

**Legacy™ Line 547K\*14  
Single Package Rooftop Heat Pump  
with Puron® (R-410A) Refrigerant  
and Axion™ Fan Technology**



# Installation Instructions

## CONTENTS

	Page
<b>SAFETY CONSIDERATIONS</b> .....	1
<b>MODEL NUMBER NOMENCLATURE AND DIMENSIONS</b> .....	2
<b>Rated Indoor Airflow (cfm)</b> .....	2
<b>INSTALLATION</b> .....	6
<b>Jobsite Survey</b> .....	6
<b>Step 1 — Plan for Unit Location</b> .....	6
• ROOF MOUNT	
<b>Step 2 — Plan for Sequence of Unit Installation</b> .....	7
• CURB-MOUNTED INSTALLATION	
• PAD-MOUNTED INSTALLATION	
• FRAME-MOUNTED INSTALLATION	
<b>Step 3 — Inspect Unit</b> .....	7
<b>Step 4 — Provide Unit Support</b> .....	7
• ROOF CURB MOUNT	
• SLAB MOUNT (HORIZONTAL UNITS ONLY)	
• ALTERNATE UNIT SUPPORT (IN LIEU OF CURB OR SLAB MOUNT)	
<b>Step 5 — Field Fabricate Ductwork</b> .....	7
• FOR UNITS WITH ACCESSORY ELECTRIC HEATERS	
<b>Step 6 — Rig and Place Unit</b> .....	9
• POSITIONING ON CURB	
<b>Step 7 — Convert to Horizontal and Connect</b> .....	10
• ALL UNITS	
<b>Step 8 — Install Outside Air Hood</b> .....	10
• ECONOMIZER HOOD REMOVAL (FACTORY OPTION)	
• ECONOMIZER HOOD SETUP	
<b>Step 9 — Install External Condensate Trap and Line</b> ..	11
<b>Step 10 — Make Electrical Connections</b> .....	11
• FIELD WIRING	
• UNITS WITH FACTORY-INSTALLED NON-FUSED DISCONNECT	
• UNITS WITHOUT FACTORY-INSTALLED NON- FUSED DISCONNECT	
• CONVENIENCE OUTLETS	
• ALL UNITS	
• FACTORY-OPTION THRU-BASE CONNECTIONS (ELECTRICAL CONNECTIONS)	
• COMMERCIAL DEFROST CONTROL	
• ELECTRIC HEATERS	
• SINGLE POINT BOXES AND SUPPLEMENTARY FUSES	
• SINGLE POINT BOXES WITHOUT FUSES	
• LOW-VOLTAGE CONTROL CONNECTIONS	


• CONTROL AND POWER WIRING DIAGRAMS	
<b>EconoMi\$er X (Factory-Installed Option)</b> .....	24
• PRODUCT DESCRIPTION	
• SYSTEM COMPONENTS	
• SPECIFICATIONS	
• INPUTS	
• OUTPUTS	
• ENVIRONMENTAL	
• ECONOMIZER MODULE WIRING DETAILS	
• S-BUS SENSOR WIRING	
• CO2 SENSOR WIRING	
• INTERFACE OVERVIEW	
• USER INTERFACE	
• KEYPAD	
• MENU STRUCTURE	
• SETUP AND CONFIGURATION	
• TIME-OUT AND SCREENSAVER	
• STANDARD OR SINGLE SPEED FAN OPERATION	
• 2 SPEED FAN OPERATION	
• 2SP H/C (2 SPEED HEAT/COOL) SPEED FAN OPERATION	
• 3 SPEED FAN OPERATION	
• ENTHALPY SETTINGS	
• CHECKOUT	
• TROUBLESHOOTING	
• SMOKE DETECTORS	
• COMPLETING INSTALLATION OF RETURN-AIR SMOKE SENSOR	
• ADDITIONAL APPLICATION DATA	
<b>Step 11 — Adjust Factory-Installed Options</b> .....	37
• SMOKE DETECTORS	
• ECONOMISER X OCCUPANCY SWITCH	
<b>Step 12 — Install Accessories</b> .....	37
<b>Step 13 — Fan Speed Set Up</b> .....	37
• UNITS WITH ELECTROMECHANICAL CONTROLS	
<b>Typical Unit Piping</b> .....	39
<b>Pre-Start and Start-Up</b> .....	40
<b>START-UP CHECKLIST</b> .....	CL-1

## SAFETY CONSIDERATIONS


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

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

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

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 model number nomenclature. See Fig. 2 for unit dimensions and Fig. 3 for service clearances. See Fig. 4 and 5 for base rail details.

**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 — AHRI Efficiency — Rated Indoor Airflow**

MODEL NUMBER	FULL LOAD AIRFLOW (CFM)
547K*14	5500

Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Example:	5	4	7	K	E	1	4	N	0	0	0	A	2	A	0	A	A

**Unit Type**  
Packaged Rooftop Heat Pump  
with Field-Installed Electric Heat

**Model**  
K = Puron® (R-410A) Refrigerant  
with Axion™ Fan

**Voltage**  
E = 460-3-60  
P = 208/230-3-60  
T = 575-3-60

**Cooling Tons**  
14 = 12.5 tons

**Refrig. System Options**  
N = Two Stage Cooling, Single Circuit

**Heat Level**  
(Field-installed electric heaters available)  
000 = No Heat

**Coil Options Round Tube/Plate Fin**  
(Condenser - Evaporator - Hail Guard)  
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 Guard  
N = Precoat Al/Cu - Al/Cu — Louvered Hail Guard  
P = E-coat Al/Cu - Al/Cu — Louvered Hail Guard  
Q = E-coat Al/Cu - E-coat Al/Cu — Louvered Hail Guard  
R = Cu/Cu - Al/Cu — Louvered Hail Guard  
S = Cu/Cu - Cu/Cu — Louvered Hail Guard



**Packaging and Control**  
A = Standard Packaging, electro-mechanical controls, no intake or exhaust option. Will allow for use of field-installed economizers (W7212, W7220), manual damper, or 2-position damper.  
B = LTL Packaging, electro-mechanical controls, no intake or exhaust option. Will allow for use of field-installed economizers (W7212, W7220), manual damper, or 2-position damper.  
C = Standard Packaging, electro-mechanical controls that require factory-installed W7220 EconoMi\$er X  
F = LTL Packaging, electro-mechanical controls that require factory-installed W7220 EconoMi\$er X

**Factory Installed Options**  
0A = None  
**NOTE:** See the 547K 7.5 to 12.5 ton Price Pages for a complete list of factory-installed options.

**Outdoor Air Options**  
A = Electromechanical controls. Allows for use of all field-installed economizers and dampers.  
B = Temperature Economizer, Barometric Relief, Standard Leak (W7220)  
E = Temperature Economizer, Barometric Relief, Standard Leak w/CO<sub>2</sub> (W7220)  
H = Enthalpy Economizer, Barometric Relief, Standard Leak (W7220)  
L = Enthalpy Economizer, Barometric Relief, Standard Leak w/CO<sub>2</sub> (W7220)  
U = Temperature Economizer, Barometric Relief, Ultra Low Leak (W7220)  
W = Enthalpy Economizer, Barometric Relief, Ultra Low Leak (W7220)

**Indoor Fan Options**  
2 = Standard/Medium Static Motor with Axion™ Fan  
3 = High Static Motor with Axion Fan

**Fig. 1 — 547K\*14 Units Model Number Nomenclature**

- NOTES:
1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN [ ] ARE IN MILLIMETERS.
  2.  CENTER OF GRAVITY
  3.  DIRECTION OF AIR FLOW

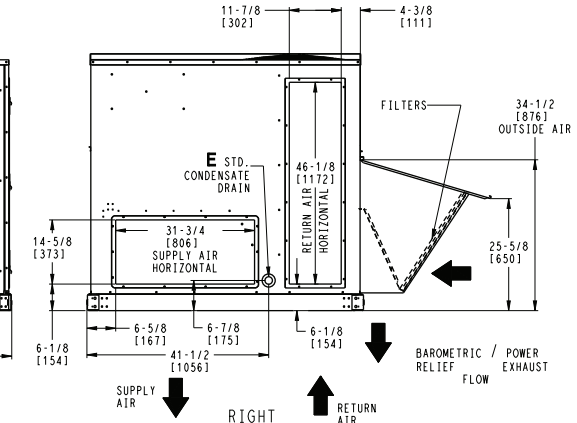
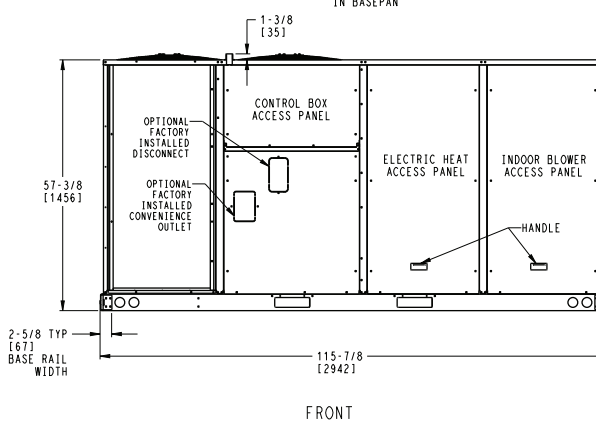
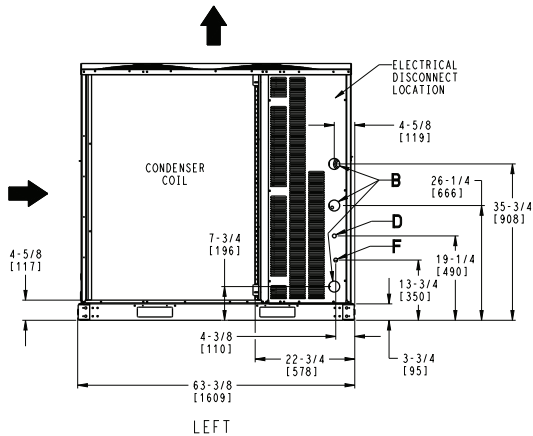
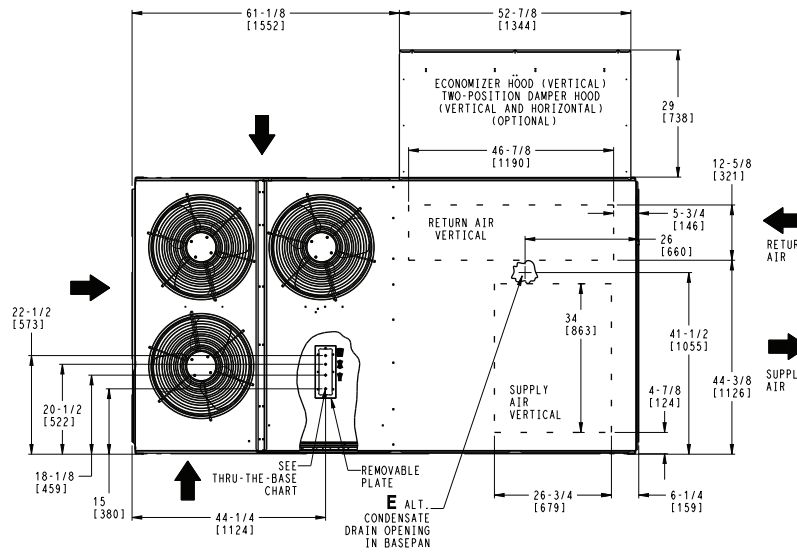
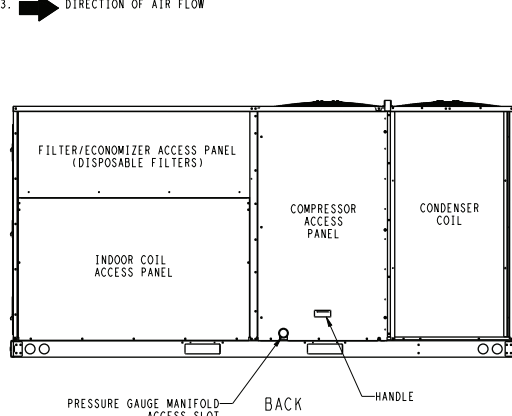


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CONNECTION SIZES	
B	2 1/2" [64] DIA POWER SUPPLY HOLE
D	7/8" [22] DIA FIELD CONTROL WIRING HOLE
E	3/4"-14 NPT CONDENSATE DRAIN
F	7/8" [22] DIA FIELD CONVENIENCE OUTLET HOLE

THRU-THE-BASE CHART THESE HOLES REQUIRED FOR USE CRBTMPWRO05A00, 006A00, 007A00				
ACCESSORY NO.	THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)	
005	W 1/2"	ACC.	7/8" [22.2]	
	X 1/2"	24V	7/8" [22.2]	
	Y 1 1/4"	POWER	1 1/2" [38.1]	
006	W 1/2"	ACC.	7/8" [22.2]	
	X 1/2"	24V	7/8" [22.2]	
	Y 1 1/2"	POWER	2" [50.8]	
007	W 1/2"	ACC.	7/8" [22.2]	
	X 1/2"	24V	7/8" [22.2]	
	Y 2"	POWER	2 1/2" [63.5]	
FOR "THRU-THE-BASEPAN" FACTORY OPTION, FITTINGS FOR X & Y ARE PROVIDED AS SPECIFIED ON "006".				



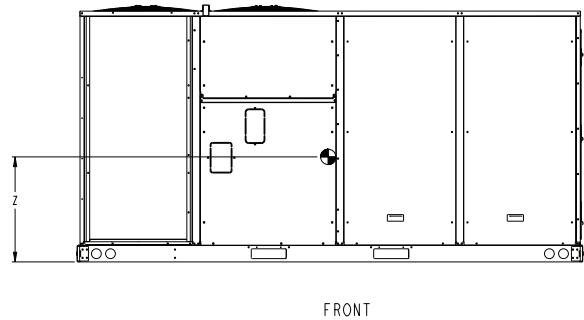
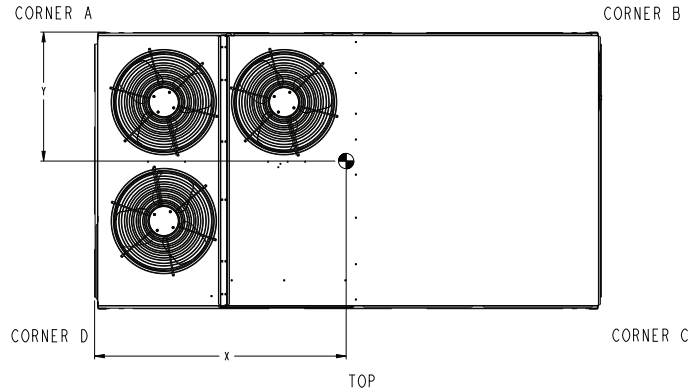
ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES	547K 14 SINGLE ZONE ELECTRICAL HEAT PUMP	50TM002593	REV
U.S. ECCN:NSR	1 OF 2	5/4/22	-			-

Fig. 2 — 547K\*14 Unit Dimensional Drawing



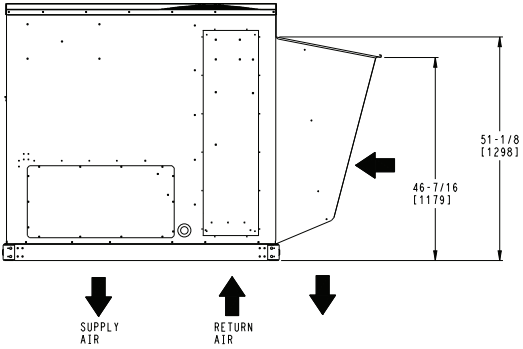
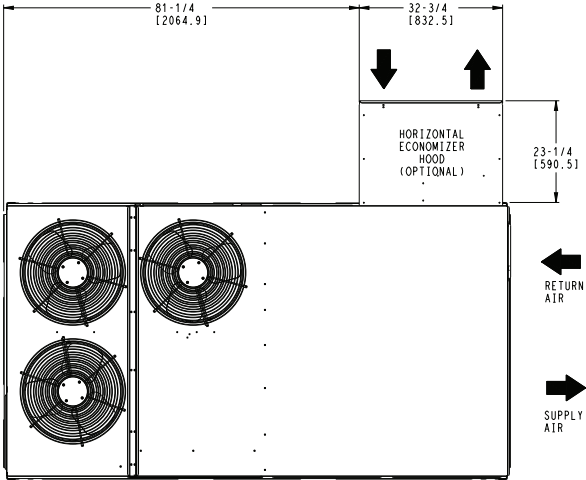
UNIT	STD UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
547K 14	1250	567	350	159	338	153	277	125	286	130	57 [1448]	28 1/2 [724]	24 [610]

STANDARD UNIT WEIGHT IS WITHOUT ELECTRIC HEAT & WITHOUT PACKAGING.  
 FOR OPTIONS & ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.



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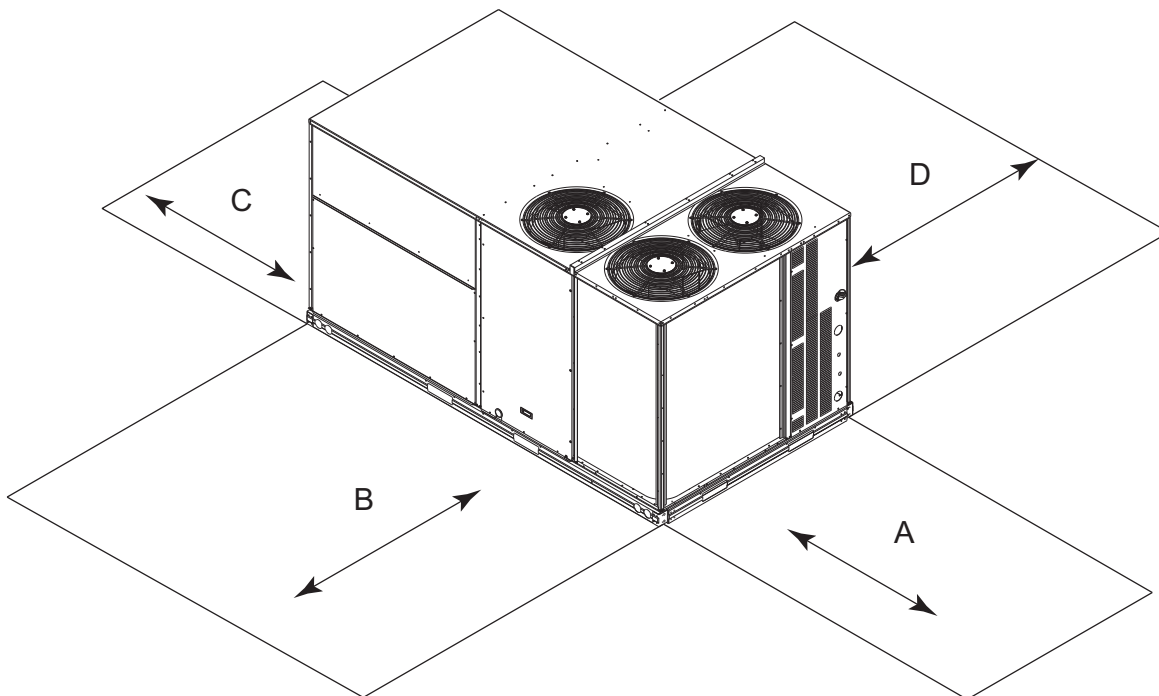
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HORIZONTAL ECONOMIZER

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES	547K 14 SINGLE ZONE ELECTRICAL	50TM002593	REV
U.S. ECCN:NSR	2 OF 2	5/4/22	-	HEAT PUMP		-

Fig. 2 — 547K\*14 Unit Dimensional Drawing (cont)



LOCATION	DIMENSION in. (mm)	CONDITION
A	48 (1219) 18 (457) 18 (457) 12 (305)	Unit disconnect is mounted on panel. No disconnect, convenience outlet option. Recommended service clearance. Minimum clearance.
B	42 (1067) 36 (914) Special	Surface behind servicer is grounded (e.g., metal, masonry wall). Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass). Check for sources of flue products within 10 ft (3 m) of unit fresh air intake hood.
C	36 (914) 18 (457)	Side condensate drain is used. Minimum clearance.
D	42 (1067) 36 (914)	Surface behind servicer is grounded (e.g., metal, masonry wall, another unit). Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass).

NOTE: Unit is not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.

**Fig. 3 — Service Clearances — 547K\*14 Units**

## 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 the minimum clearances required for safety. This includes the clearance to combustible surfaces, unit performance and service access below, around and above unit as specified in Fig. 3.

NOTE: Consider also the effect of adjacent units.

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

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

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 the 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. See Install External Condensate Trap and Line on page 11 for required trap dimensions.

### ROOF MOUNT

Check building codes for weight distribution requirements. Unit operating weight is shown in Table 2.

**Table 2 — Operating Weights**

547K*14	LB (kg)
<b>BASE UNIT</b>	1250 (567)
<b>ECONOMIZER</b>	
<b>VERTICAL</b>	130 (47)
<b>HORIZONTAL</b>	242 (110)
<b>POWERED OUTLET</b>	35 (16)
<b>CURB</b>	
<b>14 in. (356 mm)</b>	180 (82)
<b>16 in. (610 mm)</b>	245 (116)

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 (see Install External Condensate Trap and Line on page 11 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.

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. 5. 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. 4. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

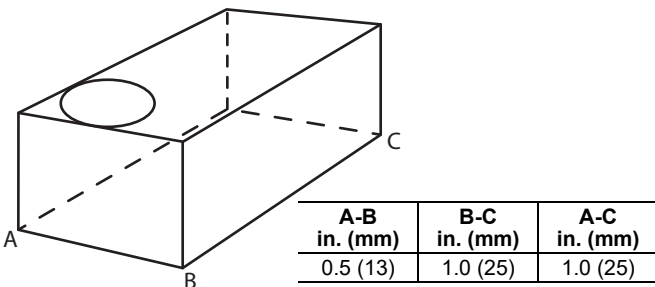


Fig. 4 — Unit Leveling Tolerances

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. 5. Improperly applied gasket can also result in air leaks and poor unit performance.

Install insulation, cant strips, roofing felt, and counter flashing as shown. Ductwork must be attached to curb and not to the unit.

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.

Step 5 — Field Fabricate Ductwork

NOTE: 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.

A minimum clearance is not required around ductwork.

⚠ 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 first 12 in. (305 mm) away from unit.

Outlet grilles must not lie directly below unit discharge.

⚠ WARNING

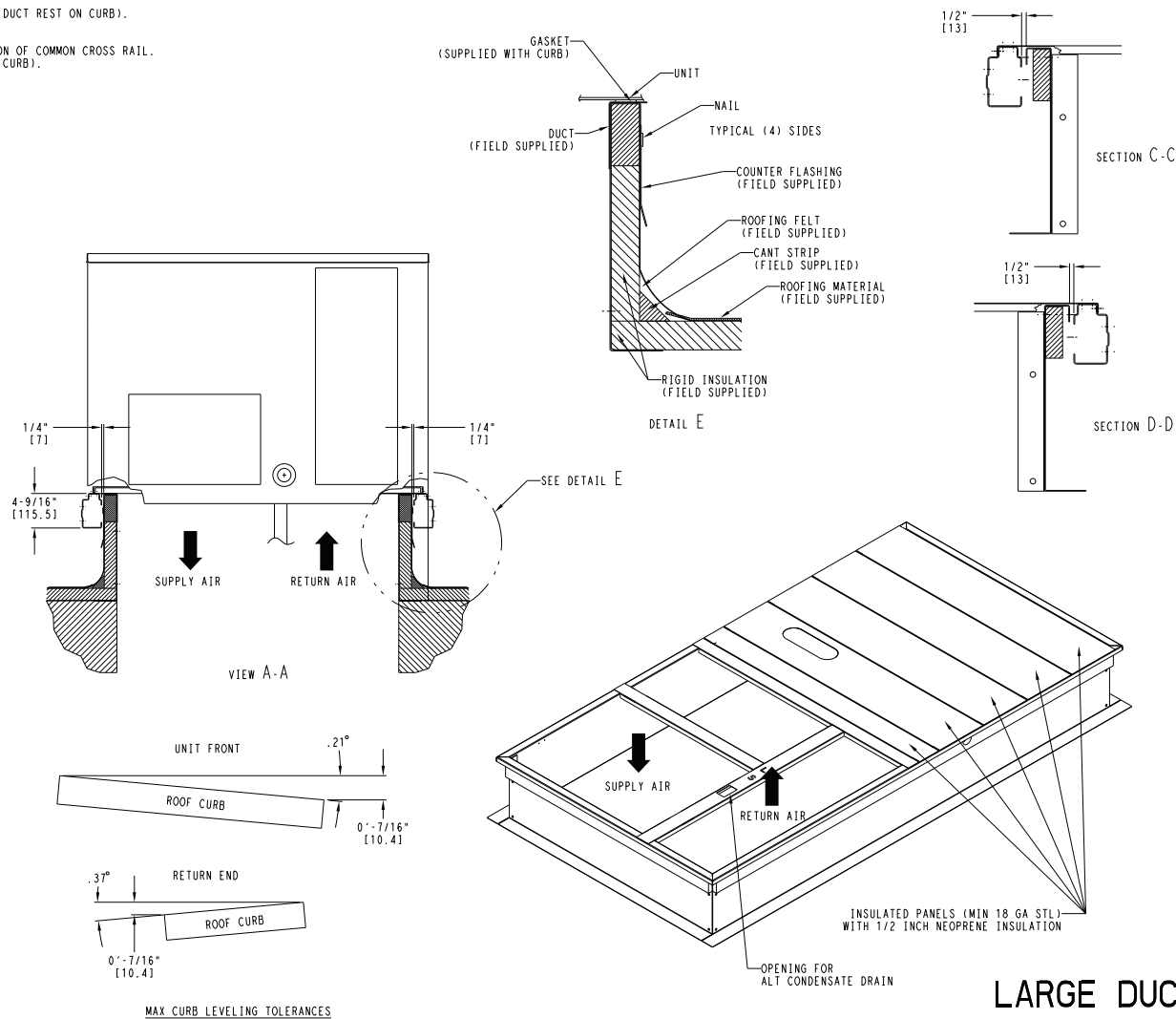
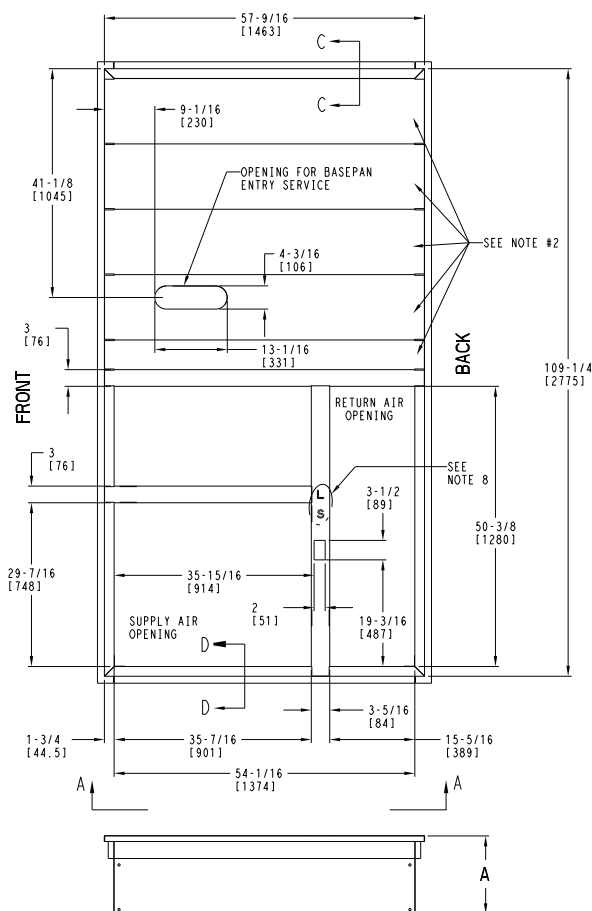
PERSONAL INJURY HAZARD

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.

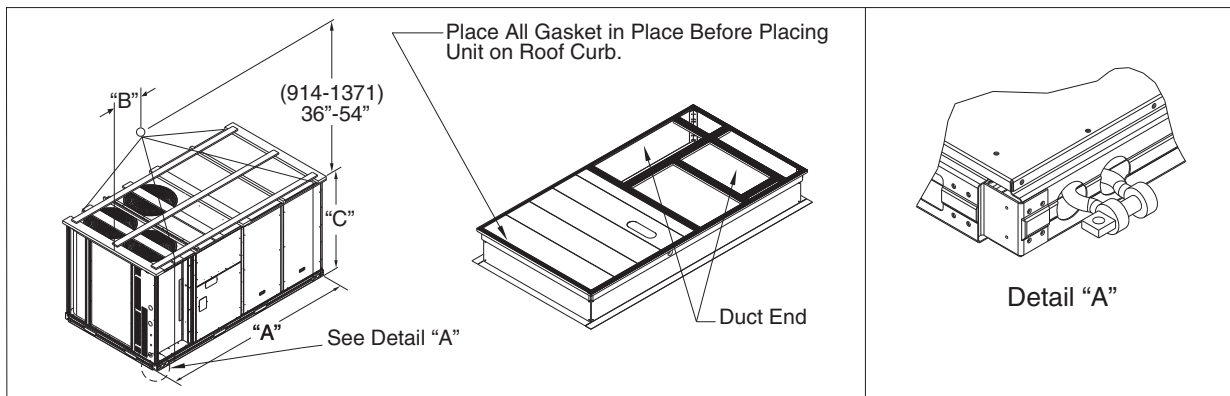
ROOF CURB ACCESSORY #	A
CRRFCURB074A00	14" [356]
CRRFCURB075A00	24" [610]

- NOTES:
1. ROOFCURB ACCESSORY IS SHIPPED DISASSEMBLED.
  2. INSULATED PANELS: 1/2" THK. NEOPRENE FOAM, 1.0# DENSITY.
  3. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
  4. ROOFCURB SIDEWALLS: 16 GAGE STEEL.
  5. ATTACH DUCTWORK TO CURB, (FLANGES OF DUCT REST ON CURB).
  6. SERVICE CLEARANCE 4 FT ON EACH SIDE.
  7. DIRECTION OF AIR FLOW.
  8. "L" & "S" DESIGNATIONS DENOTE LOCATION OF COMMON CROSS RAIL. (POSITION "L" FOR LARGE DUCT OPENING CURB).



**LARGE DUCT  
OPENINGS**

**Fig. 5 — 547K\*14 Roof Curb Details**



UNIT	MAX WEIGHT		DIMENSIONS					
			A		B		C	
	lb	kg	in.	mm	in.	mm	in.	mm
547K*14	1901	862	116.0	2945	57.0	1450	59.5	1510

**NOTES:**

1. Dimensions in ( ) are in millimeters.
2. Hook rigging shackles through holes in base rail, as shown in detail "A." Holes in base rails are centered around the unit center of gravity. Use wooden top to prevent rigging straps from damaging unit.

**Fig. 6 — Rigging Details**

**Step 6 — Rig and Place Unit**

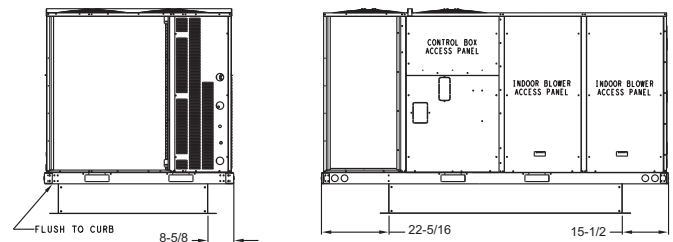
Keep unit upright and do not drop. Spreader bars are not required. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 2 and Fig. 6 for additional information.

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

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 can be tightened with a 1/2 in. square socket drive extension. For further details see Install External Condensate Trap and Line on page 11.

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



**Fig. 7 — Retrofit Installation Dimensions**

If the alternative condensate drain location through the bottom of the unit is used in conjunction with a retrofit curb, the hole in the curb must be moved 12-1/2 in. (320 mm) towards the duct end of the unit. See Fig. 8.

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

Remove all shipping materials and top skid. Remove extra center post from the condenser end of the unit so that the condenser end of the unit matches Fig. 16 and 17. Recycle or dispose of all shipping materials.

**⚠ CAUTION**

**UNIT DAMAGE HAZARD**

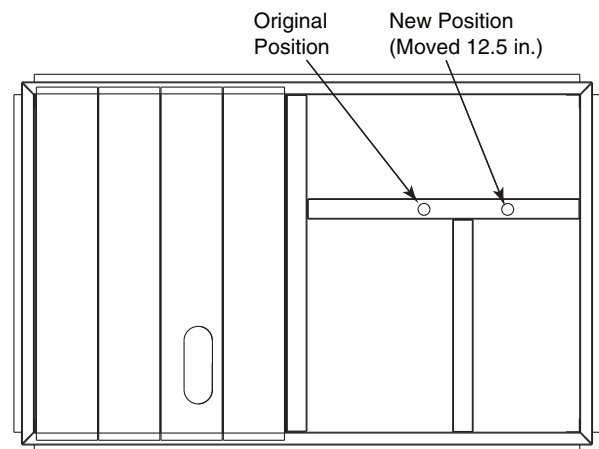
Failure to follow this caution may result in equipment damage.

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**

For full perimeter curbs CRRFCURB074A00 and 075A00, the clearance between the roof curb and the front and rear base rails should be 1/4 in. (6.4 mm). The clearance between the curb and the end base rails should be 1/2 in. (13 mm). For retrofit applications with curbs CRRFCURB003A01 and 4A01, the unit should be positioned as shown in Fig. 7. Maintain the 15-1/2 in. (394 mm) and 8-5/8 in. (220 mm) clearances and allow the 22-5/16 in. (567 mm) dimension to float if necessary.



**Fig. 8 — Alternative Condensate Drain Hole Positions**

## Step 7 — Convert to Horizontal and Connect

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 using accessory CRDUCTCV002A00. To convert to horizontal configuration, remove screws from side duct opening covers and remove covers.

Discard the supply duct cover. Install accessory CRDUCTCV002A00 to cover the vertical supply duct opening. Use the return duct cover removed from the end panel to cover the vertical return duct opening.

### ALL UNITS

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.

## Step 8 — Install Outside Air Hood

### ECONOMIZER HOOD REMOVAL (FACTORY OPTION)

1. The hood is shipped in knock-down form and located in the return air compartment. It is attached to the economizer using 2 plastic tie-wraps.
2. To gain access to the hood, remove the filter access panel (see Fig. 9).
3. Locate and cut the (2) plastic tie-wraps being careful (see Fig. 10). Be careful to not damage any wiring or cut tie-wraps securing any wiring.
4. Carefully lift the hood assembly (with metal tray) through the filter access opening and assemble per the steps outlined in *Economizer and Two-Position Hood Setup*, on page 10.

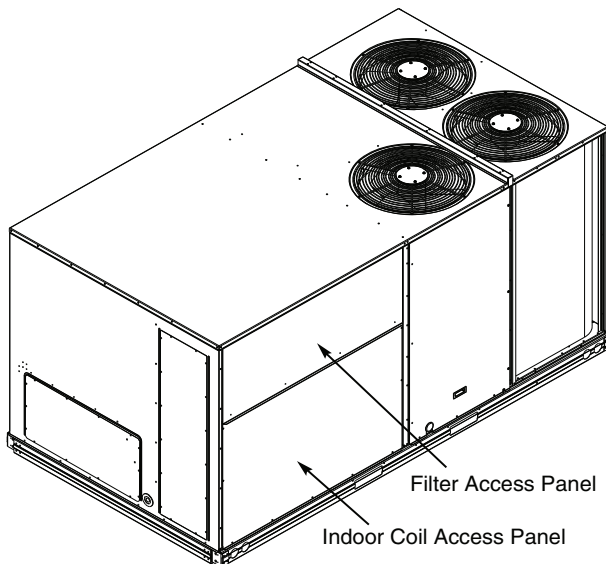


Fig. 9 — Typical Access Panel Locations

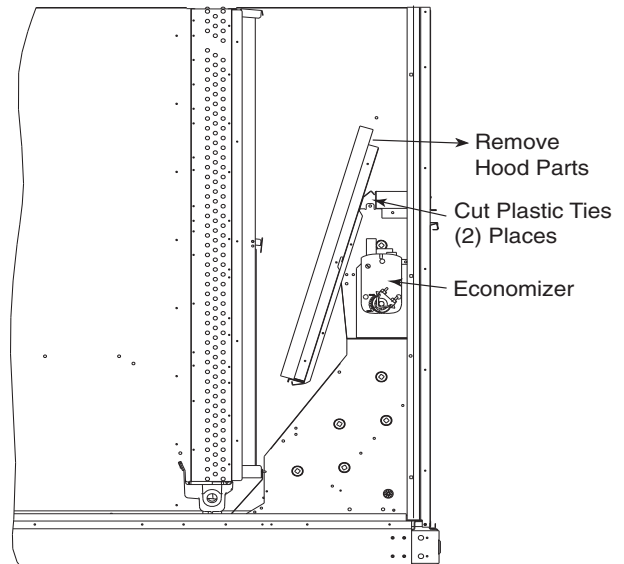


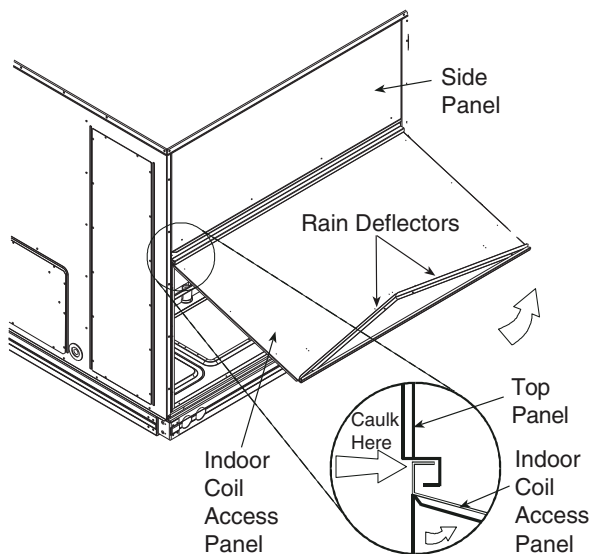
Fig. 10 — Economizer Hood Package Location

### ECONOMIZER HOOD SETUP

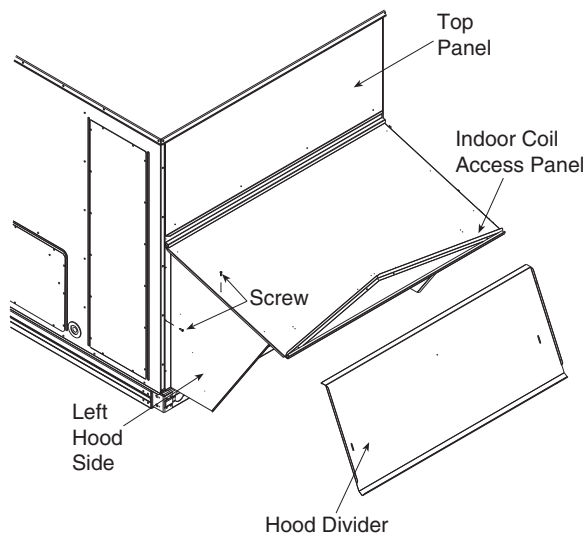
NOTE: If the power exhaust accessory is to be installed on the unit, the hood shipped with the unit will not be used and must be discarded. Save the aluminum filter for use in the power exhaust hood assembly.

1. The indoor coil access panel will be used as the top of the hood. If the panel is still attached to the unit, remove the screws along the sides and bottom of the panels. See Fig. 11.
2. Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Be careful not to lift the panel too far, as it might fall out. 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. 12.
3. Remove the shipping tape holding the economizer barometric relief damper in place (economizer only).
4. Insert the hood divider between the hood sides. See Fig. 12 and 13. 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.
5. 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. 13.
6. Caulk the ends of the joint between the unit top panel and the hood top.
7. Replace the filter access panel.

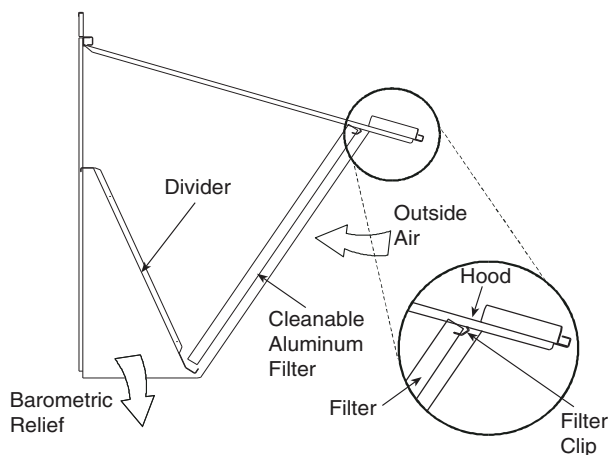




**Fig. 11 — Indoor Coil Access Panel Relocation**



**Fig. 12 — Economizer Hood Construction**



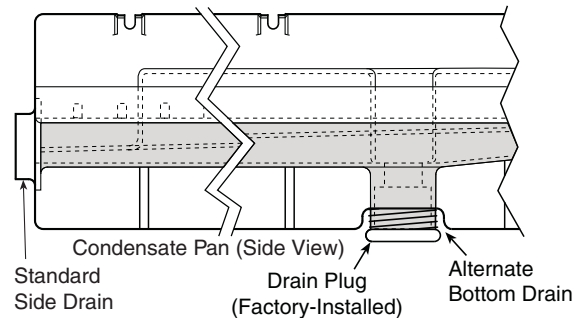
**Fig. 13 — Economizer Filter Installation**

### Step 9 — 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. 14. Unit airflow configuration does not determine which drain connection to use. Either drain connection can be used with vertical or horizontal applications.

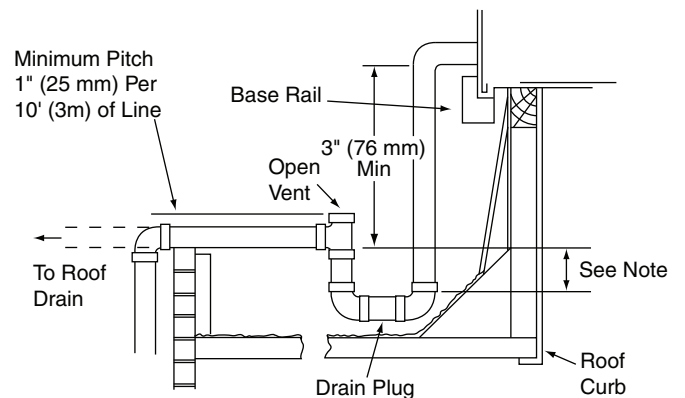
To use the alternate bottom drain connection, remove the red drain plug from the bottom connection (use a 1/2 in. square socket drive extension) and install it in the side drain connection.

The piping for the condensate drain and external trap can be completed after the unit is in place. See Fig. 14 and 15.



**Fig. 14 — Condensate Drain Pan (Side View)**

**NOTE:** If the alternate bottom drain is not used, check the drain plug for tightness prior to setting the unit on the roof curb.



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

**Fig. 15 — 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 10 — Make Electrical Connections

#### **⚠ WARNING**

#### **ELECTRIC SHOCK HAZARD**

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

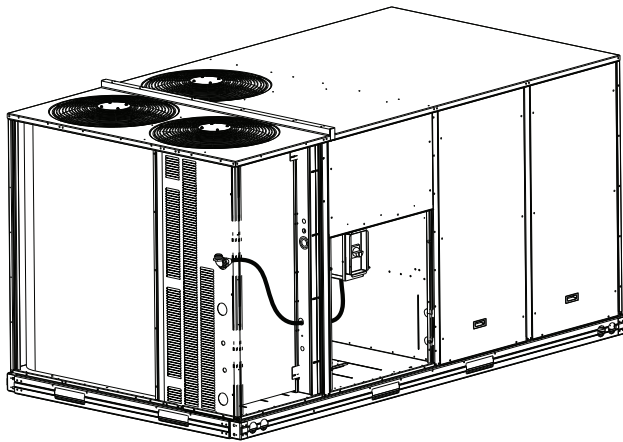
Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed 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:** Check all factory and field electrical connections for tightness. Field-supplied wiring shall conform with the limitations of minimum 63°F (33°C) rise.

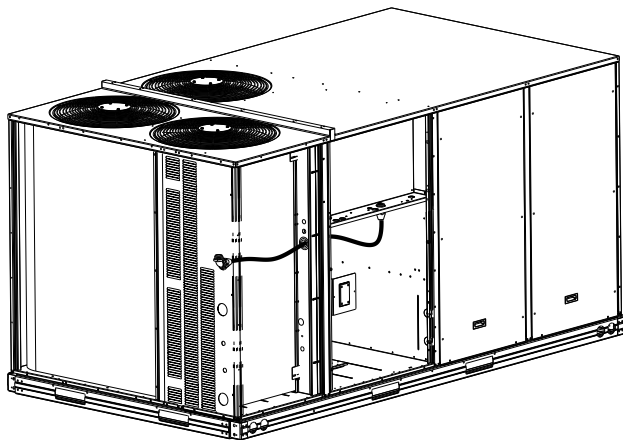
### Field Power Supply

For those units without through-the-curb power, conduit must be used to route the main power from the condenser end, via the power entry in the corner post of the unit (see Fig. 16-18) to either the factory option disconnect or the bottom of the control box. A 1 in. conduit is provided wrapped around compressor. A second conduit is provided with factory-installed powered convenience outlet. For those units that require a conduit larger than 1 in., the conduit must be field-supplied. Figures 16-18 show the wire routings.

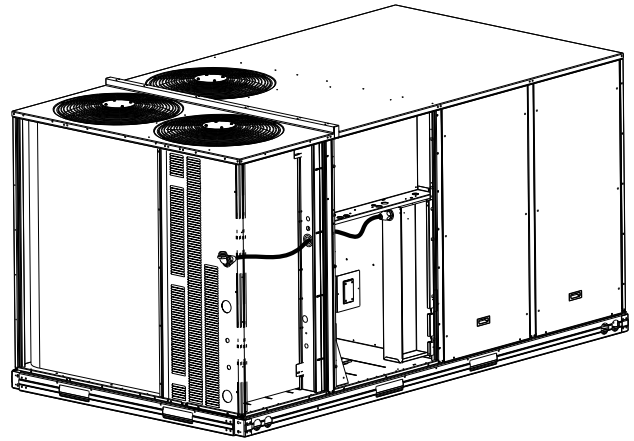
If the field disconnect is larger than 100-A, it must be attached to the unit using accessory CRDISBKT001A00 — disconnect switch bracket (see Fig. 19). Follow the instructions provided with this accessory. For smaller field disconnects, be sure to use 1/2 in. screws to mount the disconnect directly to the end panel (see Fig. 20). In either case, set the disconnect vertical location on the unit so that a 90 degree fitting can be used to connect the conduit to the disconnect.



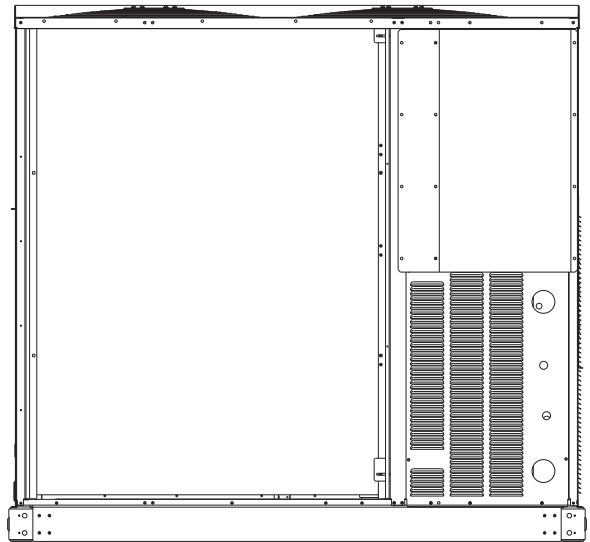
**Fig. 16 — Conduit into Factory Option Disconnect**



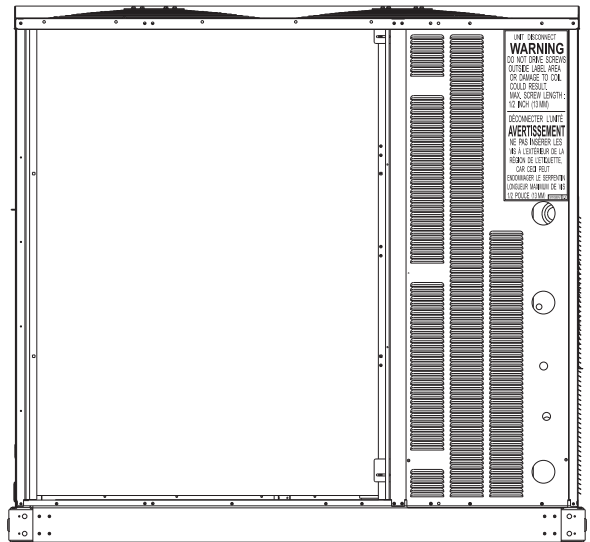
**Fig. 17 — Conduit into Control Box**



**Fig. 18 — Conduit into Single Point Box**



**Fig. 19 — Mounting Position for Field Disconnects (Over 100A)**



**Fig. 20 — Mounting Position for Field Disconnects (Up to 100A)**



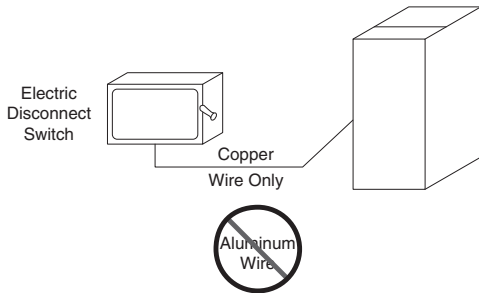
Field power wires are connected to the unit at line-side pressure lugs at the main terminal block (TB1) or at factory-installed option non-fused disconnect switch. See Fig. 21. Max wire size is no. 2 AWG (copper only). See Fig. 22.

**⚠ WARNING**

**FIRE HAZARD**

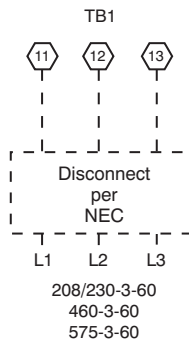
Failure to follow this warning could result in personal injury, death, or property damage.

Do not connect aluminum wire between disconnect switch and unit. Use only copper wire.

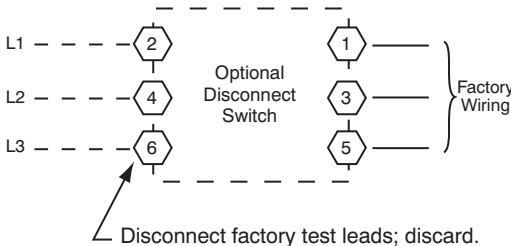


**Fig. 21 — Disconnect Switch and Unit**

**Units Without Disconnect Option**



**Units With Disconnect Option**



**Fig. 22 — Power Wiring Connections**

**TEST LEADS** - Unit may be equipped with short leads (pig-tails) on the field line connection points off the 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.

**FIELD WIRING**

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.

Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 22 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is 2/0 AWG per pole.

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 Overcurrent Protection) device size.

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 following formula to determine the percent of voltage imbalance.

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

Example: Supply voltage is 230-3-60



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

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.

**⚠ CAUTION**

**UNIT DAMAGE HAZARD**

Failure to follow this caution may result in equipment damage.

Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Bryant warranty.

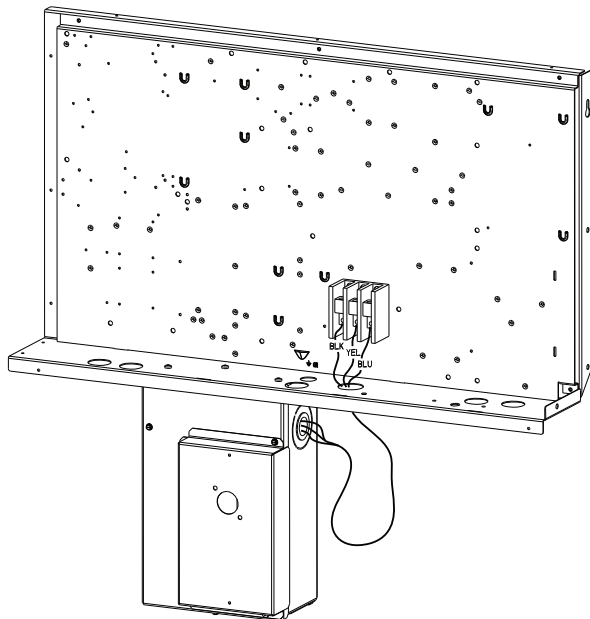
**UNITS WITH FACTORY-INSTALLED NON-FUSED DISCONNECT**

The factory-installed optional 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).

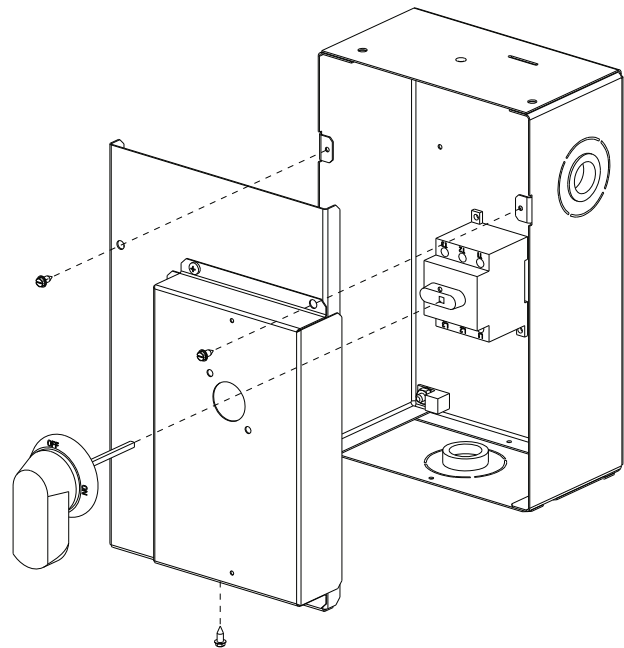
Connect field power supply conductors to LINE side terminals when the switch enclosure cover is removed to attach the handle.

**To field install the NFD shaft and handle (see Fig. 24):**

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 the tip of the shaft to the top surface of the pointer to be 3.75 in. to 3.88 in. (95 mm to 99 mm) for 80A and 100A NFD and 3.43 in. to 3.56 in. (87 mm to 90 mm) for 200A NFD.
7. Tighten the locking screw to secure the shaft to the NFD.
8. Turn the handle to the OFF position with red arrow pointing to 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. 23 — Location of Non-Fused Disconnect Enclosure**



**Fig. 24 — 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 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.

**CONVENIENCE OUTLETS**

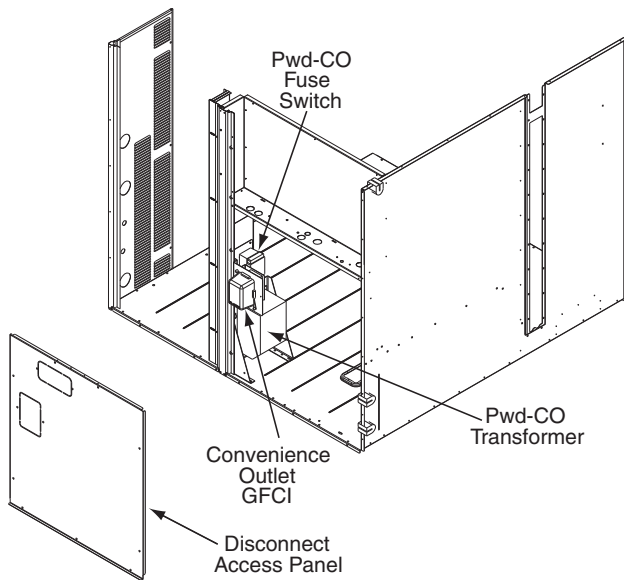
**⚠ WARNING**

**ELECTRICAL OPERATION HAZARD**

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 547K 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. 25.



**Fig. 25 — Convenience Outlet Location**

### Installing Weatherproof Cover

A weatherproof cover is now required by UL standards for the factory-installed convenience outlets. 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.

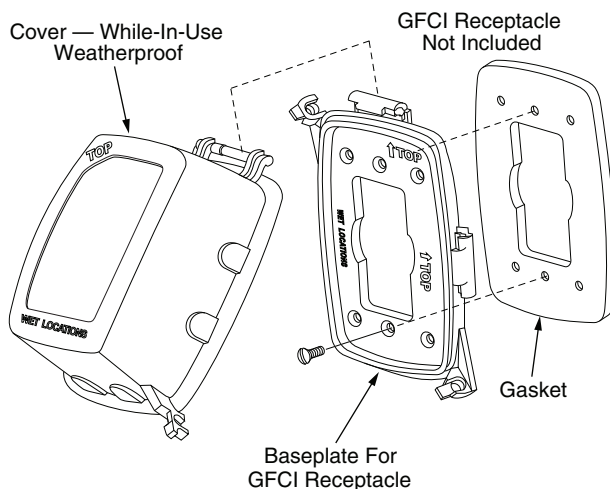
On units with electromechanical controls the weatherproof cover kit is shipped in the unit's control box. The kit includes the hinged cover, a backing plate and gasket. See Fig. 26.

### 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 2 screws at the GFCI duplex outlet, until approximately 1/2 in. (13 mm) under screw heads is 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 2 screws until snug (do not over-tighten).

Mount the weatherproof cover to the backing plate as shown in Fig. 26. Remove 2 slot fillers in the bottom of the cover to permit service tool cords to exit the cover. Check for full closing and latching.



**Fig. 26 — Weatherproof Cover Installation**

### Non-Powered 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.

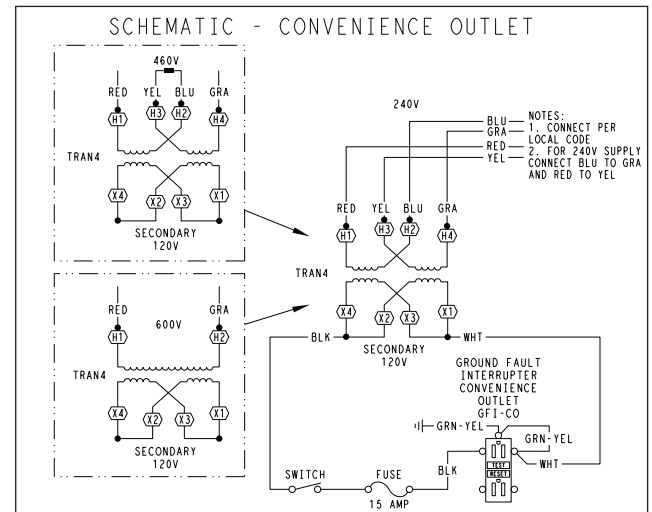
### Unit-Powered Type

A unit-mounted transformer is factory-installed to step-down 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. 25.

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; 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 is open. See Fig. 27. On a unit without a unit-mounted disconnect, connect the source leads to the main terminal block (TB3).

If the convenience outlet transformer is connected to the line side of a field disconnect, the conduit provided with the unit must be used to protect the wires as they are routed from the transformer to the field disconnect. The end of the conduit with the straight connector attaches to the field disconnect. The other end does not need to connect to the transformer; however, the conduit must be routed so that all wiring is either in the conduit or behind the access panel.

If the convenience outlet transformer is connected to the line side of the factory disconnect option, route the wires through the web bushing located on the bottom of the disconnect box. For the load-side wiring to the factory option disconnect, route the wires through the hole on the right side of the disconnect. Be sure to create a drip loop at least 6 inches long.



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

**Fig. 27 — Powered Convenience Outlet Wiring**

## ALL UNITS

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.

### Unit-Mounted Convenience Outlets

Outlets will often require that 2 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 “Fusetron”<sup>1</sup> T-15, non-renewable screw-in (Edison base) type plug fuse. See Fig. 28 for maximum continuous use amp limitations.

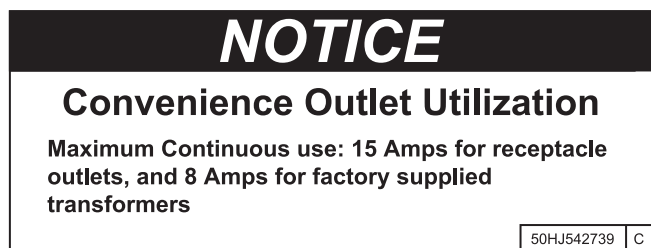


Fig. 28 — Convenience Outlet Utilization Notice Label

### FACTORY-OPTION THRU-BASE CONNECTIONS (ELECTRICAL CONNECTIONS)

This service connection kit consists of a 1/2 in. electrical bulkhead connector and a 1-1/2 in. electrical bulkhead connector, connected to an “L” bracket covering the embossed (raised) section of the unit basepan in the condenser section. See Fig. 29. The 1/2 in. bulkhead connector enables the low-voltage control wires to pass through the basepan. The 1-1/2 in. electrical bulkhead connector allows the high-voltage power wires to pass through the basepan.

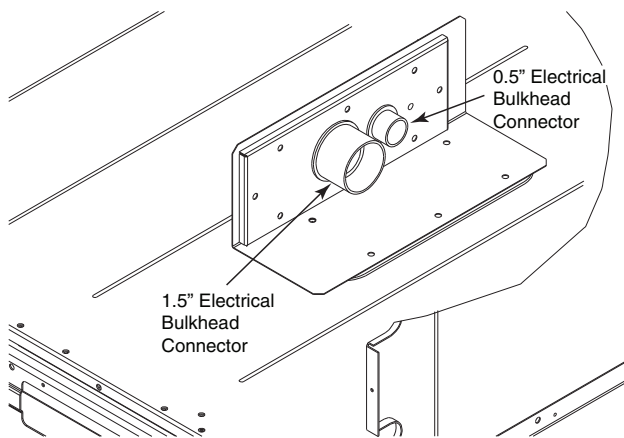


Fig. 29 — Thru-the-Base Option, Shipping Position

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. 30.
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.

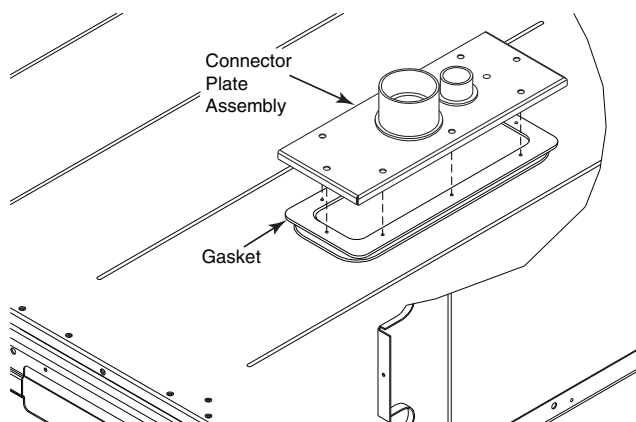


Fig. 30 — Completing Installation of Thru-the-Base Option

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 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). A hole must be field cut in the main control box bottom on the left side so the 24-v control connections can be made.

Connect the control power conduit to the unit control box at this hole.

### 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. 22.

### Field Control Wiring

The 547K\*14 requires an external temperature control device. This device can be a thermostat (field-supplied) or a thermostat emulation device provided as part of a third-party Building Management System.

### Thermostat

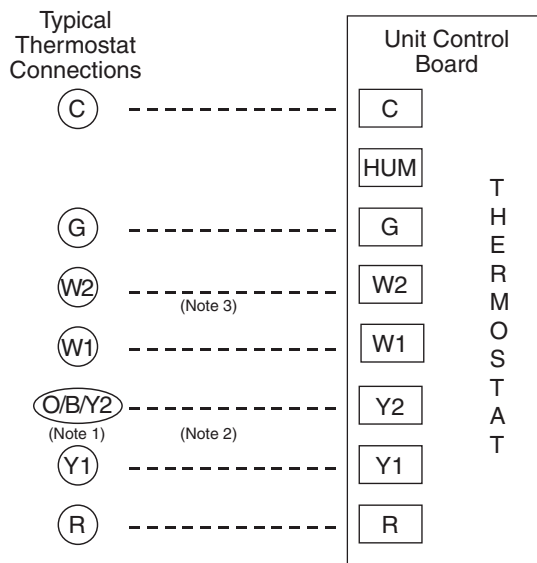
Install a Bryant-approved accessory 2-stage Cooling/Heating thermostat according to installation instructions included with the accessory. If using an electronic thermostat, configure it for “non-heat pump” operation. Locate the thermostat accessory on a solid wall in the conditioned space to sense average 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 7 leads. If the thermostat does not require a 24-v source (no “C” connection required), use a thermostat cable or equivalent with minimum of 6 leads. See Fig. 31. 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 Gauge) insulated wire 95°F (35°C minimum).

For 50 to 75 ft (15 to 23 m), use no. 16 AWG insulated wire (35°C minimum). For over 75 ft (23 m), use no. 14 AWG insulated wire (35°C 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.

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





**Fig. 31 — Typical Low-Voltage Control Connections**

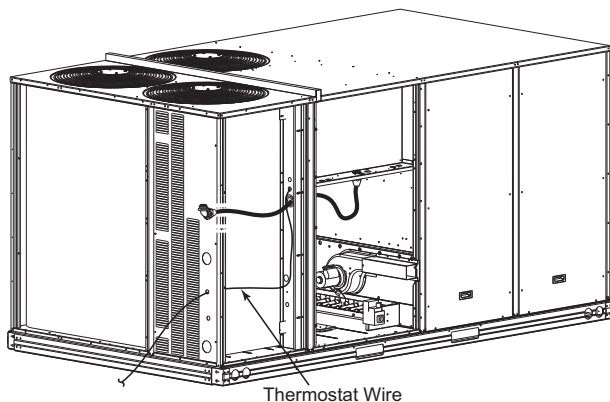
#### Unit without Thru-Base Connection Kit

Pass the thermostat control wires through the bushing on the unit end panel. Route the wire through the snap-in wire tie and up to the web bushing near the control box. Route the wire through the bushing and into the bottom left side of the control box after removing one of the 2 knockouts in the corner of the box. Use a connector at the control box to protect the wire as it passes into the control box. Pull the wires over to the terminal strip at the upper left corner of the Unit Control Board (UCB). Use the connector at the control box and the wire tie to take up any slack in the thermostat wire to ensure that it will not be damaged by contact with the condenser coil. See Fig. 32.

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

#### 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.

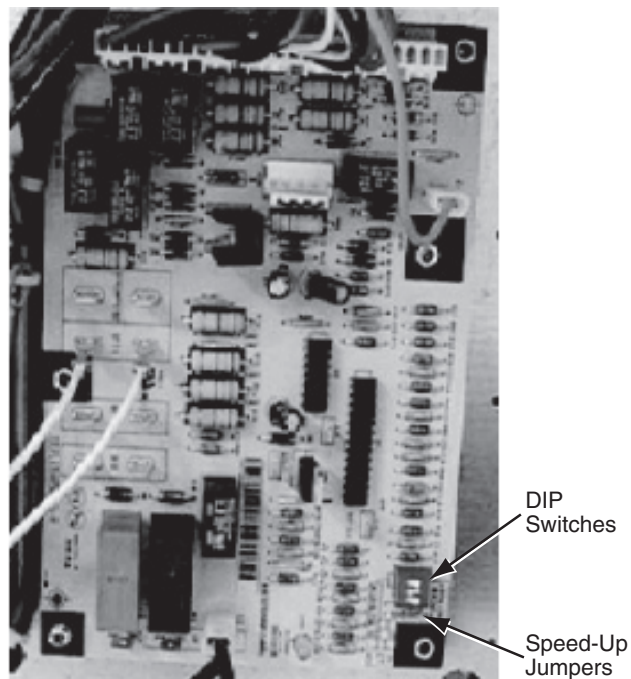


**Fig. 32 — Thermostat Wire Routing**

## COMMERCIAL DEFROST CONTROL

On 547K units equipped with electromechanical controls the Defrost Control Board (DFB) coordinates thermostat demands for supply fan control, 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. 33 for board arrangement.

The DFB is located in the main control box of the 547K unit (see Fig. 34). All connections are factory-made through harnesses to the UCB (unit control board) to the ECM (direct-drive motor), reversing valve solenoids and to defrost thermostats. Refer to Table 3 for details of DFB Inputs and Outputs.



**Fig. 33 — Defrost Control Board Arrangement**

#### Reversing Valve Control

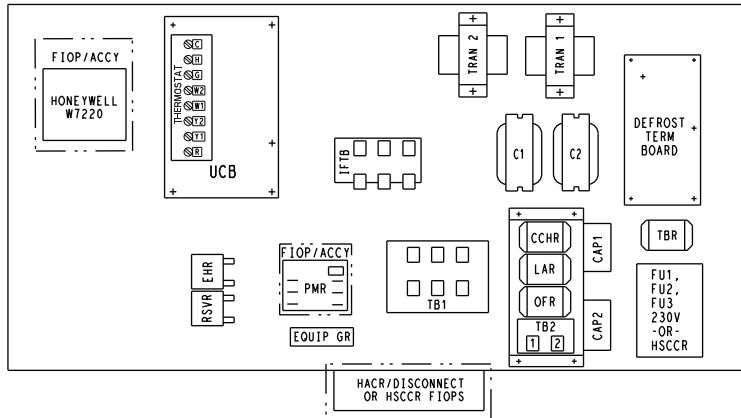
The DFB has 2 outputs for unit reversing valve control. Operation of the reversing valves is based on internal logic; this application does not use an "O" or "B" signal to determine reversing valve position. Reversing valves are energized during the cooling stages and the defrost cycle and de-energized 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 board (UCB); 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).

#### Auxiliary (Electric) Heat Control

The 547K unit can be equipped with one or 2 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).



**Fig. 34 — Defrost Control Board Location — 547K\*14 Electromechanical Unit Shown**

**Table 3 — 547K Defrost Board I/O and Jumper Configurations**

POINT NAME	TYPE OF I/O	CONNECTION PIN NUMBER	UNIT CONNECTION	NOTE
<b>INPUTS</b>				
<b>G Fan</b>	DI, 24 vac	P2-3	CTB-G	
<b>Y1 Cool 1</b>	DI, 24 vac	P2-5	CTB-Y1	
<b>Y2 Cool 2</b>	DI, 24 vac	P2-4	CTB-Y2	
<b>W1 Heat 1</b>	DI, 24 vac	P2-7	CTB-W1	
<b>W2 Heat 2</b>	DI, 24 vac	P2-6	CTB-W2	
<b>R Power</b>	24 vac	P3-1	CONTL BRD-8	
<b>C Common</b>	24 vac	P3-2	CONTL BRD-4	
<b>DFT 1</b>	DI, 24 vac	DFT-1 to DFT-1	—	
<b>DFT 2</b>	DI, 24 vac	DFT-2 to DFT-2	SWITCH	
<b>OUTPUTS</b>				
<b>IFO Fan On</b>	DO, 24 vac	P3-9	REHEAT/HP-2	
<b>OF OD Fan On</b>	DO, 24 vac	OF	OFR	
<b>RVS1</b>	DO, 24 vac	P3-7 to P3-5	—	Energize in COOL
<b>RVS2</b>	DO, 24 vac	P3-6 to P3-4	—	Energize in COOL
<b>COMP 1</b>	DO, 24 vac	P3-10	FPT1-REHEAT/HP-6	
<b>COMP2</b>	DO, 24 vac	P3-8	FPT2-REHEAT/HP-8	
<b>HEAT 2</b>	DO, 24 vac	E-HEAT	TB4-1	
<b>COM</b>	24 vac	P3-3	TB4-3	
<b>CONFIGURATION</b>				
<b>Select Jumper</b>	24 vac	P1-1	—	
<b>SPEED-UP CONFIGURATION</b>				
<b>Speed-Up Jumper</b>	—	JMP17	—	
<b>Speed-Up Jumper</b>	—	JMP18	—	

**NOTES:**

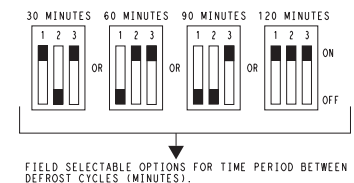
1. Jumper for 1-3 seconds: Factory Test — The defrost interval timing is reduced by a factor of 0.1 seconds/minute based on the positions of DIP switches SW1 and SW2 (i.e., 90 minutes will be reduced to 9 seconds).
2. Jumper for 5-20 seconds: Forced Defrost — Defrost runs for 30 seconds if DFT2 is open.

**Defrost**

The defrost control mode is a time/temperature sequence. There are 2 time components: The continuous run period and the test/defrost cycle period. The temperature component is provided by Defrost Thermostat (DFT2) 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. 35 and Table 4). The default run period is 60 minutes.

**DIP SWITCH SETTINGS - DEFROST BD**



**Fig. 35 — DIP Switch Settings — Defrost Board**

**Table 4 — DIP Switch Positions**

	1	2		1	2		1	2		1	2		3	
1	•		1		•	1			1	•	•	1	•	On
0		•	0	•		0	•	•	0			0		Off
	30 minutes			60 minutes (factory default)			90 minutes			120 minutes			Fan Delay	

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

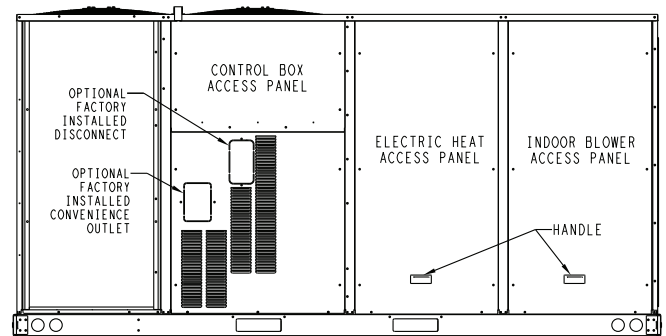
The 547K\*14 units may be equipped with field-installed accessory electric heaters. The heaters are modular in design, with heater frames holding open coil resistance wires strung through ceramic insulators, line-break limit switches and a control contactor.

Heater modules are installed in the compartment below the indoor (supply) fan outlet. Access is through the electric heat access panel. See Fig. 36-38.

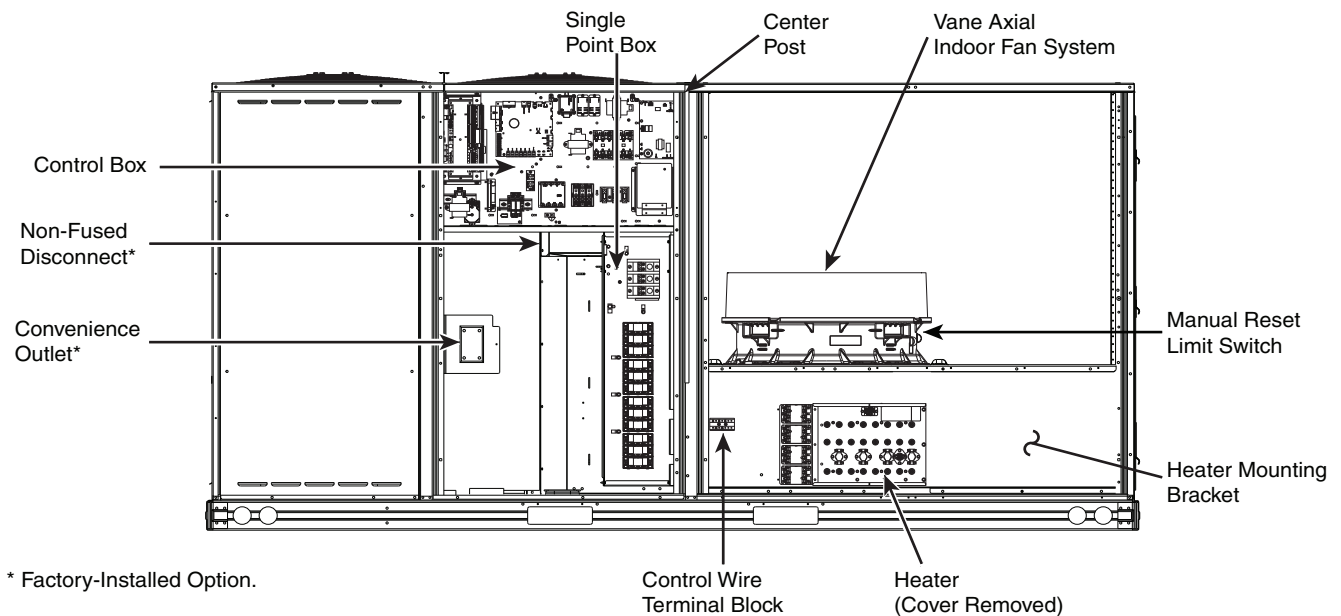
Not all available heater modules may be used in every unit. Use only those heater modules that are UL listed for use in a

specific size unit. Refer to the label on the unit cabinet for the list of approved heaters.

Refer to the *Small Roof Top Units Accessory Electric Heater and Single Point Box* installation instructions for further details.

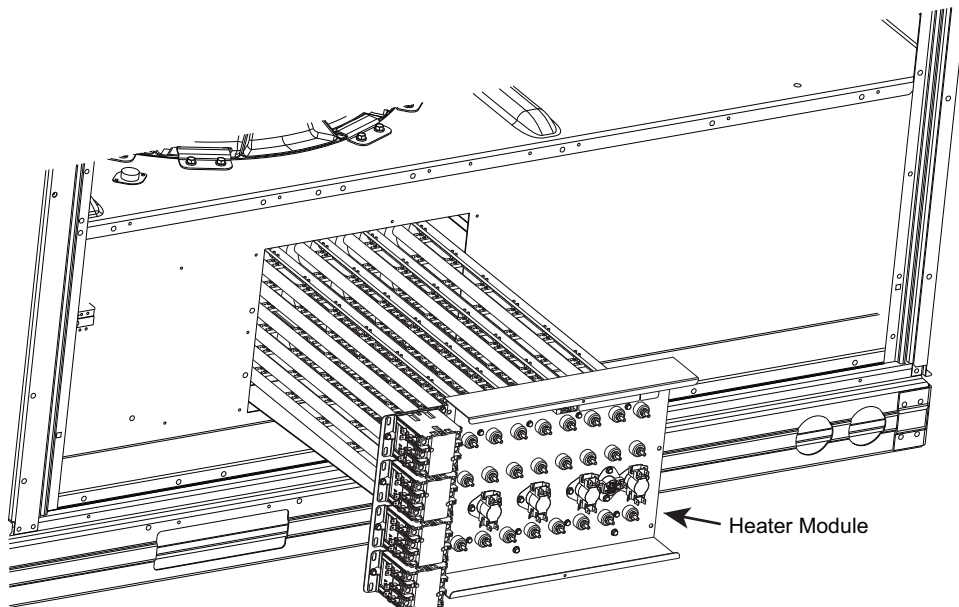


**Fig. 36 — Access Panel Location**



\* Factory-Installed Option.

**Fig. 37 — Component Location**



**Fig. 38 — Heater Module Installation**

## SINGLE POINT BOXES AND SUPPLEMENTARY FUSES

When the unit MOC 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. 40. 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 Small Roof Top Units Accessory Electric Heater and single point box installation instructions for details on tap connections.

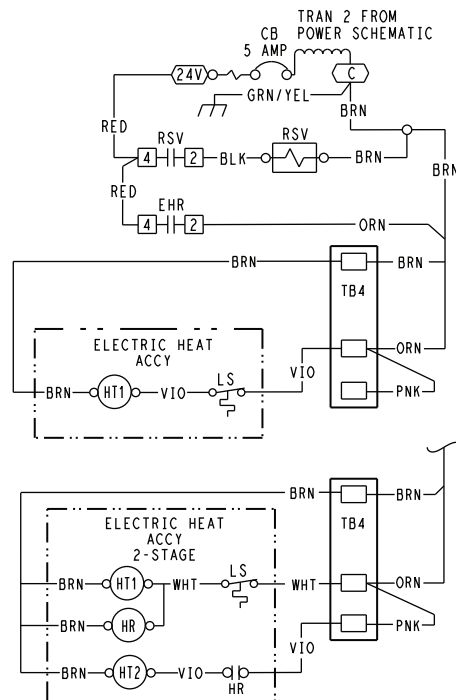
All fuses on 547K units are 60-A. (Note that all heaters are qualified for use with a 60-A fuse, regardless of actual heater ampacity, so only 60-A fuses are necessary.)

## 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.

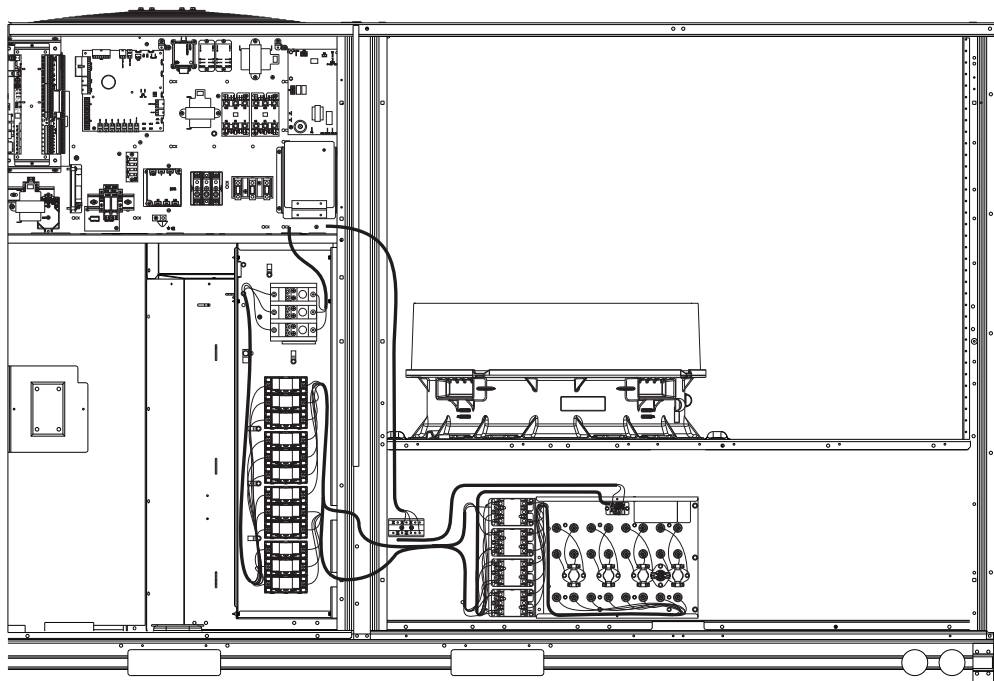
## LOW-VOLTAGE CONTROL CONNECTIONS

Pull the low-voltage control leads from the heater module — WHT, VIO and BRN to the 4-pole terminal board TB4 located on the heater bulkhead to the left of the Heater module. Connect the WHT lead from Heater circuit no. 1 to terminal TB4-1. For 2 stage heating, connect the VIO lead from Heater circuit no. 2 to terminal TB4-2. Connect the BRN lead(s) to terminal TB4-3. See Fig. 39.



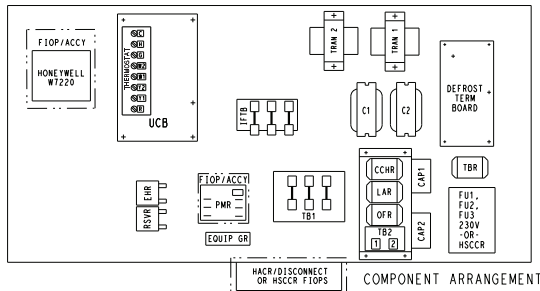
**Fig. 39 — Accessory Electric Heater Control Connections**  
CONTROL AND POWER WIRING DIAGRAMS

Figures 41-43 are typical control and power wiring diagrams.



**Fig. 40 — Typical Single Point Installation**





- NOTES:
1. UCB LAYOUT DOES NOT MATCH ACTUAL TERMINAL BOARD LAYOUT.
  2. TERMINAL BOARD JUMPERS 1, 2 AND 3 ARE CUT FROM THE FACTORY.
  3. REMOVE DESIGNATED JUMPERS ON TERMINAL BOARD WHEN ADDING SMOKE DETECTORS, OCCUPANCY AND REMOTE SHUTDOWN.
  4. USE ABC AS COARSE AND POT AS FINE ADJUSTMENTS FOR SETTING HIGH FAN SPEED. LOW SPEED IS AN OFFSET BASED ON DIP SWITCHES.
  5. 2-PIN LOW SPEED DIP SWITCH POSITIONS ARE FACTORY SET AS SHOWN.
  6. HARDSTART AND CUTOFF SET TO "MIN". JUMPER PIN ON TOP 2-PINS AS SHOWN.
  7. THE \* WIRE COLOR IS FOR DIFFERENTIATION WITHIN THIS SCHEMATIC.
  8. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.
  9. T84 LOCATED IN HEAT SECTION.

#### HP DIP SWITCH SETTINGS

(DEFAULT)

30 MINUTES 60 MINUTES 90 MINUTES 120 MINUTES

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

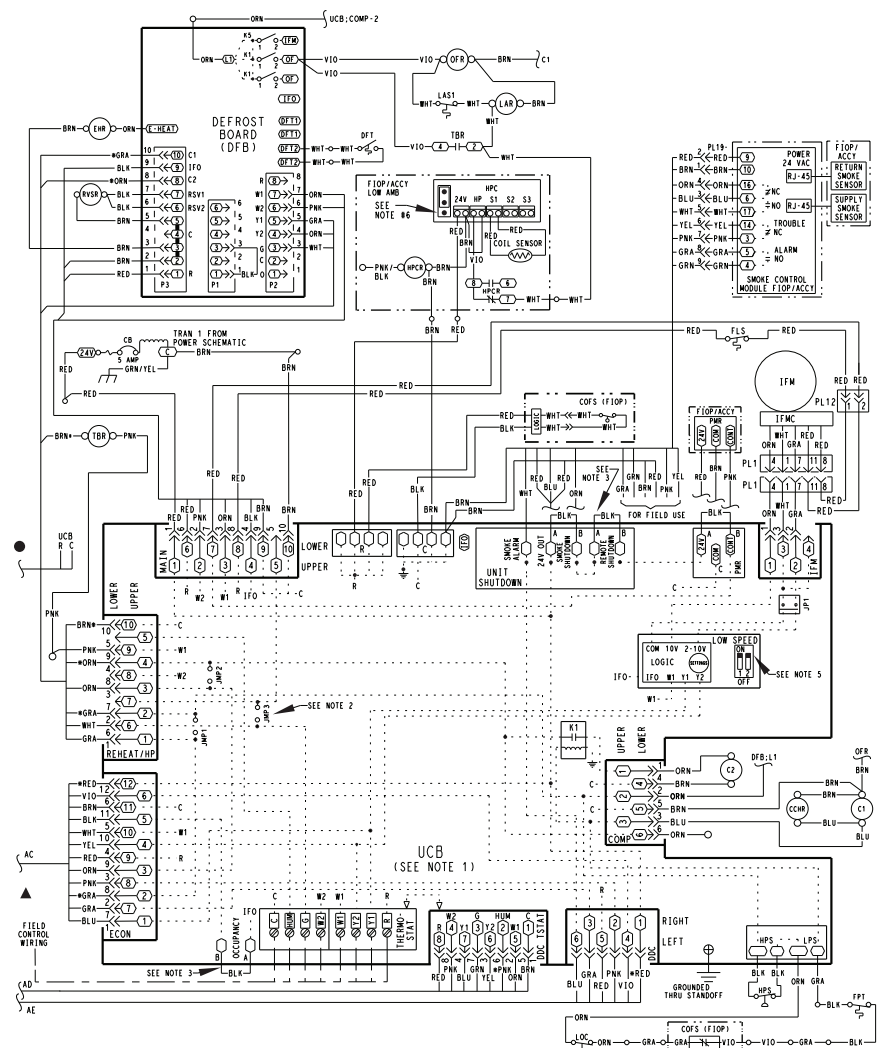
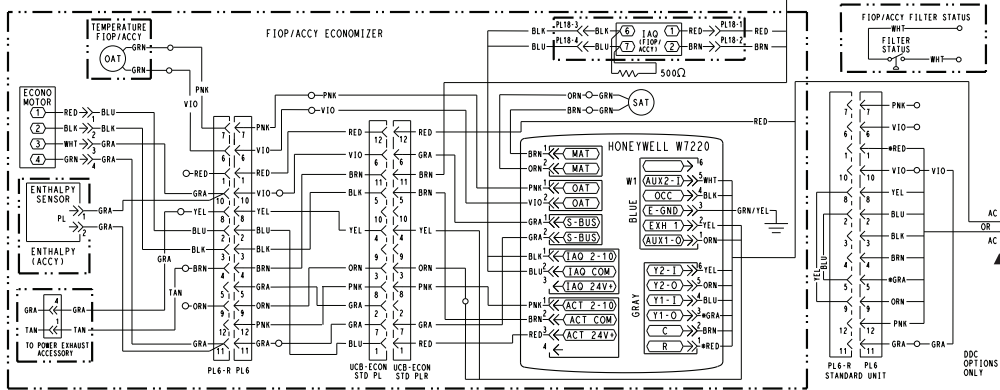
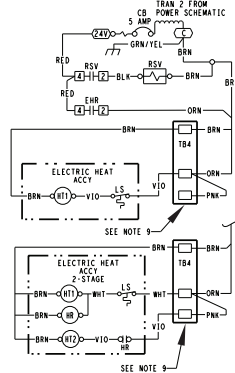
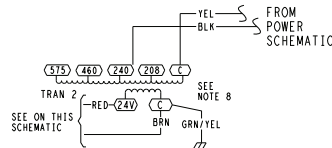
SPEED UP JUMPED TEST PINS (USE UP) METAL OBJECT FIELD SPEED UP CYCLE

1) MOMENTARILY SHORT PINS AND RELEASE TO BYPASS COMPRESSOR OFF DELAY

2) SHORT FOR 1-10 SEC. AND RELEASE FOR FORCED DEFROST.

3) PERMANENT SHORT WILL BE IGNORED. DEFROST WILL TERMINATE IN 30 SEC. IF DFT IS OPEN.

DEFROST WILL TERMINATE NORMALLY IF DFT IS CLOSED.



HP CONTROL 230/460/575V T1 12.5 TON

50TM002446

Fig. 41 — Typical Control Wiring Diagram, Electromechanical with W7220 Controller



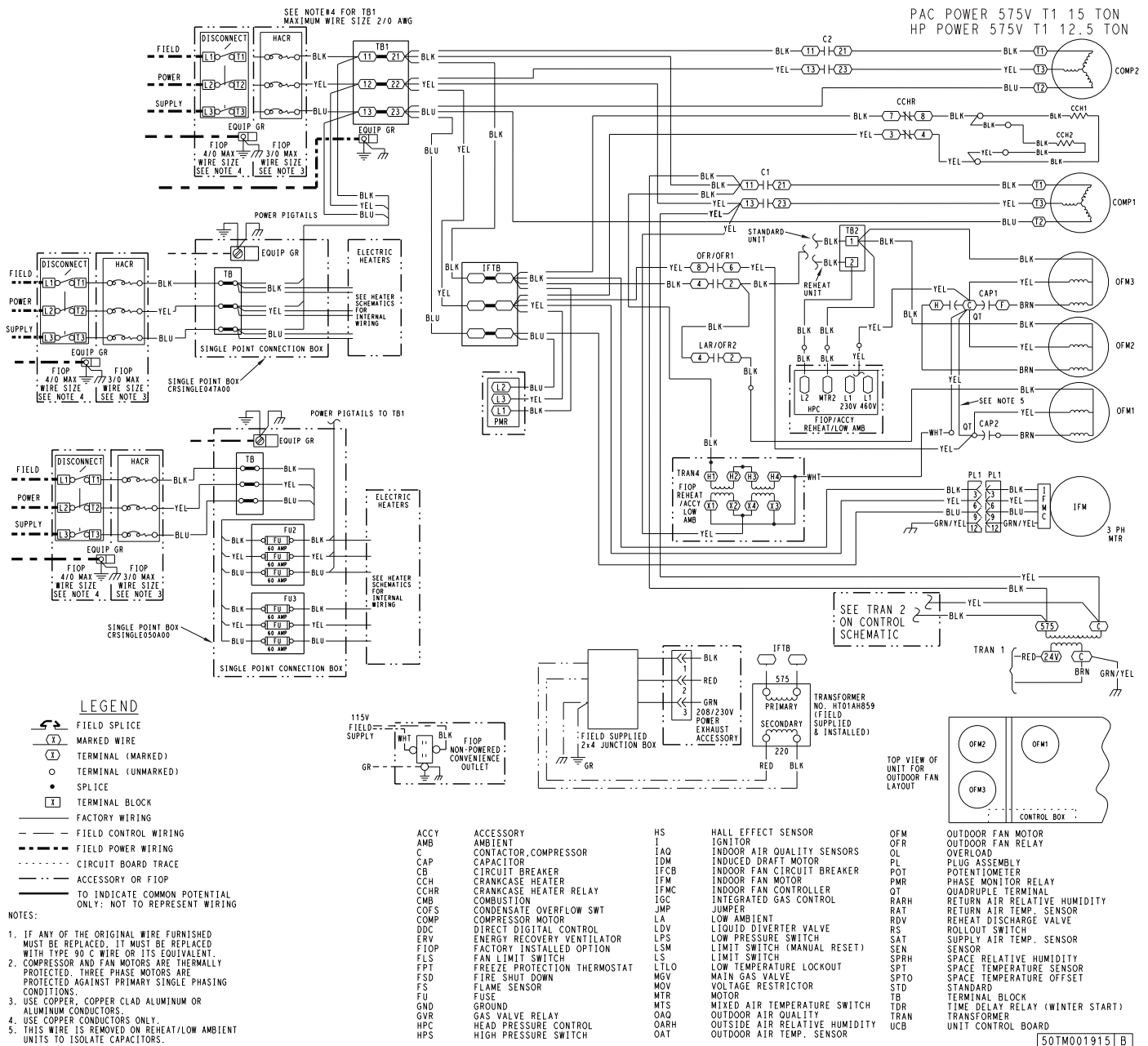


Fig. 43 — Typical Power Wiring Diagram — 575-3-60 Unit Shown

## EconoMiSer X (Factory-Installed Option)

### PRODUCT DESCRIPTION

The EconoMiSer® X system is an expandable economizer control system, which includes a W7220 economizer module (controller) with an LCD and keypad (see Fig. 44). The W7220 module can be configured with optional sensors.



Fig. 44 — 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 3 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 4 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  $-0^{\circ}\text{F}/+2^{\circ}\text{F}$

#### 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 26 for wiring details).

#### 24 vac power supply

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

### OUTPUTS

#### **Actuator Signal:**

2-10 vdc; minimum actuator impedance is 2k ohm; bus 2Hwire 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°F to 150°F (–40°C to 65°C)

Exception of display operation down to –4°F (–20°C) with full recovery at –4°F (–20°C) from exposure to –40°F (–40°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. 45 and Tables 5 and 6 to locate the wiring terminals for the economizer module.

NOTE: The 4 terminal blocks are removable. You can slide out each terminal block, wire it, and then slide it back into place.

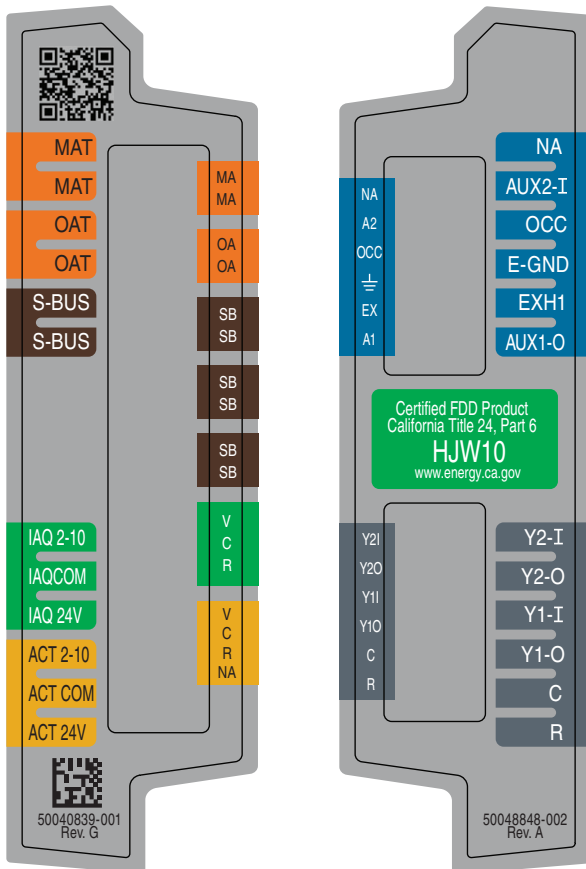


Fig. 45 — W7220 Wiring Terminals

Table 5 — 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 (Sylka 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 24-v</b>	24 vac	Damper Actuator 24 vac Source

NOTE(S):

a. Sylka is a trademark of Honeywell International Inc.

Table 6 — Economizer Module — Right Hand Terminal Blocks

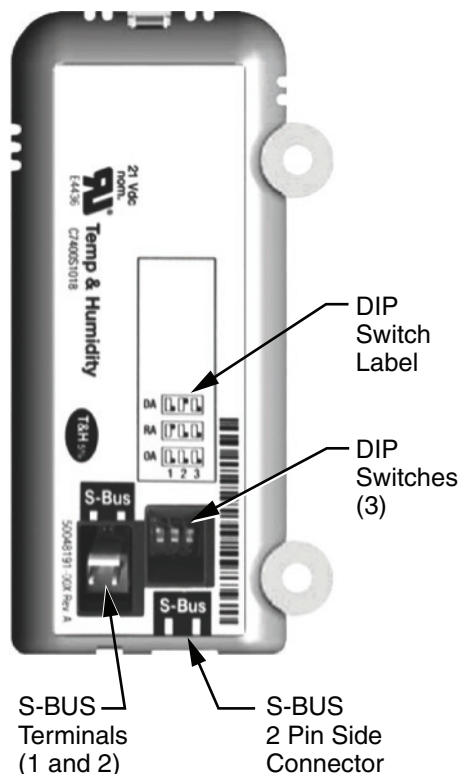
LABEL	TYPE	DESCRIPTION
<b>Top Right Terminal Blocks</b>		
<b>AUX2 I</b>	24 vac IN	The first terminal is not used.
<b>OCC</b>	24 vac IN	Shut Down (SD) or HEAT (W) Conventional only and Heat Pump Changeover (O-B) in Heat Pump mode.
<b>E-GND</b>	E-GND	Occupied/Unoccupied Input
<b>EXH1</b>	24 vac OUT	Exhaust 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. 46 and Table 5 to locate the wiring terminals for each S-Bus sensor.

Use Fig. 46 and Table 7 to locate the wiring terminals for each enthalpy control sensor.





**Fig. 46 — S-Bus Sensor DIP Switches**

**Table 7 — 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. 46 and Table 8 to set the DIP switches for the desired use of the sensor.

**Table 8 — HH57AC081 Sensor DIP Switch**

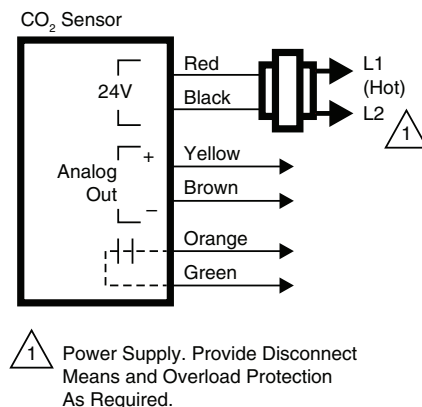
USE	DIP SWITCH POSITIONS FOR SWITCHES 1, 2, AND 3		
	1	2	3
DA	OFF	ON	OFF
RA	ON	OFF	OFF
OA	OFF	OFF	OFF

NOTE: When a 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. 47 for CO<sub>2</sub> sensor wiring.



**Fig. 47 — CO<sub>2</sub> Sensor Wiring**

#### INTERFACE OVERVIEW

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

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

#### USER INTERFACE

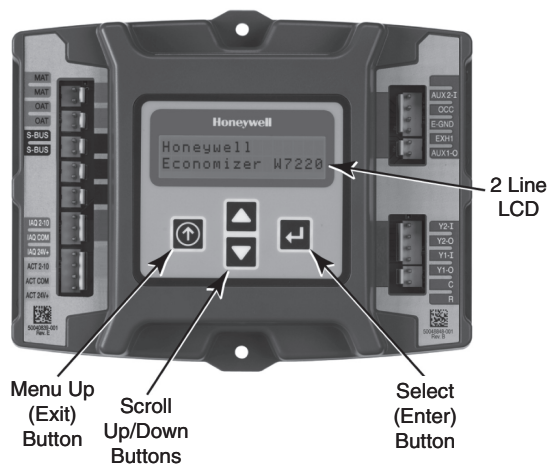
The user interface consists of a 2-line LCD display and a 4-button keypad on the front of the economizer controller.

#### KEYPAD

The 4 navigation buttons (see Fig. 48) are used 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. 48 — W7220 Controller Navigation Buttons**

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

1. Navigate to the desired menu.
2. Press the  $\leftarrow$  (Enter) button to display the first item in the currently displayed menu.
3. Use the  $\blacktriangle$  and  $\blacktriangledown$  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.

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

## MENU STRUCTURE

Table 9 illustrates the complete hierarchy of menus and parameters for the EconoMiSer® X system.

The Menus in display order are:

- STATUS
- SET POINTS
- SYSTEM SETUP
- ADVANCED SETUP
- CHECKOUT
- ALARMS

**IMPORTANT:** Table 9 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 and only MIN POS will display. If you have a CO<sub>2</sub> sensor, the DCV MIN and DCV MAX will appear AND if you have 2-speed fan DCV MIN (high and low speed) and DCV MAX (high and low speed will appear).

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 setup 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 9 — W7220 Menu Structure<sup>a</sup>

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT <sup>b</sup>	NOTES
STATUS	ECONO 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 1 stage cooling
	OCCUPIED <sup>c</sup>	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 our 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 <sup>d</sup>	__ . __ F	0°F to 140°F (-17°C to 60°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	0°F to 140°F (-17°C to 60°C)	DISCHARGE AIR TEMPERATURE, after Heating section Displays when Discharge Air 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	-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.
	OA HUM	__ %	0 to 100%	OUTSIDE AIR RELATIVE HUMIDITY Displays measured value of outdoor humidity from OA sensor. Displays __ % if not connected short, or out-of-range.
	RA TEMP	__ . __ F	0°F to 140°F (-17°C to 60°C)	RETURN AIR TEMPERATURE Displays measured value of return air temperature from RAT 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 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.
	DCV STATUS	N/A	ON/OFF	DEMAND CONTROLLED VENTILATION STATUS Displays ON if above setpoint and OFF if below setpoint, 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 outdoor air damper actuator.
	ACT COUNT	N/A	1 to 65535	Displays number of times actuator has cycled. 1 cycles equals 180 deg. 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 Output of EXH1 terminal: ON = relay closed OFF = relay open
	EXH2 OUT	OFF	ON/OFF	EXHAUST STAGE 2 RELAY OUTPUT Output of AUX terminal; displays only if AUX = EXH2
	ERV	OFF	ON/OFF	ENERGY RECOVERY VENTILATOR Output of AUX terminal; displays only if AUX = ERV



**Table 9 — W7220 Menu Structure<sup>a</sup> (cont)**

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT <sup>b</sup>	NOTES
<b>STATUS (cont)</b>	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 ON)	N/A	ON/OFF	HEAT DEMAND STATUS Displays status of heat demand on a 2-speed fan unit.
<b>SETPOINTS</b>	MAT SET <sup>d</sup>	53°F	38°F to 70°F (3°C to 21°C); increment by 1°F	MIXED AIR SETPOINT Setpoint determines where the economizer will modulate the OA damper to maintain the mixed air temperature.
	LOW T LOCK	32°F	-45°F to 80°F (-43°C to 27°C); increment by 1°F	COMPRESSOR LOW TEMPERATURE LOCKOUT Setpoint determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout.
	DRYBLB SET <sup>e</sup>	63°F	48°F to 80°F (9°C to 27°C); increment by 1°F	OA DRY BULB TEMPERATURE CHANGEOVER SETPOINT Setpoint 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. DRYBULB SET is only displayed if the economizer has a single dry bulb sensor.
	DRYBLB DIFF	0°F	0°F to 6°F Increment by 2°F	Drybulb Differential will only show if using dual drybulb - i.e. when an outdoor air temperature sensor C7250 is attached to OAT terminals and C7400S sensor is wired to S-Bus and configured for RAT (return air). Free cooling will be assumed whenever OA temp is at or below RAT minus this drybulb setting.
	ENTH CURVE	ES3	ES1, ES2, ES3, ES4, or ES5	ENTHALPY CHANGEOVER CURVE (Requires enthalpy sensor option) Enthalpy boundary "curves" for economizing using single enthalpy.
	DCV SET	1100ppm	500 to 2000 ppm; increment by 100	DEMAND CONTROLLED VENTILATION SETPOINT Displays only if CO <sub>2</sub> sensor is connected. Setpoint for Demand Controlled Ventilation of space. Above the setpoint, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the setpoint.
	MIN POS	4.4 V	2 to 10 Vdc	VENTILATION MINIMUM POSITION. Only displayed if controller is set for single speed unit under FAN TYPE, and if DCV is NOT used.
	MIN POS L	6.0 V	2 to 10 Vdc	VENTILATION MINIMUM POSITION AT LOW SPEED. Only displays if unit is set for 2 or 3 speed and CO <sub>2</sub> is not used. If using 2 speed with 1 heat and 1 cool then set for HEATING ventilation. If using 3 speed with 1 heat and 2 cool then set for LOW SPEED COOLING ventilation.
	MIN POS M	5.4 V	2 to 10 Vdc	VENTILATION MINIMUM POSITION AT MEDIUM SPEED. Only displays if unit is set for 3 speed with 1 heat and 2 cool, and CO <sub>2</sub> is not used. Set for HEATING ventilation.
	MIN POS H	4.4 V	2 to 10 Vdc	VENTILATION MINIMUM POSITION AT HIGH SPEED. Only displays if unit is set for 2 or 3 speed and CO <sub>2</sub> is not used. IF using 2 speed with 1 heat and 1 cool then set for COOLING ventilation. If using 3 speed with 1 heat and 2 cool then set for HIGH SPEED COOLING ventilation.
	VENTMAX L	6.0V	2 to 10 Vdc	DCV MAXIMUM DAMPER POSITION AT LOW SPEED. Only displays if unit is set for 2 speed or 3 speed with 1 heat and 2 cool. IF using 2 speed with 1 heat and 1 cool then set for HEATING ventilation. If using 3 speed with 1 heat and 2 cool then set for LOW SPEED COOLING.
	VENTMAX M	5.4 V	2 to 10 Vdc	DCV MAXIMUM DAMPER POSITION AT MEDIUM SPEED. Only displays if unit is set for 3 speed with 1 heat and 2 cool. Set for HEATING ventilation.
	VENTMAX H	4.4 V	2 to 10 Vdc	DCV MAXIMUM DAMPER POSITION AT HIGH SPEED. Only displays if unit is set for 2 speed or 3 speed with 1 heat and 2 cool. IF using 2 speed with 1 heat and 1 cool then set for COOLING ventilation. If using 3 speed with 1 heat and 2 cool then set for HIGH SPEED COOLING ventilation.
	VENTMIN L	3.7 V	2 to 10 Vdc	DCV MINIMUM DAMPER POSITION AT LOW SPEED. Only displays if unit is set for 2 speed or 3 speed with 1 heat and 2 cool. IF using 2 speed with 1 heat and 1 cool then set for HEATING ventilation. If using 3 speed with 1 heat and 2 cool then set for LOW SPEED COOLING.
	VENTMIN M	3.4 V	2 to 10 Vdc	DCV MINIMUM DAMPER POSITION AT MEDIUM SPEED. Only displays if unit is set for 3 speed with 1 heat and 2 cool. Set for HEATING ventilation.
	VENTMIN H	2.8 V	2 to 10 Vdc	DCV MINIMUM DAMPER POSITION AT HIGH SPEED. Only displays if unit is set for 2 speed or 3 speed with 1 heat and 2 cool. IF using 2 speed with 1 heat and 1 cool then set for COOLING ventilation. If using 3 speed with 1 heat and 2 cool then set for HIGH SPEED COOLING ventilation.

**Table 9 — W7220 Menu Structure<sup>a</sup> (cont)**

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT <sup>b</sup>	NOTES
<b>SETPOINTS (cont)</b>	ERV OAT SP <sup>f</sup>	32°F	0°F to 50°F (-18°C to 10°C); increment by 1°F	ENERGY RECOVERY VENTILATOR UNIT OUTDOOR AIR TEMPERATURE SETPOINT Only displayed when AUX1 O = ERV
	EXH1 SET	50%	0 to 100%	Exhaust fan set point for single speed units. Based on OA Damper position to activate power exhaust.
	EXH1 L SET	65%	0 to 100%	EXHAUST FAN 1 SETPOINT AT LOW SPEED on 2 speed or 3 speed with 1 heat and 2 cool. Based on economizer OA damper position to activate power exhaust.
	EXH1 M SET	60%	0 to 100%	EXHAUST POINT 1 SETPOINT AT MEDIUM SPEED. Only displays if unit is set for 3 speed with 1 heat and 2 cool. Based on economizer OA damper position to activate power exhaust.
	EXH1 H SET	50%	0 to 100%	EXHAUST FAN 1 SETPOINT AT HIGH SPEED on 2 speed or 3 speed with 1 heat and 2 cool. Based on economizer OA damper position to activate power exhaust.
	EXH2 L SET	80%	0 to 100%	EXHAUST FAN 2 SETPOINT AT LOW SPEED on 2 speed or 3 speed with 1 heat and 2 cool. Based on economizer OA damper position to activate power exhaust.
	EXH2 M SET	77%	0 to 100%	EXHAUST FAN 2 SETPOINT AT MEDIUM SPEED. Only displays if unit is set for 3 speed with 1 heat and 2 cool. Based on economizer OA damper position to activate power exhaust.
	EXH2 H SET	75%	0 to 100%	EXHAUST FAN 2 SETPOINT AT HIGH SPEED on 2 speed or 3 speed with 1 heat and 2 cool. Based on economizer OA damper position to activate power exhaust.
<b>SYSTEM SETUP</b>	INSTALL	01/01/17	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	Conventional or HP	CONV = conventional; HP O/B = Enable Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller. <sup>9</sup>
	AUX2 IN	W	SD/W or HP(O)/HP(B)	In CONV mode: SD + Enables configuration of shutdown (default); W = Informs controller that system is in heating mode. NOTE: If using 2-speed fan mode, you must program CONV mode for W. Shutdown is not available in 2-speed fan mode. <sup>9</sup> 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 2SP H/C 3 speed	Sets the economizer controller operation based on 1 speed, 2 speed, 2 speed heat/cool (2SP H/C), or 3 speed supply fan. NOTE: Multi-speed fan options also need Heat (W1) programmed in AUX2 IN. <sup>9</sup>
	FAN CFM	5000cfm	100 to 15000 cfm; increment by 100	UNIT DESIGN AIRFLOW (CFM) Enter only if using DCVAL ENA = AUTO 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 <sup>f</sup> • EXH2 = second damper position relay closure 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.
<b>ADVANCED SETUP</b>	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. NOTE: RECHECK AUX2 IN and FANTYPE for required 2-speed values.
	MA LO SET	45°F	35°F to 55°F (2°C to 13°C); Incremented by 10°F	SUPPLY AIR TEMPERATURE LOW LIMIT Temperature to achieve Freeze Protection (close damper and alarm if temperature falls below setup value).
	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.
	CO2 SPAN	2000ppm	1000 to 3000 ppm; Increment by 10	CO <sub>2</sub> ppm span to match CO <sub>2</sub> sensor.

**Table 9 — W7220 Menu Structure<sup>a</sup> (cont)**

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT <sup>b</sup>	NOTES
<b>ADVANCED SETUP (cont)</b>	STG3 DLY	2.0h	0 min, 5 min, 15 min, then 15 min intervals. Up to 4 hrs or OFF	COOLING STAGE 3 DELAY Delay after stage 2 cool has been active. Turns on second stage of cooling when economizer is first stage and mechanical cooling is second stage. Allows 3 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)	35°F to 65°F (2°C to 18°C); Incremented 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)	70°F to 180°F (21°C to 82°C); Incremented by 5°F	Used for alarm for when the DA air temperature is too high. Set 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 3 RA, OA, and MA sensors.
	MAT T CAL	0.0°F	±2.5°F	SUPPLY AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	OAS T CAL	0.0°F	±2.5°F	OUTSIDE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	OA H CAL	0% RH	±10% RH	OUTSIDE AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor.
	RA T CAL	0.0°F	±2.5°F	RETURN AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	RA H CAL	0% RH	±10% RH	RETURN AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor.
	DA T CAL	0.0°F	±2.5°F	DISCHARGE AIR TEMPERATURE CALIBRATION 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	TIME DELAY ON SECOND STAGE ECONOMIZING 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.
	DAMPER OPEN	N/A	N/A	Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure you 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 — not 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. <sup>f</sup> • SYS — 24 Vac out. Issues a system alarm.
<b>ALARMS</b>	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	SUPPLY AIR TEMPERATURE SENSOR ERROR Mixed air sensor has failed or become disconnected - check wiring then replace sensor if the alarm continues.
	CO2 SENS ERR	N/A	N/A	CO <sub>2</sub> SENSOR ERROR CO <sub>2</sub> sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues.
	OA SYLK T ERR	N/A	N/A	OUTSIDE AIR S-BUS SENSOR ERROR
	OA SYLK H ERR	N/A	N/A	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
	RA SYLK H ERR	N/A	N/A	Return air enthalpy sensor has failed or become disconnected - check wiring then replace sensor if the alarm continues.

**Table 9 — W7220 Menu Structure<sup>a</sup> (cont)**

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT <sup>b</sup>	NOTES
<b>ALARMS (cont)</b>	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 setpoint menu. Check if Mixed air temperature on STATUS menu is below the Lo Setpoint on Advanced menu. When conditions are back in normal range then 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, when the W7220 is completing a calibration on the dampers, this alarm will display. Wait until the calibration is completed and the alarm will go away. Must have OA, MA and RA sensors for DCV calibration; set up 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.

**NOTE(S):**

- Table 9 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.
- STATUS → OCCUPIED — The factory-standard Occupancy signal originates with a thermostat or other controller call for indoor fan operation at UCB terminal G. This signal passes through the Unit Control Board's OCCUPIED jumper JMP1 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.
- 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.
- SETPOINTS → DRYBLB SET — This point is not displayed if a Return Air (differential) temperature sensor or an Outdoor Air enthalpy sensor is connected.
- 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.
- SYSTEM SETUP parameters must be configured as noted for Multi-Speed unit operation:  
EQUIPMENT = CONV  
AUX2 IN = W  
FAN SPEED = 2SPEED

**LEGEND**

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

STANDARD OR SINGLE SPEED FAN OPERATION  
FAN TYPE = 1 SPEED is not used on 547K\*14 units.

## 2 SPEED FAN OPERATION

The W7220 controller has the capability to work with a system using a 2-speed supply fan. The W7220 does not control the supply directly but uses the following input status to determine the speed of the supply fan and controls the OA damper to the required position, see Table 10.

**Table 10 — Fan Speed**

STATE	FAN SPEED
OCC	Low
Y1	Low
Y2	High
W	High

The W (heating mode) is not controlled by the W7220 but it requires the status to know where to position the OA damper for minimum position for the fan speed.

The 2 speed fan delay is available when the system is programmed for 2 speed fan (in the System Setup menu item). The 2 speed fan delay is defaulted to 5 minutes and can be changed in the Advanced Setup menu item. When the unit has a call for Y1 In and in the free cooling mode and there is a call for Y2 In, the 2-speed fan delay starts and the OA damper will modulate 100% open, the supply fan should be set to high speed by the unit controller.

After the delay, one of 2 actions will happen:

- The Y2 In call will be satisfied with the damper 100% open and fan on high speed and the call will turn off

OR

- If the call for additional cooling in the space has not been satisfied then the first stage of mechanical cooling will be enabled through Y1 Out or Y2 Out.

Refer to Table 11 for economizer operation.

**Table 11 — Economizer Operation — FAN TYPE = 2SPEED**

INPUTS					OUTPUTS				
DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	W (HEAT ON)	COOL Y1-IN	COOL Y2-IN	COOL Y1-OUT	COOL Y2-OUT	FAN SPEED (reference only)	DAMPER POSITION	
								OCCUPIED	UNOCCUPIED
NONE	NO	ON	N/A	N/A	OFF	OFF	HIGH	MIN POS H	Closed
		OFF	OFF	OFF	OFF	OFF	LOW	MIN POS L	Closed
		OFF	ON	OFF	ON	OFF	LOW	MIN POS L	Closed
		OFF	ON	ON	ON	ON	HIGH	MIN POS H	Closed
	YES	ON	N/A	N/A	OFF	OFF	HIGH	MIN POS H	Closed
		OFF	OFF	OFF	OFF	OFF	LOW	MIN POS L	Closed
		OFF	ON	OFF	OFF	OFF	LOW	MIN POS L to Full Open	Closed to Full Open
		OFF	ON	ON	ON	OFF <sup>a</sup>	HIGH	MIN POS H to Full Open	Closed to Full Open
Below CO <sub>2</sub> Set	NO	ON	N/A	N/A	OFF	OFF	HIGH	VENTMIN H	Closed
		OFF	OFF	OFF	OFF	OFF	LOW	VENTMIN L	Closed
		OFF	ON	OFF	ON	OFF	LOW	VENTMIN L	Closed
		OFF	ON	ON	ON	ON	HIGH	VENTMIN H	Closed
	YES	ON	N/A	N/A	OFF	OFF	HIGH	VENTMIN H	Closed
		OFF	OFF	OFF	OFF	OFF	LOW	VENTMIN L	Closed
		OFF	ON	OFF	OFF	OFF	LOW	VENTMIN L to Full Open	Closed to Full Open
		OFF	ON	ON	ON	OFF <sup>a</sup>	HIGH	VENTMIN H to Full Open	Closed to Full Open
Above CO <sub>2</sub> Set	NO	ON	N/A	N/A	OFF	OFF	HIGH	VENTMIN H to VENTMAX H	Closed
		OFF	OFF	OFF	OFF	OFF	LOW	VENTMIN L to VENTMAX L	Closed
		OFF	ON	OFF	ON	OFF	LOW	VENTMIN L to VENTMAX L	Closed
		OFF	ON	ON	ON	ON	HIGH	VENTMAX H to VENTMAX H	Closed
	YES	ON	N/A	N/A	OFF	OFF	HIGH	VENTMIN H to VENTMAX H	Closed
		OFF	OFF	OFF	OFF	OFF	LOW	VENTMIN L to VENTMAX L	Closed
		OFF	ON	OFF	OFF	OFF <sup>a</sup>	LOW	VENTMIN L to Full Open	Closed to Full Open
		OFF	ON	ON	ON	OFF <sup>a</sup>	HIGH	VENTMIN H to Full Open	Closed to Full Open

NOTE(S):

a. With stage 3 delay (STG3 DLY) in Advanced setup, COOL Y2-OUT will be turned ON after the delay time specified.

LEGEND

N/A — Not Applicable

2SP H/C (2 SPEED HEAT/COOL) SPEED FAN OPERATION  
FAN TYPE = 2SP H/C is not used on 547K\*14 units

3 SPEED FAN OPERATION  
FAN TYPE = 3SPEED is not used on 547K\*14 units

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 49 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 12 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 49 shows the 5 current boundaries. There is also a high limit boundary for differential enthalpy. The high limit boundary is ES1 when there are no stages of mechanical cooling energized and HL (high limit) when a compressor stage is energized.

Table 12 provides the values for each boundary limit.

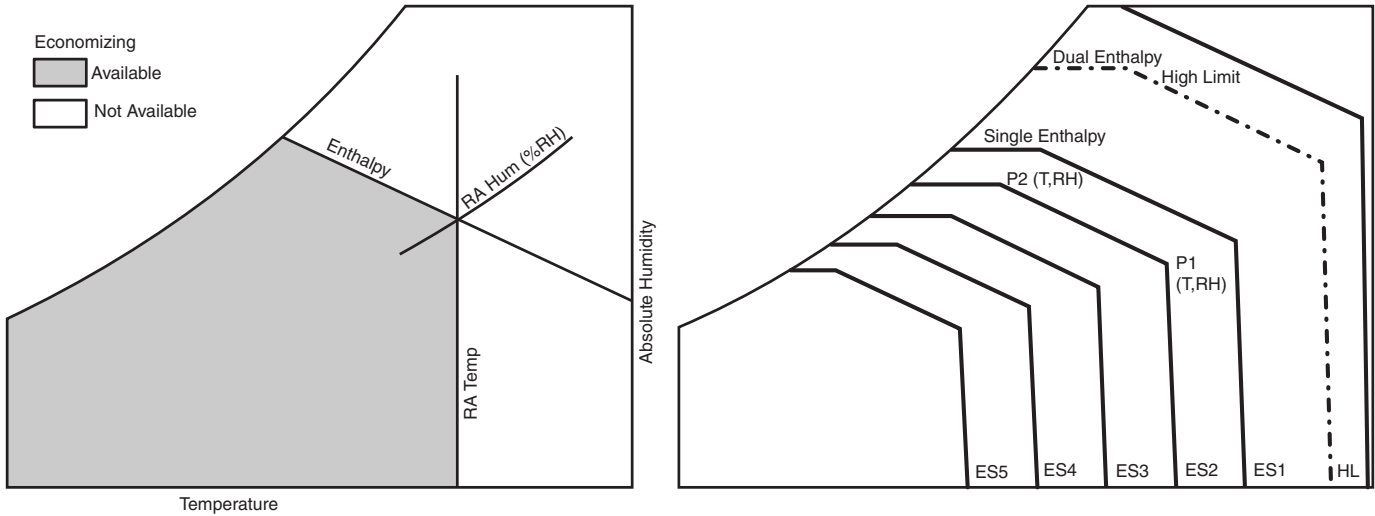


Fig. 49 — Single Enthalpy Curve Boundaries

Table 12 — 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

## 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 26.

### ⚠ WARNING

#### ELECTRIC SHOCK HAZARD

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

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

If any wiring changes are required, first be sure to remove power from the economizer module before starting work. Pay particular attention to verifying the power connection (24 vac).

### 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 9) 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 26.

### Checkout Tests

Use the Checkout menu (on page 31) 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 26.

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.
3. RUN? appears.
4. Press the ↵ (Enter) button to start the test.
5. The unit pauses and then displays IN PROGRESS.
6. When the test is complete, DONE appears.
7. 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.

## 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.
3. ERASE? displays.
4. Press the ↵ (Enter) button.
5. ALARM ERASED displays.
6. Press the ⏮ (Menu up/Exit) button to complete the action and return to the previous menu.

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

### ⚠ CAUTION

#### EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

Be sure to allow enough time for compressor start-up and shutdown between checkout tests so that you do not short-cycle the compressors.

## SMOKE DETECTORS

Smoke detectors are available as factory-installed options on 547K 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.

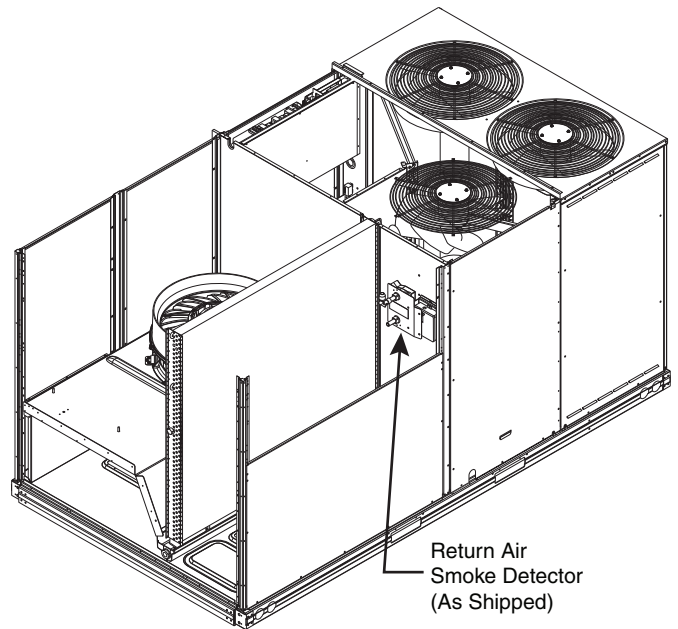
Units equipped with factory-optional return-air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 50 for the as-shipped location.

## COMPLETING INSTALLATION OF RETURN-AIR SMOKE SENSOR

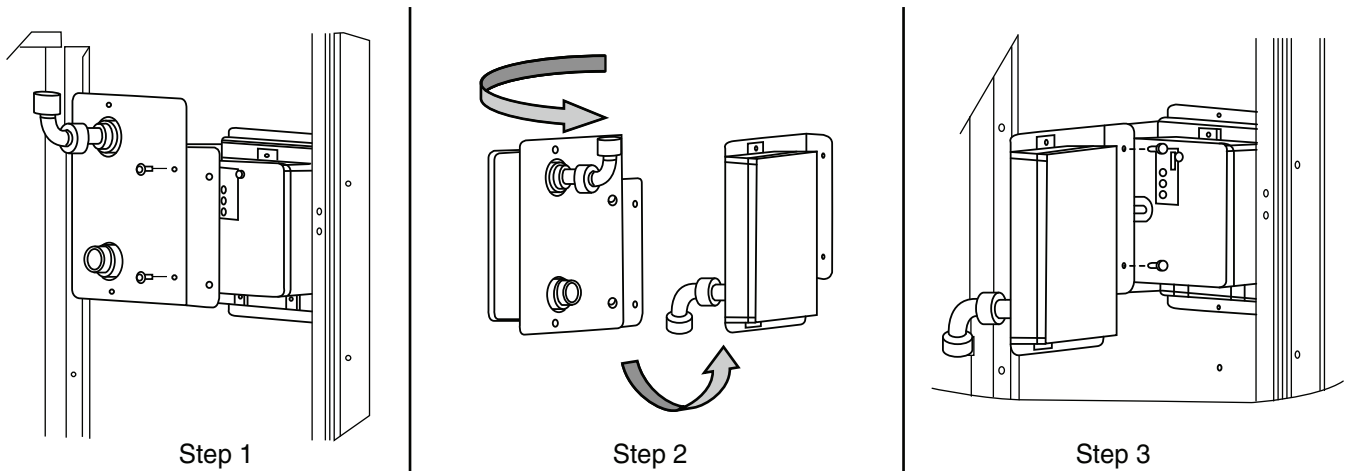
1. Unscrew the 2 screws holding the return-air smoke detector assembly. See Fig. 51, Step 1.
2. Save the screws.
3. Turn the assembly 90 degrees and then rotate end to end. Make sure that the elbow fitting is pointing down. See Fig. 51, Step 2.
4. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 51, Step 3.
5. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

#### ADDITIONAL APPLICATION DATA

Refer to the application data sheet titled “*Factory-Installed Smoke Detector, 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. 50 — Return Air Smoke Detector; Shipping Position**



**Fig. 51 — Completing Installation of Return Air Smoke Sensor**



## Step 11 — Adjust Factory-Installed Options

### SMOKE DETECTORS

Smoke detector(s) will be connected at the Unit Control Board (UCB), at terminals marked “Smoke Shutdown.”

### ECONOMISER X OCCUPANCY SWITCH

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. Detach the jumper covering the “Occupancy” terminals on the UCB and then attach the required connections.

## Step 12 — Install Accessories

Available accessories include:

- Roof curb
- Thru-base connection kit (must be installed before unit is set on curb)
- LP conversion kit
- Flue discharge deflector
- Manual outside air damper
- Two-position motorized outside air damper
- EconoMi\$er2 (without control/for external signal)
- Power exhaust
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- CO<sub>2</sub> sensor
- Louvered hail guard
- Low ambient kit
- Phase monitor control

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

## Step 13 — Fan Speed Set Up

NOTE: The Indoor Fan motor is equipped with an internal protection relay that is designed to disable unit operation if it detects a problem. See Typical Wiring Diagram (Fig. 41) for the red wires in the Indoor fan plug.

### UNITS WITH ELECTROMECHANICAL CONTROLS

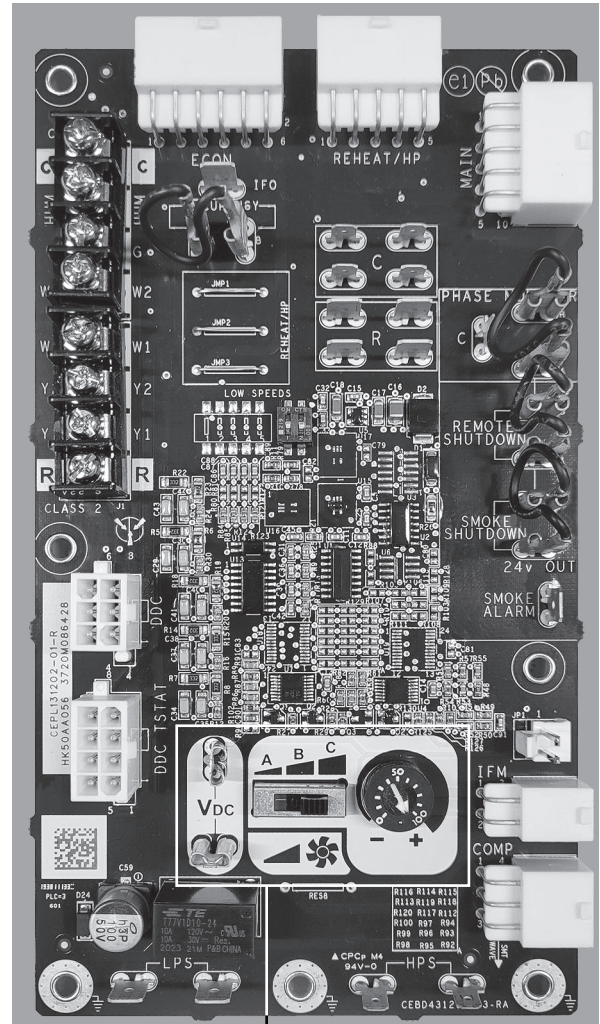
The fan speed set up controls are located on the lower section of the Unit Control Board (UCB). See Fig. 52.

1. Check the job specifications for the CFM (cubic feet per minute) and ESP (external static pressure) required.
2. Using the chart on the Fan Speed Set Up labels (see Fig. 53), calculate the Vdc from the CFM and ESP for the base unit. Then add Vdc for any accessories installed per the “Field Accessories” section of the label.

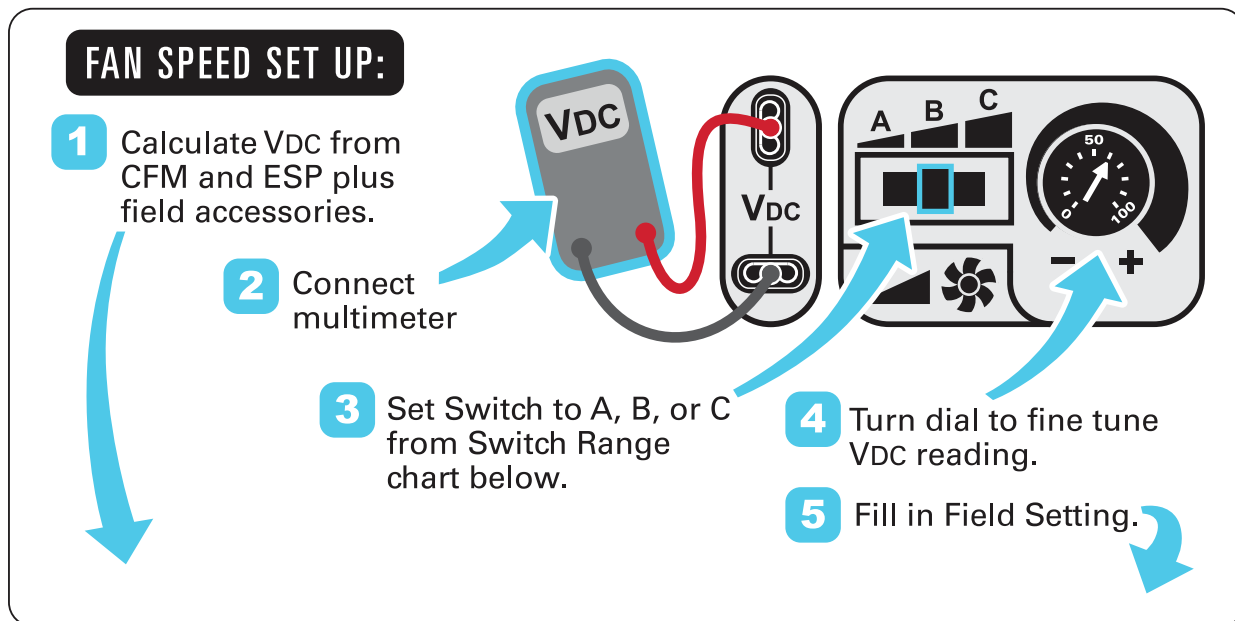
NOTE: The Fan Speed Set Up labels are located on the High Voltage cover in the Control Box.

3. Connect a multimeter to the Vdc terminals on the UCB.
4. Set the Range Switch to either A, B, or C per the Switch Range table.
5. Using a straight blade screwdriver, turn the Vdc control dial to fine tune the Vdc reading.
6. Record the reading in the Field Setting field.

NOTE: Fan set-up Vdc is not affected by the operating stage of the unit.



Fan Speed Set Up Controls  
**Fig. 52 — UCB Fan Speed Controls**



# VDC Calculator

UNIT MODEL NUMBER

CFM

ESP in. wg

0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

3000	5.6	6.1	6.5	6.9	7.3	7.6	8.0	8.3	8.6	8.9
3250	6.0	6.4	6.8	7.2	7.6	7.9	8.3	8.6	8.9	9.2
3500	6.4	6.8	7.2	7.6	7.9	8.2	8.6	8.9	9.2	9.5
3750	6.8	7.2	7.5	7.9	8.2	8.6	8.9	9.2	9.5	9.7
4000	7.2	7.6	7.9	8.2	8.6	8.9	9.2	9.5	9.8	
4250	7.6	8.0	8.3	8.6	8.9	9.2	9.5	9.8		
4500	8.0	8.4	8.7	9.0	9.3	9.6	9.8			
4750	8.5	8.8	9.1	9.3	9.6	9.9				
5000	8.9	9.2	9.4	9.7	10.0					

Field Accessories:

Economizer

0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Factory Setting:  
9.0 VDC

Field Setting:

Record field setting here  
\_\_\_\_\_ VDC

Switch Range: \*

A B C

A	4.1 - 7.5
B	6.9 - 8.7
C	7.7 - 10.0

\* Overlap in A, B, C switch range designed for maximum field adjustment potential. For example 7.2 can be set at either A or B.

NOTE: Values in the Field Accessories section are VDC adders.

Fig. 53 — Example of Fan Speed Set Up Labels for Electromechanical Controls

Typical Unit Piping

547K\*14 heat pump systems include 2 compressors, a reversing valve, dual-function outdoor and indoor coils, a common liquid line with bi-flow TXV, and dedicated cooling and heating TXVs. 547K\*14 unit indoor coils contain a vapor header check valve. See Fig. 54-55 and Tables 13-15 for typical unit piping schematic parallel coil circuits during evaporator-function operation and converging coil circuits during the condenser-function operation.

Table 13 — 547K\*14 – Cooling Mode

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

Table 14 — 547K\*14 – Heating Mode

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

Table 15 — 547K\*14 – Defrost Mode

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

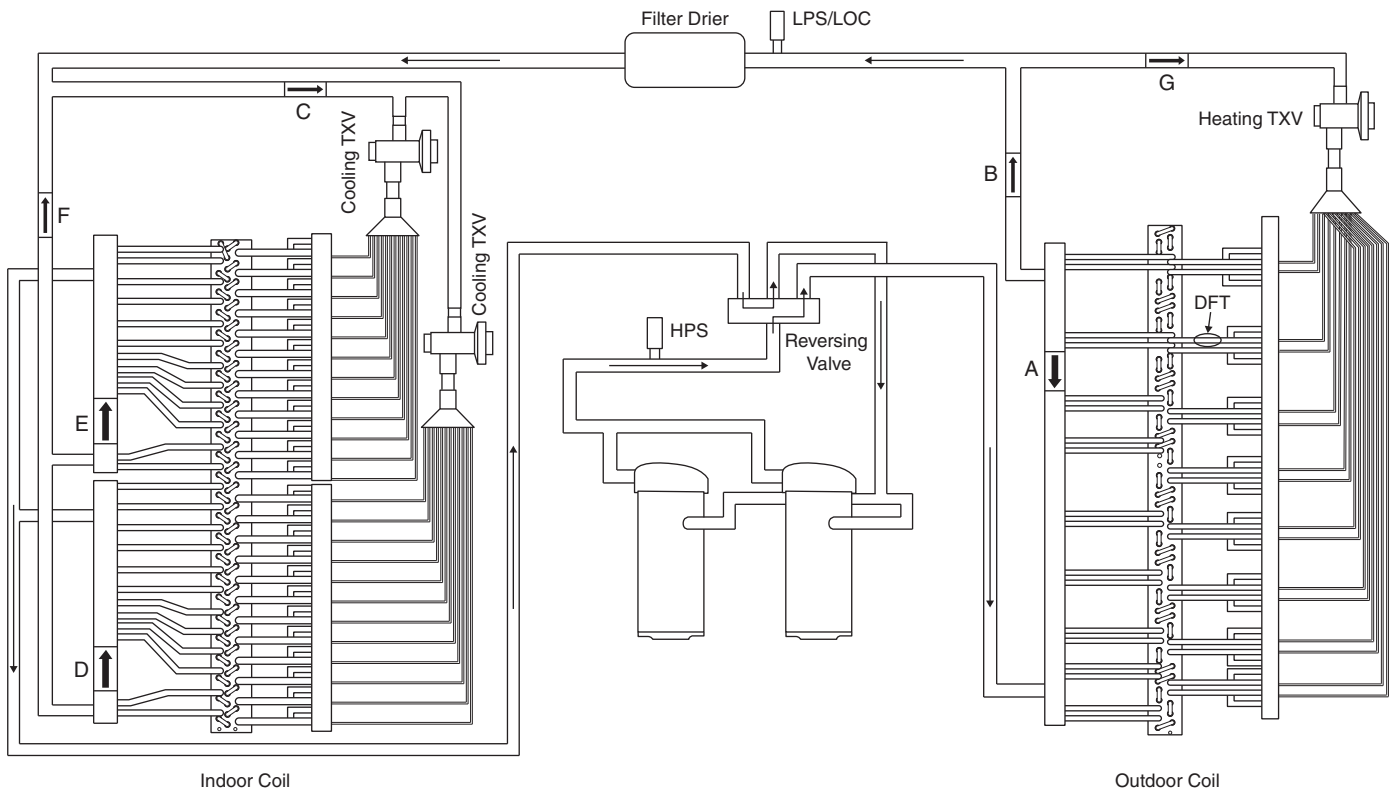
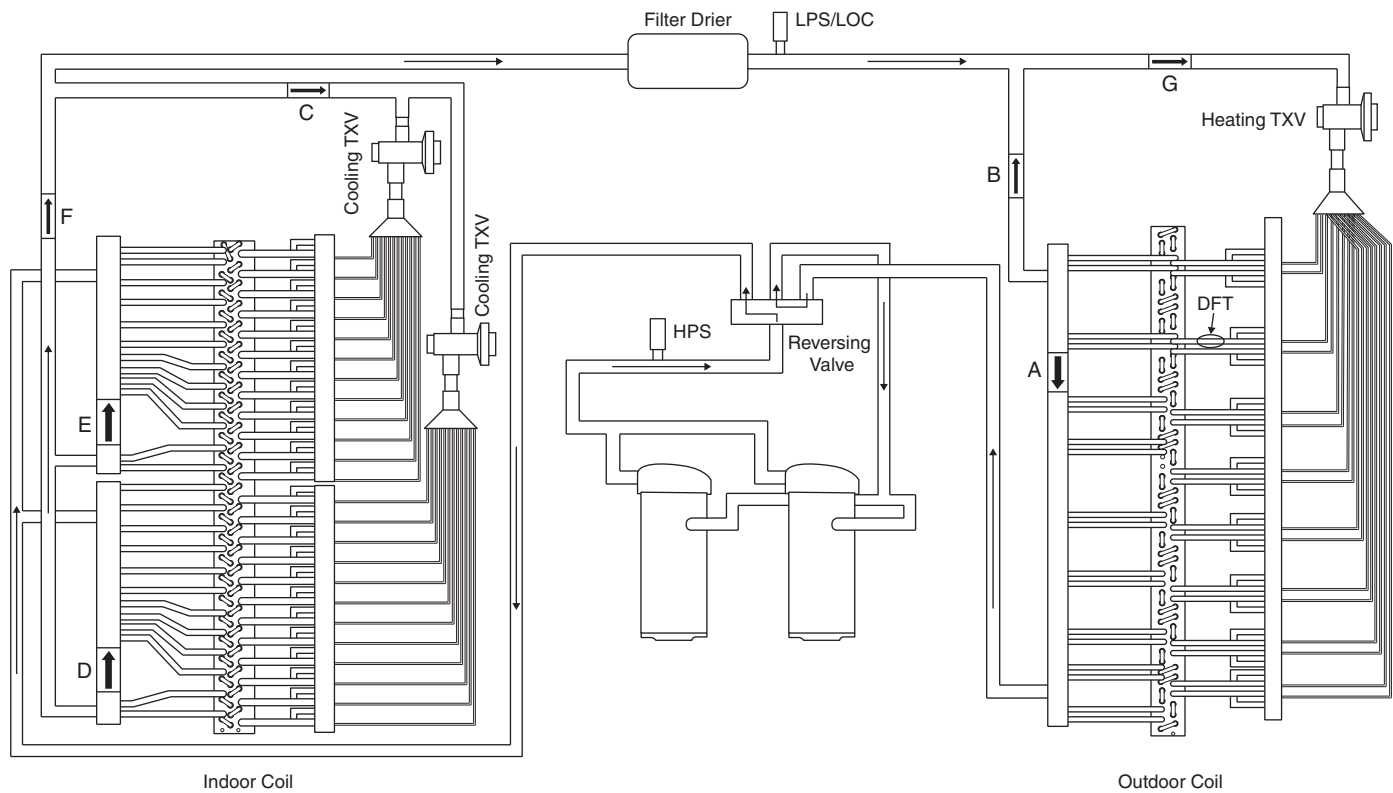


Fig. 54 — Piping Schematic — 547K\*14 Cooling Mode



**Fig. 55 — Piping Schematic — 547K\*14 Heating Mode**

### 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)).





**START-UP CHECKLIST**  
**547K\*14 Single Package Rooftop Heat Pump Units**  
(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) \_\_\_\_\_  
Verify that fan assembly is free of obstructions and rotor spins freely (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 _____
Outdoor Fan Amps	L1 _____	L2 _____	

**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 \_\_\_\_\_ PSIG  
Refrigerant Discharge \_\_\_\_\_ 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