

# 48LC\*B

Single Package Rooftop  
Gas Heating/Electric Cooling Unit with  
Multi-Zone VAV (Variable Air Volume) Operation  
with Puron® (R-410A) Refrigerant  
Sizes: 08, 09, 12



## Installation Instructions

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

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## SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloths for brazing operations and have a fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and appropriate national electrical codes (in USA, ANSI/NFPA70, National Electrical Code (NEC); in Canada, CSA C22.1) for special requirements.

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.

** WARNING**

**FIRE, EXPLOSION HAZARD**

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

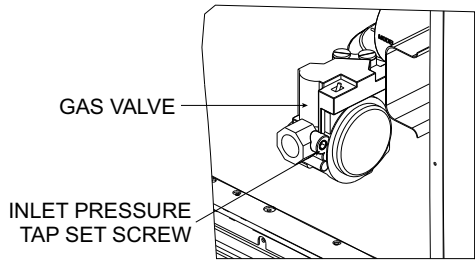
Disconnect gas piping from unit when leak testing at pressure greater than 0.5 psig (3450 Pa). Pressures greater than 0.5 psig (3450 Pa) will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig (3450 Pa), it must be replaced before use. When pressure testing field-supplied gas piping at pressures of 0.5 psig (3450 Pa) or less, a unit connected to such piping must be isolated by closing the manual gas valve.

** WARNING**


**FIRE HAZARD**

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

Inlet pressure tap set screw must be tightened and 1/8 in. NPT pipe plug must be installed to prevent gas leaks.



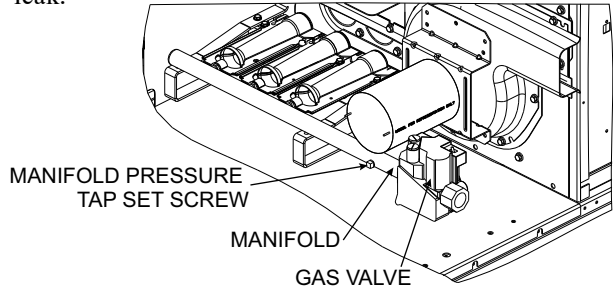
GAS VALVE  
INLET PRESSURE TAP SET SCREW

** WARNING**


**FIRE HAZARD**

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

Manifold pressure tap set screw must be tightened and 1/8 in. NPT pipe plug must be installed to prevent gas leak.



MANIFOLD PRESSURE TAP SET SCREW  
MANIFOLD  
GAS VALVE

** WARNING**

**CARBON-MONOXIDE POISONING HAZARD**

Failure to follow instructions could result in severe personal injury or death due to carbon-monoxide poisoning, if combustion products infiltrate into the building.

Check that all openings in the outside wall around the vent (and air intake) pipe(s) are sealed to prevent infiltration of combustion products into the building.

Check that furnace vent (and air intake) terminal(s) are not obstructed in any way during all seasons.

**⚠ WARNING**

**ELECTRICAL SHOCK HAZARD**

Failure to follow this warning could cause personal injury 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.

**⚠ WARNING**

**UNIT OPERATION AND SAFETY HAZARD**

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

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

**CUT 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.

## Rated Indoor Airflow (cfm)

The table to the right lists the rated indoor airflow used for the AHRI efficiency rating for the units covered in this document.

Model Number	Full Load Airflow (cfm)
48LC*B08	2625
48LC*B09	2970
48LC*B12	3500

Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Example:	4	8	L	C	D	B	1	2	A	1	A	5	-	1	N	0	A	0

### Unit Heat Type

48 - Gas Heat Packaged Rooftop

### Model Series - WeatherExpert®

LC - Ultra High Efficiency

### Heat Options

D = Low Gas Heat  
 E = Medium Gas Heat  
 F = High Gas Heat  
 S = Low Heat w/ Stainless Steel Exchanger  
 R = Medium Heat w/ Stainless Steel Exchanger  
 T = High Heat w/ Stainless Steel Exchanger

### Refrigerant System

B = Three stage cooling capacity control with multi-zone VAV operation

### Cooling Tons

08 - 7.5 ton  
 09 - 8.5 ton  
 12 - 10 ton

### Sensor Options

A = None  
 B = RA Smoke Detector  
 C = SA Smoke Detector  
 D = RA + SA Smoke Detector  
 E = CO<sub>2</sub>  
 F = RA Smoke Detector and CO<sub>2</sub>  
 G = SA Smoke Detector and CO<sub>2</sub>  
 H = RA + SA Smoke Detector and CO<sub>2</sub>

### Indoor Fan Options

1 = Standard Static Belt Drive with VFD controller  
 2 = Medium Static Belt Drive with VFD controller  
 3 = High Static Belt Drive with VFD controller  
 4 = Ultra High Static Belt Drive with VFD controller (08, 09 only)

### Coil Options: Fin/Tube (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

0 = Standard  
 1 = LTL

### Electrical Options

A = None  
 B = HACR Circuit Breaker  
 C = Non-Fused Disconnect  
 D = Thru-The-Base Connections  
 E = HACR Circuit Breaker and Thru-The Base Connections  
 F = Non-Fused Disconnect and Thru-The-Base Connections

### Service Options

0 = None  
 1 = Unpowered Convenience Outlet  
 2 = Powered Convenience Outlet  
 3 = Hinged Panels  
 4 = Hinged Panels and Unpowered Convenience Outlet  
 5 = Hinged Panels and Powered Convenience Outlet

### Intake / Exhaust Options (required on each unit)

B = Standard Leak Temperature Economizer with Barometric Relief  
 E = Standard Leak Enthalpy Economizer with Barometric Relief  
 N = Ultra LOW LEAK Temperature Economizer with Barometric Relief  
 R = Ultra LOW LEAK Enthalpy Economizer with Barometric Relief

### Base Unit Controls

1 = VAV-RTU Open Controller (required on each model)

### Design Revision

- = Factory Design Revision

### Voltage

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

48LC\*B

**NOTE:** Not all possible options can be displayed above. Refer to other support material or your local Carrier Expert

**Fig. 1 - 48LC\*B08-12 Model Number Nomenclature (Example)**

C150334



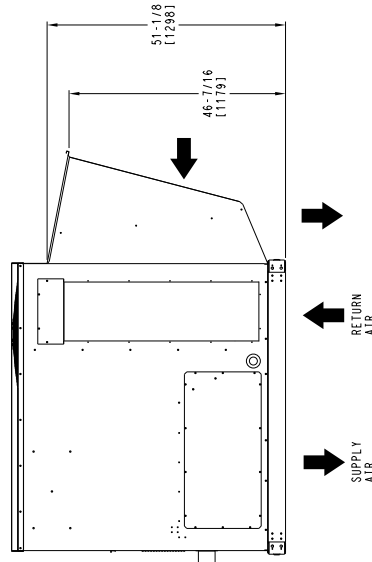
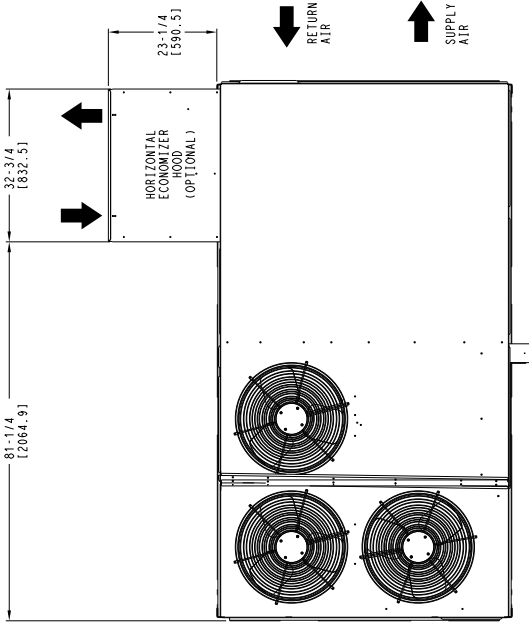
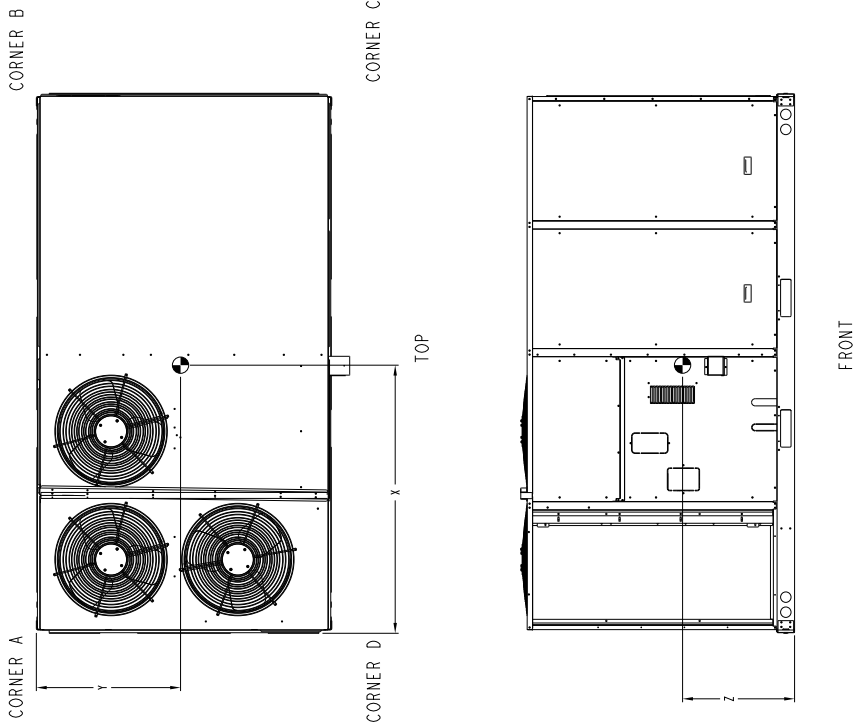


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UNIT	CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.			
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z	
48LC 08	1606	728	426	193	415	188	377	171	387	176	33 [838]	20 5/8 [525]

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




**HORIZONTAL ECONOMIZER**

DATE	SUPERCEDS	REV
11/15/12	-	48LC500408

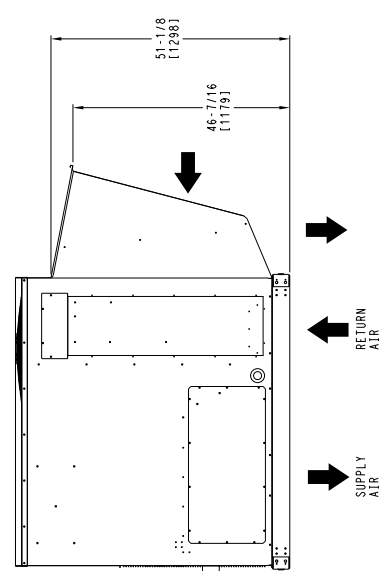
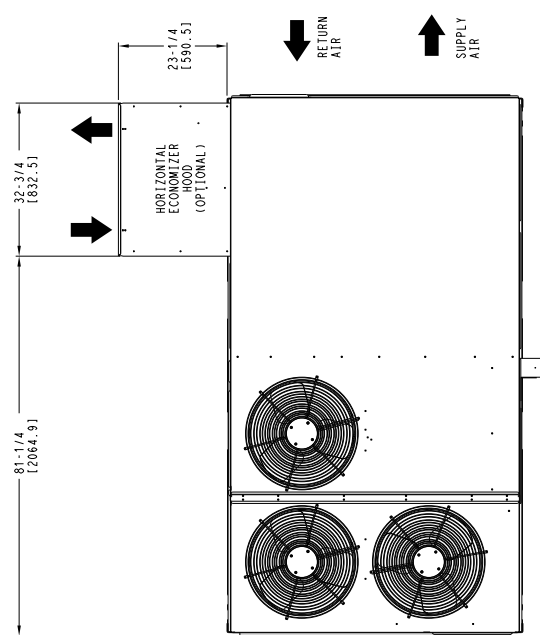
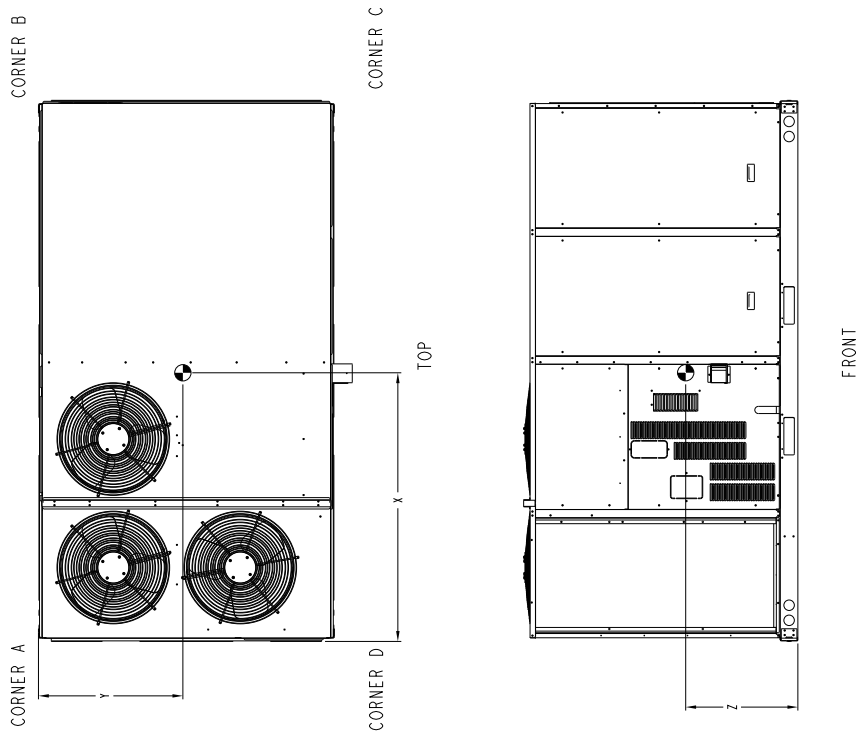
**Fig. 2 - Unit Dimensional Drawing – 08 Size Unit (cont.)**




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UNIT	CORNER A		CORNER B		CORNER C		CORNER D		C.G.								
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y							
48LC 09	728	406	184	184	410	186	397	180	393	178	58	17473	32	1812	20	578	1524
48LC 12	1606	728	406	184	410	186	397	180	393	178	58	17473	32	1812	20	578	1524

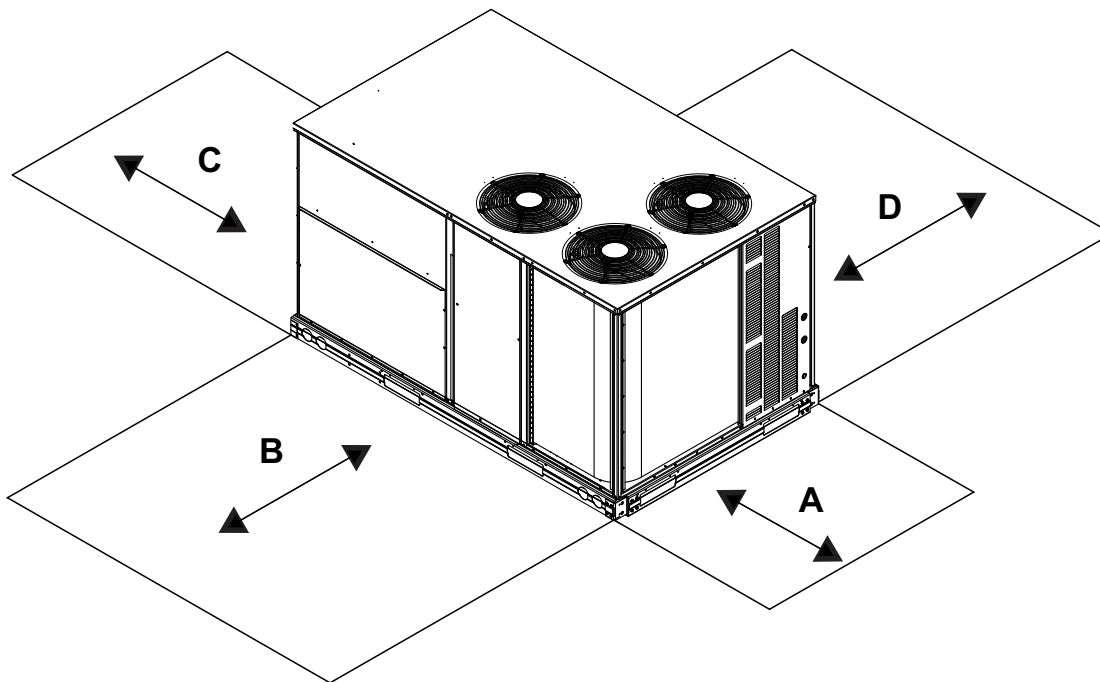
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**HORIZONTAL ECONOMIZER**

SHEET	DATE	SUPERCEDES	REV
2 OF 2	05/08/13	-	A
48LC 09-12 SINGLE ZONE ELECTRICAL COOLING WITH GAS HEAT		48LC500390	

**Fig. 3 - Unit Dimensional Drawing – 09 and 12 Size Units (cont.)**



C12322

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

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

**Fig. 4 - Service Clearance Dimensional Drawing**

## 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 at least 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 unit drawings. See Fig. 4.

**NOTE:** Consider also the effect of adjacent units.

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

Do not install unit in an indoor location. Do not locate air inlets near exhaust vents, relief valves, 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 installation of condensate trap per requirements. Refer to Step 11 — Install External Condensate Trap and Line – for required trap dimensions.

### Roof Mount —

Check building codes for weight distribution requirements. Unit operating weight is shown in Table 1.

**Table 1 – Operating Weights**

48LC*B	UNITS LB (KG)		
	08	09	12
Base Unit	1430 (650)	1534 (696)	1554 (705)
Economizer			
Vertical	103 (47)	103 (47)	103 (47)
Horizontal	242 (110)	242 (110)	242 (110)
Powered Outlet	35 (16)	35 (16)	35 (16)
Curb	Curb	Curb	Curb
14-in/356 mm	180 (82)	180 (82)	180 (82)
24-in/610 mm	255 (116)	255 (116)	255 (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 —**

- Install curb
- Install field-fabricated ductwork inside curb
- Install accessory thru-base service connection package (affects curb and unit) (refer to accessory installation instructions for details)
- Prepare bottom condensate drain connection to suit planned condensate line routing (refer to Step 9 for details)
- Rig and place unit
- Install outdoor air hood
- Install condensate line trap and piping
- Make electrical connections
- Install other accessories

**Pad-mounted installation —**

- Prepare pad and unit supports
- Check and tighten the bottom condensate drain connection plug
- Rig and place unit
- Convert unit to side duct connection arrangement
- Install field-fabricated ductwork at unit duct openings
- Install outdoor air hood
- Install condensate line trap and piping
- Make electrical connections
- 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.

On units with hinged panel option, check to be sure all latches are snug and in closed position.

Locate the carton containing the outside air hood parts; see Figs. 14. Do not remove carton until unit has been rigged and located in final position.

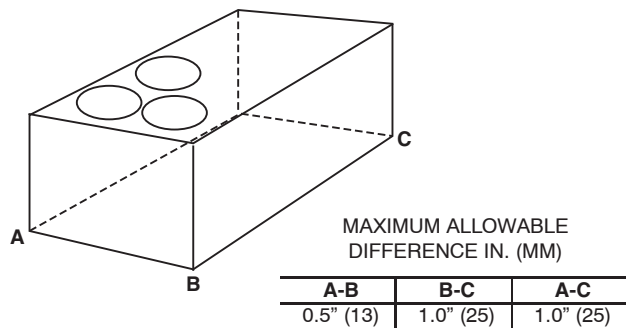
**Step 4 — Provide Unit Support**

**Roof Curb Mount —**

Accessory roof curb details and dimensions are shown in Fig. 6. Assemble and install accessory roof curb in accordance with instructions shipped with the curb.

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

Curb should be level. This is necessary for unit drain to function properly. Unit leveling tolerances are show in Fig. 5. Refer to Accessory Roof Curb Installation Instructions for additional information as required.



**Fig. 5 - Unit Leveling Tolerances**

C10001

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

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

ROOF CURB ACCESSORY #	A
CRRFCURB07A00	14" [356]
CRRFCURB07SA00	24" [610]

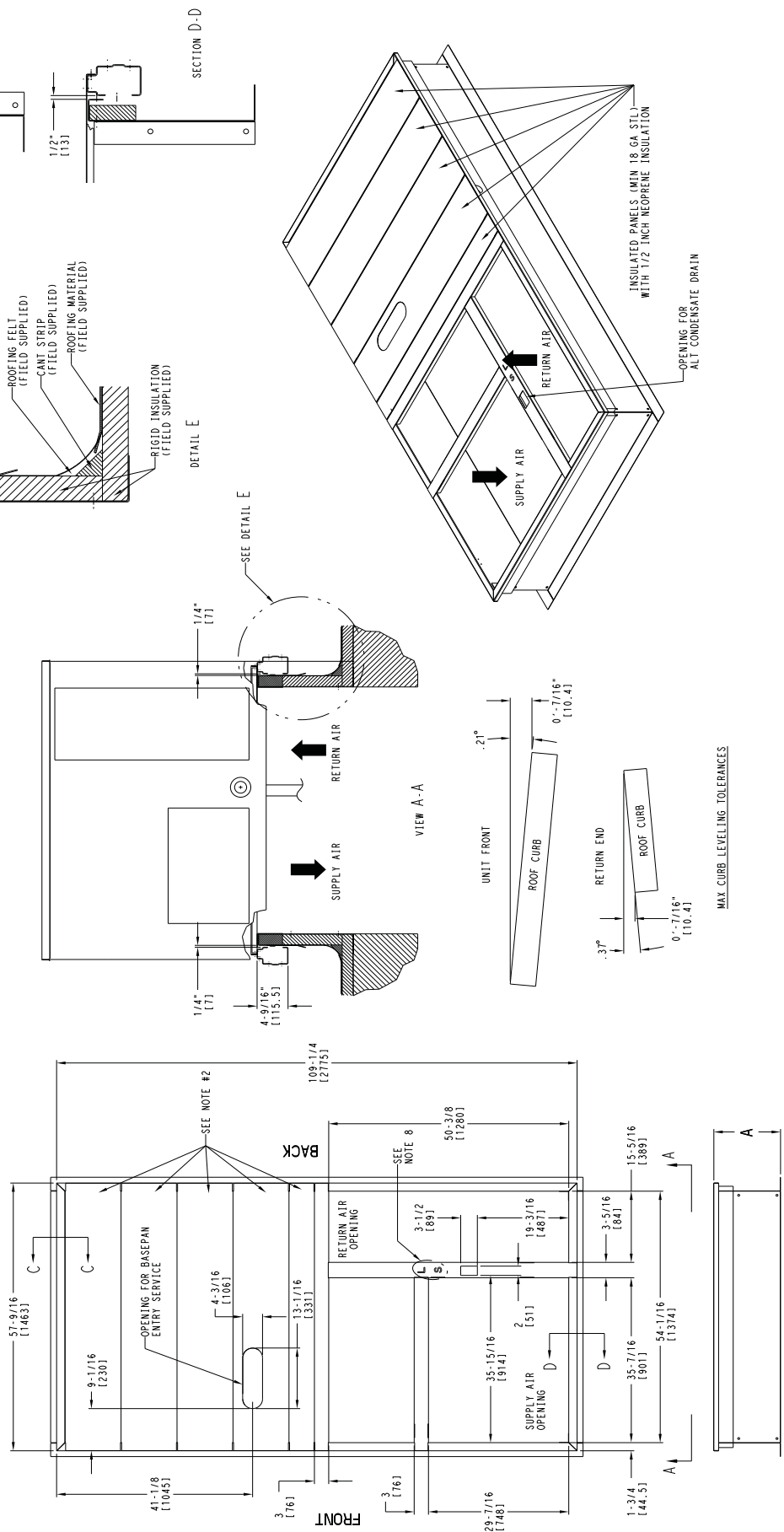


Fig. 6 - Roof Curb Details - Size 08-12 Units

48LC\*B

**IMPORTANT:**

If the unit's gas connection and/or electric and control wiring is to be routed through the basepan and the unit is equipped with the factory-installed Thru-the-Base service option see the following sections:

- **Factory-Option Thru-Base Connections (Gas Connection)** on page 17
- **Factory-Option Thru-Base Connections (Electrical Connections)** on page 27

If using the field-installed Thru-the-Base accessory follow the instructions provided with the accessory kit.

**NOTE:** If gas and/or 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.

**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).

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

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

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

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

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

**⚠ CAUTION****PROPERTY DAMAGE HAZARD**

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

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

**Step 6 — Rig and Place Unit**

When the unit is ready to be rigged and no longer will be lifted by a fork truck, the wood protector under the basepan must be removed. Remove 4 screws from each base rail. Wood protector will drop to the ground. See instructions on the unit base rails.

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 1 and Fig. 7 for additional information.

Lifting holes are provided in base rails as shown in Fig. 7. Refer to rigging instructions on unit.

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 "Step 13 - Install External Condensate Trap & Line" on page 19.

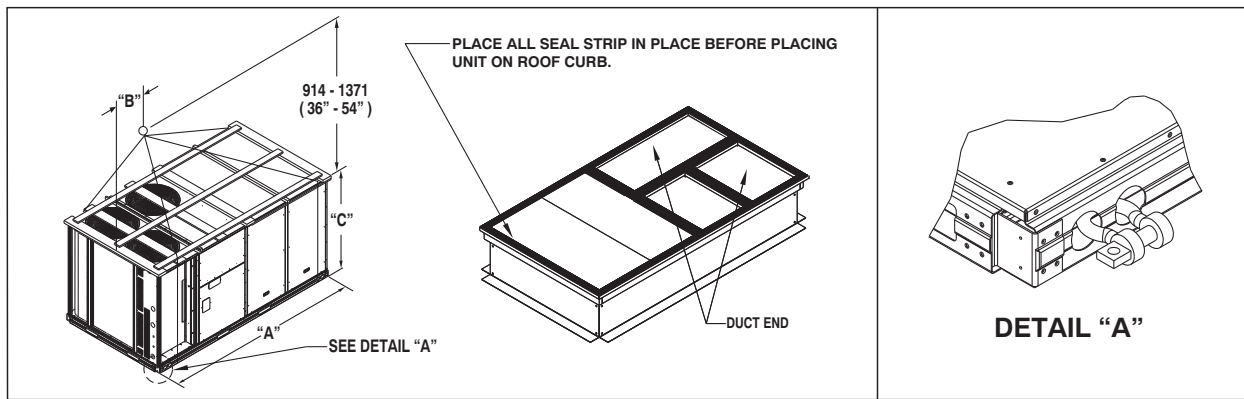
Before setting the unit onto the curb, recheck gasketing on curb.

**⚠ 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 panels or packaging are removed.





C10774

UNIT	MAX WEIGHT		DIMENSIONS					
			A		B		C	
	LB	KG	IN	MM	IN	MM	IN	MM
48LC*B08	2460	1116	116	2945	57	1448	59.5	1510
48LC*B09	2465	1118	116	2945	58	1473	59.5	1510
48LC*B12	2465	1118	116	2945	58	1473	59.5	1510

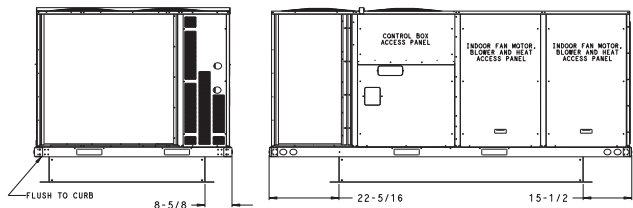
**NOTES:**

1. SPREADER BARS REQUIRED — Top damage will occur if spreader bars are not used.
2. Dimensions in ( ) are in millimeters.
3. Hook rigging shackles through holes in base rail, as shown in detail "A." Holes in base rails are centered around the unit center of gravity.
4. Use wooden top to prevent rigging straps from damaging unit.

**Fig. 7 - Rigging Details**

**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. 8. Maintain the 15.5 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.



C10003

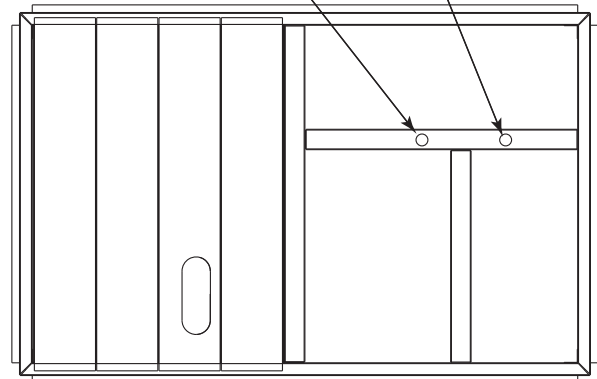
**Fig. 8 - Retrofit Installation Dimensions**

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 12.5 in (320 mm) towards the end of the unit. (See Fig. 9.)

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 Figs. 29 and 30. Recycle or dispose of all shipping materials.

Original Position  
New Position (moved 12.5 in.)



C10904

**Fig. 9 - Alternative Condensate Drain Hole Positions**

**IMPORTANT:**

If the unit has the factory-installed Thru-the-Base option, make sure to complete installation of the option before placing the unit on the roof curb.

See the following sections:

- **Factory-Option Thru-Base Connections (Gas Connection)** on page 17
- **Factory-Option Thru-Base Connections (Electrical Connections)** on page 27

**NOTE:** If gas and/or 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.

48LC\*B

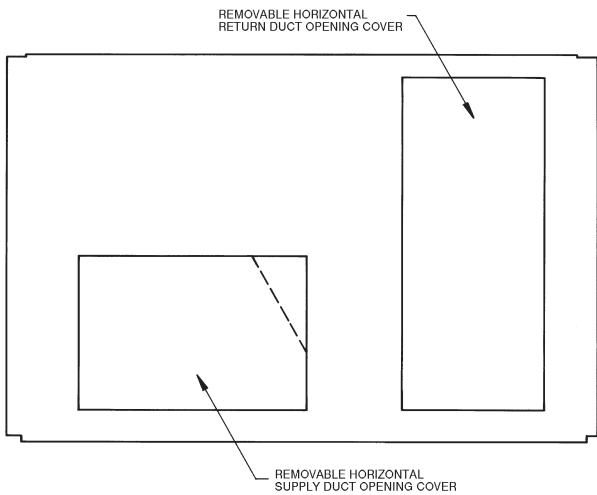
### Step 7 — Convert to Horizontal & Connect Ductwork (when required)

Unit is shipped in the vertical duct configuration. Unit *without* factory-installed 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. See Fig. 10.

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.

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.



C06108

**Fig. 10 - Horizontal Conversion Panels**

### Step 8 — SAT Sensor Installation

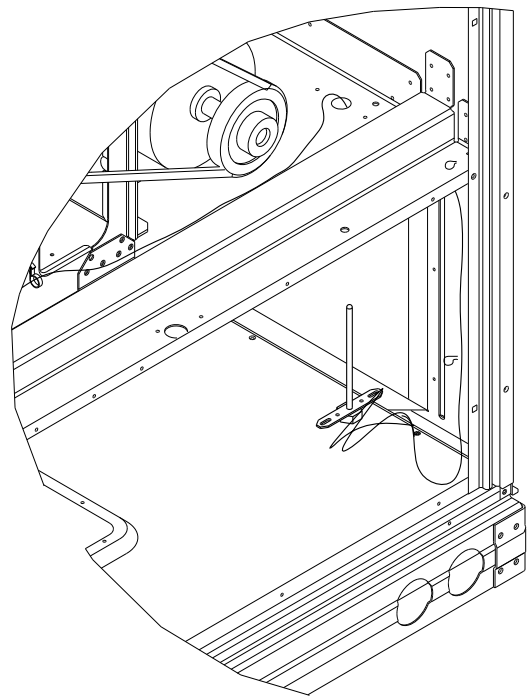
The supply air temperature (SAT) sensor is secured in the supply section of the unit for shipping purposes (see Fig. 11). This sensor must be relocated and mounted in the supply duct during installation.

### Step 9 — VAV Duct Pressure Transducer and Field Tubing Installation

Before VAV rooftop unit can operate correctly, installation of the factory supplied duct pressure transducer (DPT) and plastic pneumatic tubing (field supplied) is required. The DPT is mounted in the unit control box for shipping purposes and is shown in Fig. 12. Remove the screw holding the DPT and disconnect quick connects from the transducer terminals. For correct pressure sensing, mount the DPT externally to the main trunk duct approximately 2/3 of the way from the unit. Install factory supplied duct pressure tap (located in the installer’s packet) at the DPT location by inserting tap perpendicular to duct airflow with the arrow on pressure tap flange matching airflow direction.

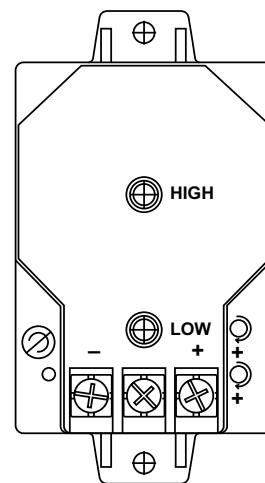
Connect 1/4-in plastic pneumatic tubing (field supplied) to barbed fitting on pressure tap and connect the other end to “High” fitting of pressure transducer. Leave “Low” pressure connection open to the atmosphere. Connect 20 or 22 AWG insulated wire [35°C (95°F) minimum] to DPT “+” and “-” terminals. Route wiring back to rooftop unit along with the low voltage VAV terminal field control wiring. Connect wire from DPT “+” terminal to quick connect on red wire from VAV-RTU Open Board J4 – Terminal 4 and wire from DPT “-” terminal to quick connect on black wire from VAV RTU-Open Board J4-Terminal 5 with 3/16-in quick connects. Wire nuts may also be used.

Proper installation of these components is required for accurate input to Analog Input 1 (static\_press) on the VAV-RTU Open Control Board. For more information on this please refer to the 48/50LC\*B07-26 Controls, Start-Up, Operation, and Troubleshooting document.



C150324

**Fig. 11 - SAT Sensor - Shipping Location**



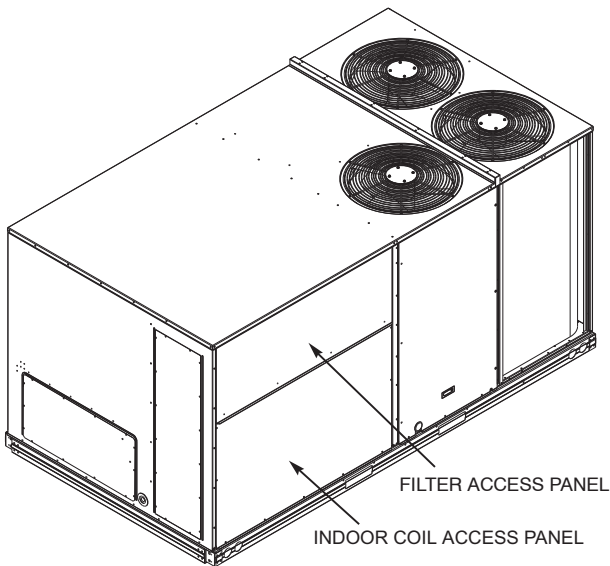
C150384

**Fig. 12 - Duct Pressure Transducer**

## Step 10 — Install Outside Air Hood

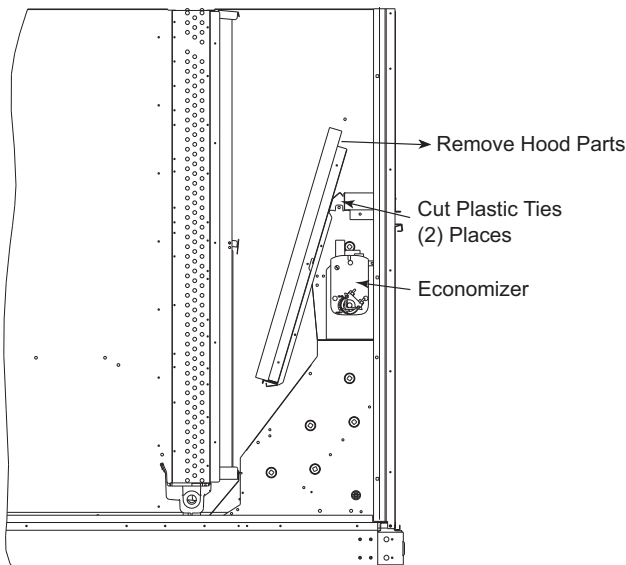
### Economizer Hood Removal and Setup —

1. The hood is shipped in knock-down form and located in the return air compartment. It is attached to the economizer using two plastic tie-wraps.
2. To gain access to the hood, remove the filter access panel. (See Fig. 13.)
3. Locate and cut the (2) plastic tie-wraps, being careful to not damage any wiring. (See Fig. 14.)
4. Carefully lift the hood assembly through the filter access opening and assemble per the steps outlined in the following procedure *Economizer Hood Assembly*.



C10004

**Fig. 13 - Typical Access Panel Locations**



C10005

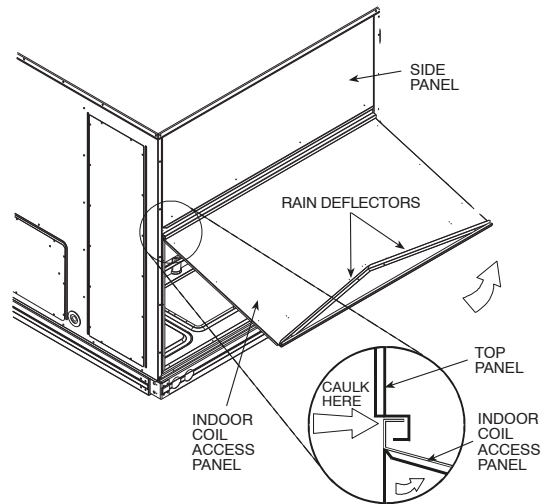
**Fig. 14 - Economizer Hood Package Location**

### Economizer Hood Assembly —

**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.

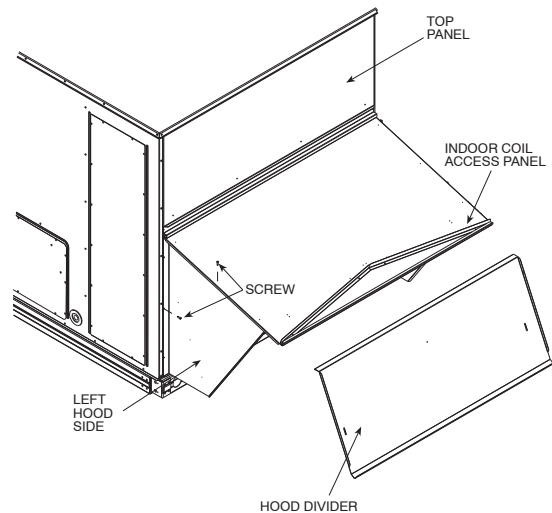
1. The indoor coil access panel will be used as the top of the hood. If the panel is still attached to the unit, remove the screws along the sides and bottom of the panel. See Fig. 15.



C10007

**Fig. 15 - Indoor Coil Access Panel Relocation**

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. 16.

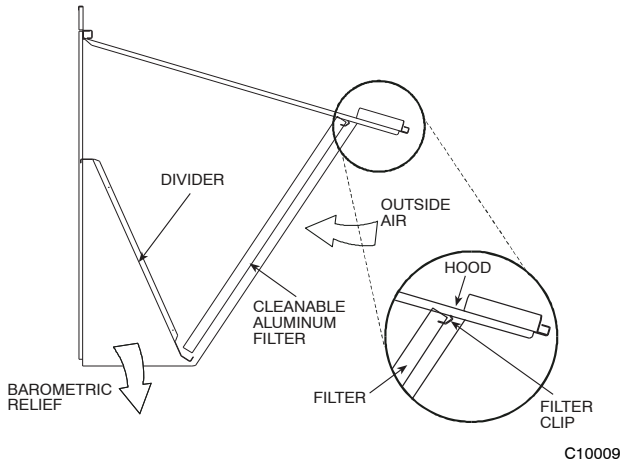


C10008

**Fig. 16 - Economizer Hood Construction**

3. Remove the shipping tape holding the economizer barometric relief damper in place.
4. Insert the hood divider between the hood sides. See Fig. 16 and 13. Secure hood divider with 3 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.
5. Attach the post that separates the filters with the screws provided.

6. Open the filter clips which are located underneath the hood top. Insert the aluminum filters into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filters into place. See Fig. 17.
7. Install the two rain deflectors on the edge of the hood top as shown in Fig. 15.

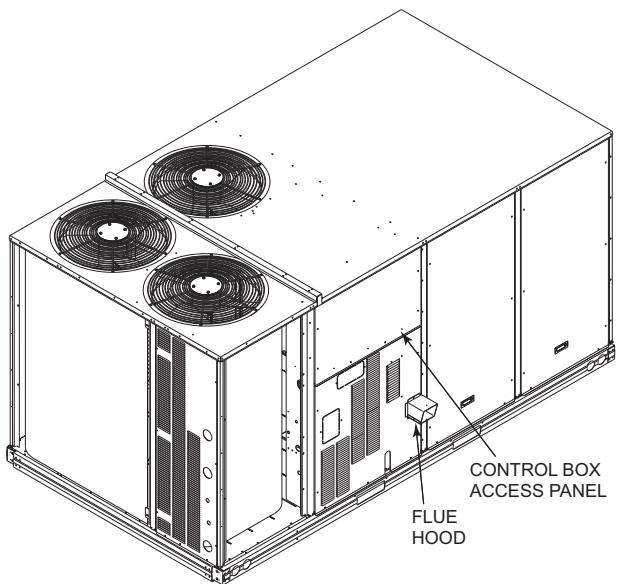


**Fig. 17 - Economizer Filter Installation**

8. Caulk the ends of the joint between the unit top panel and the hood top as shown in Fig. 15.
9. Replace the filter access panel.

**Step 11 — Install Flue Hood**

The flue hood is shipped screwed to the basepan beside the burner compartment access panel. Remove the panel below the control box access panel to access the flue hood shipping location. Using screws provided, install flue hood and screen in location shown in Fig. 18.



**Fig. 18 - Flue Hood Details**

**Step 12 — Install Gas Piping**

Installation of the gas piping must be accordance with local building codes and with applicable national codes. In U.S.A., refer to NFPA 54/ANSI Z223.1 National Fuel Gas Code (NFGC). In Canada, installation must be accordance with the CAN/CSA B149.1 and CAN/CSA B149.2 installation codes for gas burning appliances.

This unit is factory equipped for use with Natural Gas fuel at elevations up to 2000 ft (610 m) above sea level. Unit may be field converted for operation at elevations above 2000 ft (610 m) and/or for use with liquefied petroleum fuel. See accessory kit installation instructions regarding these accessories.

**NOTE:** In U.S.A. the input rating for altitudes above 2000 ft (610 m) must be derated by 4% for each 1000 ft (305 m) above sea level. In Canada the input rating must be derated by 10% for altitudes of 2000 ft (610 m) to 4500 ft. (1372 m) above sea level.

For natural gas applications, gas pressure at unit gas connection must not be less than 4 in. wg (996 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating. For liquified petroleum applications, the gas pressure must not be less than 11 in. wg (2740 Pa) or greater than 13 in. wg (3240 Pa) at the unit connection.

**Table 2 – Natural Gas Supply Line Pressure Ranges**

UNIT	MIN	MAX
48LC*B08/09/12	4.0 in. wg (996 Pa)	13.0 in. wg (3240 Pa)

**Table 3 – Liquid Propane Supply Line Pressure Ranges**

UNIT	MIN	MAX
48LC*B08/09/12	11.0 in. wg (2740 Pa)	13.0 in. wg (3240 Pa)

The gas supply pipe enters the unit at the burner access panel on the front side of the unit, through the long slot at the bottom of the access panel. The gas connection to the unit is made to the 3/4-in. FPT gas inlet port on the unit gas valve.

Manifold pressure is factory-adjusted for NG fuel use. Adjust as required to obtain best flame characteristics.

**Table 4 – Natural Gas Manifold Pressure Ranges**

UNIT MODEL	UNIT SIZE	HIGH FIRE	LOW FIRE
48LCD/E/S/RB	08, 09, 12	3.5 in. wg (872 Pa)	2.0 in. Wg (498 Pa)
48LCF/TB (High Heat units only)	12 only	3.4 in. wg (847 Pa)	2.3 in. Wg (573 Pa)

Manifold pressure for LP fuel must be adjusted to specified range. Follow instructions in the accessory kit to make initial readjustment.

**Table 5 – Natural Gas Manifold Pressure Ranges**

UNIT MODEL	UNIT SIZE	HIGH FIRE	LOW FIRE
48LCD/E/S/RB	08, 09, 12	10.0 in. wg (2491 Pa)	5.7 in. Wg (1420Pa)
48LCF/TB (High Heat units only)	12 only	6.2 in. wg (1554 Pa)	3.9 in. Wg (971 Pa)

# ⚠ CAUTION

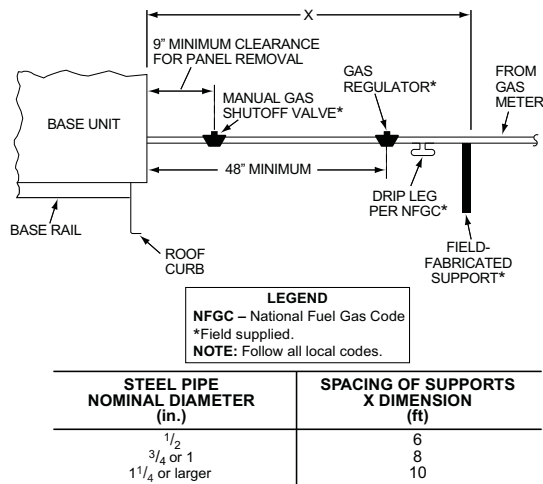
## EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to equipment.

When connecting the gas line to the unit gas valve, the installer **MUST** use a backup wrench to prevent damage to the valve.

Install a gas supply line that runs to the unit heating section. Refer to the NFPA 54/NFPA 54 or equivalent code for gas pipe sizing data. Size the gas supply line to allow for a maximum pressure drop of 0.5-in wg (124 Pa) between gas regulator source and unit gas valve connection when unit is operating at high-fire flow rate.

The gas supply line can approach the unit in three ways: horizontally from outside the unit (across the roof), thru-curb/under unit basepan (accessory kit required) or through unit basepan (factory-option or accessory kit required). Consult accessory kit installation instructions for details on these installation methods. Observe clearance to gas line components per Fig. 19.



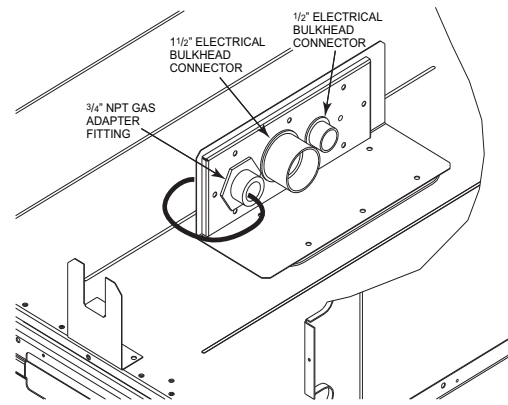
**Fig. 19 - Gas Piping Guide**

C11121

## Factory-Option Thru-Base Connections (Gas Connection) —

This service connection kit consists of a 3/4-in NPT gas adapter fitting (stainless steel), 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. 20.

1. Remove the “L” bracket assembly from the unit (see Fig. 20).



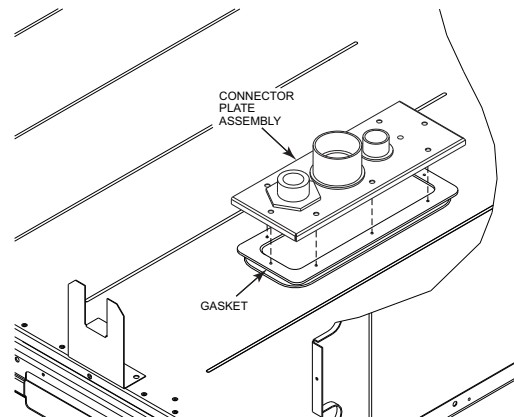
C10905

**Fig. 20 - Thru-the-Base Option, Shipping Position**

2. Cut and discard the wire tie on the gas fitting. Hand tighten the fitting if it has loosened in transit.
3. 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.

4. Place the gasket over the embossed area in the basepan, aligning the holes in the gasket to the holes in the basepan. See Fig. 21.



C10906

**Fig. 21 - Completing Installation of Thru-the-Base Option**

5. Install the connector plate assembly to the basepan using 8 of the washer head screws.

**NOTE:** If gas and/or 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.

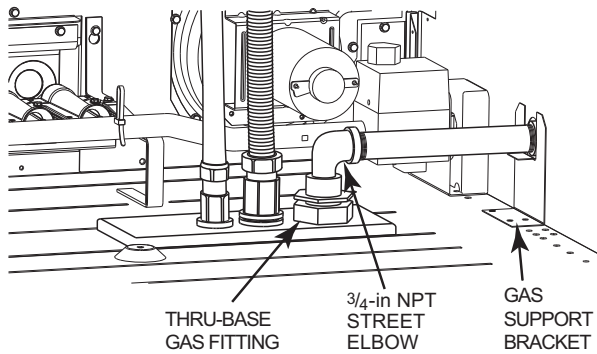
The thru-base gas connector has male and female threads. The male threads protrude above the basepan of the unit; the female threads protrude below the basepan.

Check tightness of connector lock nuts before connecting gas piping.

48LC\*B



Install a  $\frac{3}{4}$ -in NPT street elbow on the thru-base gas fitting. Attach a  $\frac{3}{4}$ -in pipe nipple with minimum length of 16-in (406 mm) (field-supplied) to the street elbow and extend it through the access panel at the gas support bracket. (See Fig. 22.)



**Fig. 22 - Gas Line Piping**

C10806

Other hardware required to complete the installation of the gas supply line will include a manual shutoff valve, a sediment trap (drip leg) and a ground-joint union. A pressure regulator valve may also be required (to convert gas pressure from pounds to inches of pressure). The manual shutoff valve must be located within 6-ft (1.83 m) of the unit. The union, located in the final leg entering the unit, must be located at least 9-in (230 mm) away from the access panel to permit the panel to be removed for service. If a regulator valve is installed, it must be located a minimum of 4-ft (1220 mm) away from the unit's flue outlet. Some municipal codes require that the manual shutoff valve be located upstream of the sediment trap. See Fig. 23 and 24 for typical piping arrangements for gas piping that has been routed through the sidewall of the curb. See Fig. 25 for typical piping arrangement when thru-base is used. Ensure that all piping does not block access to the unit's main control box or limit the required working space in front of the control box.

When installing the gas supply line, observe local codes pertaining to gas pipe installations. Refer to the NFPA 54/ANSI Z223.1 NFGC latest edition (in Canada, CAN/CSA B149.1). In the absence of local building codes, adhere to the following pertinent recommendations:

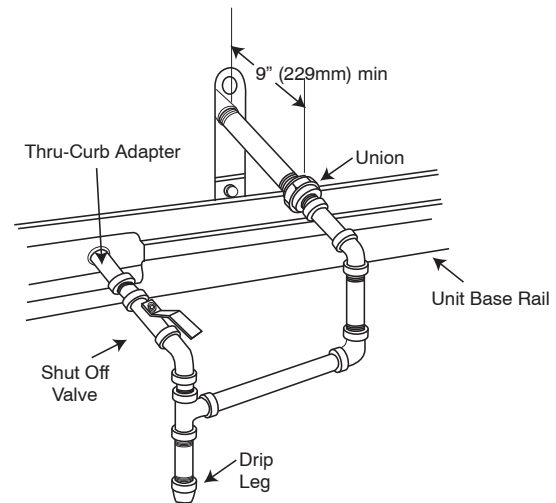
1. Avoid low spots in long runs of pipe. Grade all pipe  $\frac{1}{4}$ -in. in every 15 ft (7 mm in every 5 m) to prevent traps. Grade all horizontal runs downward to risers. Use risers to connect to heating section and to meter.
2. Protect all segments of piping system against physical and thermal damage. Support all piping with appropriate straps, hangers, etc. Use a minimum of one hanger every 6 ft (1.8 m). For pipe sizes larger than  $\frac{1}{2}$ -in., follow recommendations of national codes.
3. Apply joint compound (pipe dope) sparingly and only to male threads of joint when making pipe connections. Use only pipe dope that is resistant to action of liquefied petroleum gases as specified by local and/or national codes. If using PTFE (Teflon) tape, ensure the materi-

al is Double Density type and is labeled for use on gas lines. Apply tape per manufacturer's instructions.

4. Pressure-test all gas piping in accordance with local and national plumbing and gas codes before connecting piping to unit.

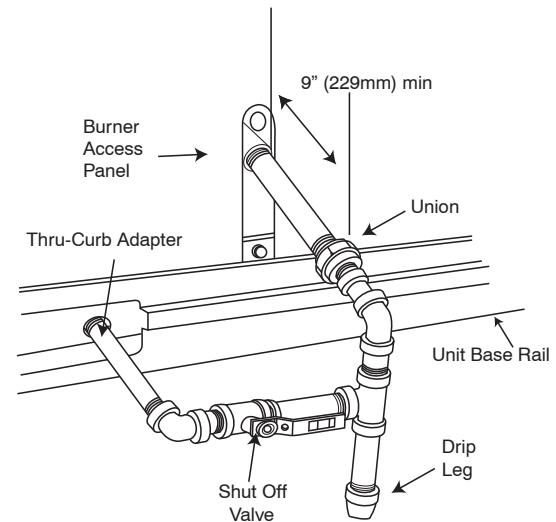
**NOTE:** Pressure test the gas supply system after the gas supply piping is connected to the gas valve. The supply piping must be disconnected from the gas valve during the testing of the piping systems when test pressure is in excess of 0.5 psig (3450 Pa). Pressure test the gas supply piping system at pressures equal to or less than 0.5 psig (3450 Pa). The unit heating section must be isolated from the gas piping system by closing the external main manual shutoff valve and slightly opening the ground-joint union.

Check for gas leaks at the field-installed and factory-installed gas lines after all piping connections have been completed. Use soap-and-water solution (or method specified by local codes and/or regulations).



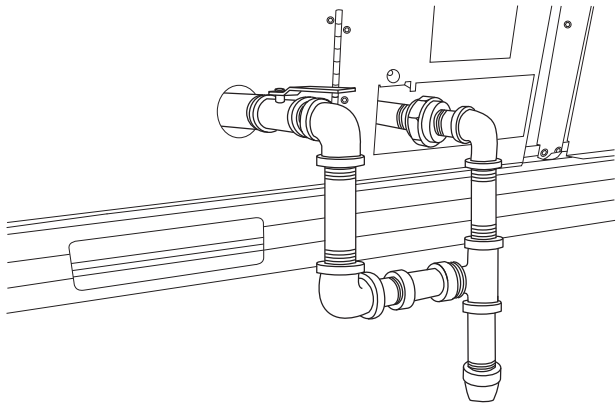
**Fig. 23 - Gas Piping**

C07469



**Fig. 24 - Gas Piping**

C07470



**Fig. 25 - Gas Piping Thru-Base Connections**

C10826

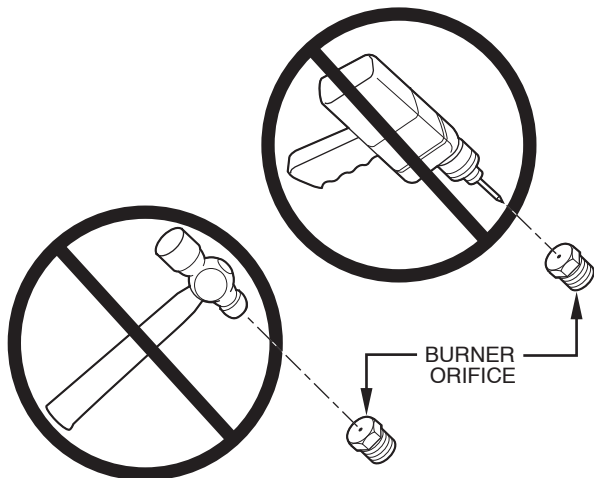
**⚠ WARNING**

**FIRE OR EXPLOSION HAZARD**

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

- Connect gas pipe to unit using a backup wrench to avoid damaging gas controls.
- Never purge a gas line into a combustion chamber.
- Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections.
- Use proper length of pipe to avoid stress on gas control manifold.

**NOTE:** If orifice hole appears damaged or it is suspected to have been re-drilled, check orifice hole with a numbered drill bit of correct size. Never re-drill an orifice. A burr-free and squarely aligned orifice hole is essential for proper flame characteristics. See Fig. 26.

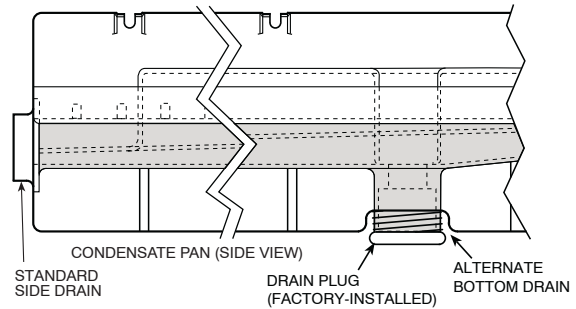


**Fig. 26 - Orifice Hole**

A93059

**Step 13 — Install External Condensate Trap & 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. 27. Unit airflow configuration does not determine which drain connection to use. Either drain connection can be used with vertical or horizontal applications.



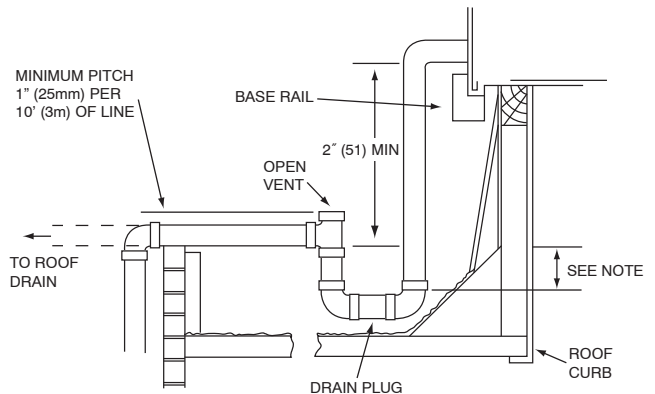
**Fig. 27 - Condensate Drain Pan (Side View)**

C08021

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. 28.

*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.).*



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

**Fig. 28 - Condensate Drain Piping Details**

C08022

48LC\*B

## Step 14 — Make Electrical Connections

### ⚠ WARNING

#### ELECTRICAL SHOCK HAZARD

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

*Do not use gas piping as an electrical ground.* Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code); ANSI/NFPA 70, latest edition (in Canada, Canadian Electrical Code CSA [Canadian Standards Association] C22.1), and local electrical codes.

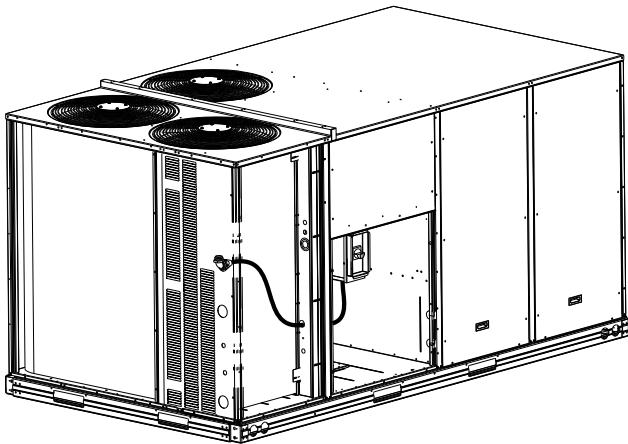
48LC\*B

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

#### Field Power Supply —

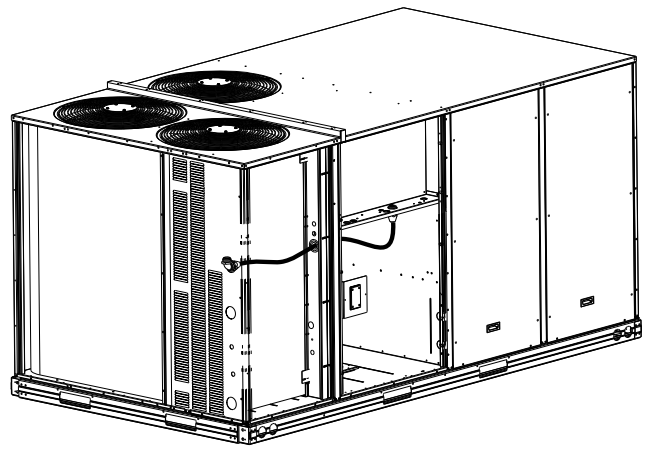
For those units without through-the-curb power, conduit must be used to route the main power from the condenser end, via the power entry in the corner post of the unit (see Figs. 29 and 30) to either the factory option disconnect or the bottom of the control box. 1" conduit is provided wrapped around compressor. A second conduit is provided with factory installed powered convenience outlet. For those units that require conduit larger than 1", it must be field supplied. Figs. 29 and 30 show the wire routings.

If the field disconnect is larger than 100A, it must be attached to the unit using accessory CRDISBKT001A00 — disconnect switch bracket — (see Fig. 31). Follow the instructions provided with this accessory. For smaller field disconnects, be sure to use 1/2" screws to mount the disconnect directly to the end panel (see Fig. 32). In either case, set the disconnect vertical location on the unit so that a 90° fitting can be used to connect the conduit to the disconnect.



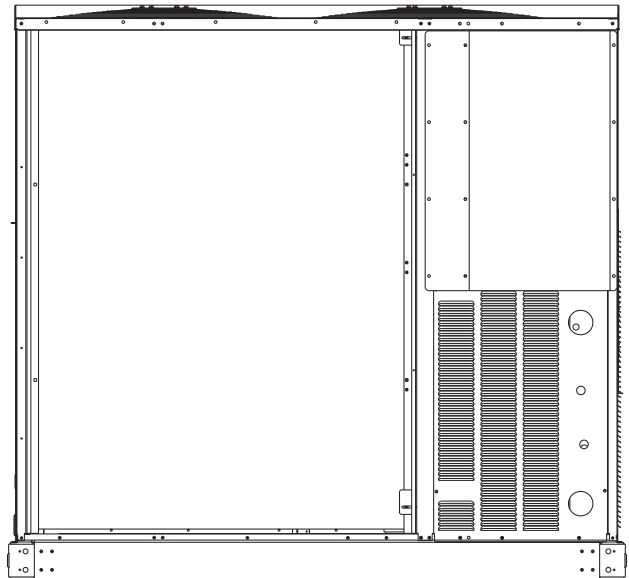
C12375

**Fig. 29 - Conduit into Factory Option Non-Fused Disconnect or HACR**



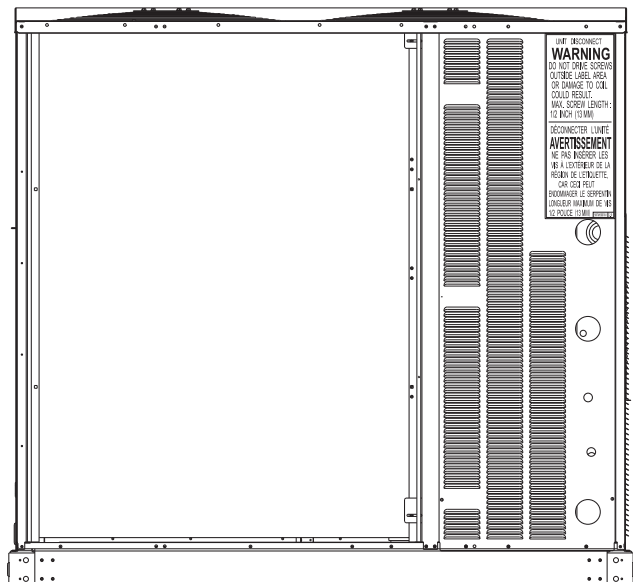
C12376

**Fig. 30 - Conduit into Control Box**



C10853

**Fig. 31 - Mounting Position for Field Disconnects (over 100A)**



C10854

**Fig. 32 - 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 or HACR. Refer to Table 6 for maximum wire size at connection lugs. Use copper wire only. See Fig. 36.

**Table 6 – Connection Lug Min/Max Wire Sizes**

	Minimum	Maximum
TB1 in unit control box	#14	#1
80A Disconnect Option	#14	#4
100A Disconnect Option	#8	1/0
25A HACR Option	#14	1/0
30A HACR Option	#14	1/0
35A HACR Option	#14	1/0
40A HACR Option	#14	1/0
50A HACR Option	#14	1/0
60A HACR Option	#14	1/0
70A HACR Option	#14	1/0
80A HACR Option	#14	1/0
90A HACR Option	#14	1/0
100A HACR Option	#14	1/0

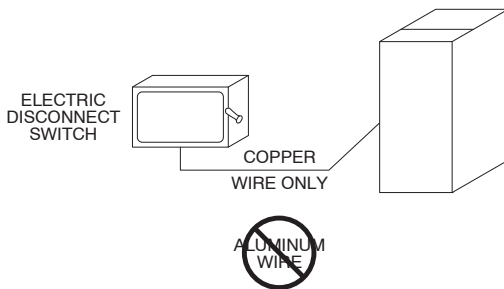
**NOTE: TEST LEADS** - Unit may be equipped with short leads (pigtailed) on the field line connection points off the optional non-fused disconnect switch or HACR. These leads are for factory run-test purposes only; remove and discard before connecting field power wires to unit connection points. Make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

⚠ **WARNING**

**FIRE HAZARD**

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

Do not connect aluminum wire between disconnect switch and 48LC\*B unit. Use only copper wire. (See Fig. 33.)



**Fig. 33 - Disconnect Switch and Unit**

A93033

**All Units —**

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

Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 36 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Refer to Table 6 for maximum wire size at connection lugs.

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

**NOTE:** Units ordered with factory installed HACR do not need an additional ground-fault and short-circuit over-current protection device unless local codes require.

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate. See Tables 12 and 13. On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown in the legend for Tables 12 and 13 (see Note 2 on page 46) to determine the percent of voltage imbalance.

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.

⚠ **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 Carrier warranty.

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

48LC\*B

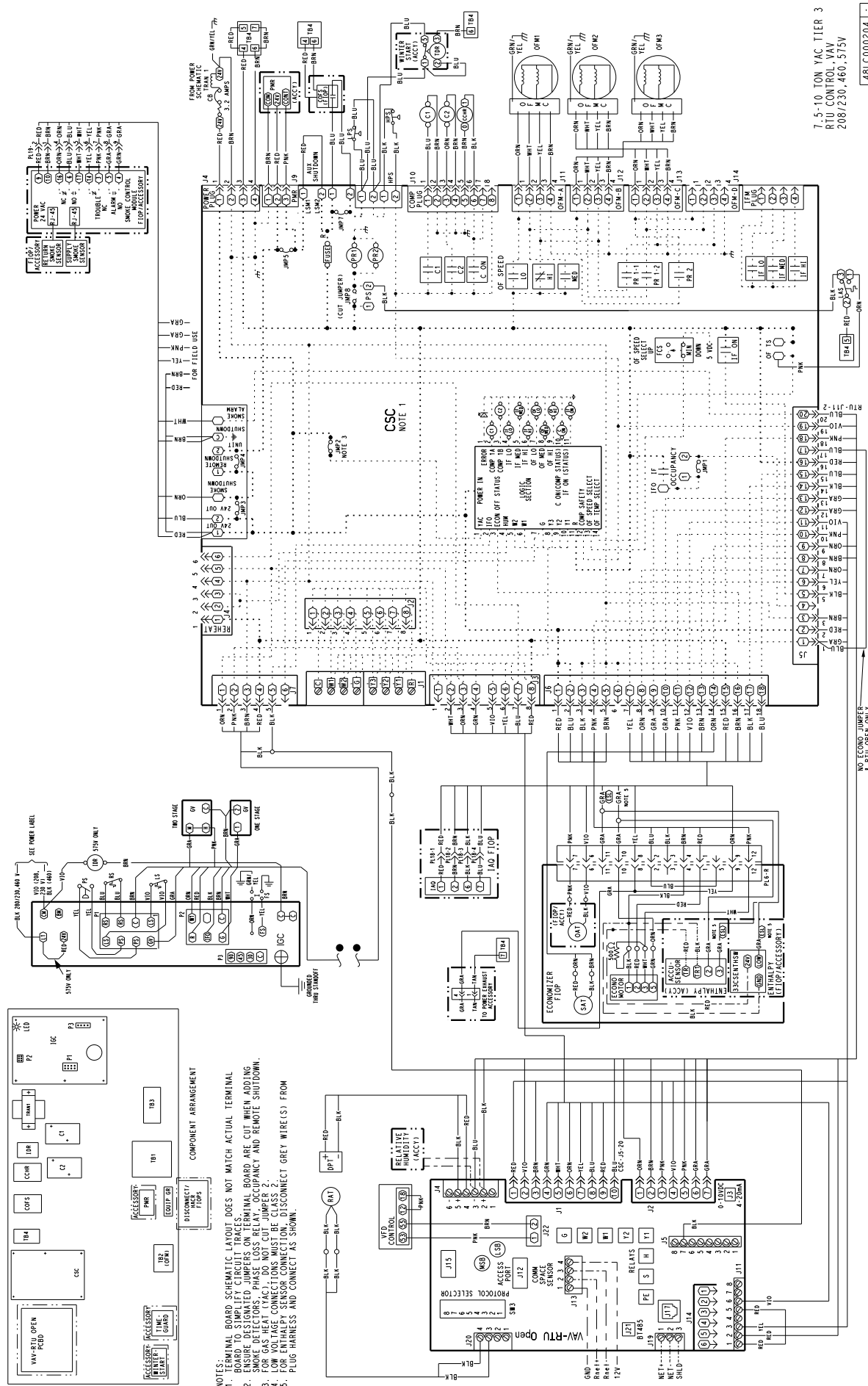
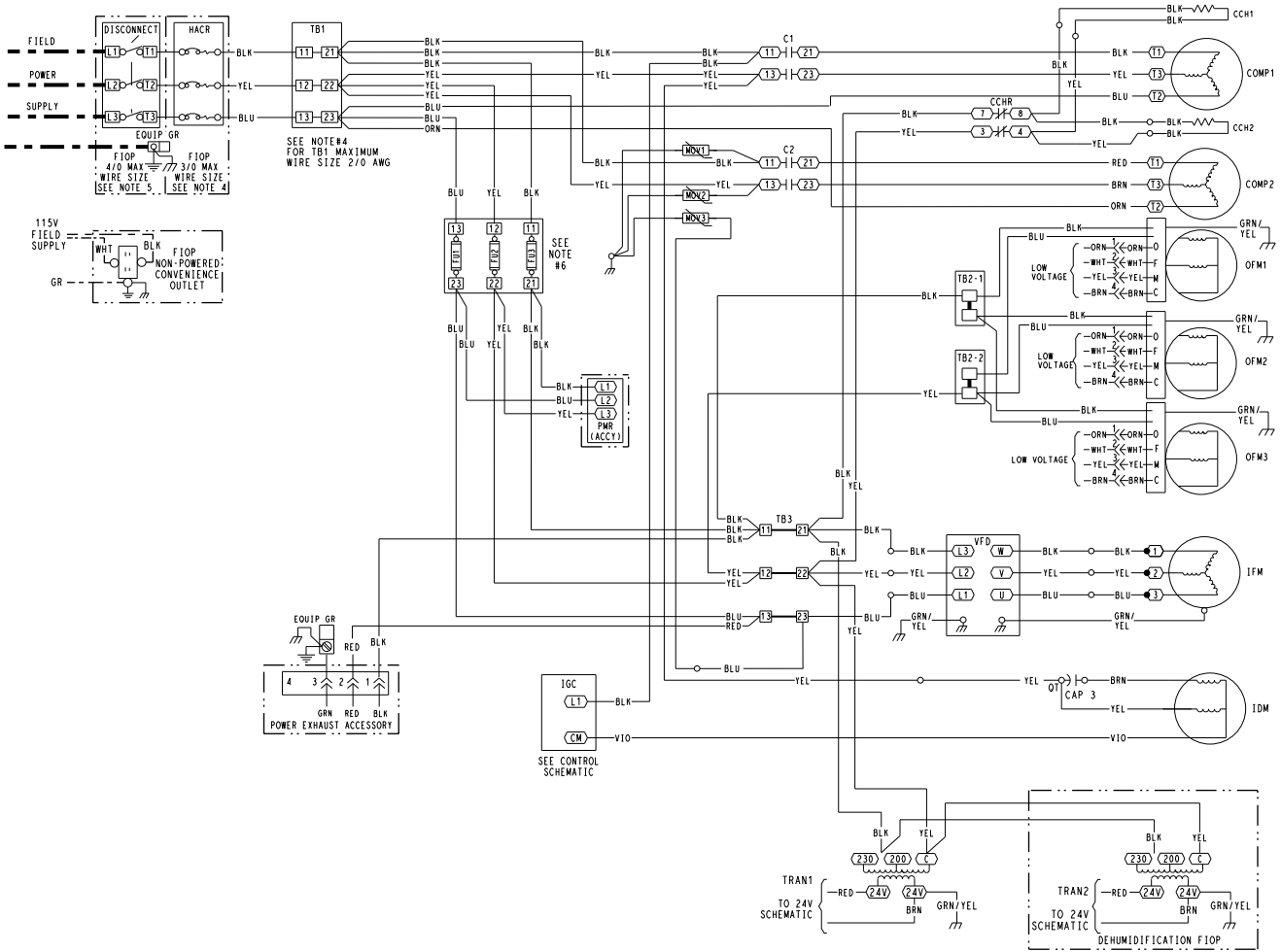


Fig. 34 - 48 LC\*B08-12 VAV-RTU Open Control Wiring Diagram



- NOTES:
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
  2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
  4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
  5. USE COPPER CONDUCTORS ONLY.
  6. FUI, 2, 3 REPLACE WITH 250V 60A BUSSMAN FRNR 60.

YAC POWER TIER3-7.5,8.5,10 TON  
208/230V 3Ø  
48LC500457 B

C150363

Fig. 35 - 48LC\*B08-12 Typical Power Wiring Diagram, 208/230V Unit Shown

**Units Without Factory-Installed Non-Fused Disconnect or HACR —**

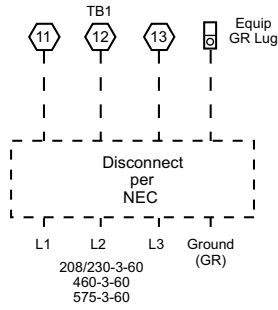
When installing units, provide a disconnect switch of adequate size per NEC (National Electrical Code). Disconnect sizing data is provided on the unit informative plate. Locate on unit cabinet or within sight of the unit per national or local codes. Do not cover unit informative plate if mounting the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

**Units With Factory-Installed Non-Fused Disconnect or HACR —**

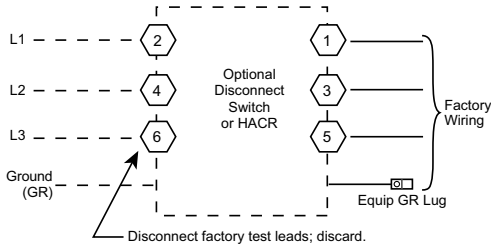
The factory-installed option non-fused disconnect switch (NFD) or HACR is located in a weatherproof enclosure located under the main control box. The manual switch handle is shipped in th disconnect or HACR enclosure. Assemble the shaft and handle to the switch or HACR at this point. Discard the factory test leads (see Fig. 36). The factory disconnect is either an 80A or 100A depending on the unit voltage, indoor motor and options.

48LC\*B

Units Without Disconnect or HACR Option

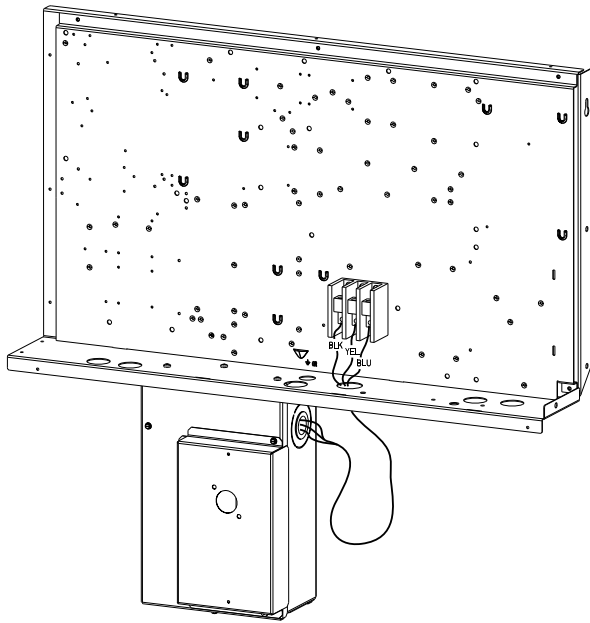


Units With Disconnect or HACR Option



**Fig. 36 - Power Wiring Connections**

C12323



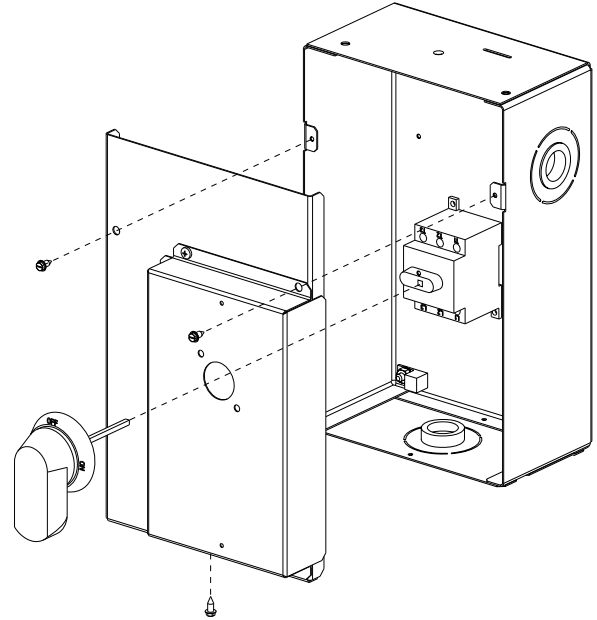
C12324

**Fig. 37 - Location of Non-Fused Disconnect Enclosure**

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

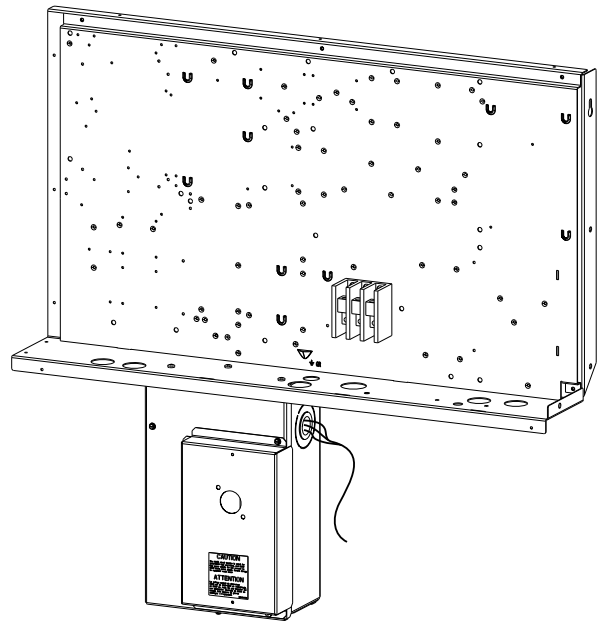
1. Remove the unit front panel (see Fig. 2).
2. Remove (3) hex screws on the NFD enclosure - (2) on the face of the cover and (1) on the bottom.
3. Remove the front cover of the NFD enclosure.
4. Make sure the NFD shipped from the factory is at OFF position (the arrow on the black handle knob is at OFF).
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 - 3.88 in. (95 - 99 mm) for 80A & 100A NFD and 3.43 - 3.56 in. (87 - 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 at OFF.
9. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
10. Secure the handle to the painted cover with (2) screws and lock washers supplied.
11. Engaging the shaft into the handle socket, re-install (3) hex screws on the NFD enclosure.
12. Re-install the unit front panel.



C12325

**Fig. 38 - Handle and Shaft Assembly for NFD**



C12326

**Fig. 39 - Location of HACR Enclosure**

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

1. Remove the unit front pane (see Fig. 2).
2. Remove (3) hex screws on the HACR enclosure - (2) on the face of the cover and (1) on the bottom.

3. Remove the front cover of the HACR enclosure.
4. Make sure the HACR shipped from the factory is at OFF position (the white arrow pointing at OFF).
5. Insert the shaft all the way with the cross pin on the top of the shaft in the horizontal position.
6. Tighten the locking screw to secure the shaft to the HACR.
7. Turn the handle to the OFF position with red arrow pointing at OFF.
8. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
9. Secure the handle to the painted cover with (2) screws and lock washers supplied.
10. Engaging the shaft into the handle socket, re-install (3) hex screws on the HACR enclosure.
11. Re-install the unit front panel.

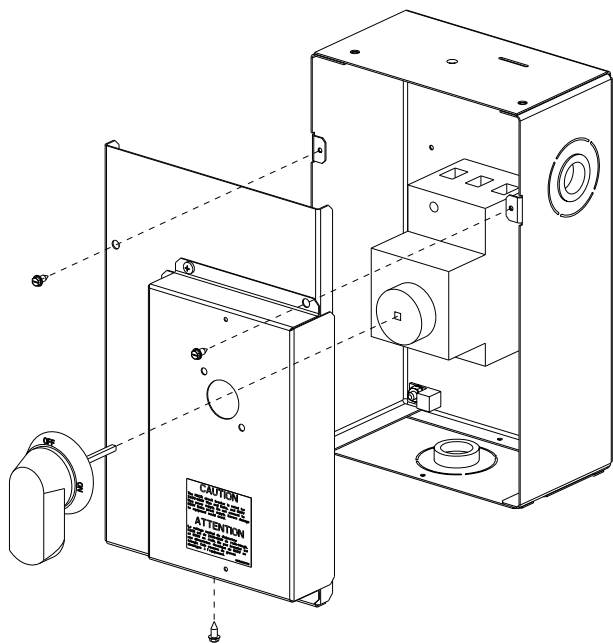


Fig. 40 - Handle and Shaft Assembly for HACR

C12327

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 48LC\*B units: non-powered and unit-powered. Both types provide a 125-volt GFCI (ground-fault circuit-interrupter) duplex receptacle rated at 15-A behind a hinged waterproof access cover, located on the panel beneath the control box. See Fig. 41.

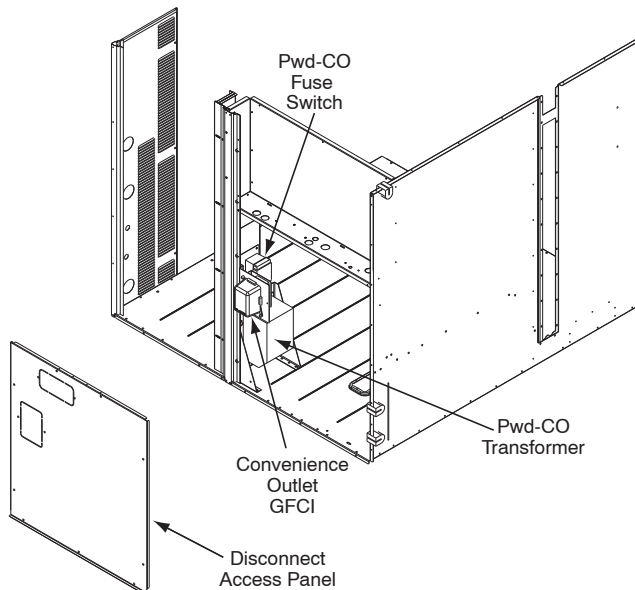


Fig. 41 - Convenience Outlet Location

C10361

## NOTICE/AVIS

**Convenience Outlet Utilization**  
 Maximum Intermittent Use 15 - Amps  
 Maximum Continuous Use 8 - Amps  
 Observe a 50% limit on the circuit  
 Loading above 8 - Amps

**Utilisation de la prise utilitaire**  
 Usage intermittent maximum 15 - Amps  
 Usage continu maximum 8 - Amps  
 Observez une limite de 50% sur le circuit  
 Chargement au-dessus de 8 - Amps

50HE501288	2.0
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Fig. 42 - Convenience Outlet Utilization Notice

C10077

**Non-powered type:** This type requires the field installation of a general-purpose 125-volt 15-A circuit powered from a source elsewhere in the building. Observe national and local codes when selecting wire size and conduit requirements, fuse or breaker requirements and disconnect switch size and location. Route 125-v power supply conductors into the bottom of the utility box containing the duplex receptacle.

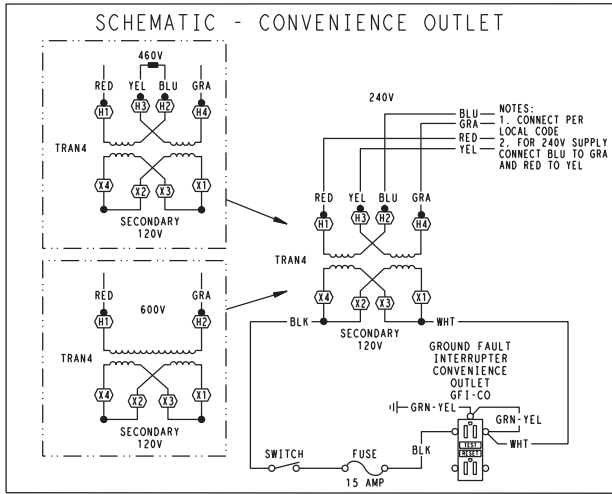
**Unit-powered type:** A unit-mounted transformer is factory-installed to stepdown the main power supply voltage to the unit to 115-v at the duplex receptacle. This option also includes a manual switch with fuse, located in a utility box and mounted on a bracket behind the convenience outlet; access is through the panel beneath the control box. See Fig. 41.

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

48LC\*B

service power to the unit when the unit disconnect switch is open. Other connection methods will result in the convenience outlet circuit being de-energized when the unit disconnect switch is open. See Fig. 43. On a unit without a unit-mounted disconnect, connect the source leads to the main terminal block (TB1).

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

**Fig. 43 - Unit Powered Convenience Outlet Wiring**

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 wire 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" long.

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.

Fuse on power type: The factory fuse is a Bussman "Fusetron" T-15, non-renewable screw-in (Edison base) type plug fuse.

## ⚠ WARNING

### ELECTRICAL OPERATION HAZARD

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

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

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

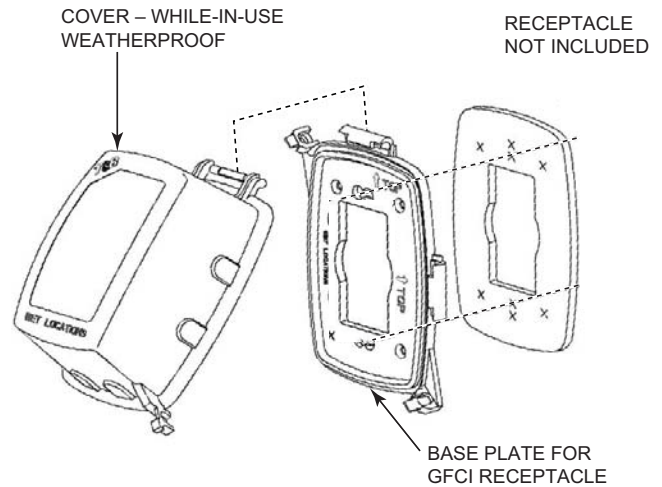
The weatherproof cover kit is shipped in the unit's control box. The kit includes the hinged cover, a backing plate and gasket.

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

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

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

Mount the weatherproof cover to the backing plate as shown in Fig. 44. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover. Check for full closing and latching.



**Fig. 44 - Weatherproof Cover Installation**

C09022

## HACR —

The amp rating of the HACR factory installed option is based on the size, voltage, indoor motor and other electrical options of the unit as shipped from the factory. If field installed accessories are added or changed in the field (i.e., power exhaust), the HACR may no longer be of the proper amp rating and therefore will need to be removed from the unit. See unit nameplate and label on factory installed HACR for the amp rating of the HACR that was shipped with the unit from the factory. See unit nameplates for the proper fuse, HACR or maximum over-current protection device required on the unit with field installed accessories.

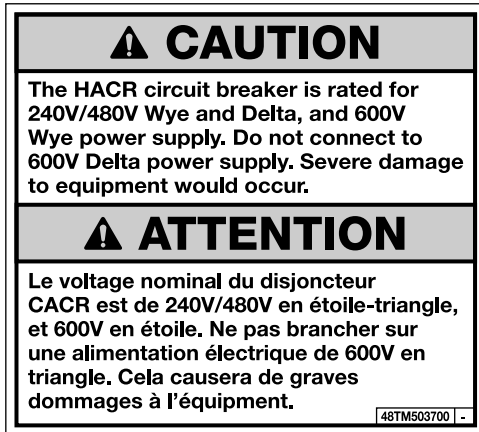


Fig. 45 - HACR Caution Label

## 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. 46. 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.

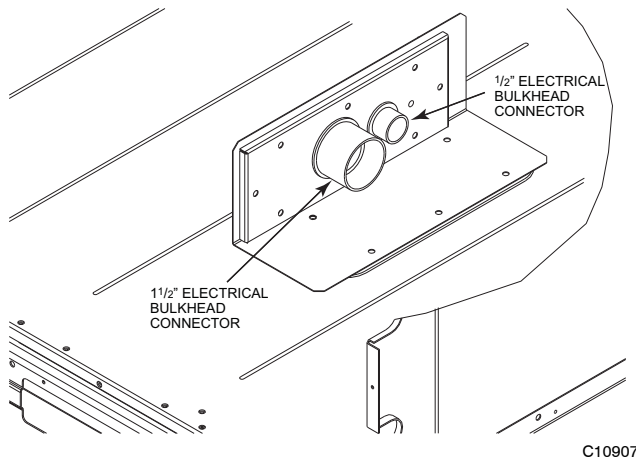


Fig. 46 - Thru-the-Base Option, Shipping Position

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. 47.
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.

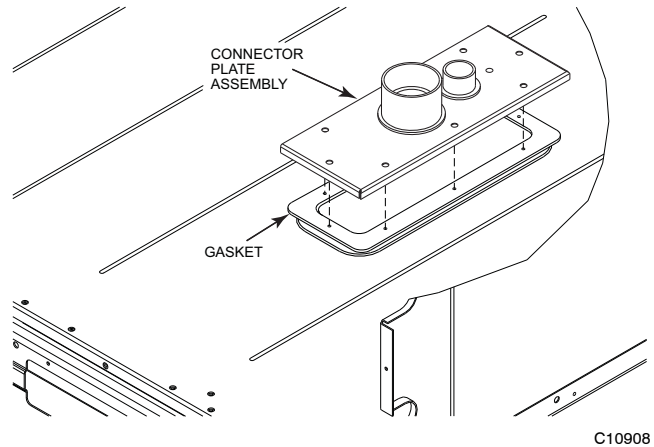


Fig. 47 - Completing Installation of Thru-the-Base Option

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 and low voltage through appropriate conduits. Connect the power conduit to the internal disconnect (if unit is so equipped) or to the external disconnect (through unit side panel). 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. 36.

## Unit without Thru-Base Connection Kit —

Pass the field 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 two knockouts in the corner of the box. Using 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 lower left corner of the



Integrated Staging Control (ISC) Board. Use the connector at the control box and the wire tie to take up any slack in the field control wire to ensure that it will not be damaged by contact with the condenser coil. See Fig. 48.

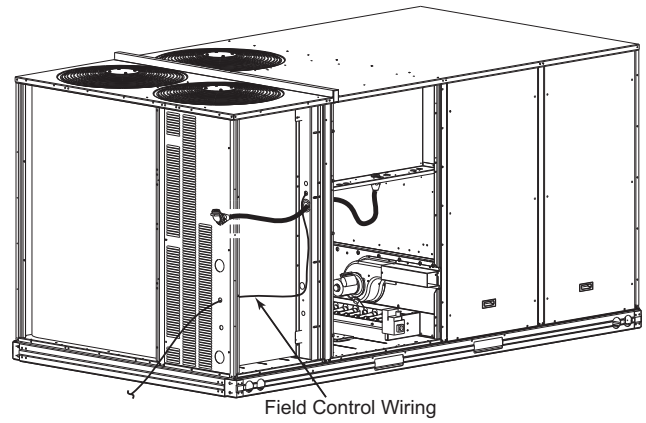
**NOTE:** If thru-the-bottom connections accessory is used, refer to the accessory installation instructions for information on routing power and control wiring.

**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.

**VAV-RTU Open Controller**

For details on VAV-RTU Open option refer to the *48/50LC\*B 7-26 VAV-RTU Open Controller Controls, Start-up, Operation and Troubleshooting* manual.



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**Fig. 48 - Field Control Wire Routing**

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## Integrated Staging Control (ISC) Board

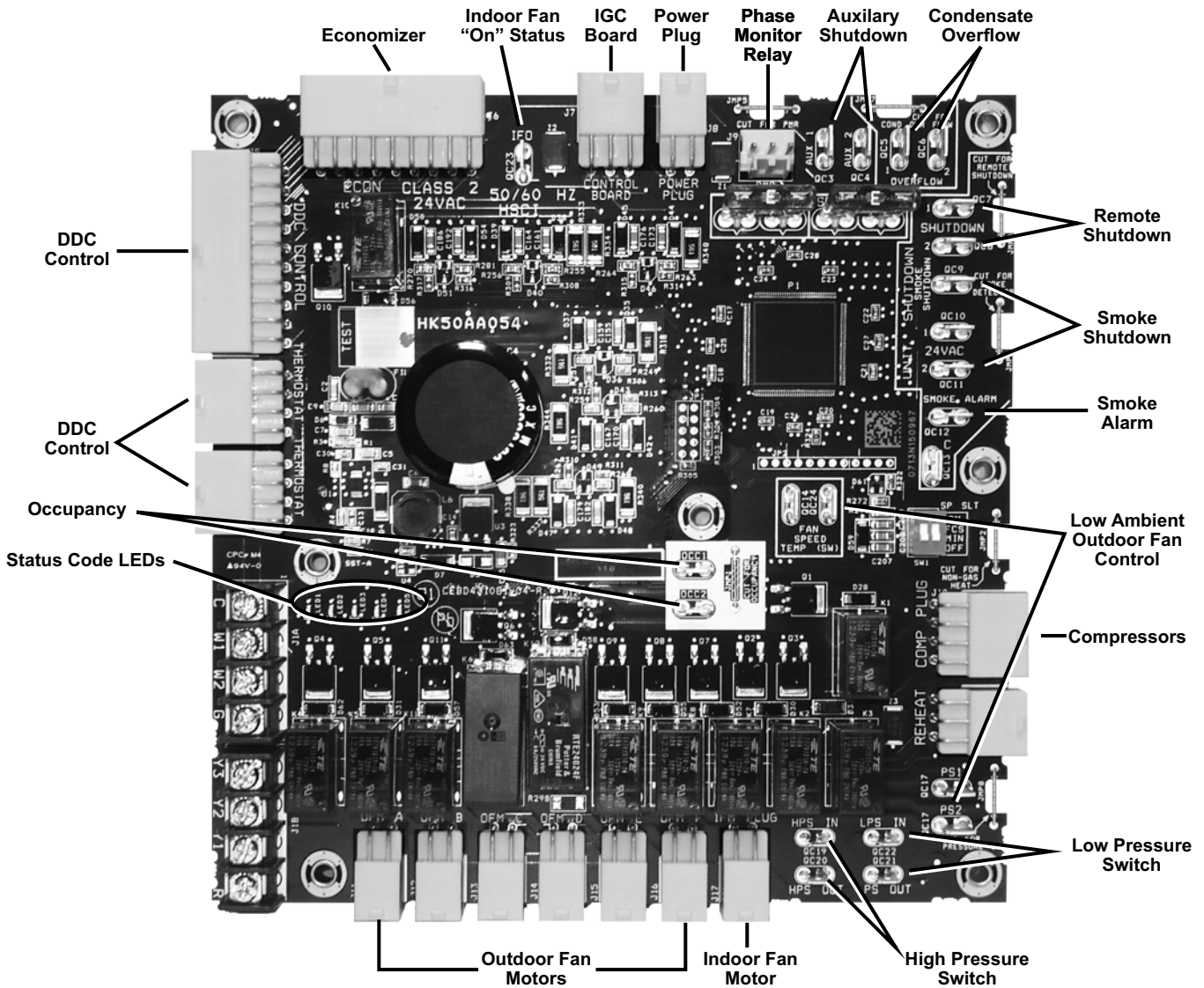


Fig. 49 - Integrated Staging Control (ISC) Board

C150322

### Sequence of Operation

#### General —

The Carrier Integrated Staging Control (ISC) is intended for use with the VAV-RTU Open controller. After initial power to the board, a Green LED will blink with a 1 second duty cycle indicating the unit is running properly. In the event of the ISC board failing, the Green LED will be OFF or continuously ON. When the unit is not running properly, the Green LED will blink along with Red LED lights. The Red LED light configuration will indicate the type of error the board has identified. See Fig. 49 for LED locations and Table 7 for a list of status codes.

The ISC board can be remotely shutdown by removing Jumper 4 and wiring to the Remote Shutdown terminal. The Smoke Control Module can shutdown the unit by removing Jumper 3 and wiring to the Smoke Shutdown terminal. The Smoke Alarm terminal on the ISC Board provides a pass thru connection should a smoke alarm

signal be connected. The VAV-RTU Open controller provides the signal which is passed thru the ISC board to the Smoke Alarm terminal.

The crankcase heater will run at all times except when the compressors are running. An auxiliary power supply (24Vac) available at TB-4 Terminal is provided to power auxiliary equipment. An optional Phase Monitor Relay can be wired to the PMR terminal by removing Jumper 5. An optional Condensate Flow Switch can be wired to the COFS Terminal by removing Jumper 7.

#### Static Pressure Control —

The supply fan VFD will be controlled using a PID and an analog input from a duct static pressure transducer. The supply fan will modulate its speed to maintain the desired duct static pressure setpoint.

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**Table 7 – Status Code Descriptions for ISC Board LEDs**

ERROR#	ERROR NAME	LED INDICATION				
		LED01	LED02	LED03	LED04	LED05
1	Check Smoke Detector/PMR/AUX		RED	Blinking Green LED (Note 1)		
2	Check HPS/LPS/COFS	RED	RED			
3	Call for Y3 with no call for Y1. Check Y1 wiring.				RED	
4	Call for Y3 with no call for Y1/Y2. Check Y1 wiring.				RED	RED
5	Call for Y2 with no call for Y1. Check Y1 wiring.		RED		RED	
6	Call for W2 with no call for W1. Check W1 wiring.	RED				RED
7	Call for heat (W1/W2) and cooling (Y1/Y2/Y3). Check VAV–RTU Open wiring.	RED	RED		RED	RED
8	Call for heat (W1/W2) with no IFM. Check G wiring.		RED		RED	RED
9	Call for cooling (Y1/Y2/Y3) with no G. Check G wiring	RED	RED		RED	
10	Call for heat (W1/W2) and cooling (Y1/Y2/Y3) with no G. Check VAV–RTU Open and G wiring.	RED	RED			RED
11	Check ISC Board and the VAV–RTU Open wiring	RED			RED	RED
12	Call for Economizer Y1 Feedback (ECON) from economizer with no call for Y1. Check VAV–RTU Open and economizer wiring.	RED				
13	Check ISC Board and the VAV–RTU Open wiring	RED			RED	
14	Check ISC Board and the VAV–RTU Open wiring					RED
15	Check ISC Board and the VAV–RTU Open wiring		RED			RED

- NOTES: 1. Green LED Blinking at 1HZ indicates normal operation.  
 2. Solid red LED indicates an error exists, see above LED configuration.

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**Field Test/Commissioning –**

The control will provide BACnet test points to activate specific test modes that can be used to commission the rooftop and the system. Test modes will be available in the Service Test screen on the Property pages and shall also be available on the local Equipment Touch device for standalone commissioning. Tests include: Fan Test, Low Heat Test, High Heat Test, Cooling Test, Power Exhaust Test, and an Economizer Test. When any test is active, the appropriate Linkage mode will be sent to the system’s terminals. This will ensure appropriate system operation and airflow during any test mode.

**Ventilation —**

In the Ventilation/Fan Mode (G), the indoor–fan will run at low speed and the damper will operate at minimum position.

**Supply Air Temperature Control –**

The control will maintain the desired supply air temperature setpoint whenever cooling is required. A user configurable setpoint will be provided (default 53°F). The control will use the appropriate method (economizer cooling, mechanical cooling, or a combination of both) to achieve this setpoint whenever the zone temperature is greater than the current cooling setpoint (occupied or unoccupied). If Supply Air Reset is enabled, the reset algorithm will calculate a proportional reset value between the Occupied Cooling setpoint and 1°F above the Occupied Heating setpoint. The amount of reset (reset ratio and maximum reset limit value) is user configurable.

**Minimum Ventilation –**

The economizer minimum position will be adjusted as required based on the supply fan speed. Two user configurable minimum economizer positions will be provided. The economizer will be positioned at the “Low

Fan Econ Min Pos” when the fan is operating at its slowest speed. When the fan is operating at its maximum speed, the economizer will be positioned at the “Vent Dmpr Pos / DCV Min Pos”. For any supply fan speed between these two points, the economizer minimum position will be calculated proportionally.

**Demand Controlled Ventilation [DCV] –**

Whenever the unit is in an occupied mode and “DCV Control” is set to enable, a unique economizer minimum position will be calculated based on the output of the DCV calculation. Two user configurable values are provided; the “DCV Max Ctrl Setpoint” is the differential CO<sub>2</sub> setpoint that is used as the control point and a “DCV Max Vent Damper Pos” provides the ability to limit the maximum amount of outdoor air being introduced into the unit through the economizer by the DCV control. The economizer will be positioned at the greater of any minimum economizer position. Demand Controlled Ventilation can be used in either a differential mode where both the indoor air and outdoor air CO<sub>2</sub> levels are provided to the control or it may be used in a single indoor air mode with only the indoor air CO<sub>2</sub> level. In the latter case, the outdoor air CO<sub>2</sub> level is assumed at 400 ppm.

**Mechanical Cooling Cycle –**

The control will operate three stages of mechanical cooling in order to maintain the desired supply air temperature whenever economizer cooling operation is unavailable but cooling is required. This condition will be determined if the OA has high enthalpy or at a temperature above the Economizer Lockout temperature. The two compressors will be staged in a binary fashion so that three stages of cooling are provided. Mechanical cooling stages will be added as required to meet the desired SA setpoint. The number of stages will depend on the return air conditions and the system load (airflow through the coil). Stages will be added

or dropped as required to maintain the setpoint while also maintaining the minimum on time and minimum off time for compressor operation. Anytime the SA falls below the desired SA setpoint, stages will be dropped until only stage 1 is operating. At that point, should the SA fall below 45°F (7°C), the economizer will modulate to increase the amount of outdoor air in order to maintain this minimum SA temperature. Should the economizer reach the maximum OA position and if the SA is still below the minimum SA temperature, the 1st cooling stage will be disabled and the economizer will return to the minimum position.

### Integrated Cooling Cycle -

If economizer cooling operation is insufficient to maintain the desired SA setpoint, mechanical cooling will be activated to supplement the free economizer cooling. This condition will be determined if the OA has low enthalpy but is at a temperature at least 5 deg F above the desired SA setpoint and below the Economizer Lockout temperature. Mechanical cooling stages will be added as required to meet the desired SA setpoint. The number of stages will depend on the return air conditions and the system load (airflow through the coil). Stages will be added or dropped as required to maintain the setpoint while also maintaining the minimum on time and minimum off time for compressor operation. Anytime the SA falls below the desired SA setpoint, stages will be dropped until only stage 1 is operating. At that point, should the SA fall below the minimum SA temperature, the economizer will modulate to increase the amount of return air in order to maintain this minimum SA temperature. Should the economizer reach the minimum OA position and if the SA is still below the minimum SA temperature, the 1st cooling stage will be disabled.

### Economizer Cooling Cycle -

The control will provide the ability to utilize outdoor air for maintaining the supply air setpoint should the outdoor air be suitable. The economizer control will utilize an OAT temperature check, a RAT temperature check if RAT is available or a SPT temperature check comparison and optionally, an OA enthalpy check to determine if OA conditions are suitable for economizing. Economizer operation, if available, will begin whenever cooling is required. The economizer will modulate the position of the OA damper to maintain the desired calculated economizer setpoint. The economizer will be controlled to meet CEC Title 24 requirements so that it will remain open 100% during integrated cooling and only partially close if required.

### Low Ambient Cooling Operation Down to 45°F (7°C) —

In Low Ambient RTU conditions when the temperature is between 55°F (13°C) and 45°F (7°C), the Low Ambient Switch (LAS) will be active and the outdoor-fans will run to the pre-set factory outdoor-fan speed. When the temperature is greater than 65°F (18°C), the Low Ambient Switch will deactivate and the outdoor-fans will run in the standard cooling mode. If the Outdoor Fan Select Switch (see Fig. 50) is in the up position, the outdoor fans will run in the Fan Cycle Speed Mode (FCS) set to 250 rpm. If the Outdoor Fan Select Switch is in the down position, the outdoor fans will run in the Minimum Fan Speed Mode (MIN) set to 160 rpm regardless of the cooling demand.

At temperatures below 45°F (7°C), unit will utilize economizer for SA temperature control.

LC Size 08 through 12 Units have a SPDT Low Ambient Switch wired to the OF terminal and the Outdoor Fan Relay (See Fig. 51). The jumper across the PS terminal will be removed. When the LAS is active, the switch will close making contact to the OF terminal and will drop connection to the ODF Relay. When electrical connection is removed from the ODF Relay, the PS connection will be opened. This will place the third outdoor-fan electrically isolated from receiving any speed command, which will then turn the motor off. This is done for units that only require two outdoor fans to run at the same pre-set factory Low Ambient Speed.

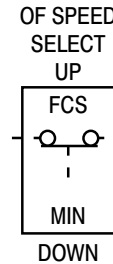


Fig. 50 - Outdoor Fan Speed Select Switch

C13327

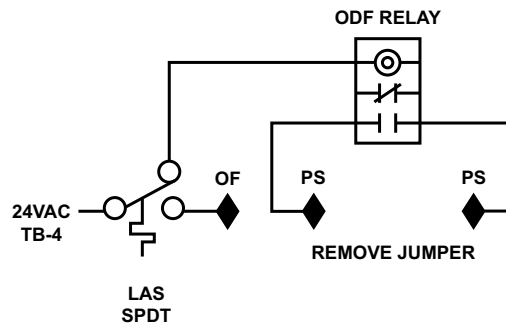


Fig. 51 - Schematic of SPDT Low Ambient Switch

C13703

The Low Ambient Temperature Outdoor Fan Control Table (below) shows the operation of the outdoor fan for size 08, 09 and 12 units.

Table 8 – Low Ambient Temperature Outdoor Fan Control

LC Size	No. of Fans On	No. of Fans Off	Switch	Outdoor Fan Select Switch	RPM
08	2	1	(1) SPDT	Down	160
09	2	1	(1) SPDT	Down	160
12	2	1	(1) SPDT	Down	160

### Heating —

In the Heating Mode (W1 and G), the ISC board sends power to W on the IGC board. The indoor-fan motor will energize and the outdoor-air dampers will open to their minimum position. The ISC board upon seeing W1 and G ON will turn the indoor fan to high speed.

The IGC board starts its gas ignition process. A check is made to ensure that the rollout switch and limit switch are closed. If the check was successful, the induced draft

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motor is energized, and when its speed is satisfactory, as proven by the “hall effect” sensor, the ignition activation period begins. The burners will ignite within 5 seconds. If the burners do not light, there is a 22-second delay before another 5 second attempt. This sequence is repeated for 15 minutes or until the burners light. If, after the 15 minutes, the burners still have not lit, heating is locked out. To reset the control, break 24VAC power to the VAV-RTU Open.

When gas ignition occurs, the IGC board will continue to monitor the condition of the rollout switch, the limit switches, the “hall effect” sensor, as well as the flame sensor.

When W1 is turned OFF, the IGC board turns off the gas valve. The IGC board has a delay time before it turns IFO=OFF. At this time, the ISC board sees W1=OFF and IFO=ON. The ISC will keep the indoor fan ON high speed. Once the IGC board delay times out, the ISC board will see W1=OFF and IFO=OFF, which then turns the indoor fan OFF.

If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. The indoor fan motor will continue to operate for an additional 45 seconds then stop. If the over temperature limit opens after the indoor motor is stopped, but within 10 minutes of W1 becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan OFF delay will not change back to 45 seconds unless power is reset to the control. A LED indicator is provided on the IGC to monitor operation.

When additional heat is required, W2 closes and initiates power to the second stage of the main gas valve. When the zones are satisfied, the gas valve closes, interrupting the flow of gas to the main burners.

### **Morning Warm-up –**

The control will provide a Morning Warm-up cycle the first time if transition from unoccupied to occupied and if the heating is required and the unit goes into heating immediately. Whenever the unit enters the heating mode, before any heat stage is enabled, the control will provide a Linkage mode to the system that will cause the terminals to maintain sufficient airflow. The Linkage mode of Warm-up (2) will be sent to the terminal system to insure sufficient airflow while in the heating mode but also providing a controlled warm-up cycle to prevent overheating of some zones. As a safety measure, should the heating cycle continue and the SAT approach the “Maximum Heating SAT” limit, the Linkage mode sent will change to Pressurization (6) to insure all terminals open to their maximum airflow. The Linkage mode will remain Pressurization until that heating cycle ends. Once the heating demand is met and the heat cycle is completed or if cooling is required, heating will be locked out until the beginning of the next occupied period.

### **Occupied Heating –**

Optionally, the user may enable occupied heating which will allow heating whenever heating is needed during the occupied period. The cycle will operate exactly the same as Morning Warm-up above, except it will not be limited by the transition into an occupied period.

## Variable Air Volume (VAV) with Variable Frequency Drive

The Variable Air Volume (VAV) system utilizes a Variable Frequency Drive (VFD) to modulate supply fan speed using a PID and an analog input from a duct static pressure sensor. The supply fan will adjust to meet the configured static set point regardless of cooling stage. In heating mode the latest VAV Open air terminals offer a minimum airflow setting. This shall be configured to maintain the required airflow (CFM) whenever the RTU is in a heating mode per the unit's specification. The Open VAV terminals will recognize the Heating or Warm-up modes as a heat mode and utilize the higher airflow minimum setpoint as configured. The system will further monitor the SAT of the RTU to determine if the SAT is approaching the configured maximum limit. As the limit is approached, the Linkage mode is changed to Linkage Pressurization to ensure all terminals open to their maximum supply airflow.

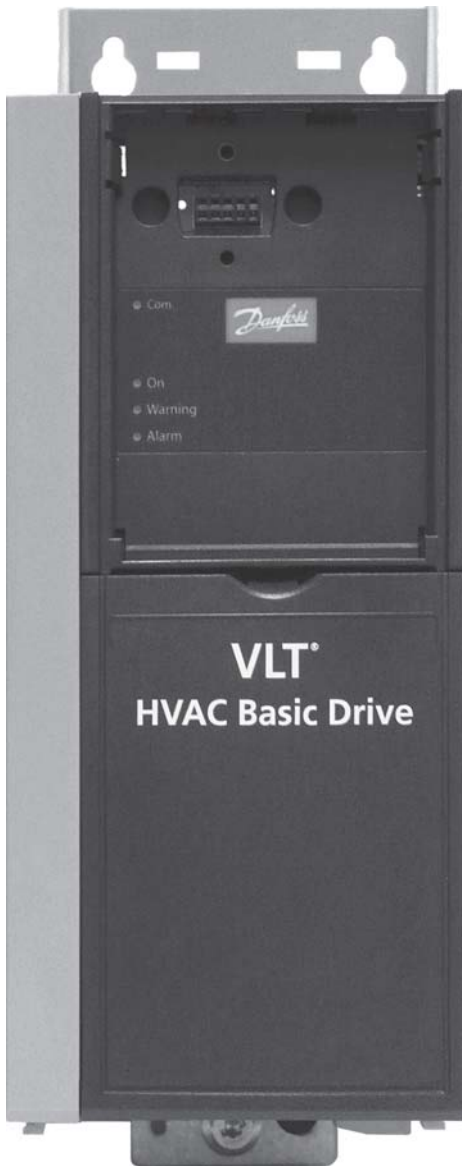
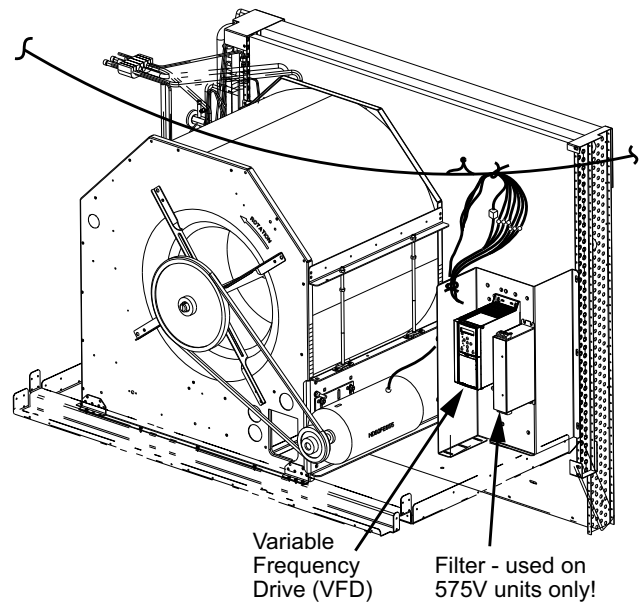


Fig. 52 - Variable Frequency Drive (VFD)

C13110



Variable Frequency Drive (VFD)  
Filter - used on 575V units only!

C13229

Fig. 53 - VFD Location

## Multi-Speed VFD Display Kit (Field-Installed Option)

**NOTE:** The Remote VFD Keypad is part of the Multi-Speed VFD display kit (PN: CRDISKIT002A00) which is a field-installed option. It is not included with 48LC\*B08-12 base units.

The VFD keypad as shown in Fig. 54 consists of the following sections:

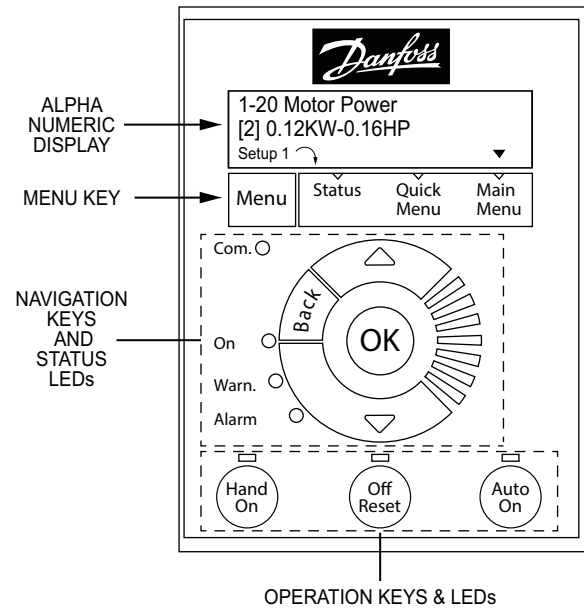
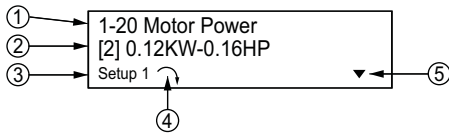


Fig. 54 - VFD Keypad

C13112

**Alpha Numeric Display:** The LCD display is back lit with 2 alpha-numeric lines. All data is displayed on the LCD.



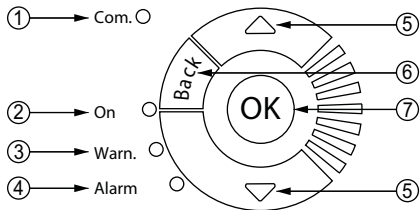
C13113

1	Parameter number and name.
2	Parameter value.
3	Setup number shows the active setup and the edit setup. If the same set-up acts as both the active and edit set-up, only that setup number is shown (factory setting). When the active and edit setup differ, both numbers are shown in the display (SETUP 12). The flashing number indicates the edit setup.
4	The symbol in the number 4 position in the figure above indicates motor direction. The arrow point either clockwise or counter-clockwise to show the motor's current direction.
5	The position of the triangle indicates the currently selected menu: Status, Quick Menu or Main Menu.

48LC\*B

**Menu Key:** Use the Menu key to select between Status, Quick Menu or Main Menu. The triangle icon at the bottom of the LCD display indicates the currently selected mode. (See number 5 in the table above.)

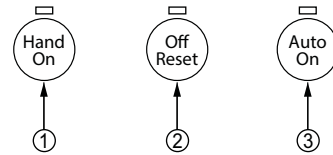
**Navigation Keys and Status LEDs:** The Navigation keys and Status LEDs are detailed in the following table.



C13114

1	<b>Com. LED:</b> Flashes when bus communications is communicating.
2	<b>Green LED/On:</b> Control selection is working.
3	<b>Yellow LED/Warn.:</b> Indicates a warning.
4	<b>Flashing Red LED/Alarm:</b> Indicates an alarm.
5	<b>Arrows ▲▼:</b> Use the Up and Down arrow keys to navigate between parameter groups, parameters and within parameters. Also used for setting local reference.
6	<b>Back key:</b> Press to move to the previous step or layer in the navigation structure.
7	<b>OK key:</b> Press to select the currently displayed parameter and for accepting changes to parameter settings.

**Operation Keys and LEDs:** The following table details the functions of the Operating keys. An illuminated yellow LED above the key indicates the active key.



C13115

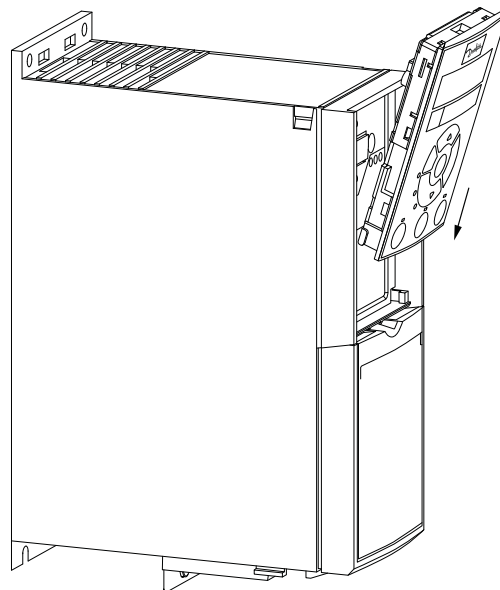
1	<b>Hand On key:</b> Starts the motor and enables control of the variable frequency drive (VFD) via the VFD Keypad option. <b>NOTE:</b> Please note that terminal 27 Digital Input (5-12 Terminal 27 Digital Input) has coast inverse as default setting. This means that the Hand On key will not start the motor if there is no 24V to terminal 27, so be sure to connect terminal 12 to terminal 27.
2	<b>Off/Reset key:</b> Stops the motor (off). If in alarm mode the alarm will be reset.
3	<b>Auto On key:</b> The variable frequency drive is controlled either via control terminals or serial communication.

**Connecting the Keypad to the VFD**

The VFD keypad can be mounted directly to the variable frequency drive, provided you can easily access the front panel of the VFD. If you don't have easy access to the VFD front panel, use the cable included with the kit to connect the keypad to the VFD.

**Connecting the Keypad Directly to the VFD —**

1. Place the bottom of the VFD keypad into the variable frequency drive as shown in Fig. 55.



C13116

**Fig. 55 - Align Bottom of VFD Keypad with Opening in VFD Front Panel**

2. Push the top of the VFD keypad into the variable frequency drive as shown in Fig. 56.

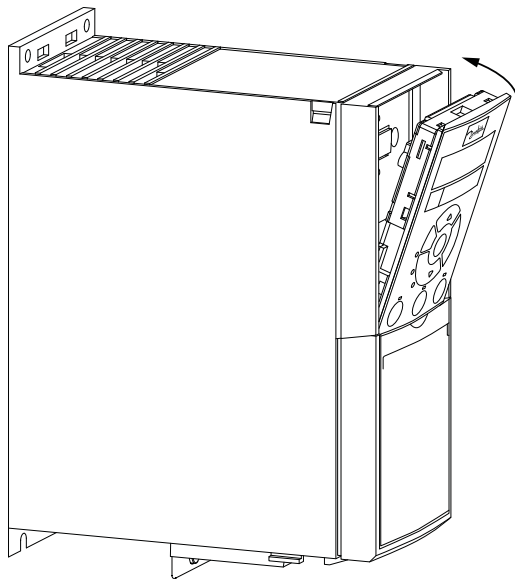
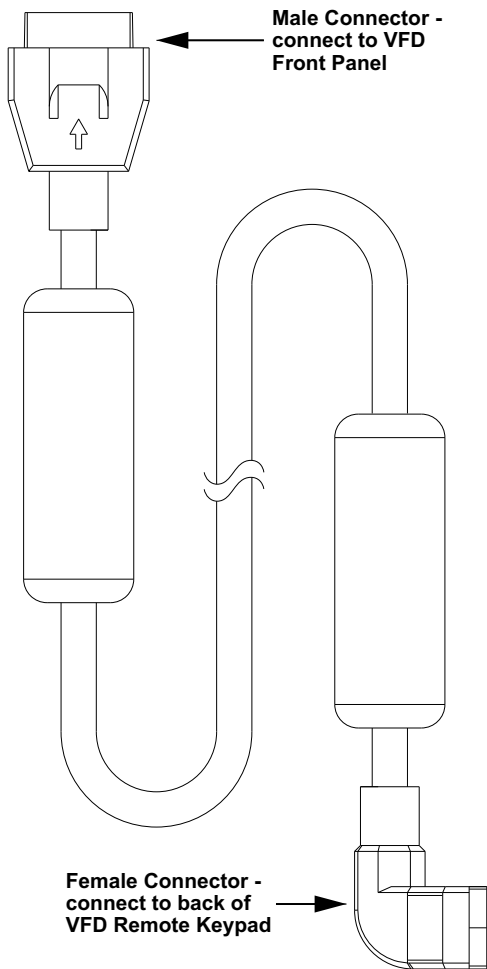


Fig. 56 - Secure Keypad in Place

C13117

**Using the Cable to Connect the Keypad to the VFD —**

The VFD keypad can be connected to the variable frequency drive via the cable included with the Multi-Speed VFD display kit (PN: CRDISKIT002A00).



Female Connector - connect to back of VFD Remote Keypad

Fig. 57 - VFD Remote Keypad Cable

C13118

1. Connect the male end of the cable to the front panel of the variable frequency drive. Use 2 of the screws included with the kit to secure the cable to the VFD.
2. Connect the female end of the cable to the back panel of the VFD Remote keypad. Secure the cable to the remote keypad using the 2 remaining screws from the kit.

**Program the VFD for Indoor Fan Control**

**IMPORTANT:** 48LC\*B08-12 units are programmed at the Factory for variable indoor fan speeds. The following procedure is only to be used to recover this function after an event such as a system crash.

**NOTE:** This procedure requires use of the VFD Keypad which is included as part of the field-installed Multi-Speed VFD display kit (PN: CRDISKIT002A00). If the VFD keypad is not already installed, install it. See “Connecting the Keypad to the VFD” for details.

**To program the VFD for variable indoor fan motor speeds:**

1. At Power-Up:  
At the first power up the LCD displays the Select Language screen. The default setting is English. To change the language, press the **OK** key and use the **▲** and **▼** keys to scroll to the desired language and then press **OK**.

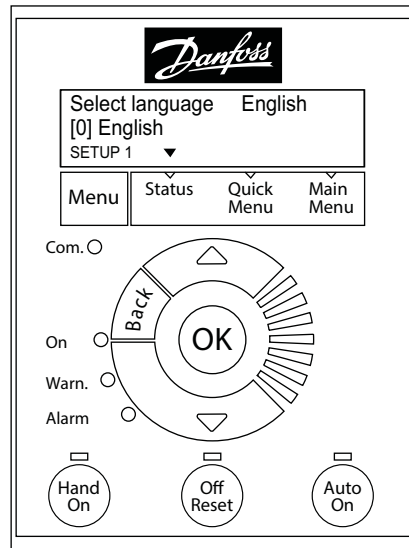


Fig. 58 - Keypad with Power Up Screen Displayed

C13119

2. Selecting Regional Settings:
  - a. Press the **Off Reset** key.
  - b. Press the **Menu** key to move the ▼(triangle icon) so it is positioned over Main Menu. The display show the following -

0 - ** Operation / Display
1 - ** Load and Motor

- c. Press the **OK** key, the display changes to -

0 - 0* Basic Settings
0 - 1* Set-up Operations

48LC\*B

- d. With the top row highlighted, press **OK**. The display changes to -

0-01 Language
[0] English

**NOTE:** If English is not the desired language press **OK**, select the desired language and press **OK** again.

- e. Press **▼(Down Arrow)** key once; the display changes to -

0-03 Regional Settings
[0] International

- f. Press **OK**; the [0] is now highlighted.

- g. Press **▼(Down Arrow)** key once; the display changes to -

0-03 Regional Settings
[1] North America

- h. Press **OK**

**NOTE:** If the Alarm 060 appears, follow Step 3 to clear the alarm. Make sure to press **Off Reset** when done. If there is no alarm, continue at Step 4.

### 3. Clearing Alarm 060: External Interlock:

- a. Press the **Menu** key twice to position the **▼**(triangle icon) over Main Menu; the display changes to -

0- ** Operation / Display
1- ** Load and Motor

- b. Press the **▼(Down Arrow)** key until the following display appears -

4- ** Limits / Warnings
5- ** Digital In/Out

- c. Press **OK**. The display changes to -

5-0* Digital I/O mode
5-1* Digital Inputs

- d. Press **▼(Down Arrow)** once to highlight the bottom row and press **OK**. The display changes to -

5-10 Terminal 18 Digital In...
[8] Start

- e. Press **▼(Down Arrow)** twice; the following display appears-

5-12 Terminal 27 Digital In...
[7] External Interlock

- f. Press **OK** to highlight the number in the bracket.

- g. Press **▼(Down Arrow)** until the following display appears -

5-12 Terminal 27 Digital In...
[0] No operation

- h. Press **OK**.

- i. Press **Off Reset**. The Alarm indicator disappears.

### 4. Entering Grid Type:

- a. Press the **Menu** key to move the **▼**(triangle icon) so it is positioned over Main Menu. The display show the following -

0-0* Basic Settings
0-1* Set-up Operations

- b. Press **OK** twice: the display changes to -

0-01 Language
[0] English

- c. Press **▼(Down Arrow)** three times, to reach the following display -

0-06 Grid Type
[102] 200-240V/60Hz

- d. Press **OK** to highlight the number in the bracket and then use the **▲** and **▼ (Up and Down Arrow)** keys to select the desired voltage and Hertz for the unit.

- e. Press **OK** to accept the selection and continue.

### 5. Entering Motor Data:

- a. Press the **Menu** key to move the **▼**(triangle icon) so it is positioned over Main Menu. The display show the following -

0- ** Operation / Display
1- ** Load and Motor

- b. Press **▼(Down Arrow)** once to highlight the bottom row.

- c. Press **OK**, the display changes to -

1-0* General Settings
1-1* Motor Selection

- d. Press **▼(Down Arrow)** twice to reach the following display -

1-1* Motor Selection
1-2* Motor Data

- e. Press **OK**, the following display appears -

1-20 Motor Power
[9] 1.5kW - 2 hp

**NOTE:** The number in the bracket may be different from what is shown above.

- f. Press **OK** and then use the **▲** and **▼ (Up and Down Arrow)** keys to scroll to the proper motor horsepower. Press **OK** again to set the selected hp.
- g. Press **▼(Down Arrow)** once, the following display appears -

1-22 Motor Voltage
230V

- h. Press **OK** to highlight the voltage value. Use the **▲** and **▼ (Up and Down Arrow)** keys to select the nameplate voltage. Press **OK** again to set the selected voltage.



- i. Press ▼(Down Arrow) once to display the following -

1-23 Motor Frequency
60Hz

- j. Press OK to highlight the Frequency value and then use the ▲ and ▼ (Up and Down Arrow) keys to select the nameplate Hz. Press OK again to set the selected Hz.

- k. Press ▼(Down Arrow) once to display the following -

1-24 Motor Current
6.61A

- l. Press OK to highlight the Current value and then use the ▲ and ▼ (Up and Down Arrow) keys to select the Max Amps value provided. Press OK again to set the selected Max Amps.

**NOTE:** Max Amps is greater than the nameplate value. Check the VFD Unit Parameters (see Tables 9 - 11 on pages 41 - 43) and use the value listed for the given unit in the column labeled “Motor Current Must-Hold Amps”.

- m. Press ▼(Down Arrow) once to display the following -

1-25 Motor Nominal Speed
1740rpm

- n. Press OK to highlight the rpm value and then use the ▲ and ▼ (Up and Down Arrow) keys to select the nameplate rpm. Press OK again to set the selected rpm.

6. Entering Parameters for 1-71, 1-73, 1-82, and 1-90:

- a. Press the Menu key to move the ▼(triangle icon) so it is positioned over Main Menu. The display show the following -

0 - ** Operation / Display
1 - ** Load and Motor

- b. Press ▼(Down Arrow) once to highlight the bottom row.

- c. Press OK, the display changes to -

1 - 0* General Settings
1 - 1* Motor Selection

- d. Press ▼(Down Arrow) until the following display appears -

1 - 6* Load Depen. Setting
1 - 7* Start Adjustments

- e. Press OK, the following display appears -

1-71 Start Delay
2.0s

- f. Press OK to highlight the number and then use the ▲ and ▼ (Up and Down Arrow) keys to select the number provided in Tables 9 - 11. Press OK again to set the selected value.

- g. Press ▼(Down Arrow) twice, the following display appears -

1-73 Flying Start
[1] Enabled

- h. Press OK to highlight the number in the bracket and then use the ▲ and ▼ (Up and Down Arrow) keys to select the number provided in Tables 9 - 11. Press OK again to set the selected value.

- i. Press the Back key once, the following display appears -

1 - 6* Load Depen. Setting
1 - 7* Start Adjustments

- j. Press ▼(Down Arrow) once, the following display appears -

1 - 7* Start Adjustments
1 - 8* Stop Adjustments

- k. Press OK, the following display appears -

1-80 Function at Stop
[0] Coast

- l. Press ▼(Down Arrow) once, the following display appears -

1-82 Min Speed for Functio...
1.0 Hz

- m. Press OK to highlight the number and then use the ▲ and ▼ (Up and Down Arrow) keys to select the number provided in Tables 9 - 11. Press OK again to set the selected value.

- n. Press the Back key once, the following display appears -

1 - 7* Start Adjustments
1 - 8* Stop Adjustments

- o. Press ▼(Down Arrow) once, the following display appears -

1 - 8* Stop Adjustments
1 - 9* Motor Temperature

- p. Press OK, the following display appears -

1-90 Motor Thermal Prote...
[4] ETR trip 1

- q. Press OK to highlight the number in the bracket then use the ▲ and ▼ (Up and Down Arrow) keys to select the number provided in Tables 9 - 11. Press OK again to set the selected value.

7. Setting References:

- a. Press the Menu key to move the ▼(triangle icon) so it is positioned over Main Menu. The display show the following -

0 - ** Operation / Display
1 - ** Load and Motor

- b. Press **▼(Down Arrow)** three times, the following display appears -

2- ** Brakes
3- ** Reference / Ramps

- c. Press **OK**, the following display appears -

3-0* Reference Limits
3-1* References

- d. Press **OK** again, the following display appears -

3-02 Minimum Reference
0.000

**NOTE:** If the bottom row displays a number other than 0.000, press **OK** and use the **▲** and **▼ (Up and Down Arrow)** key to select 0.000.

- e. Press **▼(Down Arrow)** once, the following display appears -

3-03 Maximum Reference
60.000

**NOTE:** If the bottom row displays a number other than 60.000, press **OK** and use the **▲** and **▼ (Up and Down Arrow)** keys to select 60.000.

- f. Press the **Back** key until the following display appears -

3-0* Reference Limits
3-1* References

- g. Press **▼(Down Arrow)** once to move the highlight to the bottom row and then press **OK**. The following display appears -

3-10 Preset Reference
[0]0.00%

- h. Press **OK** once to highlight the number in the bracket. Press **OK** again; the highlight moves to the current percent value.

Use the **▲** and **▼ (Up and Down Arrow)** keys and the following table to enter the required Preset Reference values.

[0]0.00%	Stop
[1]LL.LL%	Low Speed (see Tables 9 – 11, column labeled “Preset References 3–10[1] for the proper % for each unit)
[2]MM.MM%	Medium Speed (see Tables 9 – 11, column labeled “Preset References 3–10[2]” for the proper % for each unit)
[3]100%	Override (High Speed)
[4]100%	High Speed (100% or close to 100% to achieve the required CFM at high speed)
[5]0.00%	Stop
[6]0.00%	Stop
[7]0.00%	Stop

8. Setting the Ramp Time:

- a. Press the **Back** key until the following display appears -

3-0* Reference Limits
3-1* References

- b. Press **▼(Down Arrow)** twice, the following display appears -

3-1* References
3-4* Ramp 1

- c. Press **OK**, the following display appears -

3-41 Ramp 1 Ramp up Time
3.00s

- d. Press **OK** again to highlight the bottom row and use the **▲** and **▼ (Up and Down Arrow)** keys to select 10.00s. Press **OK** again to set the selected Ramp up Time.

- e. Press **▼(Down Arrow)** once, the following display appears -

3-42 Ramp 1 Ramp Down Time
3.00s

- f. Press **OK** again to highlight the bottom row and use the **▲** and **▼ (Up and Down Arrow)** keys to select 10.00s. Press **OK** again to set the selected Ramp Down Time.

9. Setting Limits:

- a. Press the **Back** key until the following display appears -

2- ** Brakes
3- ** Reference / Ramps

- b. Press **▼(Down Arrow)** once, the following display appears -

3- ** Reference / Ramps
4- ** Limits / Warnings

- c. Press **OK**, the following display appears -

4-1* Motor Limits
4-4* Adj. Warning 2

- d. Press **OK** again, the following display appears -

4-10 Motor Speed Direction
[2] Both Directions

- e. Press **▼(Down Arrow)** once, the following display appears -

4-12 Motor Speed Low Limi...
0.0Hz

- f. Press **▼(Down Arrow)** again, the following display appears -

4-14 Motor Speed High Limi...
65.0Hz

**NOTE:** Press **OK** to highlight the Hz value and then use the **▲** and **▼** (**Up** and **Down Arrow**) keys to enter the required values.

- g. Press **▼**(**Down Arrow**) once, the following display appears -

4-18 Current Limit
110%

**NOTE:** Press **OK** to highlight the % value and then use the **▲** and **▼** (**Up** and **Down Arrow**) keys to enter the required value. See Tables 9 - 11 for proper selection of the value for this parameter then press **OK** to set the selected value.

- h. Press **▼**(**Down Arrow**) once, the following display appears -

4-19 Max Output Frequency
65.0Hz

**NOTE:** Press **OK** to highlight the Hz value and then use the **▲** and **▼** (**Up** and **Down Arrow**) keys to enter the required values.

#### 10. Setting Digital Inputs:

- a. Press the **Back** key until the following display appears -

3- ** Reference / Ramps
4- ** Limits / Warnings

- b. Press **▼**(**Down Arrow**) once, the following display appears -

4- ** Limits / Warnings
5- ** Digital In/Out

- c. Press **OK**, the following display appears -

5- 0* Digital I/O mode
5- 1* Digital Inputs

- d. Press **▼**(**Down Arrow**) once to move the highlight to the bottom row and then press **OK**. The following display appears -

5-10 Terminal 18 Digital In...
[8] Start

- e. Press **▼**(**Down Arrow**) again. The following display appears -

5-11 Terminal 19 Digital In...
[16] Preset ref bit 0

- f. Press **▼**(**Down Arrow**) again. The following display appears -

5-12 Terminal 27 Digital In...
[17] Preset ref bit 1

- g. Press **▼**(**Down Arrow**) again. The following display appears -

5-13 Terminal 29 Digital In...
[18] Preset ref bit 2

**NOTE:** By pressing **OK** the number in the bracket can be changed until the desired number appears. Press **OK** again to set the selected value.

#### 11. Setting Analog Inputs:

- a. Press the **Back** key until the following display appears -

4- ** Limits / Warnings
5- ** Digital In/Out

- b. Press **▼**(**Down Arrow**) until the following display appears -

5- ** Digital In/Out
6- ** Analog In/Out

- c. Press **OK**, the following display appears -

6- ** Analog In/Out
6- 1* Analog Input 53

- d. Press **▼**(**Down Arrow**) once to move the highlight to the bottom row and then press **OK**. The following display appears -

6-10 Terminal 53 Low Voltage
2V

- e. Press **▼**(**Down Arrow**) once to move the highlight to the bottom row and then press **OK**. The following display appears -

6-11 Terminal 53 High Voltage
[10V]

- f. Press **▼**(**Down Arrow**) once to move the highlight to the bottom row and then press **OK**. The following display appears -

6-14 Set Min Reference
[0 Hz]

- g. Press **▼**(**Down Arrow**) once to move the highlight to the bottom row and then press **OK**. The following display appears -

6-15 Set Max Reference
[60 Hz]

#### 12. Setting Reset Mode and RFI Filter:

- a. Press the **Back** key until the following display appears -

0- ** Operation / Display
1- ** Load and Motor

- b. Press **▼**(**Down Arrow**) until the following display appears -

13- ** Smart Logic
14- ** Special Functions

- c. Press **OK**, the following display appears -

14- 0* Inverter Switching
14- 1* Mains On/Off

- d. Press **▼(Down Arrow)** twice. The following display appears -

14-1* Mains On/Off
14-2* Reset Functions

- e. Press **OK**, the following display appears -

14-20 Reset Mode
[0] Manual reset

- f. Press **OK** to highlight the number in the bracket.

- g. Use the **▲** and **▼ (Up and Down Arrow)** keys to change the number to 3 for 3 automatic resets and then press **OK**. The display changes to -

14-20 Reset Mode
[3] Automatic reset x 3

- h. Press **▼(Down Arrow)** once, the following display appears -

14-21 Automatic Restart T...
10s

- i. Press **OK** to highlight the number of seconds and use the **▲** and **▼ (Up and Down Arrow)** keys to select 600 seconds. Press **OK** again to set the selected value.

- j. Press the **Back** key once, the following display appears -

14-1* Mains On/Off
14-2* Reset Functions

- k. Press **▼(Down Arrow)** twice, the following display appears -

14-4* Energy Optimising
14-5* Environment

- l. Press **OK**, the following display appears -

14-50 RFI Filter
[1] On

- m. Press **OK** to highlight the number in the bracket and use the **▲** and **▼ (Up and Down Arrow)** keys to select [0]. Press **OK** again to set the selected value.

### 13. To Complete Reprogramming:

- a. Press the **Auto On** key before disconnecting the VFD Remote Keypad from the variable frequency drive.

**Table 9 – VFD Unit Parameters – 48LC\*B08 Units**

Voltage	Unit Size	Motor Option	Regional Settings		Grid Type	Motor Power	Motor Voltage	Motor Frequency (Hz)	Motor Current (Must-Hold Amps)	Motor Nominal Speed (rpm)	Star Delay (Sec)	Flying Start	Min Speed for Function (Hz)	Motor Thermal Protection	Preset Reference		
			0-03	VFD Mfr P/N											0-06	1-20	1-22
208/230V	08	STD	[1]	131L9795	[102]	[9]	230	60	5.8	1695	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
460V	08	STD	[1]	131L9863	[122]	[9]	460	60	2.9	1690	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
575V	08	STD	[1]	131N0225	[132]	[9]	575	60	3.1	1690	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
208/230V	08	MID	[1]	131L9796	[102]	[10]	230	60	7.9	1690	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
460V	08	MID	[1]	131L9864	[122]	[10]	460	60	3.6	1690	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
575V	08	MID	[1]	131N0225	[132]	[11]	575	60	3.8	1690	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
208/230V	08	HIGH	[1]	131L9797	[102]	[11]	230	60	11.7	1750	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
460V	08	HIGH	[1]	131L9865	[122]	[11]	460	60	5.4	1750	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
575V	08	HIGH	[1]	131N0227	[132]	[11]	575	60	4.9	1710	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
208/230V	08	ULTRA	[1]	131L9797	[102]	[13]	230	60	13.6	1745	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
460V	08	ULTRA	[1]	131L9866	[122]	[13]	460	60	6.8	1745	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
575V	08	ULTRA	[1]	134F0217	[132]	[13]	575	60	6.0	1745	2.0	[1]	1.0	[4]	0%	66.50%	66.50%

Voltage	Unit Size	Motor Option	Preset Reference (cont.)							Ramp Up Time (Sec)	Ramp Down Time (Sec)	Current Limit	Terminal 18 Digital Input	Terminal 19 Digital Input	Terminal 27 Digital Input	Terminal 29 Digital Input	Terminal 53 Low Voltage	Terminal 53 High Voltage	Terminal 53 Low Reference	Terminal 53 High Reference	Reset Mode	Auto. Restart Time (S)	RFI Filter
			3-10 [3]	3-10 [4]	3-10 [5]	3-10 [6]	3-10 [7]	3-41	3-42														
208/230V	08	STD	100%	100%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]		
460V	08	STD	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
575V	08	STD	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
208/230V	08	MID	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
460V	08	MID	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
575V	08	MID	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
208/230V	08	HIGH	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
460V	08	HIGH	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
575V	08	HIGH	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
208/230V	08	ULTRA	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
460V	08	ULTRA	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
575V	08	ULTRA	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			

**48LC\*B**

Table 10 – VFD Unit Parameters – 48LC\*B09 Units

Voltage	Unit Size	Motor Option	Regional Settings		Grid Type	Motor Power	Motor Voltage	Motor Frequency (Hz)	Motor Current (Must-Hold Amps)	Motor Nominal Speed (rpm)	Star Delay (Sec)	Flying Start	Min Speed for Function (Hz)	Motor Thermal Protection	Preset Reference		
			VFD Mfr P/N	VFD Carrier P/N											Motor P/N	3-10 [0]	3-10 [1]
208/230V	09	STD	[1]	[102]	0-06	1-20	1-22	1-23	1-24	1-25	1-71	1-73	1-82	1-90	3-10 [0]	3-10 [1]	3-10 [2]
460V	09	STD	[1]	[122]	[102]	[9]	230	60	5.8	1695	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
575V	09	STD	[1]	[132]	[102]	[9]	460	60	2.9	1690	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
208/230V	09	MID	[1]	[102]	[102]	[10]	230	60	7.9	1690	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
460V	09	MID	[1]	[122]	[102]	[10]	460	60	3.6	1690	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
575V	09	MID	[1]	[132]	[102]	[11]	575	60	3.8	1690	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
208/230V	09	HIGH	[1]	[102]	[102]	[11]	230	60	11.7	1750	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
460V	09	HIGH	[1]	[122]	[102]	[11]	460	60	5.4	1750	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
575V	09	HIGH	[1]	[132]	[102]	[11]	575	60	4.9	1710	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
208/230V	09	ULTRA	[1]	[102]	[102]	[13]	230	60	13.6	1745	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
460V	09	ULTRA	[1]	[122]	[102]	[13]	460	60	6.8	1745	2.0	[1]	1.0	[4]	0%	66.50%	66.50%
575V	09	ULTRA	[1]	[132]	[102]	[13]	575	60	6.0	1745	2.0	[1]	1.0	[4]	0%	66.50%	66.50%

Voltage	Unit Size	Motor Option	Preset Reference (cont.)							Terminal 53 High Voltage	Terminal 53 Low Voltage	Terminal 53 High Reference	Terminal 53 Low Reference	Reset Mode	Auto. Restart Time (S)	RFI Filter						
			3-10 [3]	3-10 [4]	3-10 [5]	3-10 [6]	3-10 [7]	Ramp Up Time (Sec)	Ramp Down Time (Sec)								Current Limit	Terminal 18 Digital Input	Terminal 19 Digital Input	Terminal 27 Digital Input	Terminal 29 Digital Input	
208/230V	09	STD	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]
460V	09	STD	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]
575V	09	STD	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]
208/230V	09	MID	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]
460V	09	MID	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]
575V	09	MID	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]
208/230V	09	HIGH	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]
460V	09	HIGH	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]
575V	09	HIGH	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]
208/230V	09	ULTRA	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]
460V	09	ULTRA	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]
575V	09	ULTRA	100%	100%	0%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]

**Table 11 – VFD Unit Parameters – 48LC\*B12 Units**

Voltage	Regional Settings			Motor				Grid Type	Motor Power	Motor Voltage	Motor Frequency (Hz)	Motor Current (Must-Hold Amps)	Motor Nominal Speed (rpm)	Star Delay (Sec)	Flying Start	Min Speed for Function (Hz)	Motor Thermal Protection	Preset Reference		
	Unit Size	Motor Option	VFD Carrier P/N	VFD Mir P/N	0-03	0-06	1-20											1-22	1-23	1-24
208/230V	12	STD	HK30WA371	131L9796	[1]	[102]	[10]	230	60	7.9	1680	2.0	[1]	1.0	[4]	0%	66.50%	66.50%		
460V	12	STD	HK30WA377	131L9864	[1]	[122]	[10]	460	60	3.6	1680	2.0	[1]	1.0	[4]	0%	66.50%	66.50%		
575V	12	STD	HK30WA382	131N0225	[1]	[132]	[11]	575	60	3.8	1680	2.0	[1]	1.0	[4]	0%	66.50%	66.50%		
208/230V	12	MID	HK30WA372	131L9797	[1]	[102]	[11]	230	60	11.7	1750	2.0	[1]	1.0	[4]	0%	66.50%	66.50%		
460V	12	MID	HK30WA378	131L9865	[1]	[122]	[11]	460	60	5.4	1750	2.0	[1]	1.0	[4]	0%	66.50%	66.50%		
575V	12	MID	HK30WA383	131N0227	[1]	[132]	[11]	575	60	4.9	1710	2.0	[1]	1.0	[4]	0%	66.50%	66.50%		
208/230V	12	HIGH	HK30WA372	131L9797	[1]	[102]	[13]	230	60	13.6	1745	2.0	[1]	1.0	[4]	0%	66.50%	66.50%		
460V	12	HIGH	HK30WA379	131L9866	[1]	[122]	[13]	460	60	6.8	1745	2.0	[1]	1.0	[4]	0%	66.50%	66.50%		
575V	12	HIGH	HK30WA387	134F0217	[1]	[132]	[13]	575	60	6.0	1745	2.0	[1]	1.0	[4]	0%	66.50%	66.50%		

Voltage	Unit Size	Motor Option	Preset Reference (cont.)							Ramp Up Time (Sec)	Ramp Down Time (Sec)	Current Limit	Terminal 18 Digital Input	Terminal 19 Digital Input	Terminal 27 Digital Input	Terminal 29 Digital Input	Terminal 53 Low Voltage	Terminal 53 High Voltage	Terminal 53 Low Reference	Terminal 53 High Reference	Reset Mode	Auto. Restart Time (S)	RFI Filter
			3-10 [3]	3-10 [4]	3-10 [5]	3-10 [6]	3-10 [7]	3-41	3-42														
208/230V	12	STD	100%	100%	0%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]		
460V	12	STD	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
575V	12	STD	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
208/230V	12	MID	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
460V	12	MID	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
575V	12	MID	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
208/230V	12	HIGH	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
460V	12	HIGH	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			
575V	12	HIGH	100%	100%	0%	0%	10.00	10.00	100%	[8]	[16]	[17]	[18]	2	[10]	0	[60]	[3]	600	[0]			



Table 12 – Unit Wire/Fuse or HACR Breaker Sizing Data

48LC*B UNIT	NOM. V-Ph-Hz	IFM TYPE	NO C.O. or UNPWR C.O.						w/ PWRD C.O.									
			NO PE.			w/ P.E. (pwrd fr/ unit)			NO PE.			w/ P.E. (pwrd fr/ unit)						
			MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA	MCA	MAX FUSE or HACR BRKR	DISC. SIZE FLA LRA				
08	208/ 230-3-60	STD	42/42	50/50	44/44	200	46/46	48/48	204	47/47	60/50	49/49	205	51/50	60/60	54/53	209	
		MED	43/43	50/50	45/45	204	47/47	50/49	208	48/48	60/60	51/50	209	52/52	60/60	55/55	213	
		HIGH	47/46	60/50	50/48	254	51/50	54/53	258	52/51	60/60	55/54	259	56/55	60/60	59/58	263	
		ULTRA	50/49	60/60	53/52	265	54/53	57/56	269	55/54	60/60	58/57	270	58/57	70/70	63/62	274	
	460-3-60	STD	23	25	24	102	24	104	26	104	30	26	104	104	27	30	28	106
		MED	23	25	25	104	25	104	27	106	30	27	106	106	27	30	29	108
		HIGH	25	30	26	130	26	130	28	132	30	28	132	132	29	30	30	134
		ULTRA	26	30	28	135	28	135	30	137	30	30	137	137	30	35	32	139
575-3-60	STD	19	20	20	78	23	82	24	82	25	24	82	82	24	30	26	84	
	MED	20	25	21	82	23	86	25	86	25	25	86	84	25	30	27	88	
	HIGH	21	25	22	91	24	95	26	95	30	26	93	93	26	30	28	97	
	ULTRA	23	25	24	105	26	109	28	109	30	28	107	107	28	30	30	111	
09	208/ 230-3-60	STD	45/45	60/50	46/46	227	49/48	51/50	231	50/49	60/60	52/52	232	53/53	60/60	56/56	236	
		MED	46/46	60/60	48/47	231	50/50	52/52	235	51/51	60/60	53/53	236	55/54	60/60	58/57	240	
		HIGH	50/49	60/60	52/51	281	54/53	56/55	285	55/54	60/60	58/56	286	58/57	70/70	62/61	290	
		ULTRA	53/52	60/60	55/54	292	56/55	60/59	296	57/56	70/60	61/60	297	61/60	70/70	65/64	301	
	460-3-60	STD	24	30	25	113	26	115	27	115	30	27	115	115	28	30	30	117
		MED	25	30	26	115	27	117	28	117	30	28	117	117	29	35	31	119
		HIGH	26	30	28	141	28	143	30	143	30	29	143	143	30	35	32	145
		ULTRA	28	30	29	146	30	148	31	148	35	30	148	148	32	35	34	150
575-3-60	STD	20	25	21	84	24	88	25	88	25	25	88	86	25	30	27	90	
	MED	21	25	22	88	24	92	26	92	30	26	92	90	26	30	28	94	
	HIGH	22	25	23	97	25	101	27	101	30	27	101	99	27	30	29	103	
	ULTRA	24	25	25	111	27	115	29	115	30	29	113	113	29	35	31	117	
12	208/ 230-3-60	STD	51/50	60/60	52/52	252	54/54	56/56	256	55/55	60/60	58/57	257	59/59	70/70	62/62	261	
		MED	54/53	60/60	56/55	302	58/57	61/59	306	59/58	70/70	62/61	307	63/62	80/80	66/65	311	
		HIGH	57/56	70/70	59/58	313	61/60	64/63	317	62/61	80/80	65/64	318	66/65	80/80	69/68	322	
		ULTRA	26	30	27	126	28	128	29	128	30	29	128	128	30	35	32	130
	460-3-60	STD	27	30	28	152	29	154	30	154	35	30	154	154	31	35	33	156
		MED	27	30	30	157	30	159	32	159	35	32	159	159	33	40	35	161
		HIGH	29	35	30	171	30	171	32	171	35	32	171	171	33	40	35	161
		ULTRA	22	25	23	107	26	111	27	111	25	25	109	109	28	30	29	113
575-3-60	STD	23	25	24	116	27	120	28	120	30	28	118	118	29	30	30	122	
	MED	23	25	24	116	27	120	28	120	30	28	118	118	29	30	30	122	
	HIGH	25	30	26	130	29	134	30	134	30	28	132	132	30	35	32	136	
	ULTRA	25	30	26	130	29	134	30	134	30	28	132	132	30	35	32	136	

See "Legend and Notes for Tables 12 and 13" on page 46.



**Table 13 – Unit Wire Sizing Data with Factory Installed HACR Breaker**

48LC*B UNIT	NOM. V-Ph-Hz	IFM TYPE	NO C.O. or UNPWR C.O.												w/ PWRD C.O.												
			NO PE.						w/ P.E. (pwrd fr/ unit)						NO PE.						w/ P.E. (pwrd fr/ unit)						
			MCA	HACR BRKR	FLA	DISC. SIZE		LRA	MCA	HACR BRKR	FLA	DISC. SIZE		LRA	MCA	HACR BRKR	FLA	DISC. SIZE		LRA	MCA	HACR BRKR	FLA	DISC. SIZE		LRA	
08	208/ 230-3-60	STD	42/42	50/50	44/44	200	46/46	50/50	48/48	204	47/47	60/60	49/49	205	51/51	60/60	54/53	209	51/51	60/60	54/53	209	51/51	60/60	54/53	209	
		MED	43/43	50/50	45/45	204	47/47	60/60	50/49	208	48/48	60/60	51/50	209	52/52	60/60	55/55	213	52/52	60/60	55/55	213	52/52	60/60	55/55	213	
		HIGH	47/47	60/60	50/48	254	51/51	60/60	54/53	258	52/52	60/60	55/54	259	56/56	60/60	59/58	263	56/56	60/60	59/58	263	56/56	60/60	59/58	263	
		ULTRA	50/50	60/60	53/52	265	54/54	60/60	57/56	269	55/55	60/60	58/57	270	58/58	70/70	63/62	274	58/58	70/70	63/62	274	58/58	70/70	63/62	274	
	460-3-60	STD	23	25	24	102	24	30	26	104	25	30	26	104	27	30	26	106	106	27	30	26	104	27	30	26	106
		MED	23	25	25	104	25	30	27	106	26	30	27	106	27	30	27	106	108	27	30	27	106	27	30	27	108
		HIGH	25	30	26	130	26	30	28	132	27	30	28	132	29	30	28	132	134	29	30	28	132	29	30	28	134
		ULTRA	26	30	28	135	28	30	30	137	28	30	30	137	28	30	30	137	139	28	30	30	137	28	30	30	139
	575-3-60	STD	19	20	20	78	23	25	24	82	21	25	24	82	21	25	24	82	84	21	25	24	82	21	25	24	84
		MED	20	25	21	82	23	25	25	86	21	25	25	86	21	25	25	86	88	21	25	25	86	21	25	25	88
		HIGH	21	25	22	91	24	30	26	95	22	30	26	95	22	30	26	95	97	22	30	26	95	22	30	26	97
		ULTRA	23	25	24	105	26	30	28	109	24	30	28	109	24	30	28	109	111	24	30	28	109	24	30	28	111
09	208/ 230-3-60	STD	45/45	60/60	46/46	227	49/49	60/60	51/50	231	50/50	60/60	52/52	235	51/51	60/60	58/57	236	51/51	60/60	58/57	236	51/51	60/60	58/57	236	
		MED	46/46	60/60	48/47	231	50/50	60/60	52/52	235	51/51	60/60	53/53	236	55/55	60/60	62/61	240	55/55	60/60	62/61	240	55/55	60/60	62/61	240	
		HIGH	50/50	60/60	52/51	281	54/54	60/60	56/55	285	55/55	60/60	58/56	286	58/58	70/70	65/64	290	58/58	70/70	65/64	290	58/58	70/70	65/64	290	
		ULTRA	53/53	60/60	55/54	292	56/56	60/60	60/59	296	57/57	60/60	61/60	297	61/61	70/70	65/64	301	61/61	70/70	65/64	301	61/61	70/70	65/64	301	
	460-3-60	STD	24	30	25	113	26	30	27	115	27	30	27	115	27	30	27	115	117	27	30	27	115	27	30	27	117
		MED	25	30	26	115	27	30	28	117	27	30	28	117	27	30	28	117	119	27	30	28	117	27	30	28	119
		HIGH	26	30	28	141	28	30	30	143	29	30	30	143	29	30	30	143	145	29	30	30	143	29	30	30	145
		ULTRA	28	30	29	146	30	35	31	148	30	35	31	148	30	35	31	148	150	30	35	31	148	30	35	31	150
	575-3-60	STD	20	25	21	84	24	25	25	88	22	25	25	88	22	25	25	88	90	22	25	25	88	22	25	25	90
		MED	21	25	22	88	24	30	26	92	22	30	26	92	22	30	26	92	94	22	30	26	92	22	30	26	94
		HIGH	22	25	23	97	25	30	27	101	23	30	27	101	23	30	27	101	103	23	30	27	101	23	30	27	103
		ULTRA	24	25	25	111	27	30	29	115	25	30	29	115	25	30	29	115	117	25	30	29	115	25	30	29	117
12	208/ 230-3-60	STD	51/51	60/60	52/52	252	54/54	60/60	56/56	256	55/55	60/60	58/57	257	59/59	70/70	62/62	261	59/59	70/70	62/62	261	59/59	70/70	62/62	261	
		MED	54/54	60/60	56/55	302	58/58	70/70	61/59	306	59/59	70/70	62/61	307	63/63	80/80	66/65	311	63/63	80/80	66/65	311	63/63	80/80	66/65	311	
		HIGH	57/57	70/70	59/58	313	61/61	80/80	64/63	317	62/62	80/80	65/64	318	66/66	80/80	69/68	322	66/66	80/80	69/68	322	66/66	80/80	69/68	322	
		ULTRA	24	25	25	111	27	30	29	115	25	30	27	113	29	35	31	117	117	25	30	27	113	29	35	31	117
	460-3-60	STD	26	30	27	126	28	30	29	128	27	30	29	128	28	30	29	128	130	28	30	29	128	28	30	29	130
		MED	27	30	28	152	29	35	30	154	29	35	30	154	29	35	30	154	156	29	35	30	154	29	35	30	156
		HIGH	29	35	30	157	30	35	32	159	31	35	32	159	31	35	32	159	161	31	35	32	159	31	35	32	161
		ULTRA	22	25	23	107	26	30	27	111	24	25	25	109	24	25	25	109	113	24	25	25	109	24	25	25	113
	575-3-60	STD	23	25	24	116	27	30	28	120	25	30	28	120	25	30	28	120	122	25	30	28	120	25	30	28	122
		MED	23	25	24	116	27	30	28	120	25	30	28	120	25	30	28	120	122	25	30	28	120	25	30	28	122
		HIGH	25	30	26	130	29	30	30	134	26	30	30	134	26	30	30	134	136	26	30	30	134	26	30	30	136
		ULTRA	25	30	26	130	29	30	30	134	26	30	30	134	26	30	30	134	136	26	30	30	134	26	30	30	136

See "Legend and Notes for Tables 12 and 13" on page 46.



## Legend and Notes for Tables 12 and 13

### LEGEND:

BRKR	-	Circuit breaker
CO	-	Convenience outlet
DISC	-	Disconnect
FLA	-	Full load amps
IFM	-	Indoor fan motor
LRA	-	Locked rotor amps
MCA	-	Minimum circuit amps
PE	-	Power exhaust
PWRD CO	-	Powered convenience outlet
UNPWR CO	-	Unpowered convenience outlet

### NOTES:

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

### 2. Unbalanced 3-Phase Supply Voltage

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



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

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

Determine maximum deviation from average voltage.

(AB)  $227 - 224 = 3 \text{ v}$

(BC)  $231 - 227 = 4 \text{ v}$

(AC)  $227 - 226 = 1 \text{ v}$

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{4}{227} \\ &= 1.76\% \end{aligned}$$

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

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

## Smoke Detectors

Smoke detectors are available as factory-installed options on 48LC\*B08-12 units. Smoke detectors may be specified for Supply Air only or for Return Air without or with economizer or in combination of Supply Air and Return Air. Return Air smoke detectors are arranged for vertical return configurations only. 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 the Integrated Staging Control (ISC) 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. 59 for the as shipped location.

### Completing Installation of Return Air Smoke Sensor:

1. Unscrew the two screws holding the Return Air Smoke Detector assembly. See Fig. 60, Step 1. Save the screws.
2. Turn the assembly 90 and then rotate end to end. Make sure that the elbow fitting is pointing down. See Fig. 60, Step 2.
3. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 60, Step 3.
4. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

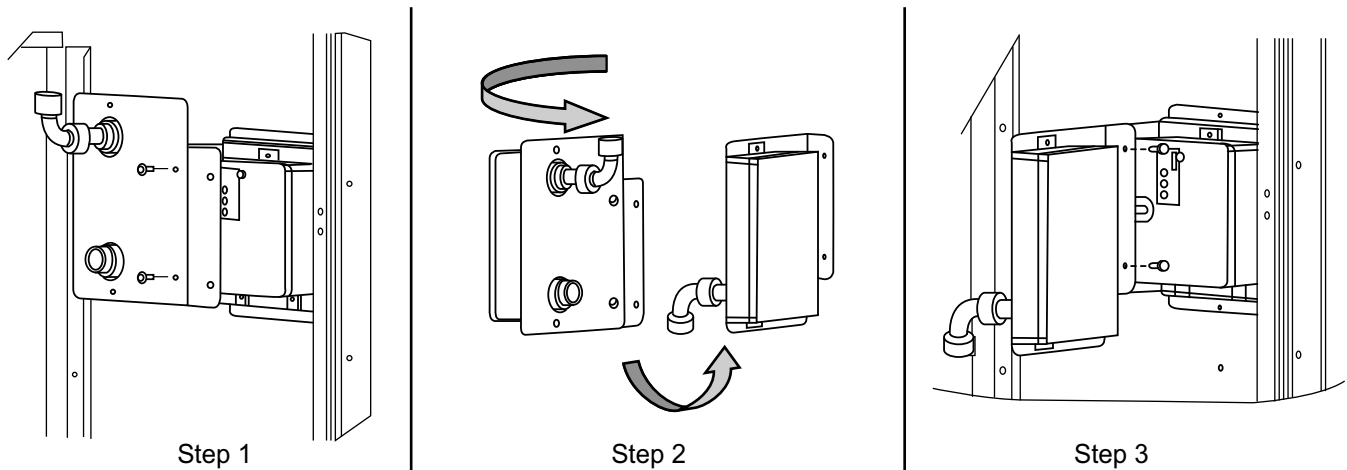
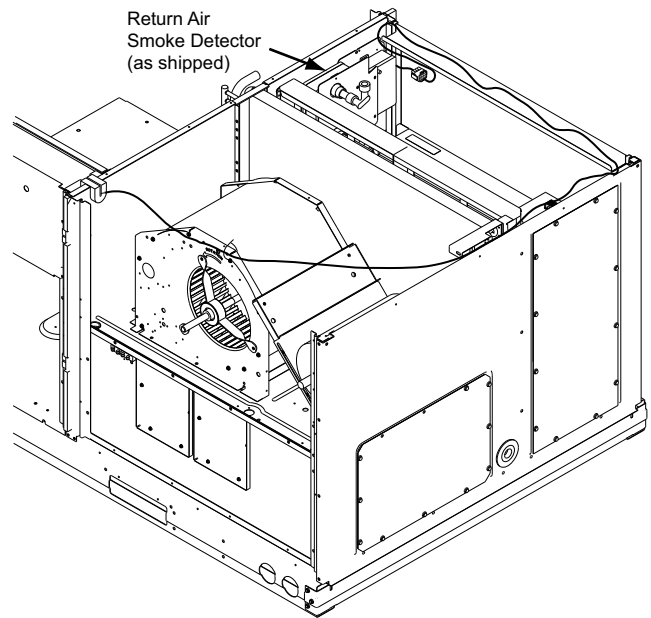


Fig. 60 - Completing Installation of Return Air Smoke Sensor



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Fig. 59 - Return Air Smoke Detector, Shipping Position

### Additional Application Data —

Refer to Catalog No. HKRNKA-1XA for discussions on additional control features of these smoke detectors including multiple unit coordination.

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## Step 15 — Adjust Factory-Installed Options

### Smoke Detectors —

Smoke detector(s) will be connected at the Integrated Staging Control (ISC) board, at terminals marked “Smoke Shutdown”. Remove jumper JMP 3 when ready to energize unit.

## Step 16 — Install Accessories

Available accessories include:

- Roof Curb (must be installed before unit)
- Thru-base connection kit (must be installed before unit is set on curb)
- Power Exhaust
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- CO<sub>2</sub> sensor
- Louvered hail guard
- Phase monitor control

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

### 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)).





# UNIT START-UP CHECKLIST

(Remove and Store in Job File)

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

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

**I. PRE-START-UP**

- VERIFY THAT ALL PACKAGING MATERIALS HAVE BEEN REMOVED FROM UNIT
- VERIFY INSTALLATION OF DUCT PRESSURE TRANSDUCER<sup>7</sup> AND SUPPLY AIR TEMPERATURE SENSOR
- VERIFY INSTALLATION OF OUTDOOR AIR HOOD
- VERIFY INSTALLATION OF FLUE EXHAUST AND INLET HOOD
- VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS
- VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
- VERIFY GAS PRESSURE TO UNIT GAS VALVE IS WITHIN SPECIFIED RANGE
- CHECK GAS PIPING FOR LEAKS
- CHECK THAT INDOOR-AIR FILTERS ARE CLEAN AND IN PLACE
- CHECK THAT OUTDOOR AIR INLET SCREENS ARE IN PLACE
- VERIFY THAT UNIT IS LEVEL
- CHECK FAN WHEELS AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND VERIFY SETSCREW IS TIGHT
- VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED
- VERIFY THAT SCROLL COMPRESSORS ARE ROTATING IN THE CORRECT DIRECTION
- VERIFY THAT CRANKCASE HEATERS HAVE BEEN ENERGIZED FOR AT LEAST 24 HOURS

48LC\*B

**II. START-UP**

**ELECTRICAL**

SUPPLY VOLTAGE	L1-L2 _____	L2-L3 _____	L3-L1 _____
COMPRESSOR AMPS 1	L1 _____	L2 _____	L3 _____
COMPRESSOR AMPS 2	L1 _____	L2 _____	L3 _____
SUPPLY FAN AMPS	L1 _____	L2 _____	L3 _____

**TEMPERATURES**

OUTDOOR-AIR TEMPERATURE	_____ °F DB (DRY BULB)
RETURN-AIR TEMPERATURE	_____ °F DB      _____ °F WB (WET BULB)
COOLING SUPPLY AIR TEMPERATURE	_____ °F
GAS HEAT SUPPLY AIR	_____ °F

**PRESSURES**

GAS INLET PRESSURE	_____ IN. WG
GAS MANIFOLD PRESSURE	STAGE 1 _____ IN. WG
	STAGE 2 _____ IN. WG
REFRIGERANT SUCTION	CIRCUIT A _____ PSIG
	CIRCUIT B _____ PSIG
REFRIGERANT DISCHARGE	CIRCUIT A _____ PSIG
	CIRCUIT B _____ PSIG

- VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS

**GENERAL**

- ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS (IF EQUIPPED)
- VERIFY SMOKE DETECTOR UNIT SHUTDOWN BY UTILIZING MAGNET TEST

**REPEAT PROCESS FOR 2 COMPRESSOR SYSTEMS**

