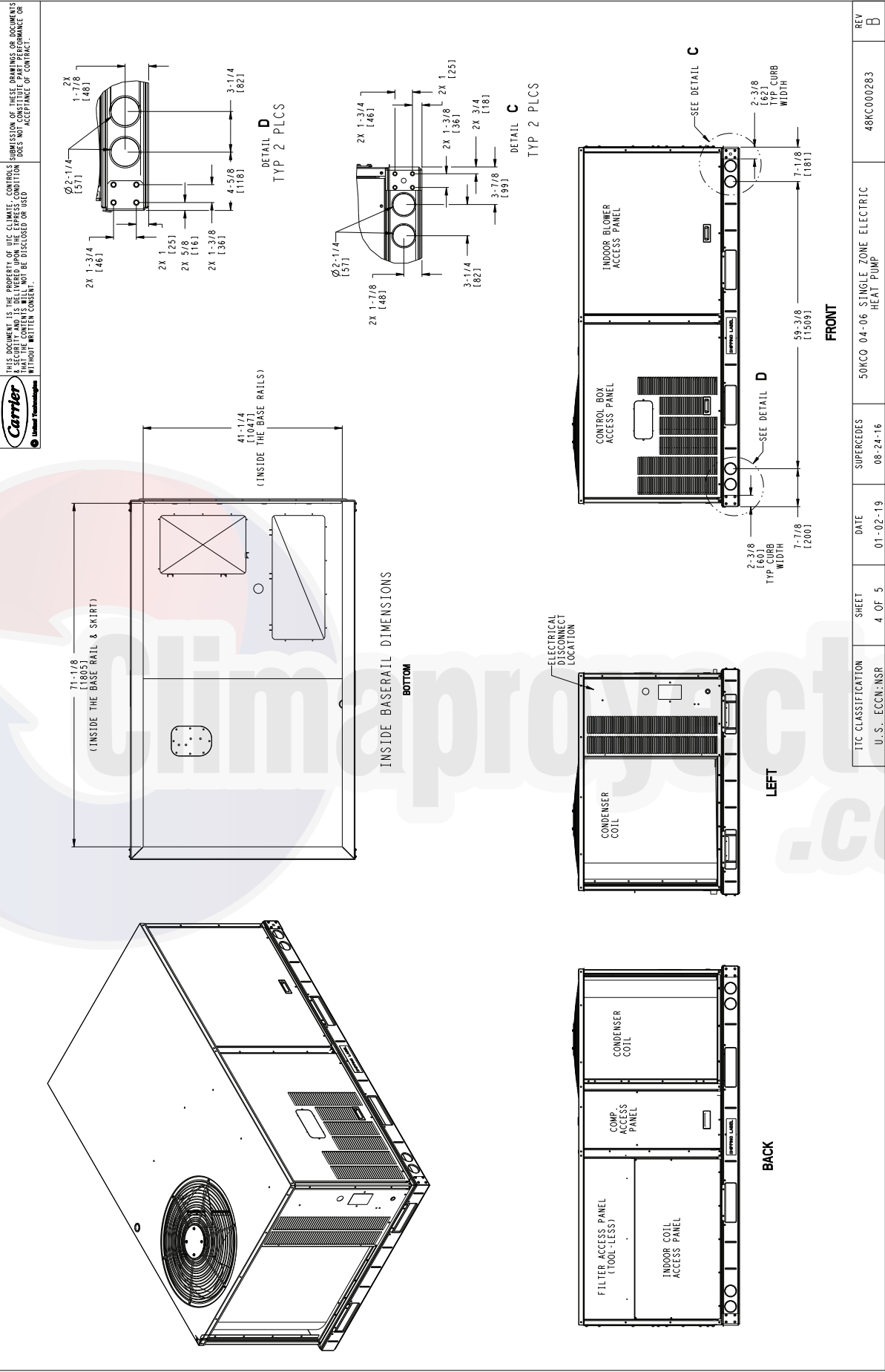


Fig. 5 — Base Rail Details



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THRU-THE-BASE CHART THESE HOLES REQUIRED FOR USE		
THREADED CONDUIT SIZE	WIRE USE	REC'D HOLE SIZES (MAX.)
W 1/2"	115V	7/8" [22.2]
X 1/2"	24V	7/8" [22.2]
Y 3/4"	POWER	1-1/8" [28.4]

FOR "THRU-THE-BASEPAN" FACTORY OPTION, FITTINGS FOR ONLY X & Y ARE PROVIDED.

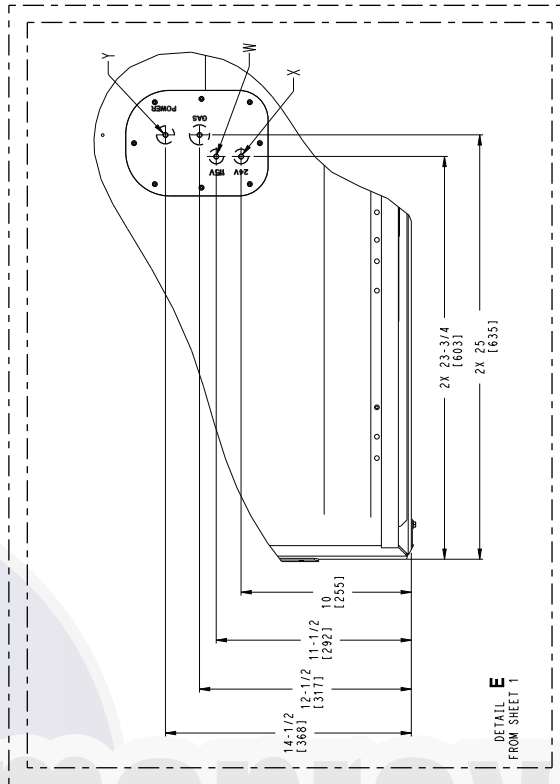
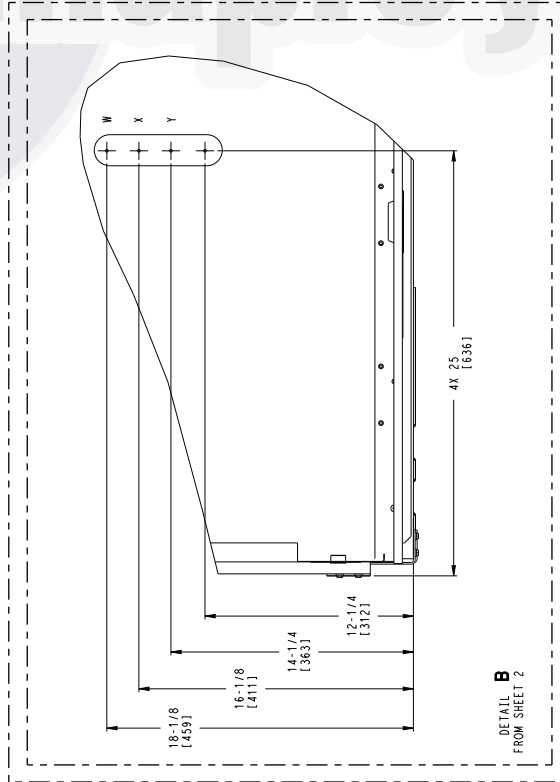
SELECT EITHER 3/4" OR 1/2" FOR POWER, DEPENDING ON WIRE SIZE.

(001A01) PROVIDES 3/4" FPT THRU CURB FLANGE & FITTING

THRU-THE-BASE CHART THESE HOLES REQUIRED FOR USE		
THREADED CONDUIT SIZE	WIRE USE	REC'D HOLE SIZES (MAX.)
W 1/2"	115V	7/8" [22.2]
X 1/2"	24V	7/8" [22.2]
Y 3/4"	POWER	1-1/8" [28.4]

FOR "THRU-THE-BASEPAN" FACTORY OPTION, FITTINGS FOR ONLY X & Y ARE PROVIDED.

(008A00) PROVIDES 3/4" FPT THRU CURB FLANGE & FITTING



THIS VIEW REPRESENTS PRODUCT BUILT ON AND PRIOR TO 04/14/2019

THIS VIEW REPRESENTS PRODUCT BUILT ON AND AFTER 04/15/2019

ITC CLASSIFICATION U.S. - ECCN: NSR	SHEET 5 OF 5	DATE 01-02-19	SUPERCEDES 08-24-16	50KCO 04-06 SINGLE ZONE ELECTRIC HEAT PUMP	48KC000283	REV B
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Fig. 6 — Thru-the-Base Charts



## REFRIGERATION SYSTEM COMPONENTS

### Typical Unit Piping

Each heat pump refrigeration system includes a compressor, accumulator, reversing valve, dual-function outdoor coil with vapor header check valve, cooling liquid line with a filter drier and a check valve, dual-function indoor coil with a vapor header check valve, and heating liquid line with a check valve and a strainer. See Fig. 7 and Tables 2-4 for typical unit piping schematic. Dual-function outdoor and indoor coils are designed to provide parallel coil circuits during evaporator-function operation and converging coil circuits during the condenser-function operation.

### Reversing Valve and Check Valve Position

See Fig. 7 and Tables 2-4.

### Troubleshooting Refrigerant Pressure Problems and Check Valves

Refer to Fig. 7 and Tables 2 and 3.

### Refrigerant System Pressure Access Ports

There are two access ports in each circuit - on the suction tube and the discharge tube near the compressor. These are brass fittings with black plastic caps. The hose connection fittings are standard 1/4-in. SAE male flare couplings.

The brass fittings are two-piece High Flow valves, with a receptacle base brazed to the tubing and an integral spring-closed check valve core screwed into the base. See Fig. 8. This check valve is permanently assembled into this core body and cannot be serviced separately. Replace the entire core body if necessary. Service tools are available from RCD that allow the replacement of the check valve core without having to recover the entire system refrigerant charge. Apply compressor refrigerant oil to the check valve core's bottom O-ring. Install the fitting body and torque to 96 ± 10 in.-lb (10.9 ± 1 Nm). Do not exceed 106 in.-lb (11.9 Nm) when tightening.

Table 2 — Cooling Mode (each circuit)

COMPONENT	STATUS/POSITION
Reversing Valve	Energized
Check Valve A	Closed
Check Valve B	Open
Check Valve C	Closed
Check Valve D	Open

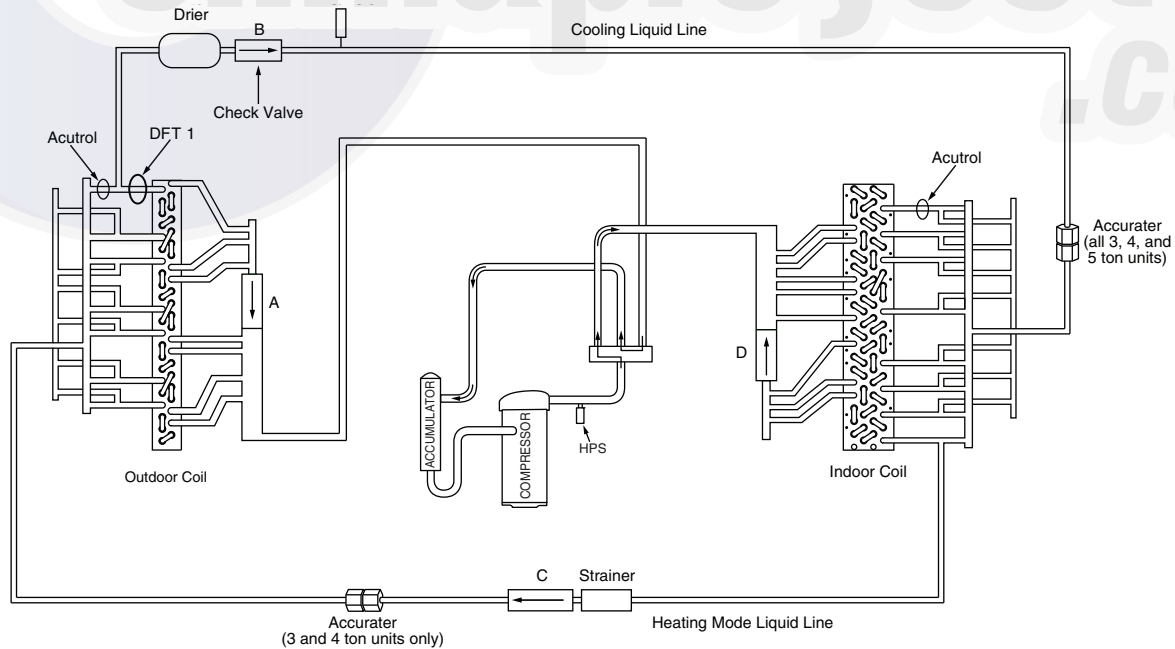
Table 3 — Heating Mode (each circuit)

COMPONENT	STATUS/POSITION
Reversing Valve	De-energized
Check Valve A	Open
Check Valve B	Closed
Check Valve C	Open
Check Valve D	Closed

Table 4 — Defrost Mode

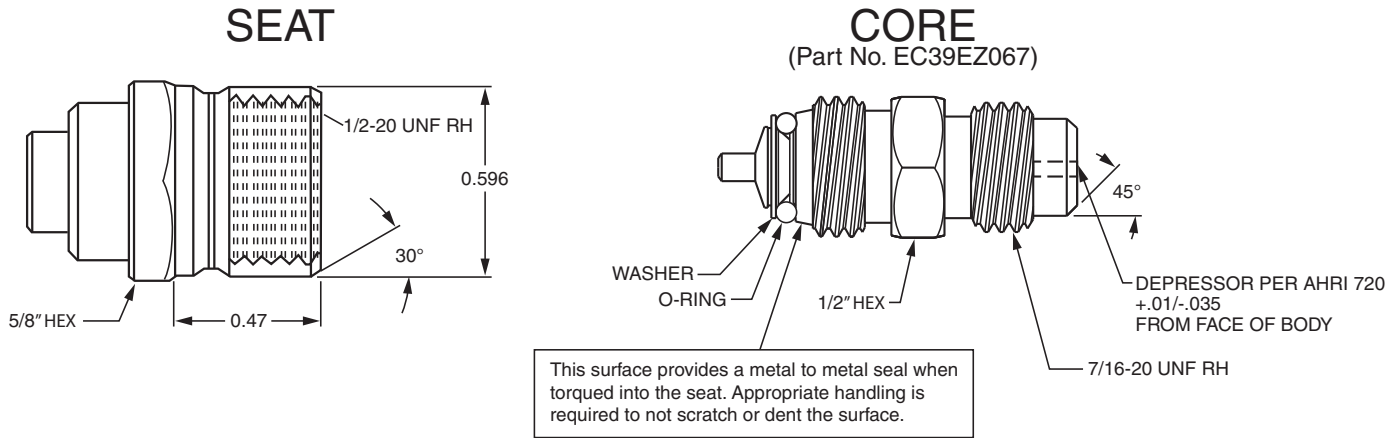
A04-A06 Circuit 2

COMPONENT	STATUS/POSITION
Defrost Thermostat	Closed
Outdoor Fan(s)	Off
Reversing Valve	Energized
Check Valve A	Closed
Check Valve B	Open
Check Valve C	Closed
Check Valve D	Open



\* Schematic shown in Heating Mode.

Fig. 7 — Typical Unit Piping Schematic



**Fig. 8 — CoreMax<sup>1</sup> Access Port Assembly**

## INSTALLATION

### Jobsite Survey

Complete the following checks before installation:

1. Consult local building codes and the NEC (National Electrical Code ANSI/NFPA 70) for special installation requirements.
2. Determine unit location (from project plans) or select unit location.
3. Check for possible overhead obstructions which may interfere with unit lifting or rigging.

### Step 1 — Plan for Unit Location

Select a location for the unit and its support system (curb or other) that provides for minimum clearances required for safety (including clearance to combustible surfaces), unit performance and service access below, around and above unit as specified in unit drawings. See Fig. 4.

NOTE: Consider also the effect of adjacent units.

Unit may be installed directly on wood flooring or on Class A, B, or C roof-covering material when roof curb is used. 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, avoid locations that permit water from higher level runoff and overhangs to fall onto unit.

Select a unit mounting system that provides adequate height to allow for removal and disposal of frost and ice that will form during the heating-defrost mode as well as allow installation of condensate trap per requirements. Refer to "Step 10 — Install External Condensate Trap and Line" on page 16 for required trap dimensions.

### ROOF MOUNT

Check building codes for weight distribution requirements. Unit operating weight is shown in Table 5.

### Step 2 — Plan for Sequence of Unit Installation

The support method used for this unit will dictate different sequences for the steps of unit installation. For example, on curb-

mounted units, some accessories must be installed on the unit before the unit is placed on the curb. Review the following for recommended sequences for installation steps.

### CURB-MOUNTED INSTALLATION

1. Install curb
2. Install field-fabricated ductwork inside curb
3. Install accessory thru-base service connection package (affects curb and unit) (refer to accessory installation instructions for details)
4. Prepare bottom condensate drain connection to suit planned condensate line routing (refer to "Step 10 — Install External Condensate Trap and Line" on page 16 for details)
5. Rig and place unit
6. Install outdoor air hood
7. Install condensate line trap and piping
8. Make electrical connections
9. Install other accessories

### PAD-MOUNTED INSTALLATION

1. Prepare pad and unit supports
2. Check and tighten the bottom condensate drain connection plug
3. Rig and place unit
4. Convert unit to side duct connection arrangement
5. Install field-fabricated ductwork at unit duct openings
6. Install outdoor air hood
7. Install condensate line trap and piping
8. Make electrical connections
9. Install other accessories

### FRAME-MOUNTED INSTALLATION

Frame-mounted applications generally follow the sequence for a curb installation. Adapt as required to suit specific installation plan.

1. CoreMax is a registered trademark of Fastest, Inc.

**Table 5 — Operating Weights**

50KCQ	UNITS LB (KG)	UNITS LB (KG)	UNITS LB (KG)
	04	05	06
<b>Base Unit</b>	495 (224)	580 (263)	610 (276)
<b>Economizer</b>			
<b>Vertical</b>	50 (23)	50 (23)	50 (23)
<b>Horizontal</b>	80 (36)	80 (36)	80 (36)
<b>Cu Fins</b>	25 (11)	43 (20)	56 (25)
<b>Powered Outlet</b>	35 (16)	35 (16)	35 (16)
<b>Curb</b>			
<b>14-in. (356 mm)</b>	115 (52)	115 (52)	115 (52)
<b>24-in. (610 mm)</b>	197 (89)	197 (89)	197 (89)

**Step 3 — Inspect Unit**

Inspect unit for transportation damage. File any claim with transportation agency.

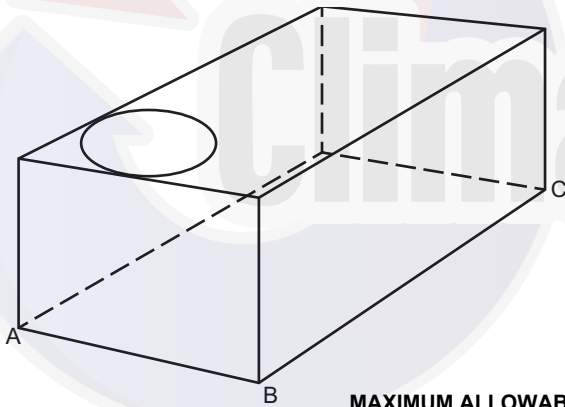
Confirm before installation of unit that voltage, amperage and circuit protection requirements listed on unit data plate agree with power supply provided.

**Step 4 — Provide Unit Support**

**ROOF CURB MOUNT**

Accessory roof curb details and dimensions are shown in Fig. 10. Assemble and install accessory roof curb in accordance with instructions shipped with the curb.

Curb should be level. This is necessary for unit drain to function properly. Unit leveling tolerances are shown in Fig. 9. Refer to Accessory Roof Curb Installation Instructions for additional information as required.



MAXIMUM ALLOWABLE DIFFERENCE in. (mm)		
A-B	B-C	A-C
0.5 (13)	1.0 (25)	1.0 (25)

**Fig. 9 — Unit Leveling Tolerances**

Install insulation, cant strips, roofing felt, and counter flashing as shown. *Ductwork must be attached to curb and not to the unit. The accessory thru-the-base power package must be installed before the unit is set on the roof curb.*

If electric and control wiring is to be routed through the basepan, attach the accessory thru-the-base service connections to the basepan in accordance with the accessory installation instructions.

NOTE: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 10. Improperly applied gasket can also result in air leaks and poor unit performance.

**SLAB MOUNT (HORIZONTAL UNITS ONLY)**

Provide a level concrete slab that extends a minimum of 6-in. (150 mm) beyond unit cabinet. Install a gravel apron in front of condenser coil air inlet to prevent grass and foliage from obstructing airflow.

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

**ALTERNATE UNIT SUPPORT (IN LIEU OF CURB OR SLAB MOUNT)**

A non-combustible sleeper rail can be used in the unit curb support area. If sleeper rails cannot be used, support the long sides of the unit with a minimum of 3 equally spaced 4-in. x 4-in. (102 mm x 102 mm) pads on each side.

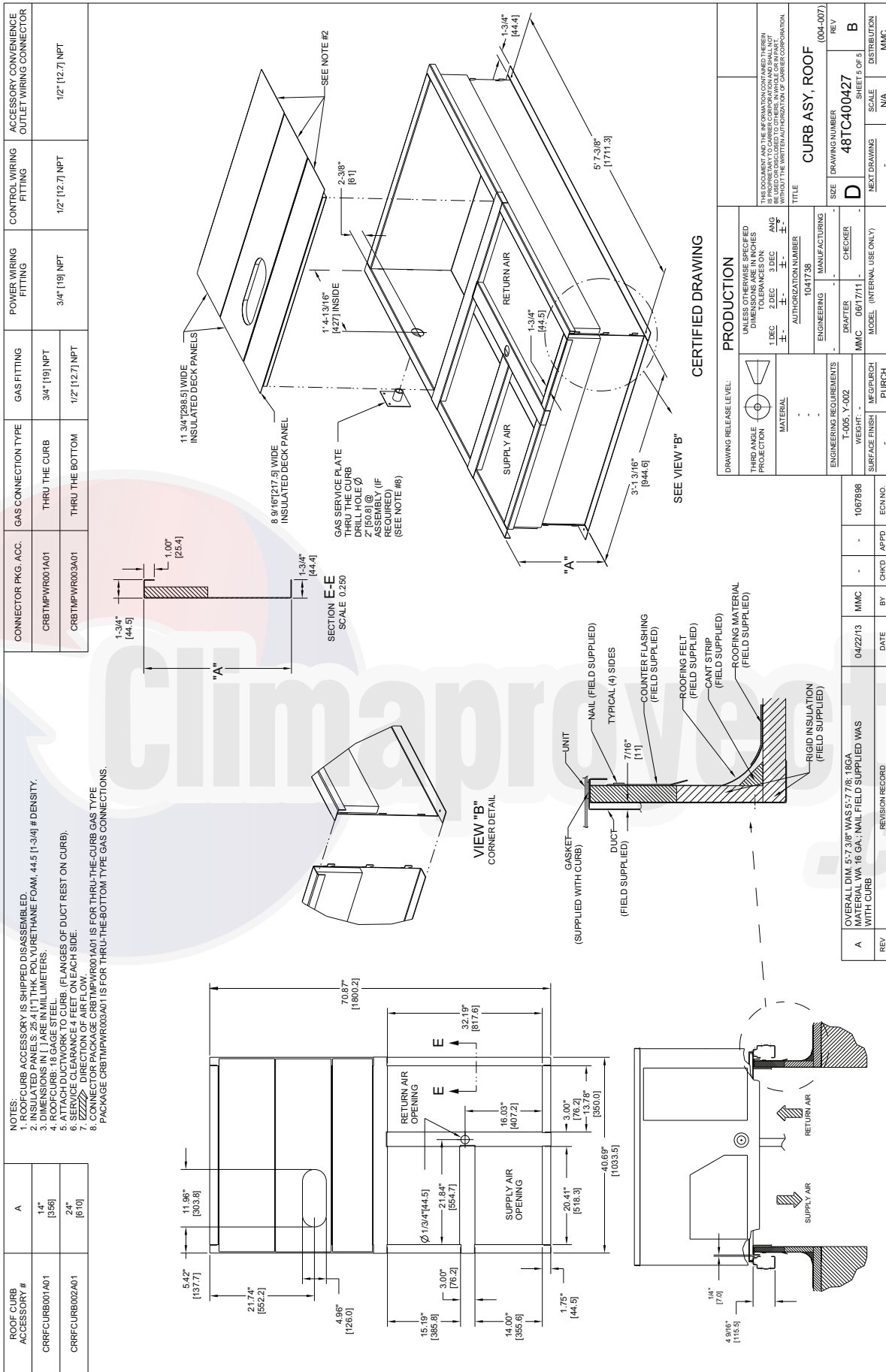


Fig. 10 — Roof Curb Details

## Step 5 — Field Fabricate Ductwork

Cabinet return-air static pressure (a negative condition) shall not exceed 0.35 in. wg (87 Pa) with economizer or 0.45 in. wg (112 Pa) without economizer.

For vertical ducted applications, secure all ducts to roof curb and building structure. *Do not connect ductwork to unit.*

Fabricate supply ductwork so that the cross sectional dimensions are equal to or greater than the unit supply duct opening dimensions for the first 18-in. (458 mm) of duct length from the unit basepan.

Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

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

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

### ⚠ CAUTION

#### PROPERTY DAMAGE HAZARD

Failure to follow this caution may result in damage to roofing materials.

Membrane roofs can be cut by sharp sheet metal edges. Be careful when placing any sheet metal parts on such roof.

#### FOR UNITS WITH ACCESSORY ELECTRIC HEATERS

All installations require a minimum clearance to combustible surfaces of 1-in. (25 mm) from duct for the first 12-in. (305 mm) away from unit.

Outlet grilles must not lie directly below unit discharge.

### ⚠ WARNING

#### PERSONAL INJURY HAZARD

Failure to follow this warning could cause personal injury.

For vertical supply and return units, tools or parts could drop into ductwork and cause an injury. Install a 90 degree turn in the 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. Due to electric heater, supply duct will require 90 degree elbow.

## Step 6 — Rig and Place Unit

Keep unit upright and do not drop. Spreader bars are required. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 5 and Fig. 11 for additional information.

Lifting holes are provided in base rails as shown in Fig. 11. Refer to rigging instructions on unit.

Before setting the unit onto the curb, recheck gasketing on curb.

Rigging materials under unit (cardboard or wood to prevent base pan damage) must be removed PRIOR to placing the unit on the roof curb.

When using the standard side drain connection, ensure the red plug in the alternate bottom connection is tight. Do this before setting the unit in place. The red drain pan plug can be tightened with a 1/2-in. square socket drive extension. For further details see “Step 10 — Install External Condensate Trap and Line” on page 16.

### ⚠ CAUTION

#### UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

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

If using top crate as spreader bar, once unit is set, carefully lower wooden crate off building roof top to ground. Ensure that no people or obstructions are below prior to lowering the crate.

#### POSITIONING ON CURB

Position unit on roof curb so that the following clearances are maintained: 1/4-in. (6.4 mm) clearance between the roof curb and the base rail inside the front and rear, 0.0-in. clearance between the roof curb and the base rail inside on the duct end of the unit. This will result in the distance between the roof curb and the base rail inside on the condenser end of the unit being approximately 1/4-in. (6.4 mm).

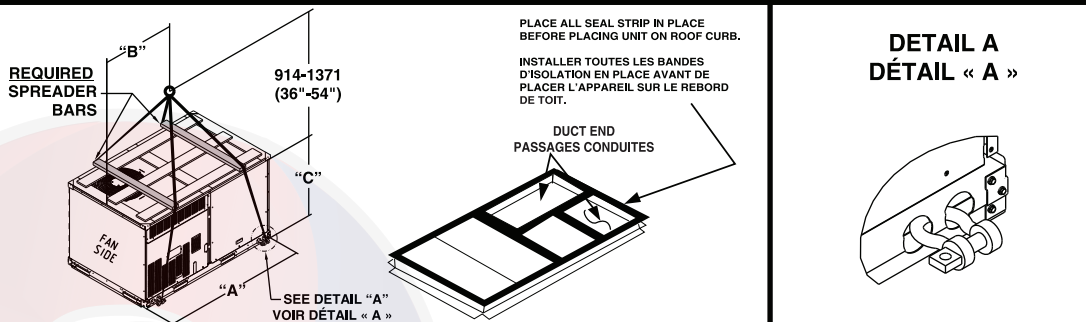
Although unit is weatherproof, guard against water from higher level runoff and overhangs.

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

**⚠ CAUTION - NOTICE TO RIGGERS:  
⚠ AVERTISSEMENT - REMARQUE À  
L'ATTENTION DES MONTEURS**

**ALL PANELS MUST BE IN PLACE WHEN RIGGING.  
TOUS LES CAPOTS DOIVENT ÊTRE EN PLACE AVANT LE LEVAGE**

- Hook rigging shackles through holes in base rail, as shown in detail "A".
- Use wooden top skid, when rigging, to prevent rigging straps from damaging unit.
- Spreader bars required to lift and transport the unit.
- Accrocher les manilles des élingues de levages dans les trous situés dans le rail de base comme indiqué au détail « A ».
- Utiliser des cales en bois lors du levage pour éviter que les élingues n'endommagent le haut de l'appareil.
- Barres d'écartement requises pour soulever et transporter l'unité.



	MAX WEIGHT		A		B		C	
	LB	KG	IN	MM	IN	MM	IN	MM
48KC04	795	361	74.5	1890	39.0	990	33.5	850
48KC05	890	405	74.5	1890	39.0	990	33.5	850
48KC06	1020	464	74.5	1890	39.0	990	41.5	1055
50KC04	760	345	74.5	1890	38.0	965	33.5	850
50KC05	850	386	74.5	1890	38.0	965	33.5	850
50KC06	985	448	74.5	1890	38.0	965	41.5	1055
50KCQ04	755	343	74.5	1890	38.5	980	33.5	850
50KCQ05	870	395	74.5	1890	37.5	955	41.5	1055
50KCQ06	925	420	74.5	1890	37.5	955	41.5	1055

48KC000261 -

Fig. 11 — Rigging Label

**Step 7 — Convert to Horizontal and Connect Ductwork (when required)**

Unit is shipped in the vertical duct configuration. Unit without factory-installed economizer or return-air smoke detector option may be field-converted to horizontal ducted configuration. To convert to horizontal configuration, remove screws from side duct opening covers (see Fig. 12) and remove covers. Use the screws to install the covers on vertical duct openings with the insulation-side down. The panels must be inserted into the notches on the basepan to properly seal. The notches are covered by the tape used to secure the insulation to the basepan and are not easily seen. See Fig. 13 for position of the notches in the basepan. Seals around duct openings must be tight. Secure with screws as shown in Fig. 14. Cover seams with foil duct tape.

Field-supplied flanges should be attached to horizontal duct openings and all ductwork should be secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof or building openings with counter flashing and mastic in accordance with applicable codes.

Do not cover or obscure visibility to the unit's informative data plate when insulating horizontal ductwork.

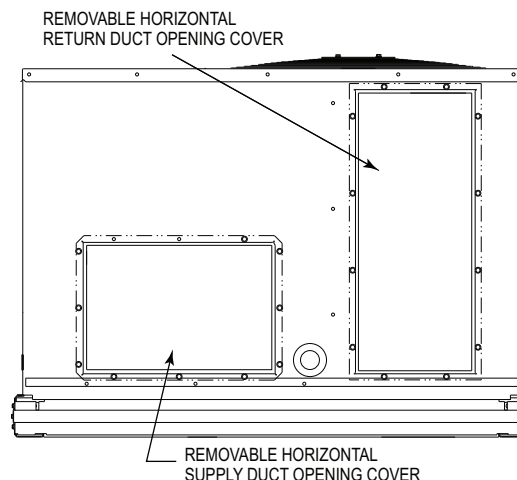
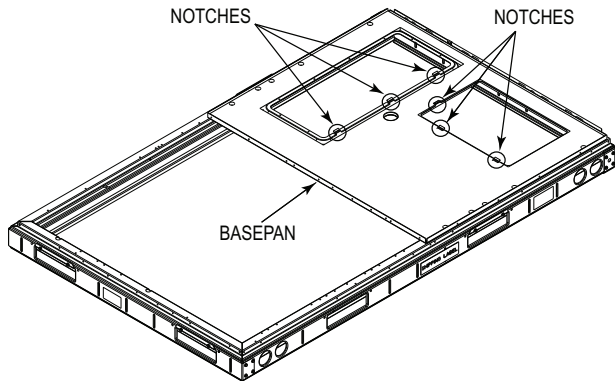
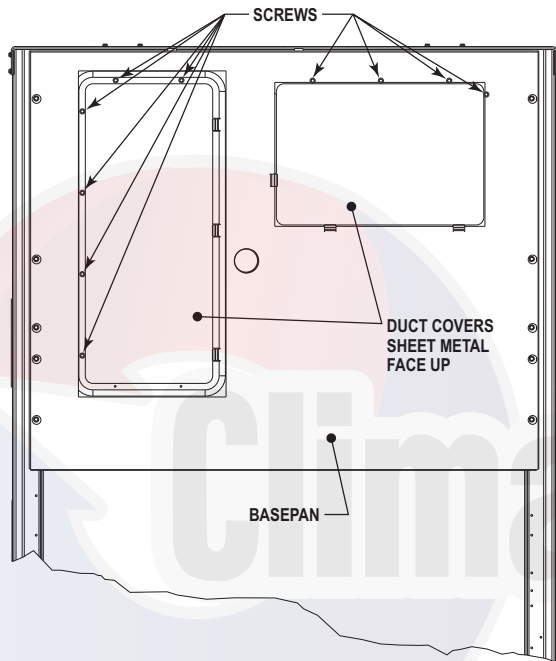


Fig. 12 — Horizontal Conversion Panels



**Fig. 13 — Location of Notches**



**Fig. 14 — Horizontal Duct Panels In Place**

### Step 8 — Install Outside Air Hood

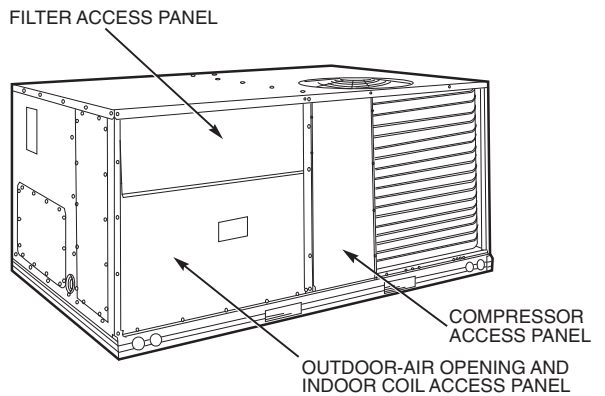
#### ECONOMIZER HOOD PACKAGE REMOVAL AND SETUP – FACTORY OPTION

NOTE: Economizer and Two Position Damper are not available as factory-installed options for size 04-06 single phase (-3 voltage code) models.

1. The hood is shipped in knock-down form and must be field-assembled. The indoor coil access panel is used as the hood top while the hood sides, divider and filter are packaged together, attached to a metal support tray using plastic stretch wrap, and shipped in the return-air compartment behind the indoor coil access panel. The hood assembly's

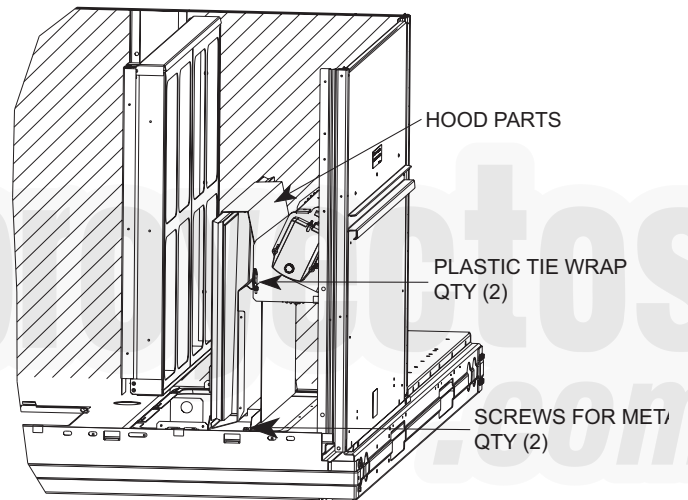
metal tray is attached to the basepan and also attached to the damper using two plastic tie-wraps.

2. To gain access to the hood, remove the filter access panel. (See Fig. 15.)



**Fig. 15 — Typical Access Panel Locations**

3. Locate the 2 screws holding the metal tray to the basepan and remove. Locate and cut the 2 plastic tie-wraps securing the assembly to the damper. (See Fig. 16.) Be careful to not damage any wiring or cut tie-wraps securing any wiring.



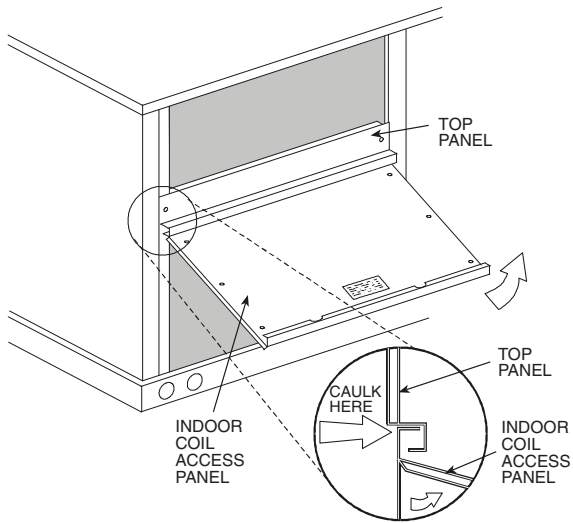
**Fig. 16 — Economizer Hood Parts Location**

4. Carefully lift the hood assembly (with metal tray) through the filter access opening and assemble per the steps outlined in Economizer Hood, below.

#### ECONOMIZER HOOD AND TWO-POSITION HOOD

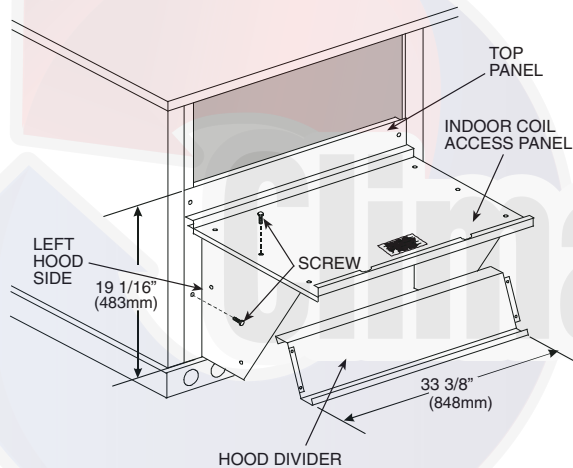
NOTE: If the power exhaust accessory is to be installed on the unit, the hood shipped with the unit will not be used and must be discarded. Save the aluminum filter for use in the power exhaust hood assembly.

1. The indoor coil access panel will be used as the top of the hood. Remove the screws along the sides and bottom of the indoor coil access panel. See Fig. 17.



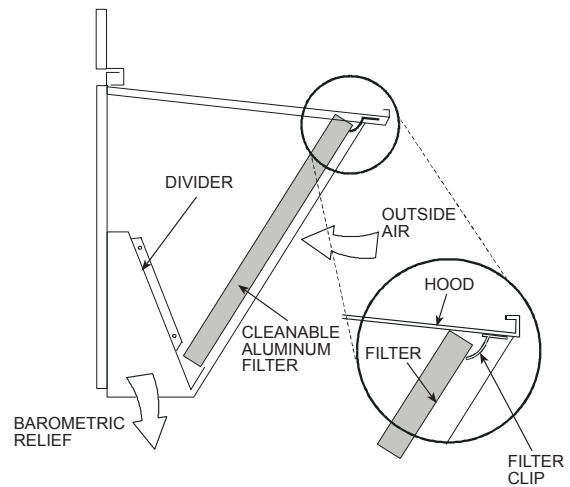
**Fig. 17 — Indoor Coil Access Panel Relocation**

- Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 18.



**Fig. 18 — Economizer Hood Construction**

- Remove the shipping tape holding the economizer barometric relief damper in place (economizer only).
- Insert the hood divider between the hood sides. See Fig. 18 and 19. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.
- Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 19.
- Caulk the ends of the joint between the unit top panel and the hood top.
- Replace the filter access panel.

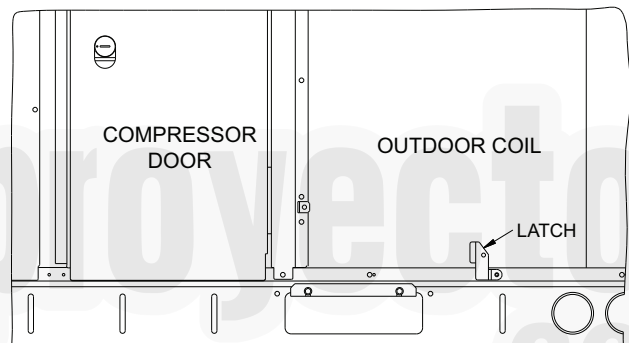


**Fig. 19 — Economizer Filter Installation**

### Step 9 — Units with Hinged Panels Only

Relocate latch shipped inside the compressor compartment behind the hinged compressor door to location shown in Fig. 20 after unit installation.

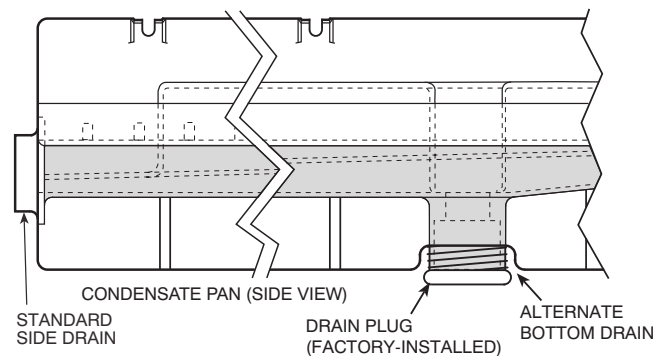
If the unit does not have hinged panels, skip this step and continue at Step 10.



**Fig. 20 — Compressor Door Latch Location**

### Step 10 — Install External Condensate Trap and Line

The unit has one 3/4-in. condensate drain connection on the end of the condensate pan and an alternate connection on the bottom. See Fig. 21. Unit airflow configuration does not determine which drain connection to use. Either drain connection can be used with vertical or horizontal applications.

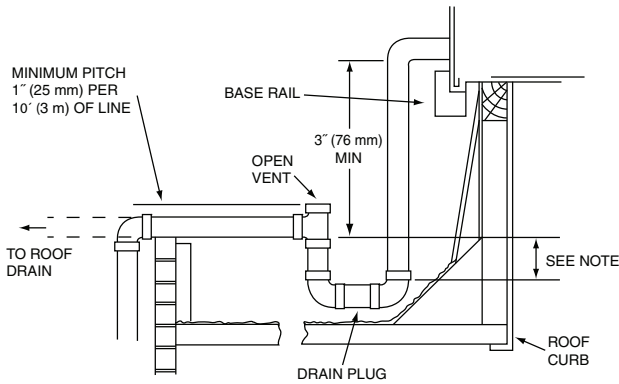


**Fig. 21 — Condensate Drain Pan (Side View)**

To use the alternate bottom drain connection, remove the red drain plug from the bottom connection (use a 1/2-in. square socket drive extension) and install it in the side drain connection.



The piping for the condensate drain and external trap can be completed after the unit is in place. See Fig. 22.



NOTE: Trap should be deep enough to offset maximum unit static difference. A 4-in. (102 mm) trap is recommended.

**Fig. 22 — Condensate Drain Piping Details**

All units must have an external trap for condensate drainage. Install a trap at least 4-in. (102 mm) deep and protect against freeze-up. If drain line is installed downstream from the external trap, pitch the line away from the unit at 1-in. per 10 ft (25 mm in 3 m) of run. Do not use a pipe size smaller than the unit connection (3/4-in.).

### Step 11 — Make Electrical Connections

#### ⚠ WARNING

#### ELECTRIC SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC; ANSI/NFPA 70, latest edition (in Canada, Canadian Electrical Code CSA [Canadian Standards Association] C22.1), and local electrical codes.

NOTE: Field-supplied wiring shall conform with the limitations of minimum 63°F (33°C) rise.

#### FIELD POWER SUPPLY

#### *If equipped with optional powered convenience outlet*

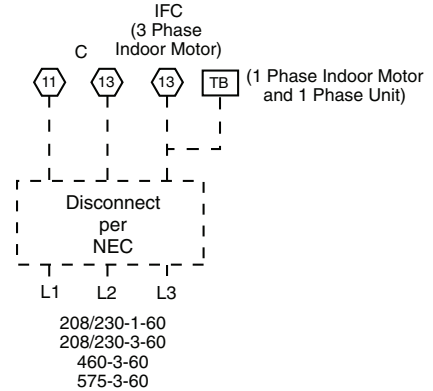
The power source leads to the convenience outlet's transformer primary are not factory-connected. Installer must connect these leads according to required operation of the convenience outlet. If an always-energized convenience outlet operation is desired, connect the source leads to the line side of the unit-mounted disconnect. (Check with local codes to ensure this method is acceptable in your area.) If a de-energize via unit disconnect switch operation of the convenience outlet is desired, connect the source leads to the load side of the unit disconnect. On a unit without a unit-mounted disconnect, connect the source leads to compressor contactor C and indoor fan terminal block (IFTB) pressure lugs with unit field power leads.

Refer to Fig. 29 for power transformer connections and the discussion on connecting the convenience outlet on page 18. Field power wires are connected to the unit at line-side pressure lugs on compressor contactor C and indoor fan contactor IFC (see wiring diagram label for control box component arrangement) or at factory-installed option non-fused disconnect switch. Max

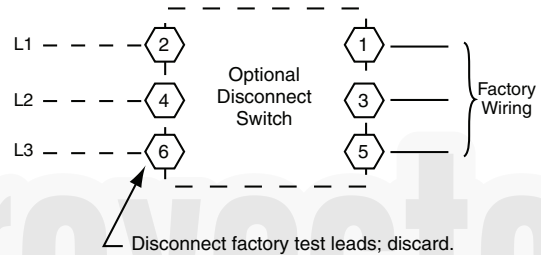
wire size is #2 AWG (copper only). See Fig. 23 and unit label diagram for field power wiring connections.

NOTE: TEST LEADS — Unit may be equipped with short leads (pigtails) on the field line connection points on contactor C or optional disconnect switch. These leads are for factory run-test purposes only; remove and discard before connecting field power wires to unit connection points. Make field power connections directly to line connection pressure lugs only.

#### Units Without Non-Fused Disconnect Option



#### Units With Non-Fused Disconnect Option



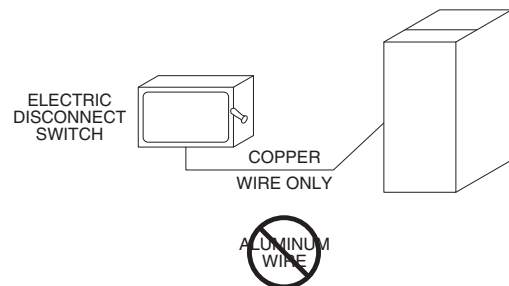
**Fig. 23 — Power Wiring Connections**

#### ⚠ WARNING

#### FIRE HAZARD

Failure to follow this warning could result in intermittent operation or performance satisfaction.

Do not connect aluminum wire between disconnect switch and 50KCQ unit. Use only copper wire. (See Fig. 24.)

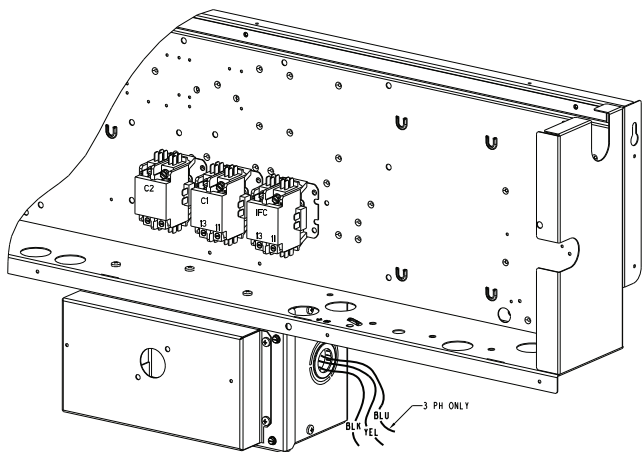


**Fig. 24 — Disconnect Switch and Unit**

#### UNITS WITH FACTORY-INSTALLED NON-FUSED DISCONNECT

The factory-installed option non-fused disconnect (NFD) switch is located in a weatherproof enclosure located under the main control box. The manual switch handle and shaft are shipped in the disconnect enclosure. Assemble the shaft and handle to the switch at this point. Discard the factory test leads (see Fig. 23).

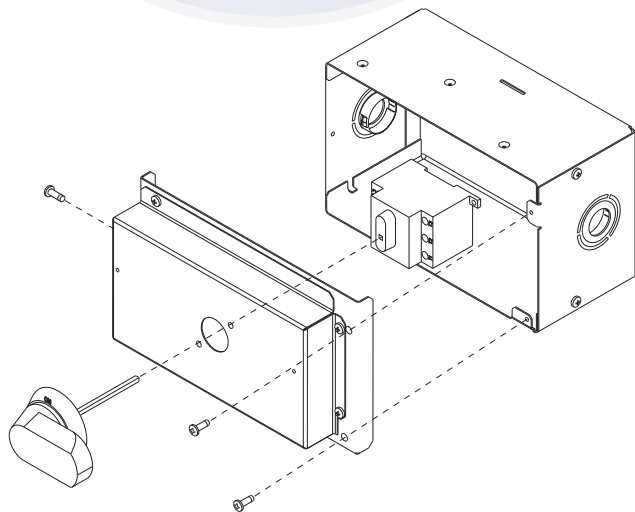
Connect field power supply conductors to LINE side terminals when the switch enclosure cover is removed to attach the handle.



**Fig. 25 — Location of Non-Fused Disconnect Enclosure**

**To field install the NFD shaft and handle:**

1. Remove the unit front panel (see Fig. 2).
2. Remove (3) hex screws on the NFD enclosure — (2) on the face of the cover and (1) on the left side cover.
3. Remove the front cover of the NFD enclosure.
4. Make sure the NFD shipped from the factory is at OFF position (the arrow on the black handle knob is at OFF).
5. Insert the shaft with the cross pin on the top of the shaft in the horizontal position.
6. Measure from the tip of the shaft to the top surface of the black pointer; the measurement should be 3.75 to 3.88 in. (95 to 99 mm).
7. Tighten the locking screw to secure the shaft to the NFD.
8. Turn the handle to the OFF position with red arrow pointing at OFF.
9. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
10. Secure the handle to the painted cover with (2) screws and lock washers supplied.
11. Engaging the shaft into the handle socket, re-install (3) hex screws on the NFD enclosure.
12. Re-install the unit front panel.



**Fig. 26 — Handle and Shaft Assembly for NFD**

**UNITS WITHOUT FACTORY-INSTALLED NON-FUSED DISCONNECT**

When installing units, provide a disconnect switch per NEC (National Electrical Code) of adequate size. Disconnect sizing data is provided on the unit informative plate. Locate disconnect sizing data on unit cabinet or within sight of the unit per national or local codes. Do not cover unit informative plate if mounting the disconnect on the unit cabinet.

**ALL UNITS**

All field wiring must comply with NEC and all local codes. Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 23 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is #2 ga AWG (copper only) per pole on contactors.

Provide a ground-fault and short-circuit over-current protection device (fuse or breaker) per NEC Article 440 (or local codes). Refer to unit informative data plate for MOCP (Maximum Over-current Protection) device size.

All field wiring must comply with the NEC and local requirements.

All units except 208/230-v units are factory wired for the voltage shown on the nameplate. *If the 208/230-v unit is to be connected to a 208-v power supply, the control transformer must be rewired by moving the black wire with the 1/4-in. female spade connector from the 230-v connection and moving it to the 200-v 1/4-in. male terminal on the primary side of the transformer.* Refer to unit label diagram for additional information. Field power wires will be connected line-side pressure lugs on the power terminal block or at factory-installed option non-fused disconnect.

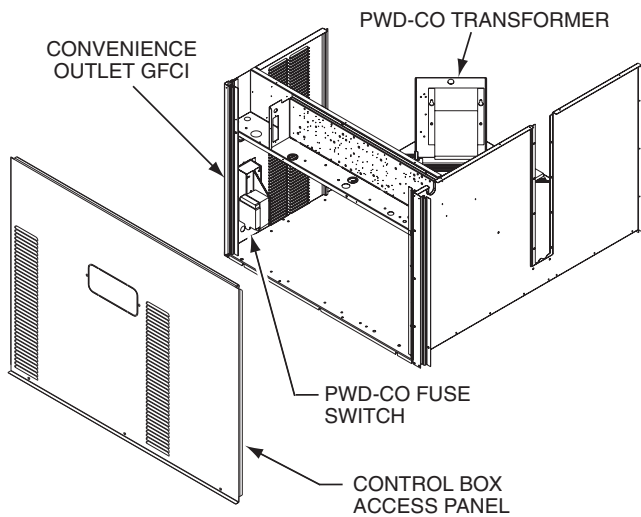
NOTE: Check all factory and field electrical connections for tightness.

**CONVENIENCE OUTLETS**

<b>⚠ WARNING</b>
<b>ELECTRICAL OPERATION HAZARD</b>
Failure to follow this warning could result in personal injury or death.
Units with convenience outlet circuits may use multiple disconnects. Check convenience outlet for power status before opening unit for service. Locate its disconnect switch, if appropriate, and open it. Lock-out and tag-out this switch, if necessary.

Two types of convenience outlets are offered on 50KCQ models: non-powered and unit-powered. Both types provide a 125-v GFCI (ground-fault circuit-interrupter) duplex receptacle rated at 15-A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 27.

NOTE: Unit powered convenience outlets are not available as factory installed options for size 04-06 single phase (-3 voltage code) models.



**Fig. 27 — Convenience Outlet Location**

**Installing Weatherproof Cover:**

A weatherproof while-in-use cover for the factory-installed convenience outlets is now required by UL standards. This cover cannot be factory-mounted due to its depth; it must be installed at unit installation. For shipment, the convenience outlet is covered with a blank cover plate.

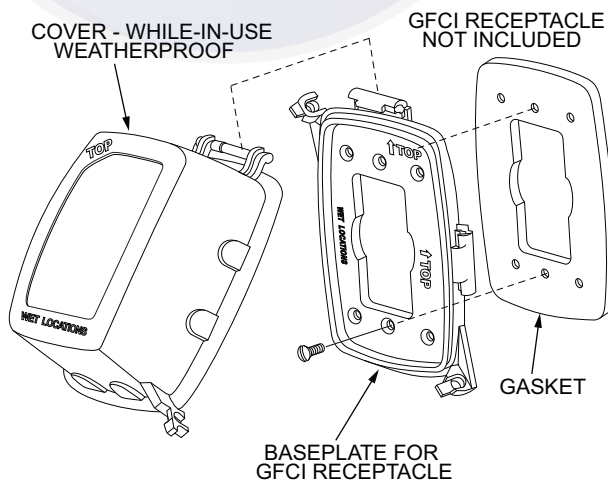
The weatherproof cover kit is shipped in the unit's control box. The kit includes the hinged cover, a backing plate and gasket.

**DISCONNECT ALL POWER TO UNIT AND CONVENIENCE OUTLET. LOCK-OUT AND TAG-OUT ALL POWER.**

Remove the blank cover plate at the convenience outlet; discard the blank cover.

Loosen the two screws at the GFCI duplex outlet, until approximately 1/2-in. (13 mm) under screw heads are exposed. Press the gasket over the screw heads. Slip the backing plate over the screw heads at the keyhole slots and align with the gasket; tighten the two screws until snug (do not over-tighten).

Mount the weatherproof cover to the backing plate as shown in Fig. 28. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover. Check for full closing and latching.



**Fig. 28 — Weatherproof Cover Installation**

**Non-Powered Type:**

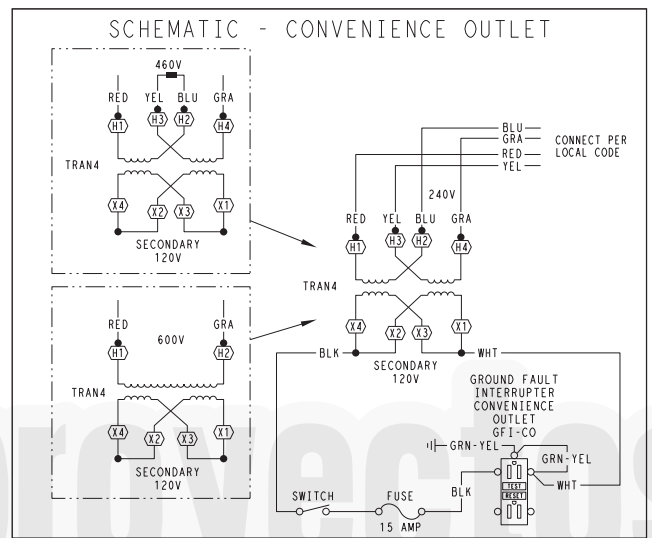
This type requires the field installation of a general-purpose 125-v 15-A circuit powered from a source elsewhere in the building. Observe national and local codes when selecting wire size, fuse or breaker requirements, and disconnect switch size

and location. Route 125-v power supply conductors into the bottom of the utility box containing the duplex receptacle.

**Unit-Powered Type:**

A unit-mounted transformer is factory-installed to stepdown the main power supply voltage to the unit to 115-v at the duplex receptacle. This option also includes a manual switch with fuse, located in a utility box and mounted on a bracket behind the convenience outlet; access is through the unit's control box access panel. See Fig. 27.

The primary leads to the convenience outlet transformer are not factory-connected. Selection of primary power source is a customer option. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect switch; this will provide service power to the unit when the unit disconnect switch is open. Other connection methods will result in the convenience outlet circuit being de-energized when the unit disconnect switch is open. See Fig. 29.



UNIT VOLTAGE	CONNECT AS	PRIMARY CONNECTIONS	TRANSFORMER TERMINALS
208, 230	240	L1: RED + YEL L2: BLU + GRA	H1 + H3 H2 + H4
460	480	L1: RED L2: Splice BLU + YEL L3: GRA	H1 H2 + H3 H4
575	600	L1: RED L2: GRA	H1 H2

**Fig. 29 — Powered Convenience Outlet Wiring**

**Using Unit-Mounted Convenience Outlets:**

Units with unit-mounted convenience outlet circuits will often require that two disconnects be opened to de-energize all power to the unit. Treat all units as electrically energized until the convenience outlet power is also checked and de-energization is confirmed. Observe National Electrical Code Article 210, Branch Circuits, for use of convenience outlets.

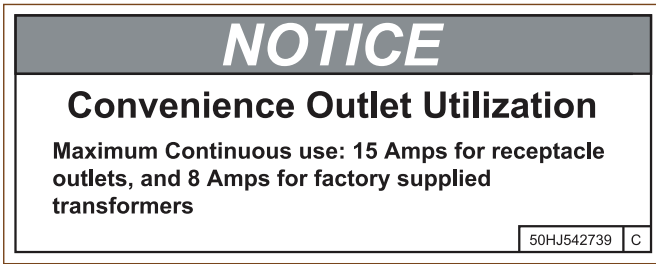
**Fuse on Power Type:**

The factory fuse is a Bussman<sup>1</sup> "Fusetron" T-15, non-renewable screw-in (Edison base) type plug fuse.

**Duty Cycle:**

The unit-powered convenience outlet has a duty cycle limitation. The transformer is intended to provide power on an intermittent basis for service tools, lamps, etc; it is not intended to provide 15 amps loading for continuous duty loads (such as electric heaters for overnight use). Observe a 50% limit on circuit loading above 8 amps.

1. Bussman and Fusetron are trademarks of Cooper Technologies Company.



**Fig. 30 — Convenience Outlet Utilization Notice Label**

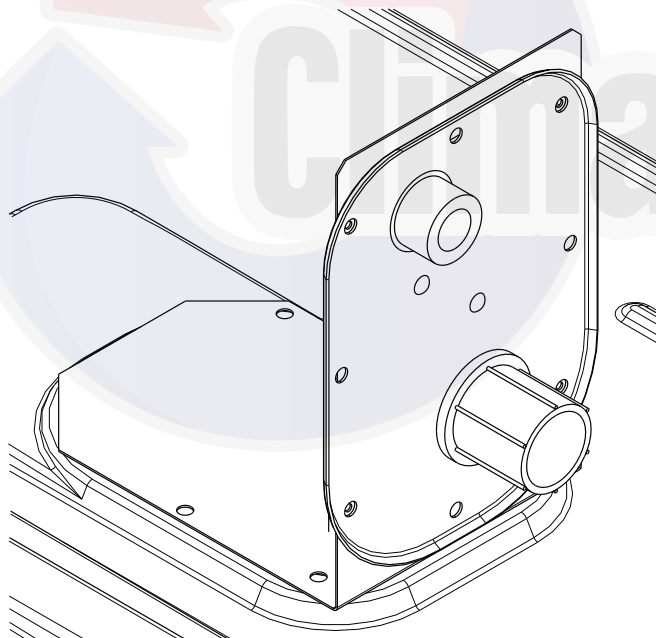
**Convenience Outlet Usage Rating:**

Continuous usage: 8 amps maximum

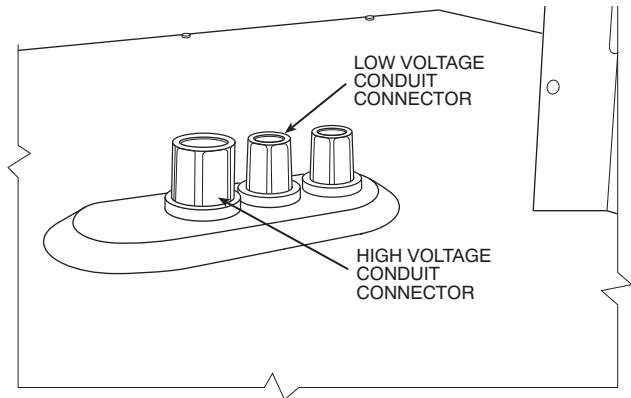
Test the GFCI receptacle by pressing the TEST button on the face of the receptacle to trip and open the receptacle. Check for proper grounding wires and power line phasing if the GFCI receptacle does not trip as required. Press the RESET button to clear the tripped condition.

**FACTORY OPTION THRU-BASE CONNECTIONS**

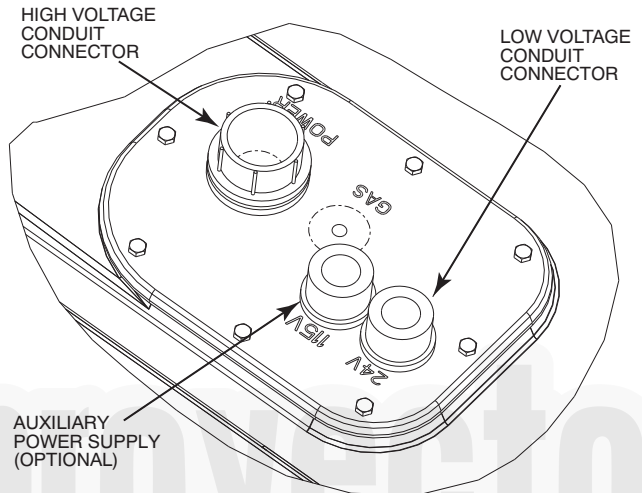
This service connection kit consists of a 1/2-in. electrical bulkhead connector and a 3/4-in. electrical bulkhead connector, connected to an “L” bracket covering the embossed (raised) section of the unit basepan in the condenser section (see Fig. 31 for shipping position). The 3/4-in. bulkhead connector enables the low-voltage control wires to pass through the basepan. The 1/2-in. bulkhead connector allows the high-voltage power wires to pass through the basepan. See Fig. 32 and 33.



**Fig. 31 — Thru-the-Base Fitting Assembly (Shown in Shipping Position)**



**Fig. 32 — Thru-Base Connection Fittings (Units Built Prior to 4/15/2019)**



**Fig. 33 — Thru-Base Connection Fittings (Units Built On and After 4/15/2019)**

1. Remove the “L” bracket assembly from the unit.
2. Remove connector plate assembly from the “L” bracket and discard the “L” bracket, but retain the washer head screws and the gasket (located between the “L” bracket and the connector plate assembly).

NOTE: Take care not to damage the gasket, as it is reused in the following step.

3. Place the gasket over the embossed area in the basepan, aligning the holes in the gasket to the holes in the basepan. See Fig. 31.
4. Install the connector plate assembly to the basepan using 8 of the washer head screws.

NOTE: If electrical connections are not going to occur at this time, tape or otherwise cover the fittings so that moisture does not get into the building or conduit in the interim.

Check tightness of connector lock nuts before connecting electrical conduits.

Field-supplied and field-installed liquid-tight conduit connectors and conduit may be attached to the connectors on the basepan. Pull correctly rated high voltage and low voltage through appropriate conduits. Connect the power conduit to the internal disconnect (if unit is so equipped) or to the external disconnect (through unit side panel). Remove one of the two knockouts located on the bottom left side of the unit control box. Use this hole for the control conduit.

## UNITS WITHOUT THRU-BASE CONNECTIONS

1. Install power wiring conduit through side panel openings. Install conduit between disconnect and control box.
2. Install power lines to terminal connections as shown in Fig. 23.

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

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

Example: Supply voltage is 230-3-60



AB = 224 v  
BC = 231 v  
AC = 226 v

$$\text{Average Voltage} = \frac{(224 + 231 + 226)}{3} = \frac{681}{3} = 227$$

Determine maximum deviation from average voltage.

(AB) 227-224 = 3 v

(BC) 231-227 = 4 v

(AC) 227-226 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{227} = 1.78\%$$

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

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

## FIELD CONTROL WIRING

The 50KCQ unit requires an external temperature control device. This device can be a thermostat (field-supplied) or a PremierLink™ controller (available as factory-installed option or as field-installed accessory, for use on a Carrier Comfort Network or as a stand-alone control) or the RTU Open Controller for Building Management Systems using non-CCN protocols (RTU Open is available as a factory-installed option only).

## THERMOSTAT

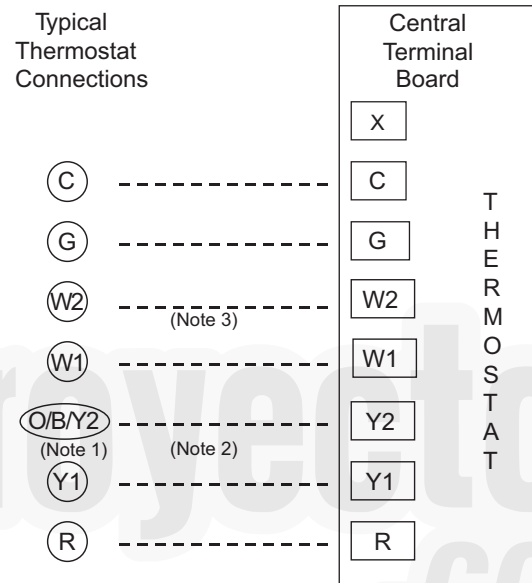
Select a Carrier-approved accessory thermostat. When electric heat is installed in the 50KCQ unit, the thermostat must be capable of energizing the G terminal (to energize the Indoor Fan Contactor) whenever there is a space call for heat (energizing the W1 terminal). The accessory thermostats listed on the unit price pages can provide this signal but they are not configured to enable this signal as shipped.

Install the accessory thermostat according to installation instructions included with the accessory.

Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions.

If the thermostat contains a logic circuit requiring 24-v power, use a thermostat cable or equivalent single leads of different colors with minimum of seven leads. If the thermostat does not require a 24-v source (no “C” connection required), use a thermostat cable or equivalent with minimum of six leads. Check the thermostat installation instructions for additional features which might require additional conductors in the cable.

For wire runs up to 50 ft. (15 m), use no. 18 AWG (American Wire Gage) insulated wire [35°C (95°F) minimum]. For 50 to 75 ft. (15 to 23 m), use no. 16 AWG insulated wire [35°C (95°F) minimum]. For over 75 ft. (23 m), use no. 14 AWG insulated wire [35°C (95°F) minimum]. All wire sizes larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and splice at the thermostat.



Notes:

1. Typical multi-function marking. Follow manufacturer's configuration instructions to select Y2.
2. Y2 to Y2 connection required on single-stage cooling units when integrated economizer function is desired
3. W2 connection not required on units with single-stage heating.

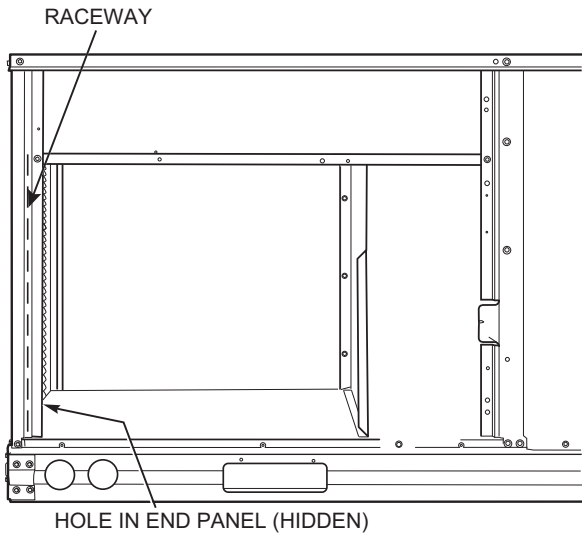
--- Field Wiring

**Fig. 34 — Low-Voltage Connections**

## UNIT WITHOUT THRU-BASE CONNECTION KIT

Pass the thermostat control wires through the hole provided in the corner post; then feed the wires through the raceway built into the corner post to the control box. Pull the wires over to the terminal strip on the upper-left corner of the Controls Connection Board. See Fig. 35.

NOTE: If thru-the-bottom connections accessory is used, refer to the accessory installation instructions for information on routing power and control wiring.



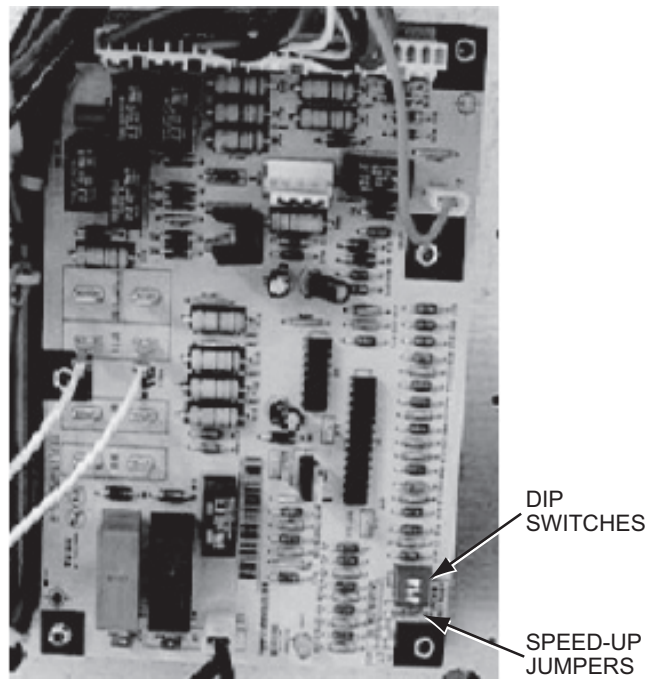
**Fig. 35 — Field Control Wiring Raceway**

**HEAT ANTICIPATOR SETTINGS**

Set heat anticipator settings at 0.14 amp for the first stage and 0.14 amp for second-stage heating, when available.

**COMMERCIAL DEFROST CONTROL**

The Commercial Defrost Control Board (DFB) coordinates thermostat demands for supply fan control, 1 or 2 stage cooling, 2 stage heating, emergency heating and defrost control with unit operating sequences. The DFB also provides an indoor fan off delay feature (user selectable). See Fig. 36 for board arrangement.



**Fig. 36 — Defrost Control Board Arrangement**

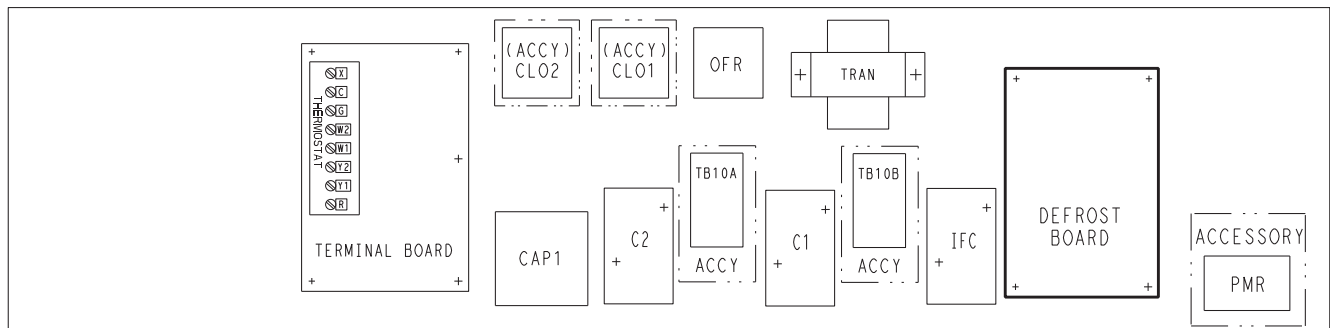
The DFB is located in the 50KCQ's main control box (see Fig. 37). All connections are factory-made through harnesses to the unit's CTB, to IFC (belt-drive motor) or to ECM (direct-drive motor), reversing valve solenoids and to defrost thermostats. Refer to Table 6 for details of DFB Inputs and Outputs. Detailed unit operating sequences are provided in the Start-Up section starting on page 9.

**Reversing valve control**

The DFB has two outputs for unit reversing valve control. Operation of the reversing valves is based on internal logic; this application does not use an "O" or "B" signal to determine reversing valve position. Reversing valves are energized during the cooling stages and the defrost cycle and de-energized during heating cycles. Once energized at the start of a cooling stage, the reversing valve will remain energized until the next heating cycle demand is received. Once de-energized at the start of a Heating cycle, the reversing valves will remain de-energized until the next cooling stage is initiated.

**Compressor control**

The DFB receives inputs indicating Stage 1 Cooling, Stage 2 Cooling and Stage 1 Heating from the space thermostat or unit control system (PremierLink™ controller or RTU Open controller); it generates commands to start compressors with or without reversing valve operation to produce Stage 1 Cooling (one compressor runs), Stage 2 Cooling (both compressors run) or Stage 1 Heating (both compressors run). The 04-06 systems have one compressor.



**Fig. 37 — Defrost Control Board Location**

**Table 6 — 50KCQ Defrost Board I/O and Jumper Configurations**

POINT NAME	TYPE OF I/O	CONNECTION PIN NUMBER	UNIT CONNECTION	NOTE
<b>INPUTS</b>				
G Fan	DI, 24 vac	P2-3	CTB-G	
Y1 Cool 1	DI, 24 vac	P2-5	CTB-Y1	
Y2 Cool 2	DI, 24 vac	P2-4	CTB-Y2	
W1 Heat 1	DI, 24 vac	P2-7	CTB-W1	
W2 Heat 2	DI, 24 vac	P2-6	CTB-W2	
R Power	24 vac	P3-1	CONTL BRD-8	
C Common	24 vac	P3-2	CONTL BRD-4	
DFT1	DI, 24 vac	DFT-1 to DFT-1		
DFT2	DI, 24 vac	DFT-2 to DFT-2		
<b>OUTPUTS</b>				
I/O Fan On	DO, 24 vac	P3-9	REHEAT	
OF OD Fan On	DO, 24 vac	OF	OFR	
RVS1	DO, 24 vac	P3-7 to P3-5		Energize in COOL
RVS2	DO, 24 vac	P3-6 to P3-4		Energize in COOL
COMP 1	DO, 24 vac	P3-10	FPT-REHEAT-6	
COMP 2	DO, 24 vac	P3-8	REHEAT-8	
HEAT 2	DO, 24 vac	E-HEAT	HC-1 (TB4-1)	
COM	24 vac	P3-3	HC-1 (TB4-3)	
<b>CONFIGURATION</b>				
Select Jumper	24 vac	P1-1		
<b>SPEED-UP CONFIGURATION</b>				
Speed-Up Jumper		JMP17		
Speed-Up Jumper		JMP18		

**Table 7 — Dip Switch Position**

SWITCH NO.	1		2		3		4		5		6		Fan Delay	
	1	2	1	2	1	2	1	2	1	2				
1			1		•		1	•		1	•	•	1	On
0	•		•		0		0	•		0		0	0	Off
	90 minutes		60 minutes		30 minutes		120 minutes							

**Auxiliary (Electric) Heat Control**

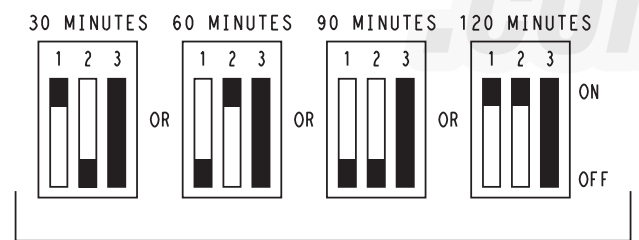
The 50KCQ unit can be equipped with one or two auxiliary electric heaters, to provide a second stage of heating. The DFB will energize this Heating System for a Stage 2 Heating Command (heaters operate concurrently with compressor(s) in the Stage 1 Heating cycle), for an Emergency Heating sequence (compressors are off and only the electric heaters are energized) and also during the Defrost cycle (to eliminate a “cold blow” condition in the space).

**Defrost**

The defrost control mode is a time/temperature sequence. There are two time components: The continuous run period and the test/defrost cycle period. The temperature component is provided by Defrost Thermostat 1 mounted on the outdoor coil.

The continuous run period is a fixed time period between the end of the last defrost cycle (or start of the current Heating cycle) during which no defrost will be permitted. This period can be set at 30, 60, 90 or 120 minutes by changing the positions of DIP switches SW1 and SW2 (see Fig. 38 and Table 7). The default run periods are 60 minutes for unit sizes 04-06.

**DIP SWITCH SETTINGS - DEFROST BD**



FIELD SELECTABLE OPTIONS FOR TIME PERIOD BETWEEN DEFROST CYCLES (MINUTES).

**Fig. 38 — DIP Switch Settings - Defrost Board**

At the end of the continuous run period, the defrost control will test for a need to defrost. On unit sizes 04-06 (single compressor designs), DFT1 controls the start and termination of the defrost cycle. If DFT1 is still open, the defrost test/run window is closed and the control repeats the continuous run period. If DFT1 is closed, the defrost cycle is initiated. The defrost period will end when DFT1 opens (indicating the outdoor coil has been cleared of frost and ice) or a 10 minute elapsed period expires, whichever comes first.

At the end of the unit defrost cycle, the unit will be returned to Heating cycle for a full continuous run period. If the space heating load is satisfied and compressor operation is terminated, the defrost control will remember where the run period was interrupted. On restart in Heating, the defrost control will resume unit operation at the point in the run period where it was last operating.

### Defrost Thermostats

These are temperature switches that monitor the surface temperature of the outdoor coil circuits. These switches are mounted on the liquid tube exiting the outdoor coil heating circuits. These switches close on temperature drop at 30°F (-1°C) and reset open on temperature rise at 80°F (27°C).

### Indoor Fan Off Delay

The DFB can provide a 60 second delay on Indoor Fan Off if the thermostat's fan selector switch is set on AUTO control. DIP Switch SW3 on the DFB selects use of the fan off time delay feature. Setting SW3 in the OPEN position turns the Fan Off Delay feature on; setting SW3 in the CLOSED position disables this feature. The delay period begins when Y1 demand or W1 demand by the space thermostat is removed.

### Defrost Speedup Functions

The DFB permits the servicer to speed-up the defrost cycle. There are two speed-up sequences: relative speed-up and an immediate forced defrost. Speed-up sequences are initiated by shorting jumper wires JMP17 and JMP18 together (see Fig. 36); use a flat-blade screwdriver.

Shorting the jumpers for a period of 1 to 3 seconds reduces the defrost timer periods by a factor of 0.1 sec/minute. (For example, the 90 minute run period is reduced to 9 seconds.) The DFB will step the unit through a Heating cycle and a Defrost cycle using these reduced time periods. This mode ends after the Defrost cycle.

Shorting the jumpers for a period of 5 to 20 seconds bypasses the remaining continuous run period and places the unit in a Forced Defrost mode. If the controlling DFT is closed when this mode is initiated, the unit will complete a normal defrost period that will terminate when the controlling DFT opens or the 10 minute defrost cycle limit is reached. If the controlling DFT is open when this mode is initiated, the Defrost cycle will run for 30 seconds. Both modes end at the end of the Defrost cycle.

### Electric Heaters

The 50KCQ units may be equipped with field-installed accessory electric heaters. The heaters are modular in design, with heater frames holding open coil resistance wires strung through ceramic insulators, line-break limit switches and a control contactor. One or two heater modules may be used in a unit.

Heater modules are installed in the compartment below the indoor (supply) fan outlet. Access is through the indoor access panel. Heater modules slide into the compartment on tracks along the bottom of the heater opening. See Fig. 39-41.

Not all available heater modules may be used in every unit. Use only those heater modules that are UL listed for use in a specific size unit. Refer to the label on the unit cabinet for the list of approved heaters.

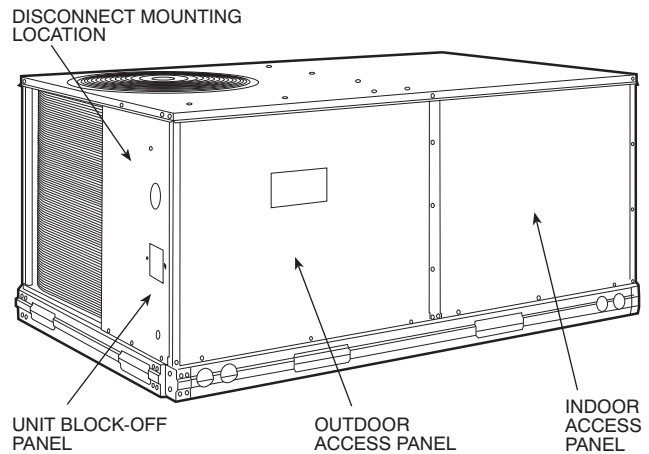


Fig. 39 — Typical Access Panel Location (3-5 Ton)

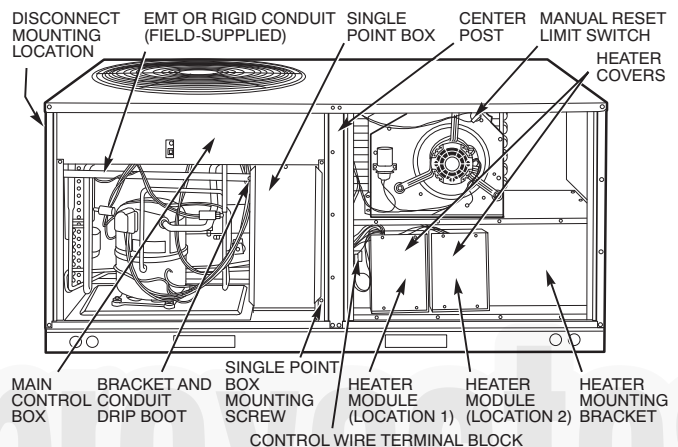


Fig. 40 — Typical Component Location

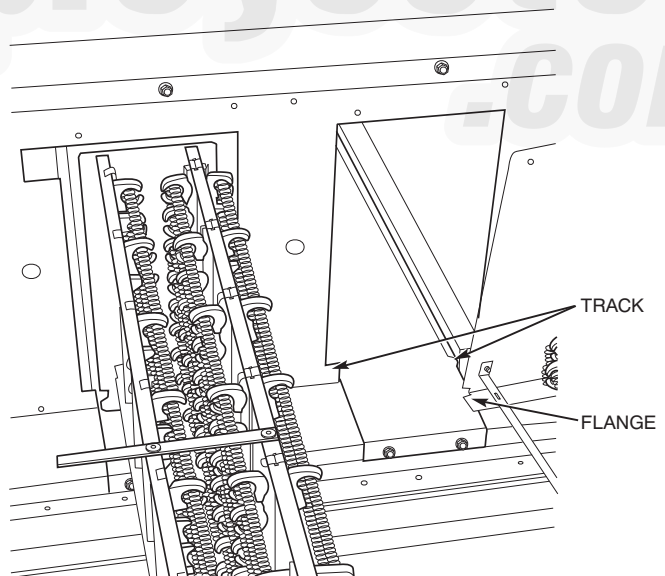


Fig. 41 — Typical Module Installation



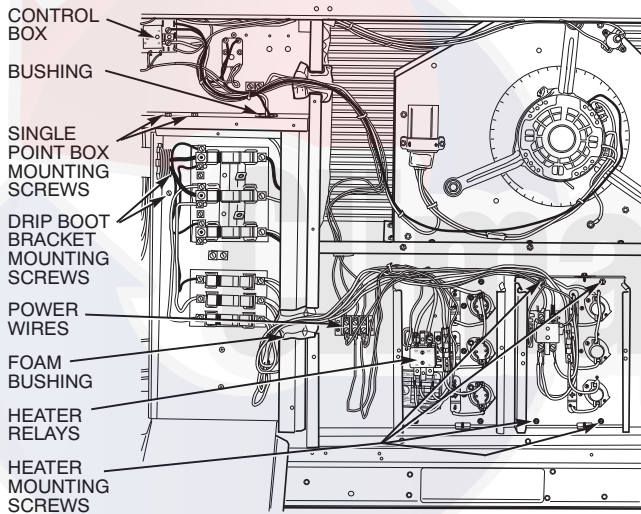
### SINGLE POINT BOXES AND SUPPLEMENTARY FUSES

When the unit MOCB device value exceeds 60-A, unit-mounted supplementary fuses are required for each heater circuit. These fuses are included in accessory single point boxes, with power distribution and fuse blocks. The single point box will be installed directly under the unit control box, just to the left of the partition separating the indoor section (with electric heaters) from the outdoor section. The single point box has a hinged access cover. See Fig. 42. The single point box also includes a set of power taps and pigtailed to complete the wiring between the single point box and the unit's main control box terminals. Refer to the accessory heater and single point box installation instructions for details on tap connections.

All fuses on 50KCQ units are 60-A. (Note that all heaters are qualified for use with a 60-A fuse, regardless of actual heater ampacity, so only 60-A fuses are necessary.)

### SINGLE POINT BOXES WITHOUT FUSES

Unit heater applications not requiring supplemental fuses require a special single point box without any fuses. The accessory single point boxes contain a set of power taps and pigtailed to complete the wiring between the single point box and the unit's main control box terminals. Refer to accessory heater and single point box installation instructions for details on tap connections.



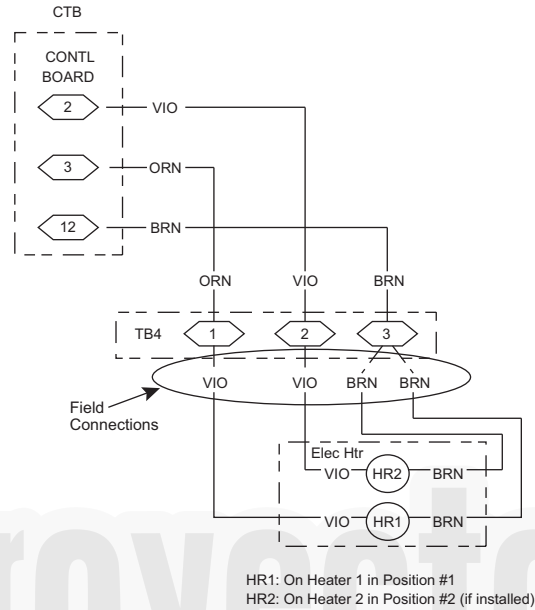
**Fig. 42 — Typical Single Point Installation**

### LOW-VOLTAGE CONTROL CONNECTIONS

Pull the low-voltage control leads from the heater module(s) — VIO and BRN (two of each if two modules are installed; identify for Module #1) — to the 4-pole terminal board TB4 located on the heater bulkhead to the left of Heater #1. Connect the VIO lead from Heater #1 to terminal TB4-1. For 2-stage heating, connect the VIO lead from Heater #2 to terminal TB4-2. For 1-stage heating with 2 heater modules connect the VIO lead from both Heater #1 and #2 to terminal TB4-1. Connect both BRN leads to terminal TB4-3. See Fig. 43.

### Control and Power Wiring Diagrams

See Fig. 44-47.



**Fig. 43 — Accessory Electric Heater Control Connections**

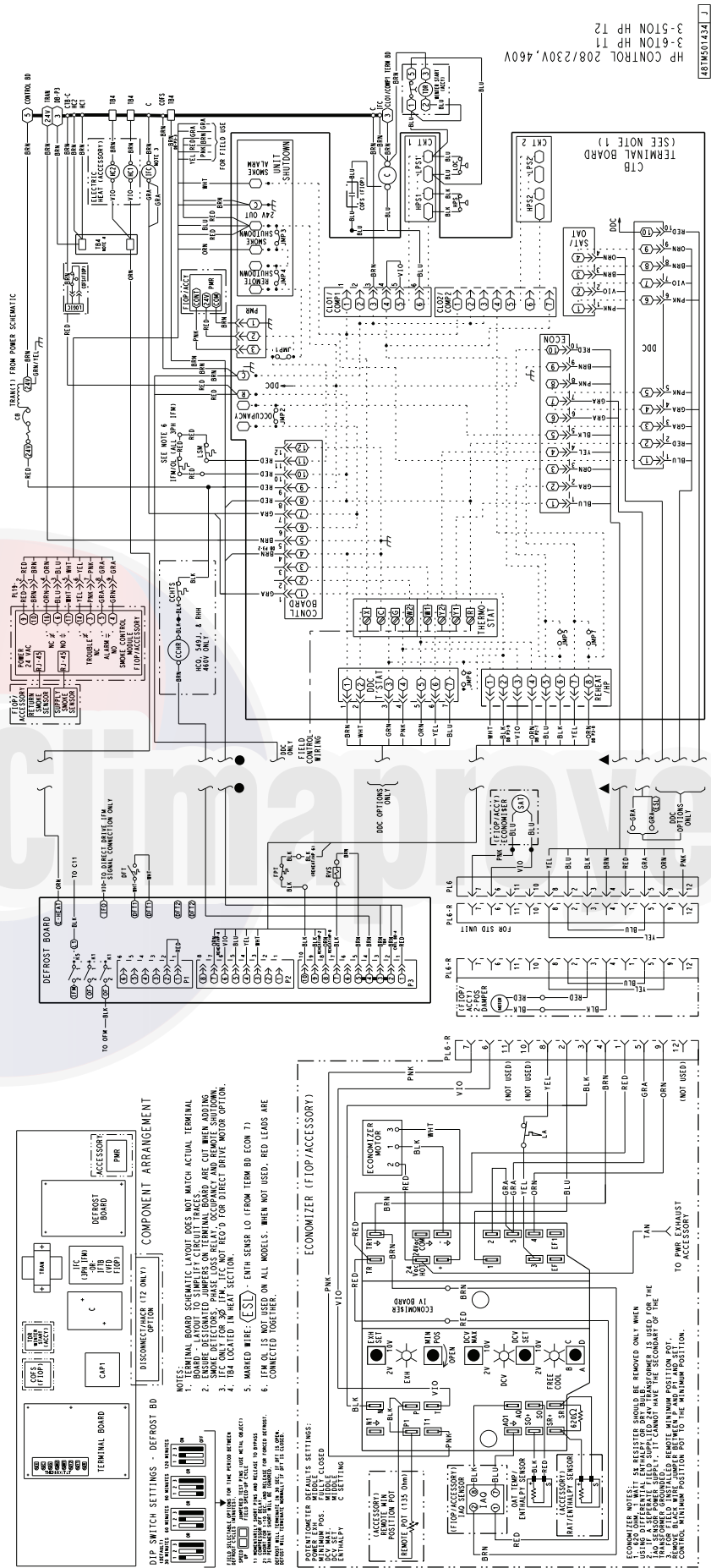


Fig. 44 — Typical 50KCQ 04-6 Electro-Mechanical Control Wiring Diagram (208/230-v, 460-v Shown)

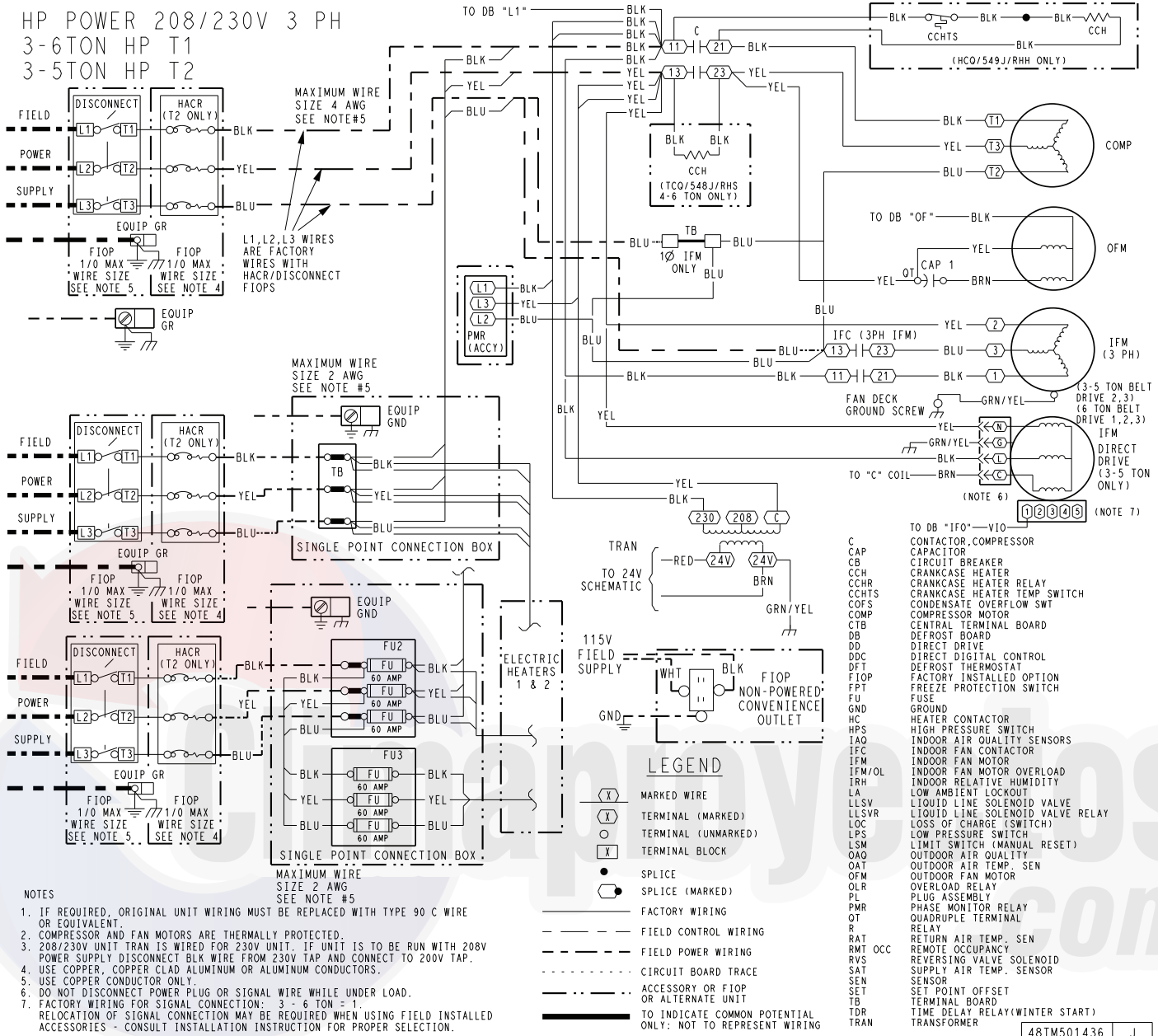


Fig. 45 — Typical 50KCQ 04-06 Electro-Mechanical Power Wiring (208/230-3-60 Hz shown)





## EconoMiSer® X (Factory Option)

The EconoMiSer X system is an expandable economizer control system, which includes a W7220 economizer module (controller) with an LCD and keypad (see Fig. 48). The W7220 can be configured with optional sensors.



**Fig. 48 — W7220 Economizer Module**

The W7220 economizer module can be used as a stand-alone economizer module wired directly to a commercial set-back space thermostat and sensors to provide outside air dry-bulb economizer control.

The W7220 economizer module can be connected to optional sensors for single or differential enthalpy control. The W7220 economizer module provides power and communications for the sensors.

The W7220 economizer module automatically detects sensors by polling to determine which sensors are present. If a sensor loses communications after it has been detected, the W7220 economizer controller indicates a device fail error on its LCD.

### SYSTEM COMPONENTS

The EconoMiSer X system includes an economizer module, 20k mixed air sensor, damper actuator, and either a 20k outdoor air temperature sensor or S-Bus enthalpy sensors.

#### **Economizer Module**

The module is the core of the EconoMiSer X system. The module is mounted in the unit's control box, and includes the user interface for the system. The W7220 economizer module provides the basic inputs and outputs to provide simple economizer control. When used with the optional sensors, the economizer module provides more advanced economizer functionality.

#### **S-Bus Enthalpy Control Sensors**

The sensor is a combination temperature and humidity sensor which is powered by and communicates on the S-Bus. Up to three sensors may be configured with the W7220 economizer module.

#### **CO<sub>2</sub> Sensor (optional)**

The sensor can be added for Demand Controlled Ventilation (DCV).

### SPECIFICATIONS

#### **W7220 Economizer Module**

The module is designed for use with 2 to 10 vdc or bus communicating actuator. The module includes terminals for CO<sub>2</sub> sensor, Mixed Air sensor, and an Outdoor Dry Bulb sensor. Enthalpy and other options are available with bus sensors.

### User Interface

Provides status for normal operation, setup parameters, check-out tests, and alarm and error conditions with a 2-line 16 character LCD display and four button keypad.

### Electrical

- Rated Voltage — 20 to 30 vac RMS, 50/60 Hz
- Transformer — 100 va maximum system input
- Nominal Power Consumption (at 24 vac, 60 Hz) — 11.5 VA without sensors or actuators
- Relay Digital Output Rating at 30 vac (maximum power from Class 2 input only) — 1.5A run:  
3.5A inrush at 0.45PF (200,000 cycles) or  
7.5A inrush at 0.45PF (100,000 cycles)
- External Sensors Power Output — 21 vdc  $\pm$  5% at 48mA

**IMPORTANT:** All inputs and outputs must be Class 2 wiring.

### INPUTS

#### **Sensors**

NOTE: A Mixed Air (MA) analog sensor is required on all W7220 units; either an Outdoor Air (OA) sensor for dry bulb change over or an OA bus sensor for outdoor enthalpy change over is required in addition to the MA sensor. An additional Return Air (RA) bus sensor can be added to the system for differential enthalpy or dry bulb changeover. For differential dry bulb changeover a 20k ohm sensor is required in the OA and a bus sensor in the RA. DIP switch on RA bus sensor must be set in the RA position.

#### Dry Bulb Temperature (optional) and Mixed Air (required), 20k NTC

2-wire (18 to 22 AWG);

Temperature range  $-40^{\circ}\text{F}$  to  $150^{\circ}\text{F}$  ( $-40^{\circ}\text{C}$  to  $65^{\circ}\text{C}$ )

Temperature accuracy:  $0^{\circ}\text{F}/+2^{\circ}\text{F}$  ( $-18^{\circ}\text{C}/-17^{\circ}\text{C}$ )

#### Temperature and Humidity, C7400S1000 (optional)

S-Bus; 2-wire (18 to 22 AWG)

Temperature: range  $-40^{\circ}\text{F}$  to  $150^{\circ}\text{F}$  ( $-40^{\circ}\text{C}$  to  $65^{\circ}\text{C}$ )

Temperature accuracy:  $0^{\circ}\text{F}/+2^{\circ}\text{F}$

Humidity: range 0 to 100% RH with 5% accuracy.

NOTE: Up to three (3) S-Bus sensors may be connected to the W7220 economizer module for outdoor air (OA), return air (RA) and discharge (supply) air (DA).

#### 4 Binary Inputs

1-wire 24 vac + common GND (see page 31 for wiring details).

#### 24 vac power supply

20 to 30 vac 50/60Hz; 100 VA Class 2 transformer.

### OUTPUTS

#### **Actuator Signal**

2 to 10 vdc; minimum actuator impedance is 2k ohm; bus two-wire output for bus communicating actuators.

#### **Exhaust fan, Y1, Y2 and AUX1 O**

All Relay Outputs (at 30 vac):

Running: 1.5A maximum

Inrush: 7.5A maximum

### ENVIRONMENTAL

#### **Operating Temperature**

$-40^{\circ}\text{F}$  to  $150^{\circ}\text{F}$  ( $-40^{\circ}\text{C}$  to  $65^{\circ}\text{C}$ ).

Exception of display operation down to  $-4^{\circ}\text{F}$  ( $-20^{\circ}\text{C}$ ) with full recovery at  $-4^{\circ}\text{F}$  ( $-20^{\circ}\text{C}$ ) from exposure to  $-40^{\circ}\text{F}$  ( $-40^{\circ}\text{C}$ )

**Storage Temperature**

-40°F to 150°F (-40°C to 65°C)

**Shipping Temperature**

-40°F to 150°F (-40°C to 65°C)

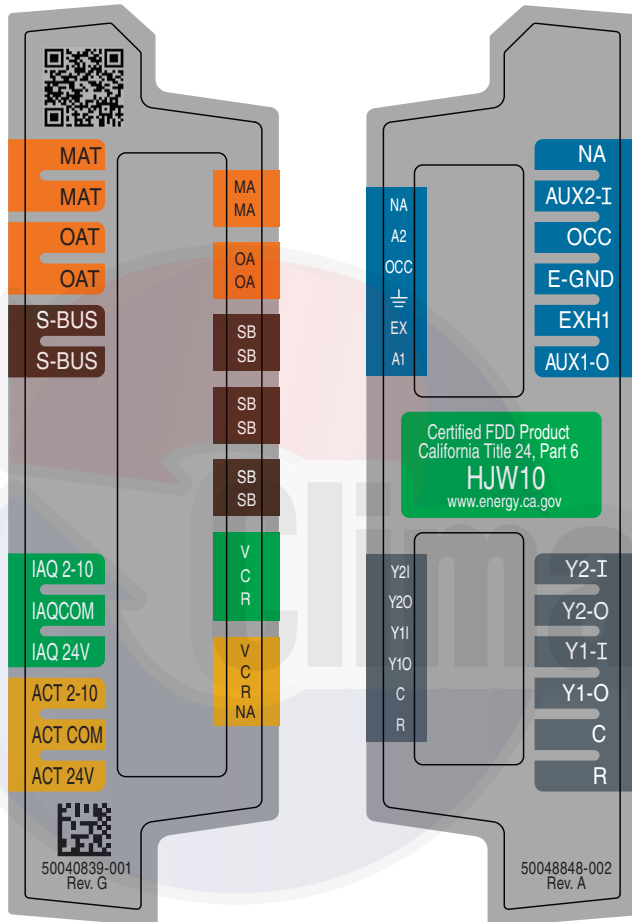
**Relative Humidity**

5% to 95% RH non-condensing

**ECONOMIZER MODULE WIRING DETAILS**

Use Fig. 49 and Tables 8 and 9 to locate the wiring terminals for the Economizer module.

NOTE: The four terminal blocks are removable. Slide out each terminal block, wire it, and then slide it back into place.



**Fig. 49 — W7220 Wiring Terminals**

**Table 8 — Economizer Module - Left Hand Terminal Blocks**

LABEL	TYPE	DESCRIPTION
<b>Top Left Terminal Block</b>		
<b>MAT</b> <b>MAT</b>	20k NTC and COM	Mixed Air Temperature Sensor (Polarity Insensitive Connection)
<b>OAT</b> <b>OAT</b>	20k NTC and COM	Outdoor Air Temperature Sensor (Polarity Insensitive Connection)
<b>S-BUS</b> <b>S-BUS</b>	S-BUS (Sylk* Bus)	Enthalpy Control Sensor (Polarity Insensitive Connection)
<b>Bottom Left Terminal Block</b>		
<b>IAQ 2-10</b>	2-10 vdc	Air Quality Sensor Input (e.g. CO <sub>2</sub> sensor)
<b>IAQ COM</b>	COM	Air Quality Sensor Common
<b>IAQ 24V</b>	24 vac	Air Quality Sensor 24 vac Source
<b>ACT 2-10</b>	2-10 vdc	Damper Actuator Output (2-10 vdc)
<b>ACT COM</b>	COM	Damper Actuator Output Common
<b>ACT 24v</b>	24 vac	Damper Actuator 24 vac Source

\*Sylk is a trademark of Honeywell International Inc.

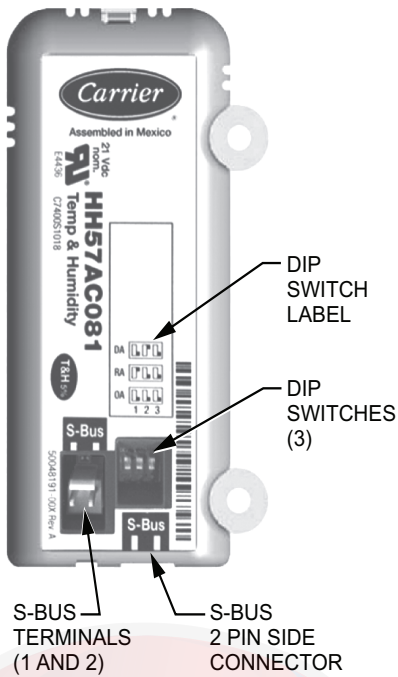
**Table 9 — Economizer Module - Right Hand Terminal Blocks**

LABEL	TYPE	DESCRIPTION
<b>Top Right Terminal Blocks</b>		
<b>AUX2 I</b>	24 vac IN	The first terminal is not used.
<b>OCC</b>	24 vac IN	Shut Down (SD) or HEAT (W) Conventional only and Heat Pump Changeover (O-B) in Heat Pump mode.
<b>E-GND</b>	E-GND	Occupied/Unoccupied Input
<b>EXH1</b>	24 vac OUT	Exhaust Fan 1 Output
<b>AUX1 O</b>	24 vac OUT	Programmable: Exhaust fan 2 output or ERV or System alarm output
<b>Bottom Right Terminal Blocks</b>		
<b>Y2-I</b>	24 vac IN	Y2 in - Cooling Stage 2 Input from space thermostat
<b>Y2-O</b>	24 vac OUT	Y2 out - Cooling Stage 2 Output to stage 2 mechanical cooling
<b>Y1-I</b>	24 vac IN	Y1 in - Cooling Stage 2 Input from space thermostat
<b>Y1-O</b>	24 vac OUT	Y1 out - Cooling Stage 2 Output to stage 2 mechanical cooling
<b>C</b>	COM	24 vac Common
<b>R</b>	24 vac	24 vac Power (hot)

**S-Bus Sensor Wiring**

The labels on the sensors and controller are color coded for ease of installation. Orange labeled sensors can only be wired to orange terminals on the controller. Brown labeled sensors can only be wired to S-bus (brown) terminals. Use Fig. 50 and Table 10 to locate the wiring terminals for each S-Bus sensor.

Use Fig. 49 and Table 10 to locate the wiring terminals for each enthalpy control sensor.



**Fig. 50 — S-Bus Sensor DIP Switches**

**Table 10 — HH57AC081 Sensor Wiring Terminations**

TERMINAL		TYPE	DESCRIPTION
NUMBER	LABEL		
1	S-BUS	S-BUS	S-BUS Communications (Enthalpy Control Sensor Bus)
2	S-BUS	S-BUS	S-BUS Communications (Enthalpy Control Sensor Bus)

Use Fig. 50 and Table 11 to set the DIP switches for the desired use of the sensor.

**Table 11 — HH57AC081 Sensor DIP Switch**

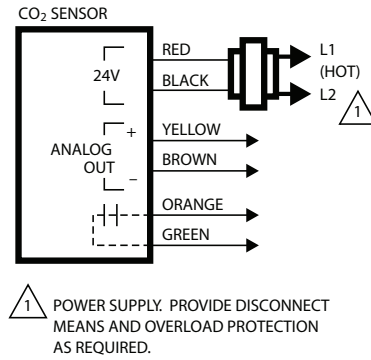
USE	DIP SWITCH POSITIONS FOR SWITCHES 1, 2, AND 3		
	1	2	3
DA	OFF	ON	OFF
RA	ON	OFF	OFF
OA	OFF	OFF	OFF

NOTE: When an S-Bus sensor is connected to an existing network, it will take 60 minutes for the network to recognize and auto-configure itself to use the new sensor.

During the 60 minute setup period, no alarms for sensor failures (except SAT) will be issued and no economizing function will be available.

**CO<sub>2</sub> Sensor Wiring**

When using a CO<sub>2</sub> sensor the black and brown common wires are internally connected and only one is connected to “IAQ COM” on the W7220. Use the power from the W7220 to power the CO<sub>2</sub> sensor OR make sure the ground for the power supplies are common. See Fig. 51 for CO<sub>2</sub> sensor wiring.



**Fig. 51 — CO<sub>2</sub> Sensor Wiring**

**INTERFACE OVERVIEW**

This section describes how to use the EconoMiSer® user interface for:

- Keypad and menu navigation
- Settings and parameter changes
- Menu structure and selection

**User Interface**

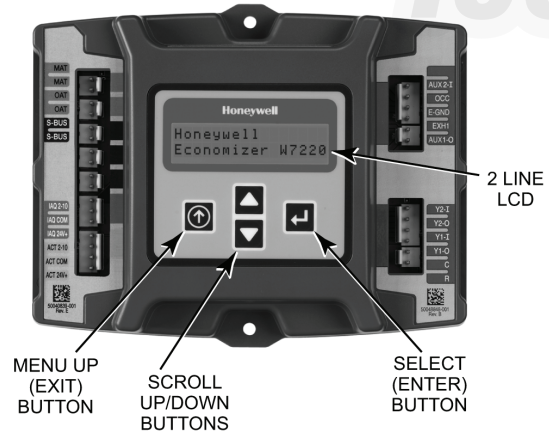
The user interface consists of a 2-line LCD display and a 4-button keypad on the front of the economizer controller.

**Keypad**

Use the four navigation buttons (see Fig. 52) to scroll through the menus and menu items, select menu items, and to change parameter and configuration settings.

To use the keypad when working with menus:

- Press the ▲ (Up arrow) button to move to the previous menu.
- Press the ▼ (Down arrow) button to move to the next menu.
- Press the ↵ (Enter) button to display the first item in the currently displayed menu.
- Press the ⏴ (Menu Up/Exit) button to exit a menu’s item and return to the list of menus.



**Fig. 52 — W7220 Controller Navigation Buttons**

To use the keypad when working with Setpoints, System and Advanced Settings, Checkout tests and Alarms:

1. Navigate to the desired menu.
2. Press the ↵ (Enter) button to display the first item in the currently displayed menu.
3. Use the ▲ and ▼ buttons to scroll to the desired parameter.



4. Press the  $\leftarrow$  (Enter) button to display the value of the currently displayed item.
5. Press the  $\blacktriangle$  button to increase (change) the displayed parameter value.
6. Press the  $\blacktriangledown$  button to decrease (change) the displayed parameter value.

NOTE: When values are displayed, pressing and holding the  $\blacktriangle$  or  $\blacktriangledown$  button causes the display to automatically increment or decrement.

1. Press the  $\leftarrow$  (Enter) button to accept the displayed value and store it in nonvolatile RAM. "CHANGE STORED" displays.
2. Press the  $\leftarrow$  (Enter) button to return to the current menu parameter.
3. Press the  $\uparrow$  (Menu Up/Exit) button to return to the previous menu.

### Menu Structure

Table 12 illustrates the complete hierarchy of menus and parameters for the EconoMiSer® X system.

The Menus in display order are:

- STATUS
- SETPOINTS
- SYSTEM SETUP
- ADVANCED SETUP

- CHECKOUT
- ALARMS

NOTE: Some parameters in the menus use the letters MA or MAT, indicating a mixed air temperature sensor location before the cooling coil. This unit application has the control sensor located after the cooling coil, in the fan section, where it is designated as (Cooling) Supply Air Temperature or SAT sensor.

### SETUP AND CONFIGURATION

Before being placed into service, the W7220 Economizer module must be set up and configured for the installed system.

**IMPORTANT:** During setup, the economizer module is live at all times.

The setup process uses a hierarchical menu structure that is easy to use. Press the  $\blacktriangle$  and  $\blacktriangledown$  arrow buttons to move forward and backward through the menus and press the button to select and confirm setup item changes.

### Time-Out and Screensaver

When no buttons have been pressed for 10 minutes, the LCD displays a screen saver, which cycles through the Status items. Each Status items displays in turn and cycles to the next item after 5 seconds.

**Table 12 — W7220 Menu Structure\***

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
STATUS	ECON AVAIL	NO	YES/NO	FIRST STAGE COOLING DEMAND (Y1-IN) YES = economizing available; the system can use outside air for free cooling when required
	ECONOMIZING	NO	YES/NO	FIRST STAGE COOLING RELAY OUTPUT YES = outside air being used for first stage cooling
	OCCUPIED	NO	YES/NO	OCCUPIED YES = OCC signal received from space thermostat or unitary controller YES = 24 vac on terminal OCC NO = 0 vac on terminal OCC
	HEAT PUMP	N/A**	COOL HEAT	HEAT PUMP MODE Displays COOL or HEAT when system is set to heat pump (Non-conventional)
	COOL Y1—IN	OFF	ON/OFF	FIRST STAGE COOLING DEMAND (Y1-IN) Y1-I signal from space thermostat or unitary controller for cooling stage 1. ON = 24 vac on terminal Y1-I OFF = 0 vac on terminal Y1-I
	COOL Y1—OUT	OFF	ON/OFF	FIRST STAGE COOLING RELAY OUTPUT Cool stage 1 Relay Output to stage 1 mechanical cooling (Y1—OUT terminal)
	COOL Y2—IN	OFF	ON/OFF	SECOND STAGE COOLING DEMAND (Y2—IN) Y2-I signal from space thermostat or unitary controller for second stage cooling. ON = 24 vac on terminal Y2-I OFF = 0 vac on terminal Y2-I
	COOL Y2—OUT	OFF	ON/OFF	SECOND STAGE COOLING RELAY OUTPUT Cool Stage 2 Relay Output to mechanical cooling (Y2—OUT terminal)
	MA TEMP	____ °F (or ____ °C)	-40°F to 150°F (-40°C to 66°C)	SUPPLY AIR TEMPERATURE, Cooling Mode Displays value of measured mixed air from MAT sensor. Displays ____ °F if not connected, short or out of range.
	DA TEMP	____ °F (or ____ °C)	-40°F to 150°F (-40°C to 66°C)	DISCHARGE AIR TEMPERATURE, after Heating section Displays when Discharge Air Syk Bus sensor is connected and displays measured discharge temperature. Displays ____ °F if sensor sends invalid value, if not connected, short or out of range.
	OA TEMP	____ °F (or ____ °C)	-40°F to 140°F (-40°C to 60°C)	OUTSIDE AIR TEMP Displays measured value of outdoor air temperature. Displays ____ °F if sensor sends invalid value, short or out of range.

**Table 12 — W7220 Menu Structure\* (cont)**

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
<b>STATUS (cont)</b>	OA HUM	-- %	0 to 100%	OUTSIDE AIR RELATIVE HUMIDITY Displays measured value of outdoor humidity from OA Sylk Bus sensor. Displays --% if not connected short, or out of range.
	RA TEMP	---.--- °F (or ---.--- °C)	0°F to 140°F (-18°C to 60°C)	RETURN AIR TEMPERATURE Displays measured value of return air temperature from RAT Sylk Bus sensor. Displays ---.--- F if sensor sends invalid value, if not connected, short or out of range
	RA HUM	-- %	0 to 100%	RETURN AIR RELATIVE HUMIDITY Displays measured value of return air humidity from RA Sylk Bus sensor. Displays --% if sensor sends invalid value, if not connected, short or out of range
	IN CO2	--- ppm	0 to 2000 ppm	SPACE/RETURN AIR CO <sub>2</sub> Displays value of measured CO <sub>2</sub> from CO <sub>2</sub> sensor. Invalid if not connected, short or out of range. May be adjusted in Advanced menu by Zero offset and Span.
	DCV STATUS	N/A	ON/OFF	DEMAND CONTROLLED VENTILATION STATUS Displays ON if above set point and OFF if below set point, and ONLY if a CO <sub>2</sub> sensor is connected.
	DAMPER OUT	2.0v	2.0 to 10.0v	Displays voltage output to the damper actuator.***
	ACT POS	N/A	0 to 100%	Displays actual position of actuator
	ACT COUNT	N/A	1 to 65,535	Displays number of times actuator has cycled. 1 cycle equals 180 degrees of actuator movement in any direction.
	ACTUATOR	N/A	OK/Alarm (on Alarm menu)	Displays ERROR if voltage or torque is below actuator range.
	EXH1 OUT	OFF	ON/OFF	EXHAUST STAGE 1 RELAY OUTPUT Displays ON when damper position reaches programmed percentage set point. Output of EXH1 terminal: ON = relay closed OFF = relay open
	EXH2 OUT	OFF	ON/OFF	EXHAUST STAGE 2 RELAY OUTPUT Output of AUX1 O terminal Displays ON when damper position reaches programmed percentage set point. ON = 24 vac output OFF = No output Displays only if AUX1 O = EXH2
	ERV	OFF	ON/OFF	ENERGY RECOVERY VENTILATOR Output of AUX1 O terminal; displays only if AUX1 O = ERV ON = 24 vac output OFF = No Output
	MECH COOL ON or HEAT STAGES ON	0	0, 1, or 2	Displays stage of mechanical cooling that is active. Displays the stage of heat pump heating that is active.
	FAN SPEED	N/A	LOW or HIGH	SUPPLY FAN SPEED Displays speed setting of fan on a 2-speed fan unit.
	W (HEAT IN)	N/A	ON/OFF	HEAT DEMAND STATUS Displays status of heat demand on a 2-speed fan unit.
<b>SETPOINTS</b>	MAT SET	53°F (12°C)	38°F to 70°F (3°C to 21°C); increment by 1 degree	SUPPLY AIR SETPOINT The economizer will modulate the OA damper to maintain the mixed air temperature at the set point
	LOW T LOCK	32°F (0°C)	-45°F to 80°F (-43°C to 27°C); increment by 1 degree	COMPRESSOR LOW TEMPERATURE LOCKOUT Set point determines outdoor temperature where the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout. At or below the set point, the Y1-O and Y2-O will not be energized on the controller.
	DRYBLB SET	63°F (17°C)	48°F to 80°F (9°C to 27°C); increment by 1 degree	OA DRY BULB TEMPERATURE CHANGEOVER SETPOINT Dry bulb set point will only appear if using dry bulb changeover. Set point determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.; at 63°F unit will economize at 62°F and below and not economize at 64°F and above. There is a 2°F deadband.
	ENTH CURVE	ES3	ES1,ES2,ES3,ES4, or ES5	ENTHALPY CHANGEOVER CURVE ES curve will only appear if using enthalpy changeover. Enthalpy boundary "curves" for economizing using single enthalpy. See page 39 for description of enthalpy curves.
	DCV SET	1100ppm	500 to 2000 ppm; increment by 100	DEMAND CONTROLLED VENTILATION Displays only if CO <sub>2</sub> sensor is connected. Set point for Demand Controlled Ventilation of space. Above the set point, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the set point.

**Table 12 — W7220 Menu Structure\* (cont)**

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
SETPOINTS (cont)	MIN POS	2.8 V	2 to 10 vdc	VENTILATION MINIMUM POSITION Displays ONLY if a CO <sub>2</sub> sensor is NOT connected.
	VENTMAX	2.8 V	2 to 10 vdc	DCV MAXIMUM DAMPER POSITION Displays only if a CO <sub>2</sub> sensor is connected. Used for Vbz (ventilation max cfm) set point. VENTMAX is the same setting as MIN POS would be if unit did not have CO <sub>2</sub> sensor.
			100 to 9990 cfm; increment by 10	If OA, MA, RA, and CO <sub>2</sub> sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 CFM.
			2 to 10 vdc	With 2-speed fan units, VENTMAX L (low speed fan) and VENTMAX H (high speed fan) settings are required. Default for VENTMAX L is 3.2V and VENTMAX H is 2.8V
	VENTMIN	2.25 V	2 to 10 vdc or 100 to 9990 cfm increment by 10	DCV MINIMUM DAMPER POSITION Displays only if a CO <sub>2</sub> sensor is connected. Used for Va (ventilation min cfm) set point. This is the ventilation for less than maximum occupancy of the space.
			100 to 9990 cfm; increment by 10	If OA, MA, RA, and CO <sub>2</sub> sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 CFM.
			2 to 10 vdc	With 2-speed fan units VENTMIN L (low speed fan) and VENTMIN H (high speed fan) settings are required. Default for VENTMIN L is 2.5V and VENTMIN H is 2.25V
	ERV OAT SP††	32°F (0°C)	0°F to 50°F (-18°C to 10°C); increment by 1 degree	ENERGY RECOVERY VENTILATOR UNIT OUTDOOR AIR TEMPERATURE SETPOINT Only when AUX1 O = ERV
EXH1 SET	50%	0 to 100%; increment by 1	EXHAUST FAN STAGE 1 SETPOINT Set point for OA damper position when exhaust fan 1 is powered by the economizer.	
EXH2 SET	75%	0 to 100%; increment by 1	EXHAUST FAN STAGE 2 SETPOINT Set point for OA damper position when exhaust fan 2 is powered by the economizer. Only used when AUX1 O is set to EXH2.	
SYSTEM SETUP	INSTALL	01/01/10	N/A	Display order = MM/DD/YY Setting order = DD, MM, then YY.
	UNITS DEG	°F	°F or °C	Sets economizer controller in degrees Fahrenheit or Celsius
	EQUIPMENT	CONV	CONV or HP	CONV = conventional; HP O/B = Enable Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller.
	AUX2 IN	W	Shutdown (SD) Heat (W1) HP(O) HP(B)	In CONV mode: SD = Enables configuration of shutdown (default); W = Informs controller that system is in heating mode. In HP O/B mode: HP(O) = energize heat pump on Cool (default); HP(B) = energize heat pump on heat.
	FAN SPEED	2 speed	1 speed/2 speed	Sets the economizer controller for operation of 1 speed or 2 speed supply fan. The controller does not control the fan, but positions the OA and RA dampers to heating or cooling mode.
	FAN CFM	5000 cfm	100 to 15000 cfm; increment by 100	UNIT DESIGN AIRFLOW (CFM) Enter only if using DCVCAL ENA = AUTO This is the capacity of the RTU. The value is found on the nameplate label for the specific unit.
	AUX1 OUT	NONE	NONE ERV EXH2 SYS	Select OUTPUT for AUX1 O relay • NONE = not configured (output is not used) • ERV = Energy Recovery Ventilator†† • EXH2 = second damper position 24 vac out for second exhaust fan • SYS = use output as an alarm signal
	OCC	INPUT	INPUT or ALWAYS	OCCUPIED MODE BY EXTERNAL SIGNAL When using a setback thermostat with occupancy out (24 vac), the 24 vac is input "INPUT" to the OCC terminal. If no occupancy output from the thermostat, then change program to "ALWAYS" OR add a jumper from terminal R to OCC terminal.
	FACTORY DEFAULT	NO	NO or YES	Resets all set points to factory defaults when set to YES. LCD will briefly flash YES and change to NO but all parameters will change to the factory default values.
	ADVANCED SETUP	MA LO SET	45°F (7°C)	35°F to 65°F (2°C to 18°C); Increment by 1 degree
FREEZE POS		CLO	CLO or MIN	FREEZE PROTECTION DAMPER POSITION Damper position when freeze protection is active (closed or MIN POS).
CO2 ZERO		0ppm	0 to 500 ppm; Increment by 10	CO <sub>2</sub> ppm level to match CO <sub>2</sub> sensor start level.

**Table 12 — W7220 Menu Structure\* (cont)**

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
<b>ADVANCED SETUP (cont)</b>	CO2 SPAN	2000ppm	1000 to 3000 ppm; Increment by 50	CO <sub>2</sub> ppm span to match CO <sub>2</sub> sensor; e.g.: 500-1500 sensor output would be 500 CO <sub>2</sub> zero and 1000 CO <sub>2</sub> span.
	STG3 DLY	2.0h	0 min, 5 min, 15 min, then 15 min intervals. Up to 4 hrs or OFF	<b>COOLING STAGE 3 DELAY</b> Delay after stage 2 cool has been active. Turns on second stage of cooling when economizer is first stage call and mechanical cooling is second stage call. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling
	SD DMPR POS	CLO	CLO or OPN	Indicates shutdown signal from space thermostat or unitary controller. When controller receives 24 vac input on the SD terminal in conventional mode, the OA damper will open if programmed for OPN and OA damper will close if programmed for CLO. All other controls, e.g., fans, etc. will shut off.
	DA LO ALM	45°F (7°C)	NONE 35°F to 65°F (2°C to 18°C); Increment by 5°F	Used for alarm for when the DA air temperature is too low. Set lower range of alarm, below this temperature the alarm will show on the display.
	DA HI ALM	80°F (27°C)	NONE 70°F to 180°F (21°C to 82°C); Increment by 5°F	Used for alarm for when the DA air temperature is too high. Sets upper range of alarm; above this temperature, the alarm will show on the display.
	DCVCAL ENA	MAN	MAN (manual) AUTO	Turns on the DCV automatic control of the dampers. Resets ventilation based on the RA, OA, and MA sensor conditions. Requires all (RA, OA, MA, CO <sub>2</sub> ) sensors. This operation is not operable with a 2-speed fan unit.
	MAT T CAL	0.0°F	± 2.5°F	<b>SUPPLY AIR TEMPERATURE CALIBRATION</b> Allows for the operator to adjust for an out of calibration temperature sensor.
	OAS T CAL	0.0°F	± 2.5°F	<b>OUTSIDE AIR TEMPERATURE CALIBRATION</b> Allows for the operator to adjust for an out of calibration temperature sensor.
	OA H CAL	0% RH	±10% RH	<b>OUTSIDE AIR HUMIDITY CALIBRATION</b> Allows for operator to adjust for an out of calibration humidity sensor.
	RA T CAL	0.0°F	± 2.5°F	<b>RETURN AIR TEMPERATURE CALIBRATION</b> Allows for the operator to adjust for an out of calibration temperature sensor.
	RA H CAL	0% RH	±10% RH	<b>RETURN AIR HUMIDITY CALIBRATION</b> Allows for operator to adjust for an out of calibration humidity sensor.
	DA T CAL	0.0°F	± 2.5°F	<b>DISCHARGE AIR TEMPERATURE CALIBRATION</b> Allows for the operator to adjust for an out of calibration temperature sensor.
	2SP FAN DELAY	5 Minutes	0 to 20 minutes in 1 minute increments	<b>TIME DELAY ON SECOND STAGE ECONOMIZING</b> When in economizing mode, this is the delay for the high speed fan to try to satisfy the call for second stage cooling before the first stage mechanical cooling is enabled.
<b>CHECKOUT***</b>	DAMPER MINIMUM POSITION	N/A	N/A	The checkout for the damper minimum position is based on the system. See Table 13.
	DAMPER OPEN	N/A	N/A	Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure to pause in the mode to allow exhaust contacts to energize due to the delay in the system.
	DAMPER CLOSE	N/A	N/A	Positions damper to the fully closed position
	CONNECT Y1-O	N/A	N/A	Closes the Y1-O relay (Y1-O)
	CONNECT Y2-O	N/A	N/A	Closes the Y2-O relay (Y2-O)
	CONNECT AUX1-O	N/A	N/A	Energizes the AUX output. If Aux setting is: • NONE — no action taken • ERV — 24 vac out. Turns on or signals an ERV that the conditions are not good for economizing but are for ERV operation.†† • SYS — 24 vac out. Issues a system alarm
<b>ALARMS</b>	CONNECT EXH1	N/A	N/A	Closes the power exhaust fan 1 relay (EXH1)
	Alarms display only when they are active. The menu title "ALARMS(#)" includes the number of active alarms in parenthesis ( ). When using SYLK bus sensors, "SYLK" will appear on the screen, and when using 20k OA temperature sensors, "SENS T" will appear on the screen			
	MA T SENS ERR	N/A	N/A	<b>SUPPLY AIR TEMPERATURE SENSOR ERROR</b> Mixed air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
CO2 SENS ERR	N/A	N/A	<b>CO<sub>2</sub> SENSOR ERROR</b> CO <sub>2</sub> sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues.	

**Table 12 — W7220 Menu Structure\* (cont)**

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
<b>ALARMS (cont)</b>	OA SYLK T ERR	N/A	N/A	OUTSIDE AIR S-BUS SENSOR ERROR Outdoor air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	OA SYLK H ERR	N/A	N/A	OUTSIDE AIR S-BUS SENSOR ERROR Outdoor air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	RA SYLK T ERR	N/A	N/A	RETURN AIR S-BUS SENSOR ERROR Return air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	RA SYLK H ERR	N/A	N/A	RETURN AIR S-BUS SENSOR ERROR Return air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	DA SYLK T ERR	N/A	N/A	DISCHARGE AIR S-BUS SENSOR ERROR Discharge air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	OA SENS T ERR	N/A	N/A	OUTSIDE AIR TEMPERATURE SENSOR ERROR Outdoor air temperature sensor has failed or become disconnected - check wiring, then replace if the alarm continues.
	ACT ERROR	N/A	N/A	ACTUATOR ERROR Actuator has failed or become disconnected - check for stall, over voltage, under voltage and actuator count. Replace actuator if damper is movable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu.
	FREEZE ALARM	N/A	N/A	Check if outdoor temperature is below the LOW Temp Lockout on set point menu. Check if Mixed air temperature on STATUS menu is below the Lo Set point on Advanced menu. When conditions are back in normal range, the alarm will go away.
	SHUTDOWN ACTIVE	N/A	N/A	AUX2 IN is programmed for SHUTDOWN and 24 V has been applied to AUX2 IN terminal.
	DMP CAL RUNNING	N/A	N/A	DAMPER CALIBRATION ROUTINE RUNNING If DCV Auto enable has been programmed, this alarm will display when the W7220 is completing a calibration on the dampers. Wait until the calibration is completed and the alarm will go away. Must have OA, MA and RA sensors for DCV calibration; set up is in the Advanced setup menu.
	DA SENS ALM	N/A	N/A	DISCHARGE AIR TEMPERATURE SENSOR ALARM Discharge air temperature is out of the range set in the ADVANCED SETUP Menu. Check the temperature of the discharge air.
	SYS ALARM	N/A	N/A	When AUX1-O is set to SYS and there is any alarm (e.g., failed sensors, etc.), the AUX1-O terminal has 24 vac out.
	ACT UNDER V	N/A	N/A	ACTUATOR VOLTAGE LOW Voltage received by actuator is above expected range.
	ACT OVER V	N/A	N/A	ACTUATOR VOLTAGE HIGH Voltage received by actuator is below expected range.
ACT STALLED	N/A	N/A	ACTUATOR STALLED Actuator stopped before achieving commanded position.	

**LEGEND**

- CLO** — Compressor Lockout
- ERV** — Energy Recovery Ventilator
- LCD** — Liquid Crystal Display
- MA** — Mixed Air
- MAT** — Mixed Air Temperature
- N/A** — Not Applicable
- OA** — Outdoor Air
- OAT** — Outdoor Air Temperature
- OCC** — Occupied
- RA** — Return Air
- RAT** — Return Air Temperature
- RTU** — Rooftop Unit
- SYS** — System

\* Table 12 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration. For example if you do not have a DCV (CO<sub>2</sub>) sensor, then none of the DCV parameters appear.

† When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment.

\*\* N/A = Not Applicable.

†† ERV Operation: When in cooling mode AND the conditions are NOT OK for economizing - the ERV terminal will be energized. In the Heating mode, the ERV terminal will be energized when the OA is below the ERV OAT set point in the set point menu.

\*\*\* After 10 minutes without a command or mode change, the controller will change to normal operation.

**NOTES:**

1. STATUS → OCCUPIED — The factory-standard Occupancy signal originates with a thermostat or other controller call for indoor fan operation at CTB terminal G. This signal passes through the Central Terminal Board's OCCUPANCY jumper to the ECONO connector and to the W7220's OCC input terminal. An external timeclock or relay is required to implement an Occupancy schedule on the economizer damper position.
2. STATUS → MA TEMP, SETPOINTS → MAT SET — The W7220 menu parameters and labels include designations MA, MAT and Mixed Air for the economizer cooling control sensor. On these rooftop units, the economizer control sensor is located downstream of the evaporator/indoor coil in the supply fan section where this sensor is designated as Supply Air Temperature (SAT) sensor.
3. SETPOINTS → DRYBLB SET — This point is not displayed if a Return Air (differential) temperature sensor or an Outdoor Air enthalpy sensor is connected.
4. SYSTEM SETUP parameters must be configured as noted for 2-Speed unit operation:  
EQUIPMENT = CONV  
AUX2 I = W  
FAN SPEED = 2SPEED

For damper minimum position settings and checkout menu readings, see Table 13. For dry bulb operation with or without DCV, see Tables 14 and 15. For enthalpy operation with or without DCV, see Tables 16 and 17.

**Table 13 — Damper Minimum Position Settings and Readings on Checkout Menu**

DEMAND CONTROLLED VENTILATION (CO <sub>2</sub> SENSOR)	FAN SPEED	SETPOINTS	CHECKOUT
NO	1	MIN POS	VMAX-HS
		N/A	N/A
YES		VENT MIN	VMAX-HS
VENT MAX		VMAX-HS	

**Table 14 — Dry Bulb Operation without DCV (CO<sub>2</sub> Sensor) — 1 Speed Fan**

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
NONE	No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
		On	On	High	24-v/On	24-v/On	MIN POS	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	MIN POS to Full-Open	Closed to Full-Open

\*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y-I and Y2-I have not been satisfied.

**Table 15 — Dry Bulb Operation with DCV (CO<sub>2</sub> Sensor) — 1 Speed Fan**

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
Below CO <sub>2</sub> set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	VENTMIN to Full-Open	Closed to Full-Open
Above CO <sub>2</sub> set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN to VENTMAX	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	VENTMIN to Full-Open	Closed to Full-Open

\*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

**Table 16 — Enthalpy Operation without DCV (CO<sub>2</sub> Sensor) — 1 Speed Fan**

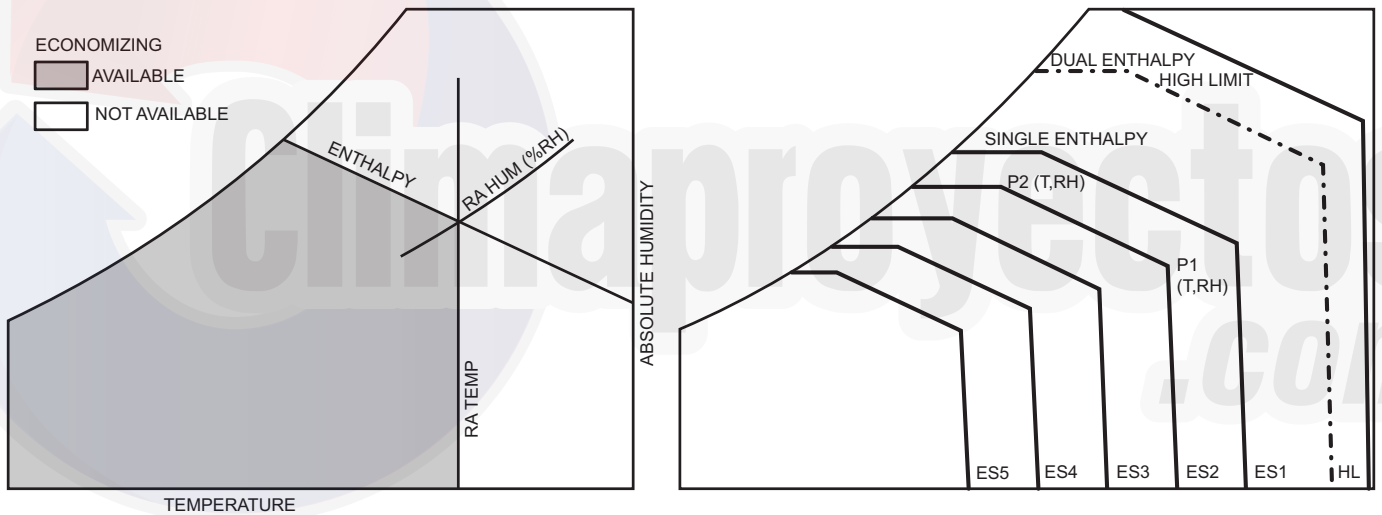
DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
NONE	No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
		On	On	High	24-v/On	24-v/On	MIN POS	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	MIN POS to Full-Open	Closed to Full-Open

\*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

**Table 17 — Enthalpy Operation with DCV (CO<sub>2</sub> Sensor) — 1 Speed Fan**

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
Below CO <sub>2</sub> set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off†	VENTMIN to Full-Open	Closed to Full-Open
Above CO <sub>2</sub> set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H to VENTMAX	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	DELAY* 24-v/On	0-v/Off†	VENTMIN to Full-Open	Closed to Full-Open

\*With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.  
 †With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.



**Fig. 53 — Single Enthalpy Curve Boundaries**

**Table 18 — Single Enthalpy and Dual Enthalpy High Limit Curves**

ENTHALPY CURVE	TEMP. DRY BULB (F)	TEMP. DEWPOINT (F)	ENTHALPY (btu/lb/da)	POINT P1		POINT P2	
				TEMP. (F)	HUMIDITY (%RH)	TEMP. (F)	HUMIDITY (%RH)
ES1	80	60	28.0	80	36.8	66.3	80.1
ES2	75	57	26.0	75	39.6	63.3	80.0
ES3	70	54	24.0	70	42.3	59.7	81.4
ES4	65	51	22.0	65	44.8	55.7	84.2
ES5	60	48	20.0	60	46.9	51.3	88.5
HL	86	66	32.4	86	38.9	72.4	80.3

**ENTHALPY SETTINGS**

When the OA temperature, enthalpy and dew point are below the respective set points, the Outdoor Air can be used for economizing. Figure 53 shows the new single enthalpy boundaries in the W7220. There are 5 boundaries (set points ES1 through ES5), which are defined by dry bulb temperature, enthalpy and dew point.

Refer to Table 18 for ENTH CURVE set point values.

The W7220 calculates the enthalpy and dew point using the OA temperature and humidity input from the OA enthalpy sensor. When the OA temperature, OA humidity and OA dew point are all below the selected boundary, the economizer sets the economizing mode to YES, economizing is available.

When all of the OA conditions are above the selected boundary, the conditions are not good to economize and the mode is set to NO.

Figure 53 shows the 5 current boundaries. There is also a high limit boundary for differential enthalpy. The high limit boundary is

## CHECKOUT

Inspect all wiring connections at the economizer module's terminals, and verify compliance with the installation wiring diagrams. For checkout, review the Status of each configured parameter and perform the Checkout tests.

NOTE: For information about menu navigation and use of the keypad see Interface Overview on page 32.

### Power Up

After the W7220 module is mounted and wired, apply power.

### Initial Menu Display

On initial start up, Honeywell displays on the first line and economizer W7220 on the second line. After a brief pause, the revision of the software appears on the first line and the second line will be blank.

### Power Loss (Outage or Brownout)

All set points and advanced settings are restored after any power loss or interruption.

NOTE: All settings are stored in non-volatile flash memory.

### Status

Use the Status menu (see Table 12) to check the parameter values for the various devices and sensors configured.

NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 32.

### Checkout Tests

Use the Checkout menu (see page 36) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 32.

To perform a Checkout test:

1. Scroll to the desired test in the Checkout menu using the ▲ and ▼ buttons.
2. Press the ↵ (Enter) button to select the item. RUN? appears.
3. Press the ↵ (Enter) button to start the test. The unit pauses and then displays IN PROGRESS. When the test is complete, DONE appears.
4. When all desired parameters have been tested, press the ⬆ (Menu Up) button to end the test.

The Checkout tests can all be performed at the time of installation or at any time during the operation of the system as a test that the system is operable.

## ⚠ CAUTION

Failure to follow this caution may result in damage to equipment. Be sure to allow enough time for compressor startup and shutdown between checkout tests so that you do not short-cycle the compressors.

ES1 when there are no stages of mechanical cooling energized and HL (high limit) when a compressor stage is energized.

## TROUBLESHOOTING

### Alarms

The economizer module provides alarm messages that display on the 2-line LCD.

NOTE: Upon power up, the module waits 60 minutes before checking for alarms. This allows time for all the configured devices (e.g. sensors, actuator) to become operational. The exception is the SAT sensor which will alarm immediately.

If one or more alarms are present and there has been no keypad activity for at least 5 minutes, the Alarms menu displays and cycles through the active alarms.

You can also navigate to the Alarms menu at any time.

### Clearing Alarms

Once the alarm has been identified and the cause has been removed (e.g. replaced faulty sensor) the alarm can be cleared from the display.

To clear an alarm, perform the following:

1. Navigate to the desired alarm.
2. Press the ↵ (Enter) button. ERASE? displays.
3. Press the ↵ (Enter) button. ALARM ERASED displays.
4. Press the ⬆ (Menu up/Exit) button to complete the action and return to the previous menu.

If the alarm still exists after clearing it, it is redisplayed within 5 seconds.

## Smoke Detectors

Smoke detectors are available as factory-installed options on 50KCQ models. Smoke detectors may be specified for supply-air only, for return-air without or with economizer, or in combination of supply-air and return-air. All components necessary for operation are factory-provided and mounted. The unit is factory-configured for immediate smoke detector shutdown operation; additional wiring or modifications to unit terminal board may be necessary to complete the unit and smoke detector configuration to meet project requirements.

Units equipped with factory-optional return-air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 54 for the as-shipped location.

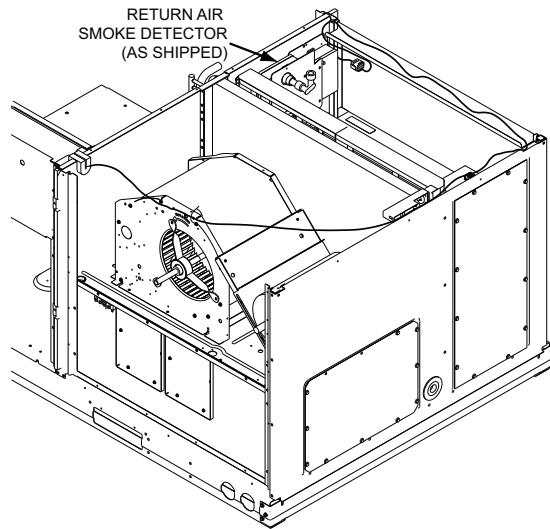
### Completing Installation of Return-Air Smoke Sensor:

1. Unscrew the two screws holding the return-air smoke detector assembly. See Fig. 55, Step 1. Save the screws.
2. Turn the assembly 90 degrees and then rotate end to end. Make sure that the elbow fitting is pointing down. See Fig. 55, Step 2.
3. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 55, Step 3.
4. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

## ADDITIONAL APPLICATION DATA

Refer to the application data document, *Factory-Installed Smoke Detectors for Small and Medium Rooftop Units 2 to 25 Tons* for discussions on additional control features of these smoke detectors including multiple unit coordination.





**Fig. 54 — Return Air Smoke Detector, Shipping Position**

**PremierLink™ Controller (Factory Option)**

For details on operating 50KCQ\*04-06 units equipped with the factory-installed PremierLink controller option, refer to the *PremierLink Retrofit Rooftop Controller Version 3.x Installation, Start-Up, and Configuration Instructions* manual.

**RTU Open Controller (Factory-installed Option)**

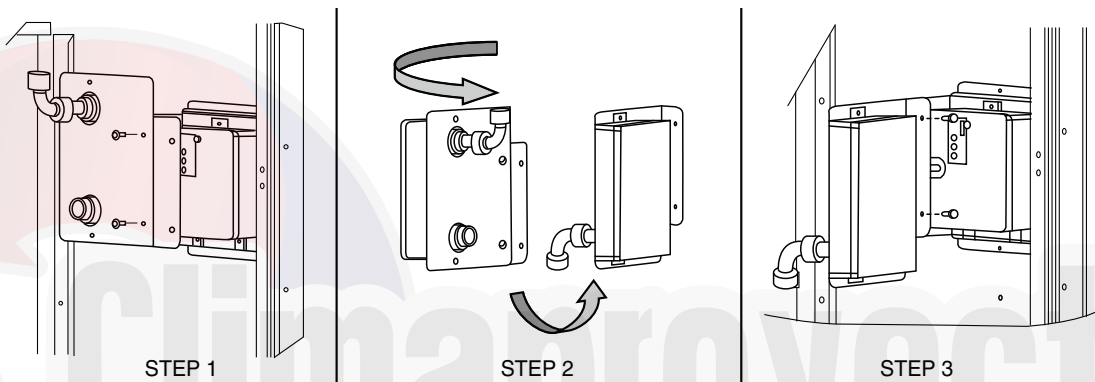
For details on operating 50KCQ\*04-06 units equipped with the factory-installed RTU Open controller refer to the *Factory-Installed RTU Open Multi-Protocol Controller Control, Start-Up, Operation and Troubleshooting* manual.

**CONTROLLER OPTIONS**

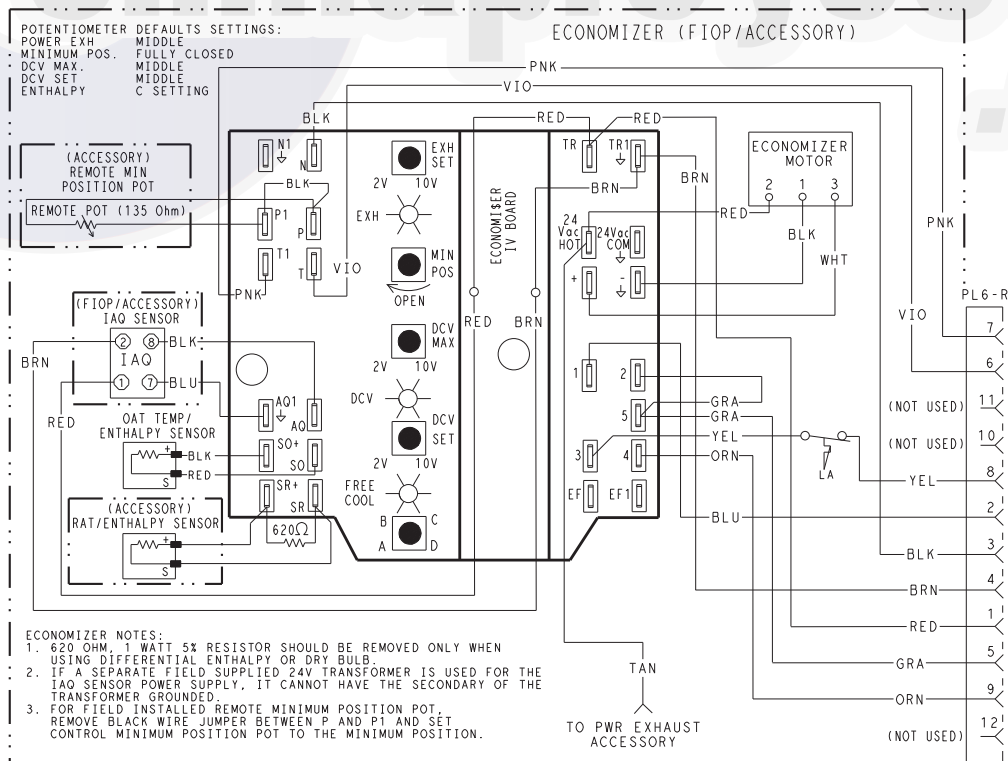
**Low Ambient**

If the unit comes with Electro-Mechanical (EM) control, then no adjustment is necessary.

If the unit comes with the PremierLink™ or RTU Open control option, then refer to its installation control manual for details on adjusting “Cooling Lock-Out” setting and configure for the specific job requirements.



**Fig. 55 — Completing Installation of Return-Air Smoke Sensor**



**Fig. 56 — EconoMi\$er IV® Wiring**

## Step 12 — Adjust Factory-Installed Options

### SMOKE DETECTORS

Smoke detector(s) will be connected at the Controls Connections Board, at terminals marked “Smoke Shutdown”. Cut jumper JMP 3 when ready to energize unit.

### ECONOMISER IV OCCUPANCY SWITCH

Refer to Fig. 56 for general EconoMiSer IV wiring. External occupancy control is managed through a connection on the Controls Connections Board.

If external occupancy control is desired, connect a time clock or remotely controlled switch (closed for Occupied, open for Unoccupied sequence) at terminals marked OCCUPANCY. Cut jumper JMP 2 to complete the installation.

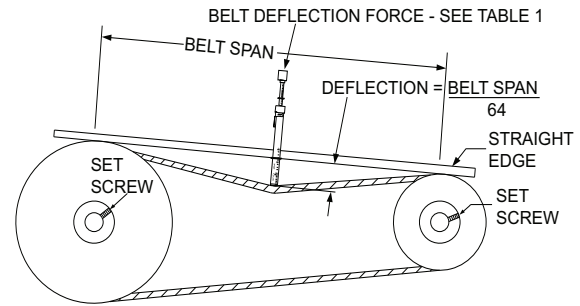


Table 1 TORQUE ALL SHEAVE SET SCREWS TO 110-130 in. lbs

BELT CROSS SECTION	SMALLEST SHEAVE DIAMETER	BELT DEFLECTION FORCE (LBS)			
		Unnotched Belts		Notched Belts	
		Used	New	Used	New
A, AX	3.0-3.6	3.7	5.5	4.1	6.1
	3.8-4.8	4.5	6.8	5.0	7.4
	5.0-7.0	5.4	8.0	5.7	8.4
B, BX	3.4-4.2	—	—	4.9	7.2
	4.4-5.6	5.3	7.9	7.1	10.5
	5.8-8.6	6.3	9.4	8.5	12.6

Table 2

BELT CONDITION	TENSION FORCE IN BELT (LBS)
New	100
Used	80

Fig. 57 — V-Belt Force Label

### BELT TENSION METHOD

Requires belt tension gage that measures tension in belt in units of lbs force.

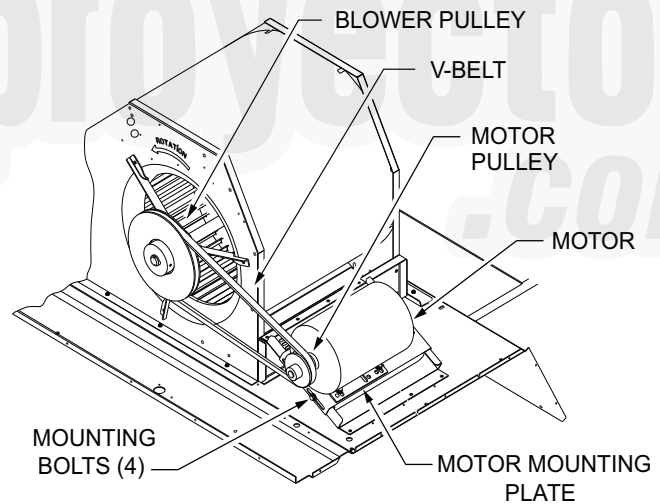


Fig. 58 — Belt Drive Motor Mounting

### Pre-Start and Start-Up

This completes the mechanical installation of the unit. Refer to the unit’s Service Manual for detailed Pre-Start and Start-Up instructions. Download the latest versions from HVAC Partners ([www.hvacpartners.com](http://www.hvacpartners.com)).

## Step 13 — Install Accessories

Available accessories include:

- Curb
- Thru-base connection kit (must be installed before unit is set on curb)
- Electric heaters and single-point connection kits
- Manual outside air damper
- Two-Position motorized outside air damper
- EconoMiSer IV (with control)
- EconoMiSer2 (without control/for external signal)
- Power Exhaust
- Differential dry-bulb sensor (EconoMiSer IV)
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- CO<sub>2</sub> sensor
- DDC interface (PremierLink™)
- Louvered hail guard
- Motormaster® head pressure controls
- Phase monitor control

Refer to separate installation instructions for information on installing these accessories.

## Step 14 — Check Belt Tension

Measure the belt span length as shown in Fig. 57. Calculate the required deflection by multiplying the belt span length by  $\frac{1}{64}$ . For example, if the belt span length is 32 inches:  $32 \times \frac{1}{64} = \frac{1}{2}$ -in. deflection.

### BELT FORCE — DEFLECTION METHOD

Check the belt tension with a spring-force belt force deflection gage (available from drive belt manufacturer).

1. Place a straightedge along the belt between the two pulleys. Measure the distance between the motor shaft and the blower shaft.
2. Set the tension gage to the desired tension (see Table 1 in Fig. 57). Place the large O-ring at that point.
3. Press the tension checker downward on the belt until the large O-ring is at the bottom of the straightedge.
4. Adjust the belt tension as needed.

Adjust belt tension by loosening the motor mounting plate front bolts and rear bolt (see Fig. 58) and slide the plate towards the fan (to reduce tension) or away from the fan (to increase tension). Ensure the blower shaft and motor shaft are parallel to each other (pulleys aligned). Tighten all bolts securely when finished.

# UNIT START-UP CHECKLIST

(Remove and use for job file)

**NOTE: To avoid injury to personnel and damage to equipment or property when completing the procedures listed in this start-up checklist, use good judgment, follow safe practices, and adhere to the safety considerations/information as outlined in preceding sections of this Installation Instruction document.**

## I. PRELIMINARY INFORMATION

MODEL NO. \_\_\_\_\_

JOB NAME \_\_\_\_\_

SERIAL NO. \_\_\_\_\_

ADDRESS \_\_\_\_\_

START-UP DATE \_\_\_\_\_

TECHNICIAN NAME \_\_\_\_\_

ADDITIONAL ACCESSORIES \_\_\_\_\_

## II. PRE-START-UP

Verify that all packaging materials have been removed from unit (Y/N) \_\_\_\_\_

Verify installation of outdoor-air hood (Y/N) \_\_\_\_\_

Verify that condensate connection is installed per instructions (Y/N) \_\_\_\_\_

Verify that all electrical connections and terminals are tight (Y/N) \_\_\_\_\_

Check that indoor-air filters are clean and in place (Y/N) \_\_\_\_\_

Check that outdoor-air inlet screens are in place (Y/N) \_\_\_\_\_

Verify that unit is level (Y/N) \_\_\_\_\_

Check fan wheels and propeller for location in housing/orifice and verify setscrew is tight (Y/N) \_\_\_\_\_

Verify that fan sheaves are aligned and belts are properly tensioned (Y/N) \_\_\_\_\_

Verify that scroll compressors are rotating in the correct direction (Y/N) \_\_\_\_\_

Verify installation of thermostat (Y/N) \_\_\_\_\_

## III. START-UP

### ELECTRICAL

Supply Voltage	L1-L2 _____	L2-L3 _____	L3-L1 _____
Compressor Amps 1	L1 _____	L2 _____	L3 _____
Compressor Amps 2	L1 _____	L2 _____	L3 _____
Supply Fan Amps	L1 _____	L2 _____	L3 _____

### TEMPERATURES

Outdoor-Air Temperature \_\_\_\_\_ °F DB (Dry Bulb)

Return-Air Temperature \_\_\_\_\_ °F DB \_\_\_\_\_ °F Wb (Wet Bulb)

Cooling Supply Air Temperature \_\_\_\_\_ °F

### PRESSURES

Refrigerant Suction CIRCUIT A \_\_\_\_\_ PSIG

CIRCUIT B \_\_\_\_\_ PSIG

Refrigerant Discharge CIRCUIT A \_\_\_\_\_ PSIG

CIRCUIT B \_\_\_\_\_ PSIG

Verify Refrigerant Charge using Charging Charts (Y/N) \_\_\_\_\_

### GENERAL

Economizer minimum vent and changeover settings to job requirements (if equipped) (Y/N) \_\_\_\_\_

Verify smoke detector unit shutdown by utilizing magnet test (Y/N) \_\_\_\_\_



CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE