

INSTALLATION INSTRUCTIONS

R-410A Single Package Rooftop Gas/Electric RGH150

These instructions must be read and understood completely before attempting installation

Safety Labeling and Signal Words

DANGER, WARNING, CAUTION, and NOTE

The signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTE** are used to identify levels of hazard seriousness. The signal word **DANGER** is only used on product labels to signify an immediate hazard. The signal words **WARNING**, **CAUTION**, and **NOTE** will be used on product labels and throughout this manual and other manual that may apply to the product.

DANGER – Immediate hazards which will result in severe personal injury or death.

WARNING – Hazards or unsafe practices which could result in severe personal injury or death.

CAUTION – Hazards or unsafe practices which may result in minor personal injury or product or property damage.

NOTE – Used to highlight suggestions which will result in enhanced installation, reliability, or operation.

Signal Words in Manuals

The signal word **WARNING** is used throughout this manual in the following manner:

 **WARNING**

The signal word **CAUTION** is used throughout this manual in the following manner:

 **CAUTION**

Signal Words on Product Labeling

Signal words are used in combination with colors and/or pictures or product labels.

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 **WARNING**

PERSONAL INJURY, AND/OR PROPERTY DAMAGE HAZARD

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

Installation or repairs made by unqualified persons could result in equipment malfunction, property damage, personal injury and/or death.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with proper tools and test instruments.

Installation must conform with local building codes and with the national Electrical Code NFPA70 current edition or Canadian Electrical Code part 1 CSA C.22.1.

IMPORTANT – READ BEFORE INSTALLING


1. Read and become familiar with these installation instructions before installing this unit.
2. Be sure the installation conforms to all applicable local and national codes.
3. These instructions contain important information for the proper maintenance and repair of this equipment. Retain these instructions for future use.

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.

Recognize safety information. This is the safety–alert symbol.

When you see this symbol  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 serious injury or death. **WARNING** signifies a hazard which **could** result in serious 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.

These instructions cover minimum requirements and conform to existing national standards and safety codes. In some instances, these instructions exceed certain local codes and ordinances, especially those that may not have kept up with changing residential construction practices. We require these instructions as a minimum for a safe installation.



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

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 lockout tag. Unit may have more than one power switch.



WARNING

UNIT OPERATION AND SAFETY HAZARD

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

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



WARNING

PERSONAL INJURY AND ENVIRONMENTAL HAZARD

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

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

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



CAUTION



CUT HAZARD

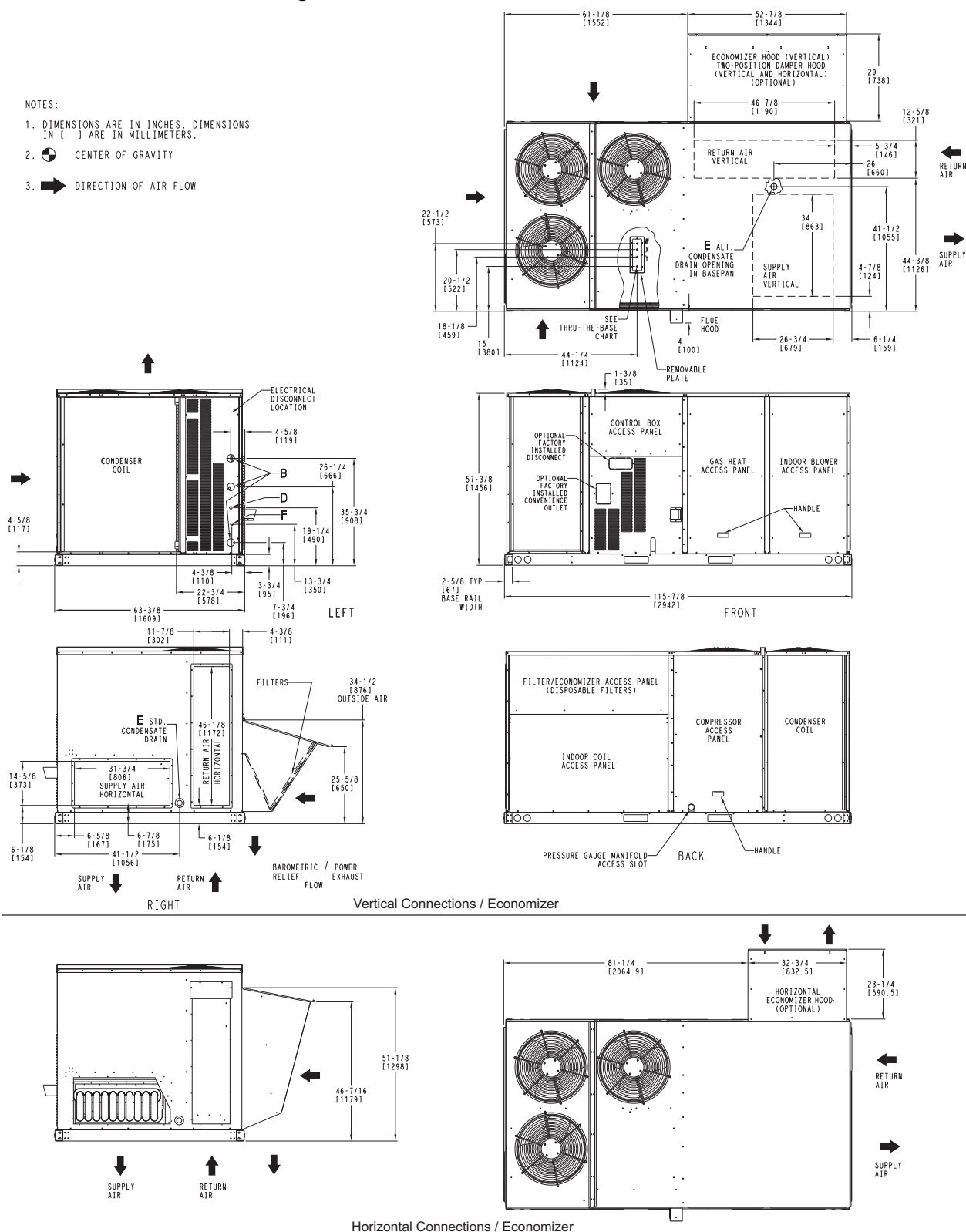
Failure to follow this caution may result in personal injury

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 equipment.

FIGURE 1 Unit Dimensional Drawing

NOTES:

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



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

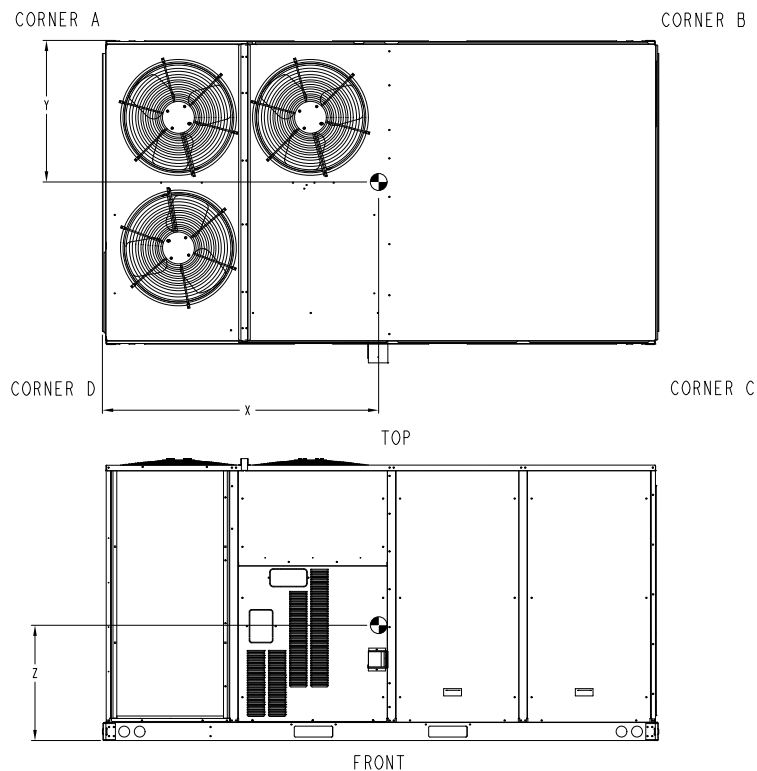
THRU-THE-BASE CHART THESE HOLES REQUIRED FOR USE CRBTMPW005A00,006A00,007A00				
ACCESSORY NO.	THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)	
005	W 1/2"	ACC.	7/8"	[22.2]
	X 1/2"	24V	7/8"	[22.2]
	Y 1 1/4"	POWER	1 1/2"	[38.1]
	Z 3/4" PIPE	GAS	1 3/4"	[44.5]
006	W 1/2"	ACC.	7/8"	[22.2]
	X 1/2"	24V	7/8"	[22.2]
	Y 1 1/2"	POWER	2"	[50.8]
	Z 3/4" PIPE	GAS	1 3/4"	[44.5]
007	W 1/2"	ACC.	7/8"	[22.2]
	X 1/2"	24V	7/8"	[22.2]
	Y 2"	POWER	2 1/2"	[63.5]
	Z 3/4" PIPE	GAS	1 3/4"	[44.5]

FOR "THRU-THE-BASEPAN" FACTORY OPTION, FITTINGS FOR X & Y ARE PROVIDED AS SPECIFIED ON "006".

Fig. 1 – Unit Dimensional Drawing (cont.)

UNIT	STD UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		C.G.		
	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	LBS.	KG.	X	Y	Z
RGH150	1430	649	342	155	377	171	372	169	338	153	60 3/4 [1543]	31 1/2 [800]	20 5/8 [524]

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



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

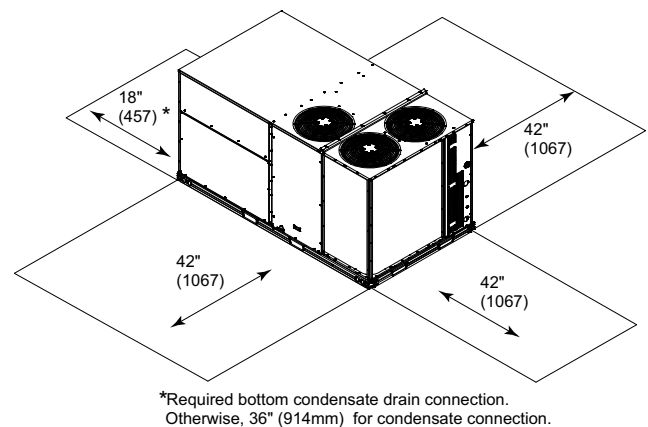
Select a location for the unit and its support system (curb or other) that provides for at least the minimum clearances required for safety. This includes the clearance to combustible surfaces, unit performance and service access below, around and above unit as specified in unit drawings. See Fig. 2.

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.

FIGURE 2 Service Clearance Dimensional Drawing



Although unit is weatherproof, avoid locations that permit water from higher level runoff and overhangs to fall onto the unit.

Select a unit mounting system that provides adequate height to allow for removal and disposal of frost and ice that will form during the heating-defrost mode as well as allow installation of condensate trap per requirements. 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

RGH	
COMPONENT	UNITS LB (KG)
Base Unit	1430 (649)
Economizer	
Vertical	100 (45)
Horizontal	115 (52)
Powered Outlet	32 (15)
Curb	
14-in/356 mm	180 (82)
24-in/610 mm	235 (107)

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.

Step 4 — Provide Unit Support

Roof Curb Mount —

Accessory roof curb details and dimensions are shown in Fig. 3. 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. 3. 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. 4. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

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

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

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.

LARGE DUCT OPENINGS

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

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

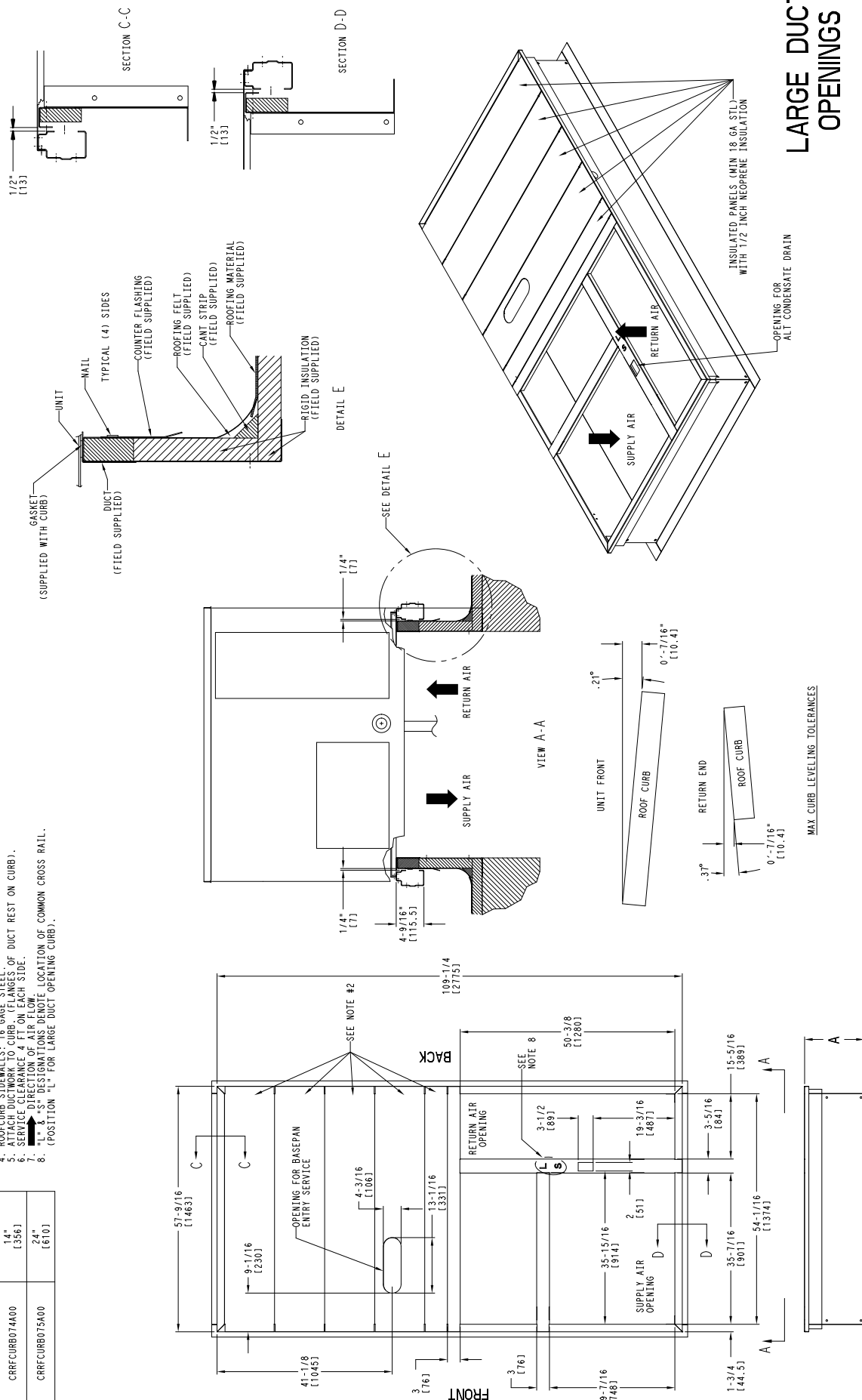
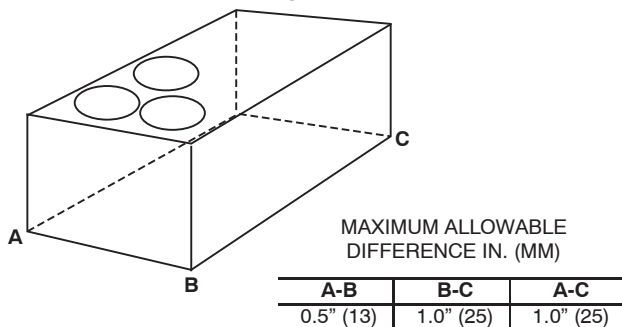


FIGURE 4 Unit Leveling Tolerances



Step 5 — Field Fabricate Ductwork

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

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

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 required. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 1 and Fig. 5 for additional information.

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

⚠ CAUTION

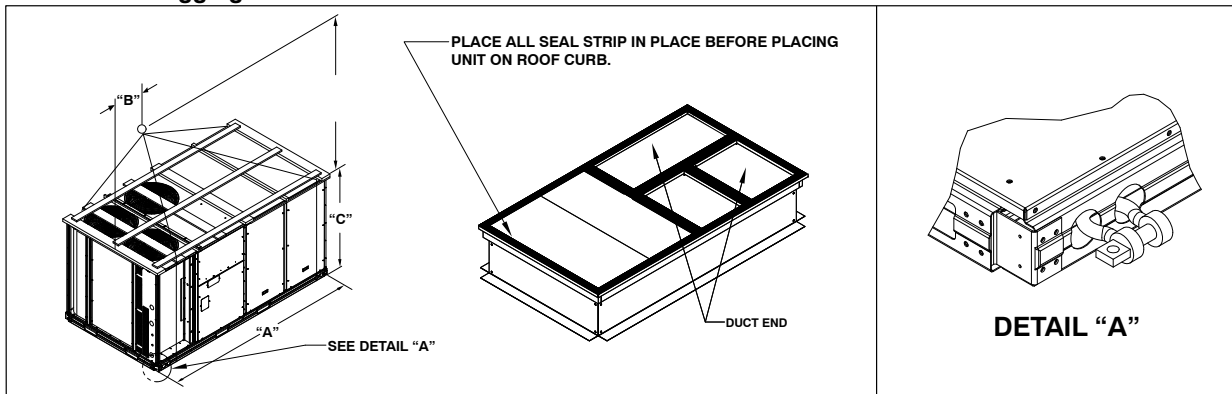
UNIT DAMAGE HAZARD

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.

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

FIGURE 5 Rigging Details



UNIT	MAX WEIGHT		DIMENSIONS					
			A		B		C	
	LB	KG	IN	MM	IN	MM	IN	MM
RGH150	2215	1009	116.0	2945	62.5	1590	59.5	1510

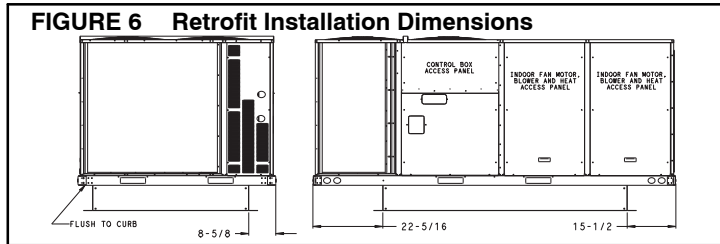
NOTES:

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. Use wooden top to prevent rigging straps from damaging unit.

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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 $\frac{1}{4}$ in (6.4 mm). The clearance between the curb and the end base rails should be $\frac{1}{2}$ in (13 mm). For retrofit applications with curbs CRRFCURB003A01 and 4A01, the unit should be positioned as shown in Fig. 6. Maintain the 15.5 in (394 mm) and $8\frac{5}{8}$ in (220 mm) clearances and allow the $22\frac{5}{16}$ in (567 mm) dimension to float if necessary.



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.

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

Remove all shipping materials and top skid. Remove extra center post from the condenser end of the unit so that the condenser end of the unit matches Fig. 23 – 25. Recycle or dispose of all shipping materials.

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

Unit is shipped in the vertical duct configuration. Unit *without* factory-installed economizer or return air smoke detector option may be field-converted to horizontal ducted configuration using accessory CRDUCTCV001A00. To convert to horizontal configuration, remove screws from side duct opening covers and remove covers.

Discard the supply duct cover. Install accessory CRDUCTCV001A00 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.

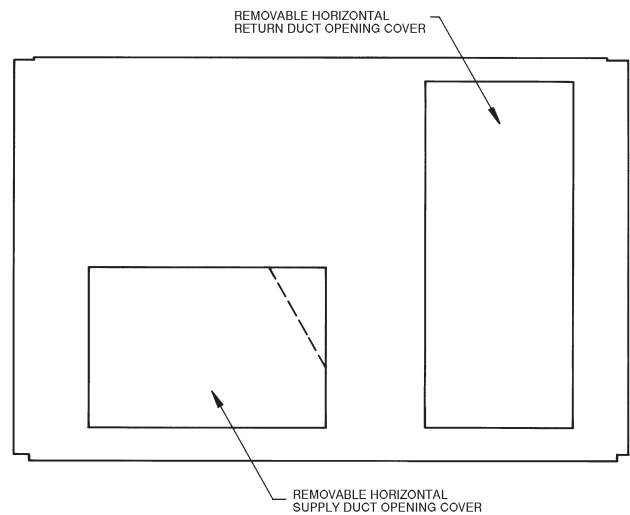
Do not cover or obscure visibility to the unit's informative data plate when insulating horizontal ductwork.

Step 8 — Install Outside Air Hood

Economizer Hood Removal and Setup – Factory Option —

1. The hood is shipped in knock-down form and located in the return air compartment. It is attached to the economizer using two plastic tie-wraps.
2. To gain access to the hood, remove the filter access panel. (See Fig. 8.)
3. Locate and cut the (2) plastic tie-wraps, being careful to not damage any wiring. (See Fig. 9.)

FIGURE 7 Horizontal Conversion Panels



4. Carefully lift the hood assembly through the filter access opening and assemble per the steps outlined in *Economizer Hood and Two-Position Hood* on page 9.

FIGURE 8 Typical Access Panel Locations

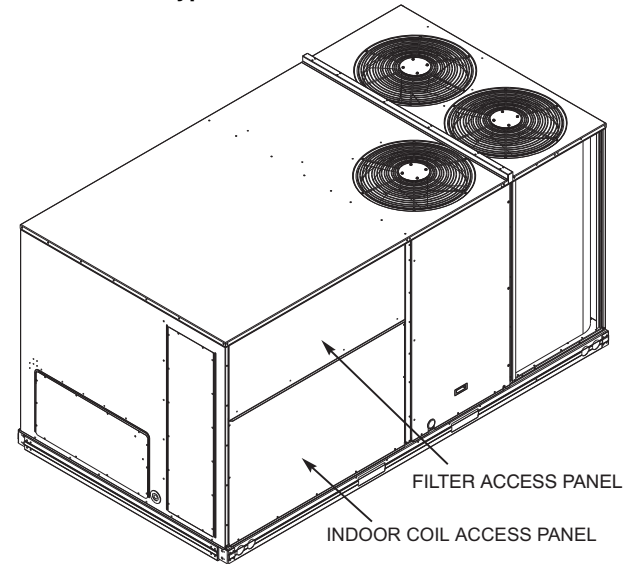
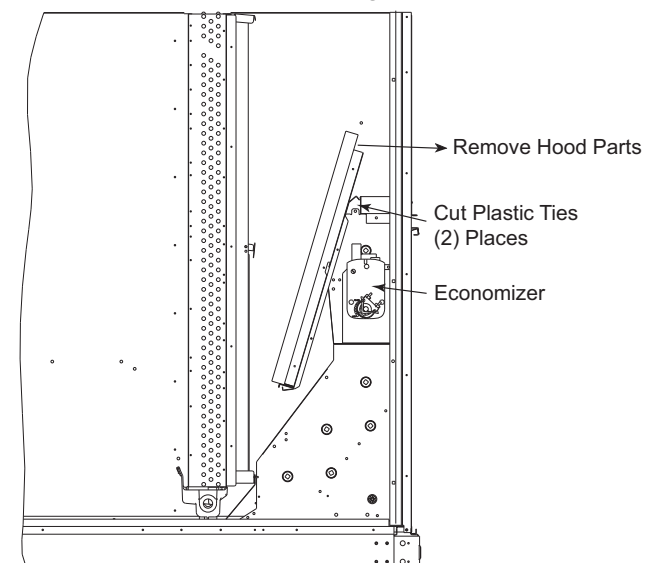


FIGURE 9 Economizer Wiring



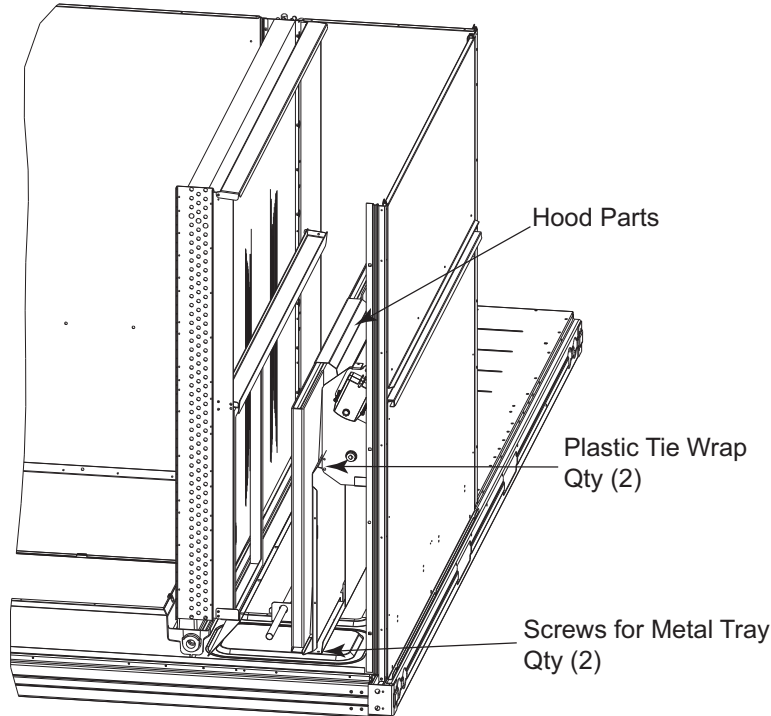
Two Position Damper Hood Removal and Setup – Factory Option —

1. The hood is shipped in knock-down form and assembled to a metal support tray using plastic stretch wrap. Located in the return air compartment, the assembly's metal tray is attached to the basepan and also attached to the damper using two plastic tie-wraps.
2. To gain access to the hood, remove the filter access panel. (See Fig. 8.)
3. Locate the (2) screws holding the metal tray to the basepan and remove. In order to remove the screws, it may be

necessary to remove the panel underneath the two-position damper. Remove the two screws. Locate and cut the (2) plastic tie-wraps securing the assembly to the damper. (See Fig. 10.) Be careful to not damage any wiring or cut tie-wraps securing any wiring.

4. Carefully lift the hood assembly (with metal tray) through the filter access opening and assemble per the steps outlined in *Economizer Hood and Two-Position Hood*.
5. If removed, reattach the panel under the damper.

FIGURE 10 Damper Assembly

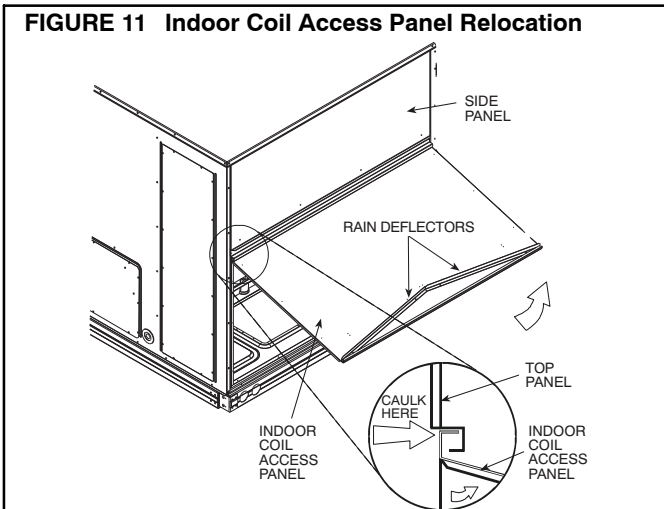


Economizer Hood and Two-Position Hood —

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

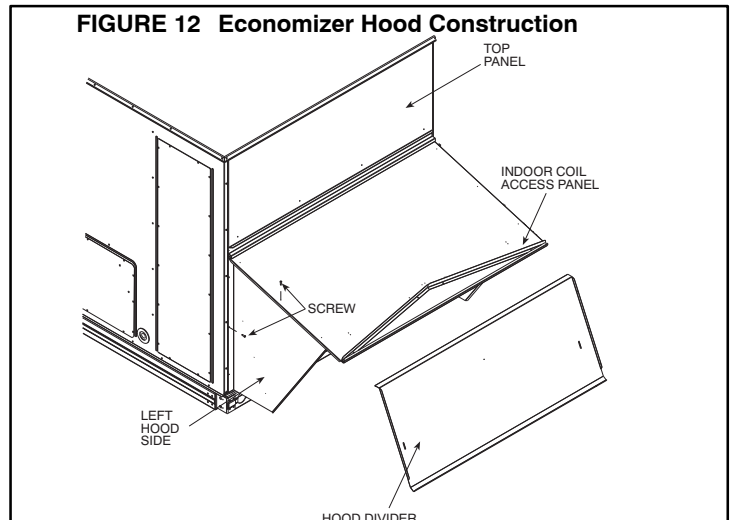
1. The indoor coil access panel will be used as the top of the hood. If the panel is still attached to the unit, remove the screws along the sides and bottom of the panel. See Fig. 11.

FIGURE 11 Indoor Coil Access Panel Relocation



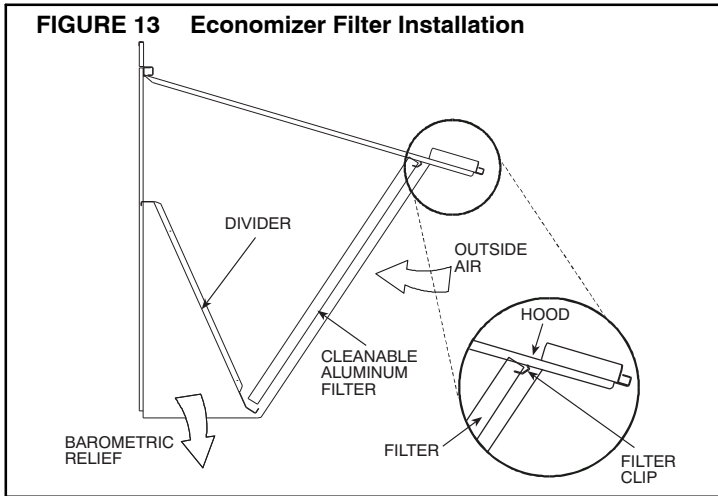
2. Swing out indoor coil access panel and insert the hood sides under the panel (hood top). **Be careful not to lift the panel too far as it might fall out.** Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 12.

FIGURE 12 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. 12 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. 13.
7. Install the two rain deflectors on the edge of the hood top as shown in Fig. 11.

FIGURE 13 Economizer Filter Installation

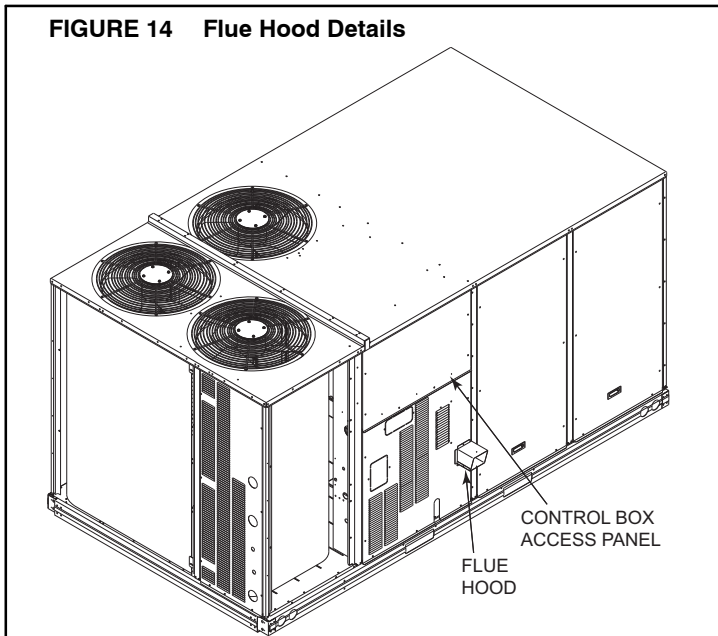


8. Caulk the ends of the joint between the unit top panel and the hood top as shown in Fig. 11.
9. Replace the filter access panel.

Step 9 — 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. 14.

FIGURE 14 Flue Hood Details



Step 10 — 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 5 in. wg (1250 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.

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.

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.

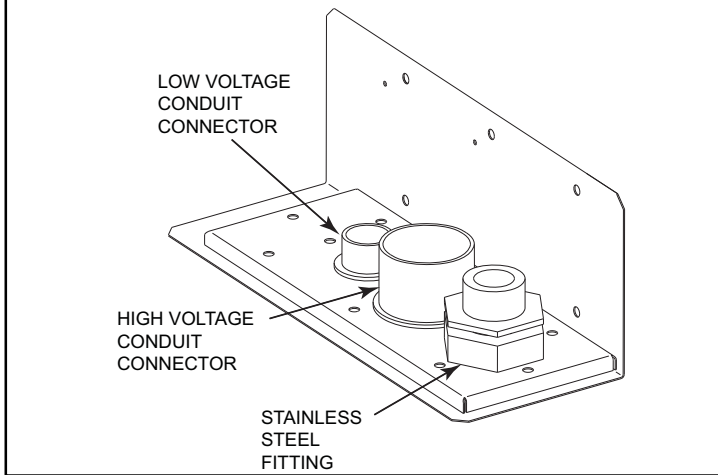
Install a gas supply line that runs to the unit heating section. Refer to the NFPA 54/NFGC or equivalent code for gas pipe sizing data. Size the gas supply line to allow for a maximum pressure drop of 0.5-in wg (124 Pa) between gas regulator source and unit gas valve connection when unit is operating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

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

This service connection kit consists of a 3/4-in NPT gas adapter fitting (brass), a 1/2-in electrical bulkhead connector and a 1 1/2-in electrical bulkhead connector, all factory-installed in the embossed (raised) section of the unit basepan in the condenser section.

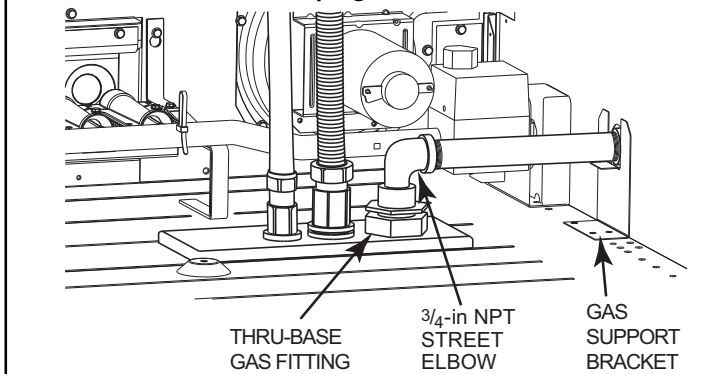
Remove the "L" bracket assembly from the unit (see Fig. 15). Remove connector plate assembly from the "L" bracket and discard the "L" bracket, but retain the washer head screws. Install the connector plate assembly to the basepan using 8 of the washer head screws.

FIGURE 15 Fittings

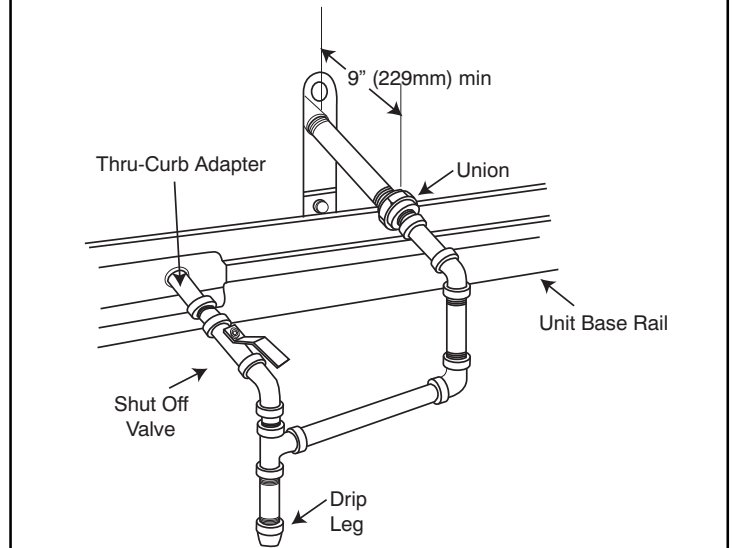
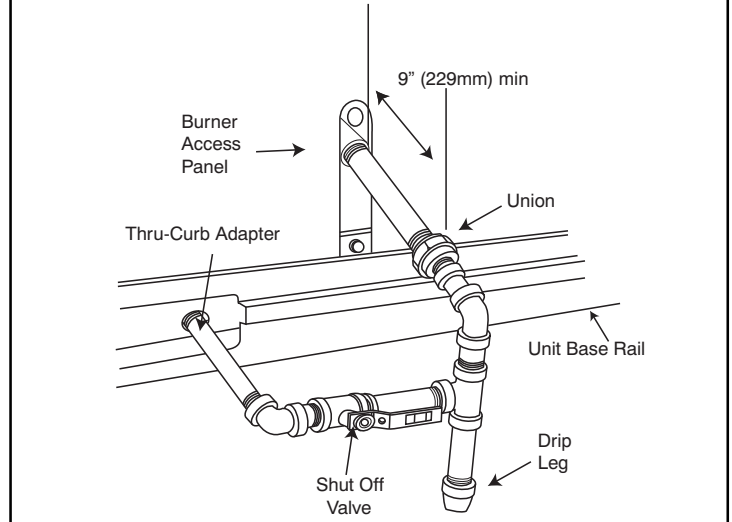
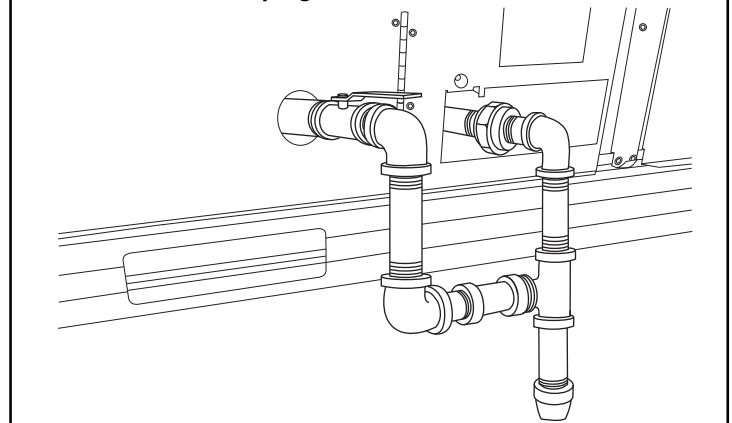
The thru-base gas connector has male and female threads. The male threads protrude above the basepan of the unit; the female threads protrude below the basepan.

Check tightness of connector lock nuts before connecting gas piping.

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. 16.)

FIGURE 16 Gas Line Piping

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. 17 and 18 for typical piping arrangements for gas piping that has been routed through the sidewall of the curb. See Fig. 19 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.

FIGURE 17 Gas Piping**FIGURE 18 Gas Piping****FIGURE 19 Gas Piping Thru-Base Connections**

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 material 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).

⚠ WARNING

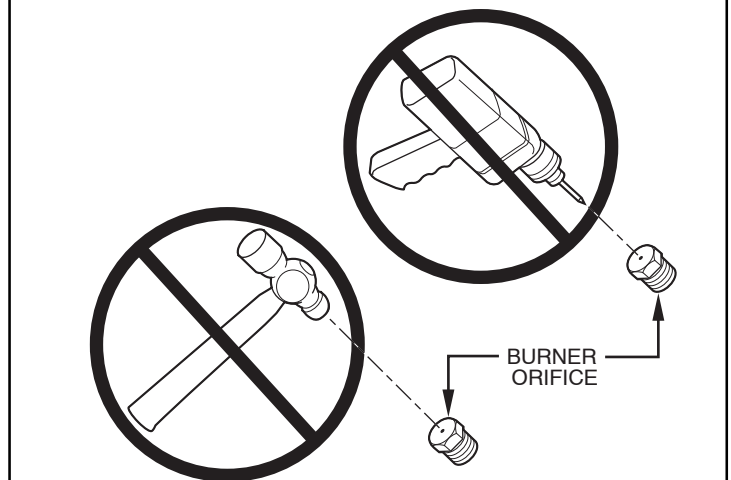
FIRE OR EXPLOSION HAZARD

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. 20.

FIGURE 20 Orifice Hole



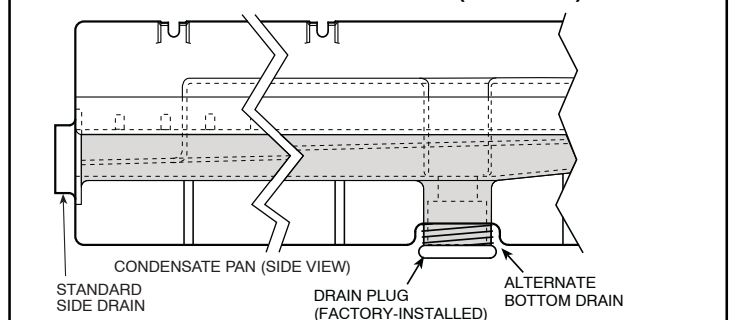
Step 11 — Install External Condensate Trap and Line

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

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 $\frac{1}{2}$ -in. square socket drive extension.

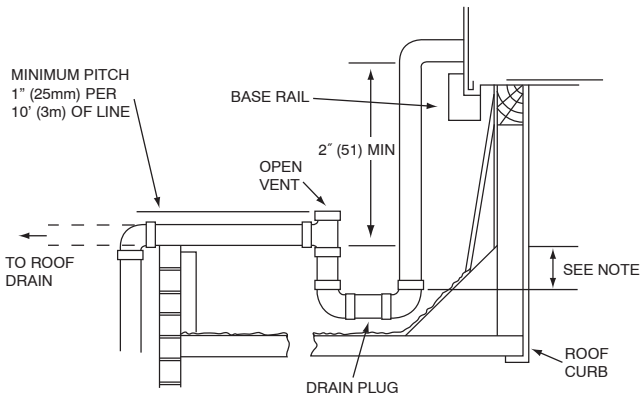
To use the alternate bottom drain connection, remove the red drain plug from the bottom connection (use a $\frac{1}{2}$ -in. square socket drive extension) and install it in the side drain connection.

FIGURE 21 Condensate Drain Pan (Side View)



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

FIGURE 22 Condensate Drain Piping Details



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

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

Step 12 — 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.

NOTE: Check all factory and field electrical connections for tightness. Field-supplied wiring shall conform with the limitations of 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 of the unit to either the factory option disconnect, the bottom of the control box or the single point box accessory. 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 23, 24, and 25 show the various wire routings.

FIGURE 23 Conduit in Factory Option Disconnect

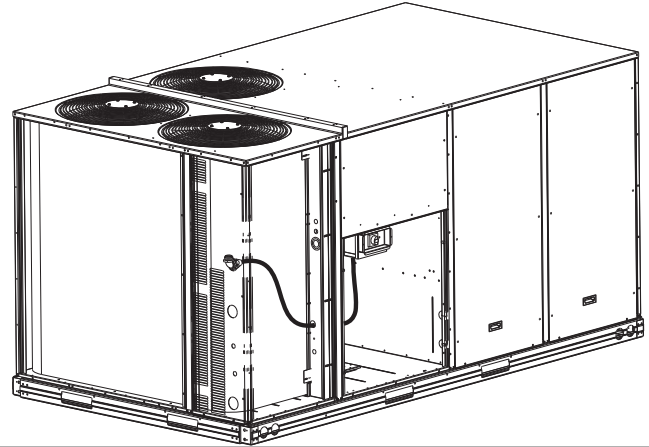


FIGURE 24 Conduit into Control Box

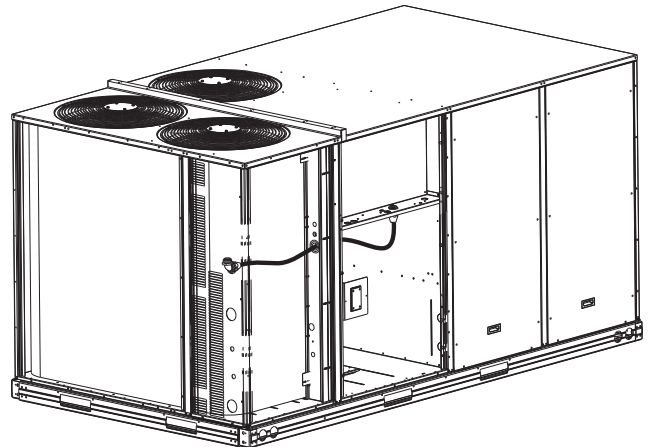
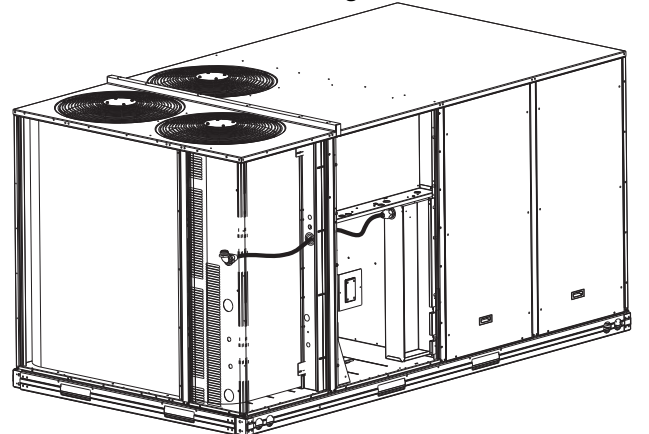


FIGURE 25 Conduit into Single Point Box



If the field disconnect is larger than 100A, it must be attached to the unit using accessory CRDISBKT001A00 (see Fig. 26). 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. 27). 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.

FIGURE 26 Mounting Position for Field Disconnects (over 100A)

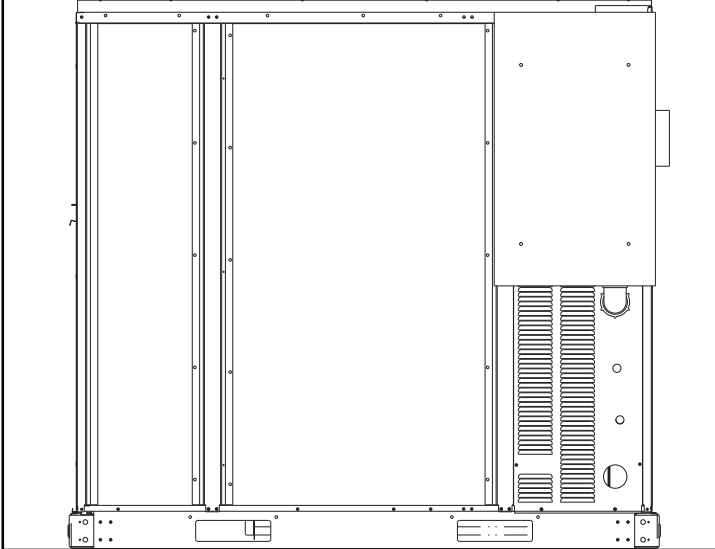
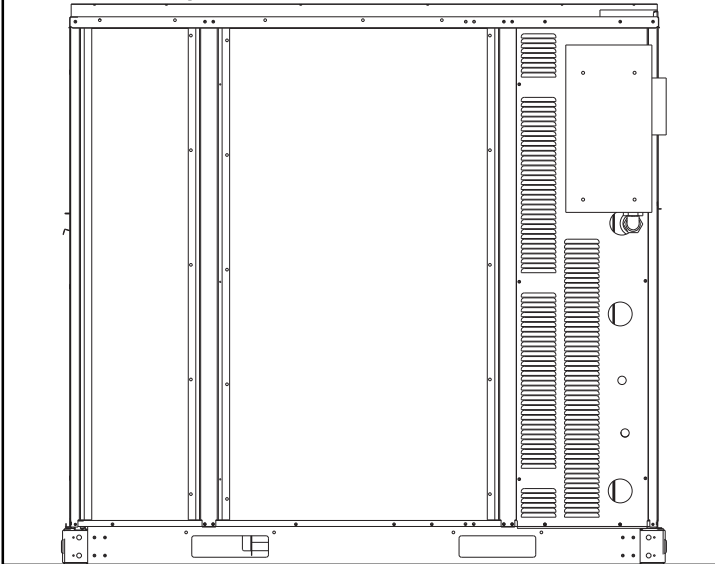


FIGURE 27 Mounting Position for Field disconnects (up to 100A)



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

Field power wires 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. Max wire size is #2 AWG (copper only). (See Fig. 29)

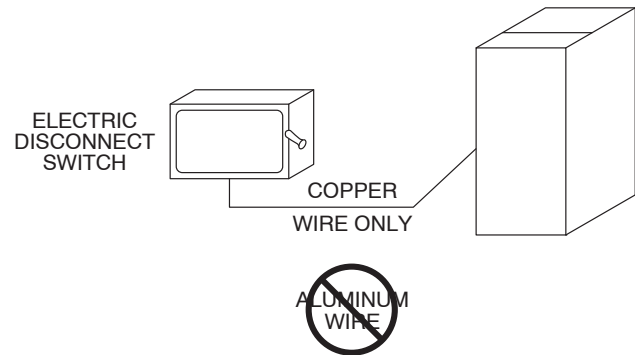
NOTE:TEST LEADS – Unit may be equipped with short leads (pigtails) on the field line connection points off the optional disconnect switch. These leads are for factory run-test purposes only; remove and discard before connecting field power wires to unit connection points. Make field power connections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

⚠ 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 furnace. Use only copper wire. (See Fig. 28.)

FIGURE 28 Disconnect Switch and Unit



All Units —

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

Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 29 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is #2/0 AWG per pole.

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

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate. See Table 4. 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 Table 4 (see Note 2 on page 21) to determine the percent of voltage imbalance.

⚠ 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 warranty.

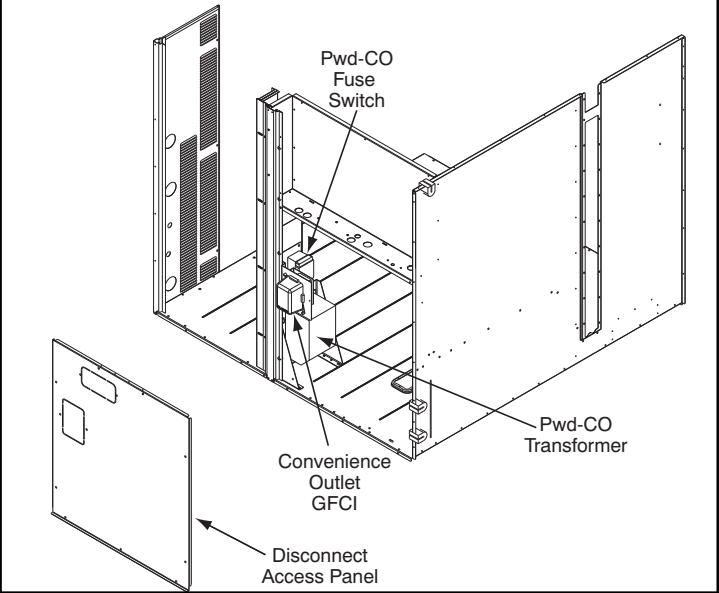
Units Without Factory-Installed Disconnect —

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 Disconnect —

The factory-installed option disconnect switch is located in a weatherproof enclosure located under the main control box. The manual switch handle is accessible through an opening in the access panel. Discard the factory test leads (see Fig. 29). The factory disconnect is an 80A disconnect.

FIGURE 30 Convenience Outlet Location



Non-powered type: This 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.

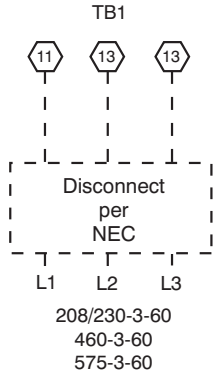
⚠ WARNING

ELECTRICAL OPERATION HAZARD

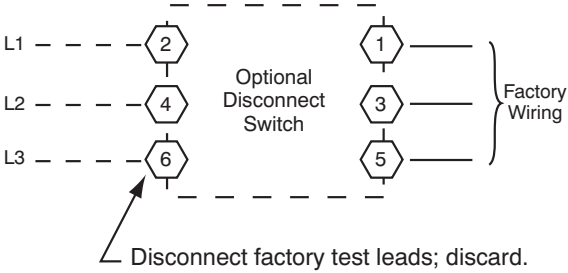
Failure to follow this warning could result in personal injury or death.

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.

**FIGURE 29 Power Wiring Connections
Units Without Disconnect Option**



Units With Disconnect Option



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. Tag-out this switch, if necessary.

Non-powered convenience outlets are offered on the RGH. It provides 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. 30.

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.

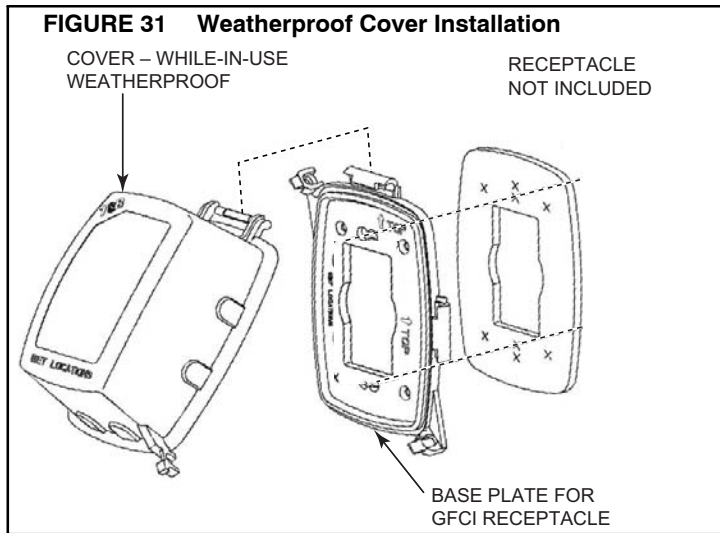
DISCONNECT ALL POWER TO UNIT AND CONVENIENCE OUTLET.

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

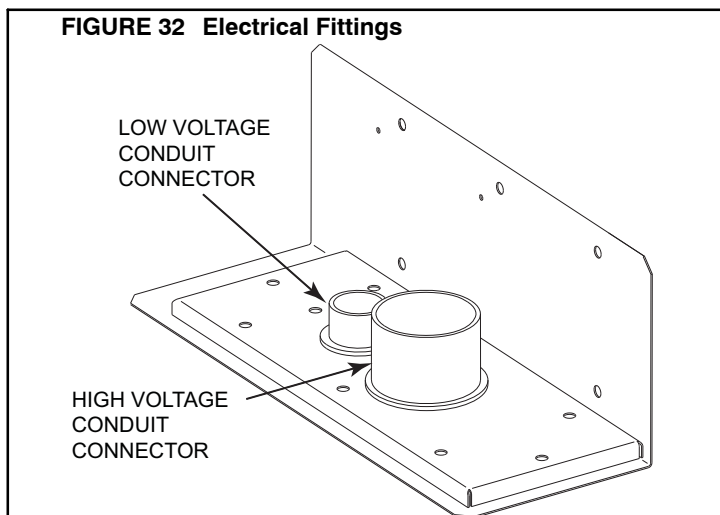
the screw heads at the keyhole slots and align with the gasket; tighten the two screws until snug (do not over-tighten).

Mount the weatherproof cover to the backing plate as shown in Fig. 31. 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.



Factory-Option Thru-Base Connections (Electrical Connections)—

This service connection kit consists of a $\frac{3}{4}$ -in NPT gas adapter fitting (brass), a $\frac{1}{2}$ -in electrical bulkhead connector and a $1\frac{1}{2}$ -in electrical bulkhead connector, all factory-installed in the embossed (raised) section of the unit basepan in the condenser section. The $\frac{1}{2}$ -in bulkhead connector enables the low-voltage control wires to pass through the basepan. The $1\frac{1}{2}$ -in electrical bulkhead connector allows the high-voltage power wires to pass through the basepan.



Remove the "L" bracket assembly from the unit (see Fig. 32). Remove connector plate assembly from the "L" bracket and discard the "L" bracket, but retain the washer head screws. Install the connector plate assembly to the basepan using 8 of the washer head screws.

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. 29.

Field Control Wiring —

The RGH unit requires an external temperature control device. This device can be a thermostat emulation device provided as part of a third-party Building Management System.

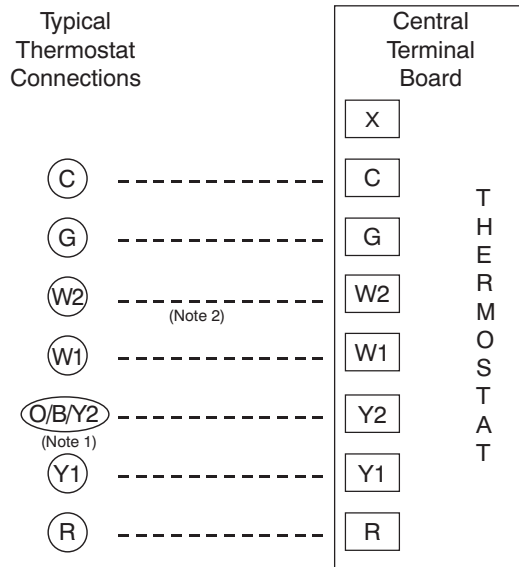
Thermostat —

Install an approved accessory 2 stage Cooling/Heating thermostat according to installation instructions included with the accessory. RGH units do not require a thermostat with an O function to control the reversing valve operation. If using an electronic thermostat, configure it for "non-heat pump" operation. Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions.

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

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

FIGURE 33 Typical Low-Voltage Control Connections



Note 1: Typical multi-function marking. Follow manufacturer's configuration instructions to select Y2. Do not configure for O output.

Note 2: W2 connection not required on units without electric heating.

--- Field Wiring

Unit without Thru-Base Connection Kit —

Pass the thermostat control wires through the bushing on the unit end panel. Route the wire through the snap-in wire tie and up to the web bushing near the control box. Route the wire through the bushing and into the bottom left side of the control box after

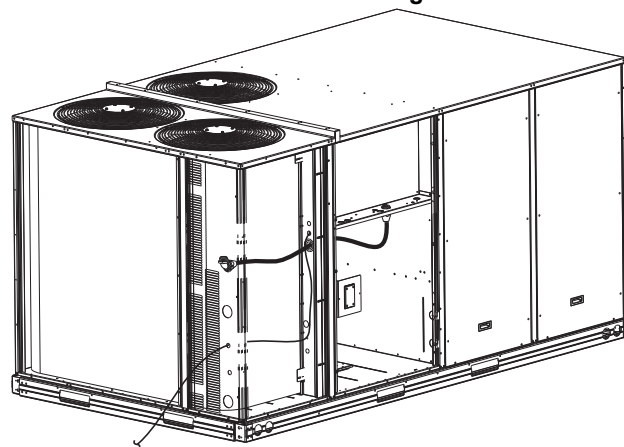
removing one of the two knockouts in the corner of the box. Using a connector at the control box to protect the wire as it passes into the control box. Pull the wires over to the terminal strip at the upper left corner of the Central Terminal Board (CTB). Use the connector at the control box and the wire tie to ensure that the thermostat wire is tight and will not be damaged by contact with the condenser coil. See Fig. 34.

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.

FIGURE 34 Thermostat Wire Routing



Smoke Detectors

Smoke detectors are available as factory-installed options on RGH 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 unit terminal board may be necessary to complete the unit and smoke detector configuration to meet project requirements.

Units equipped with factory-optional Return Air smoke detectors require a relocation of the sensor module at unit installation. See **“Completing Installation of Return Air Smoke Sensor.”**

System —

The smoke detector system consists of a four-wire controller and one or two sensors. Its primary function is to shut down the rooftop unit in order to prevent smoke from circulating throughout the building. It is not to be used as a life saving device.

Controller —

The controller (see Fig. 35) includes a controller housing, a printed circuit board, and a clear plastic cover. The controller can be connected to one or two compatible duct smoke sensors. The clear plastic cover is secured to the housing with a single captive screw for easy access to the wiring terminals. The controller has three LEDs (for Power, Trouble and Alarm) and a manual test/reset button, all located on the cover face.

Sensor —

The sensor (see Fig. 36) includes a plastic housing, a printed circuit board, a clear plastic cover, a sampling tube inlet and an exhaust tube. The sampling tube (when used) and exhaust tube are attached during installation. The sampling tube varies in length depending on the size of the rooftop unit. The clear plastic cover permits visual inspections without having to disassemble the sensor. The cover attaches to the sensor housing using four captive screws and forms an airtight chamber around the sensing electronics. Each sensor includes a harness with an RJ45 terminal for connecting to the controller. Each sensor has four LEDs (for Power, Trouble, Alarm and Dirty) and a manual test/reset button (on the left-side of the housing).

FIGURE 35 Controller Assembly

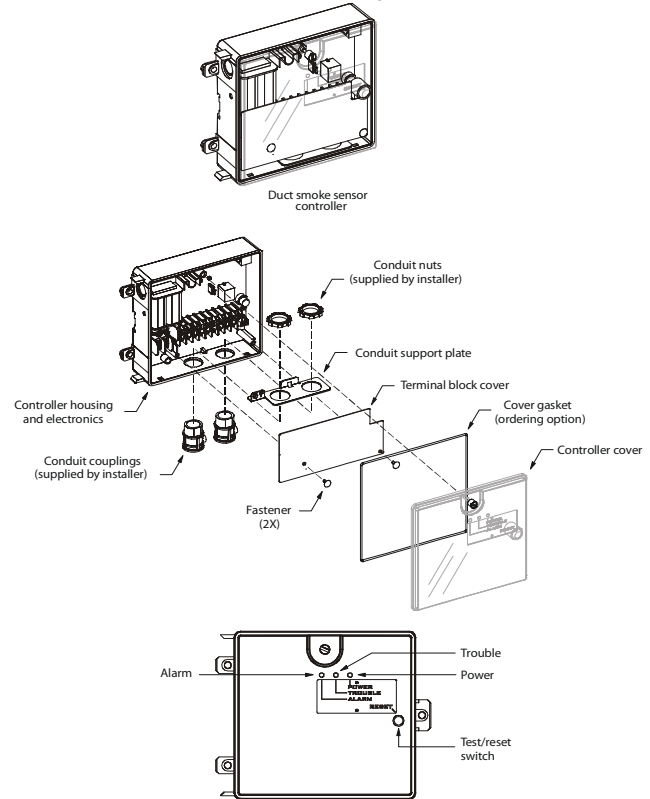
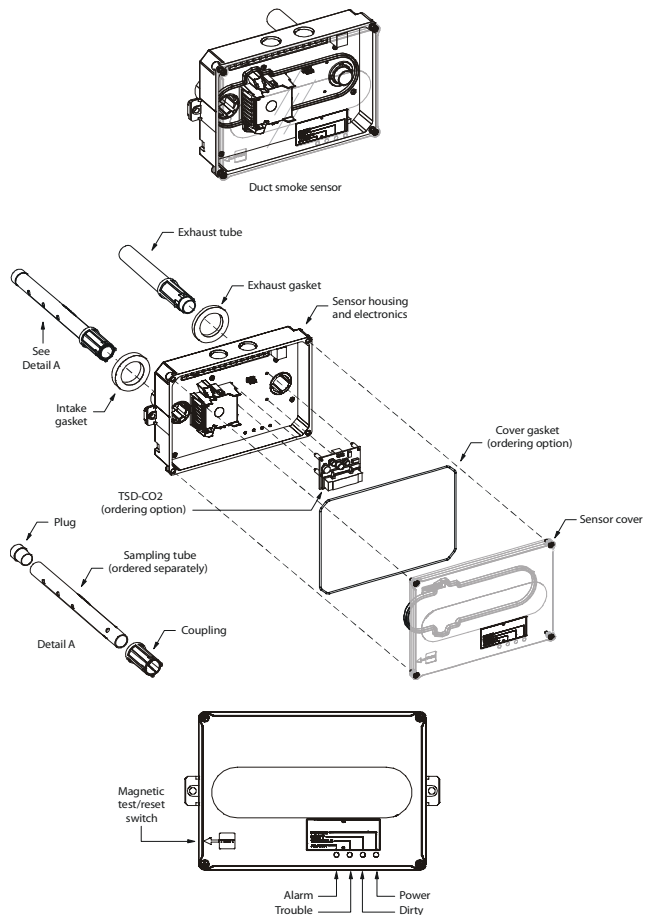


FIGURE 36 Smoke Detector Sensor



Air is introduced to the duct smoke detector sensor's sensing chamber through a sampling tube that extends into the HVAC duct and is directed back into the ventilation system through a (shorter) exhaust tube. The difference in air pressure between the two tubes pulls the sampled air through the sensing chamber. When a sufficient amount of smoke is detected in the sensing chamber, the sensor signals an alarm state and the controller automatically takes the appropriate action to shut down fans and blowers, change over air handling systems, notify the fire alarm control panel, etc.

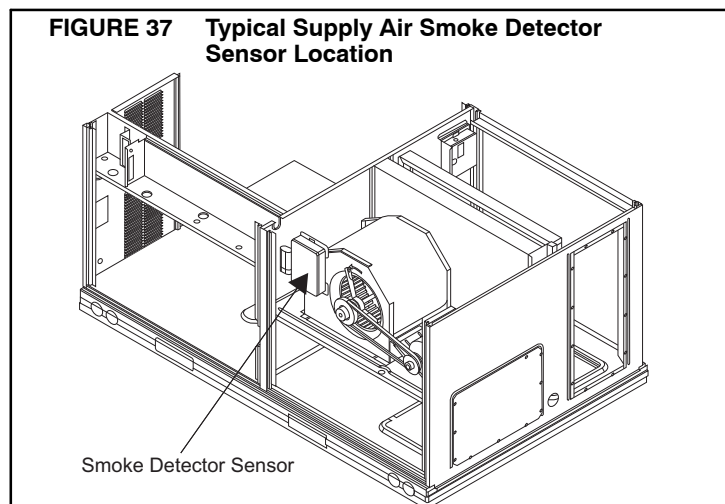
The sensor uses a process called differential sensing to prevent gradual environmental changes from triggering false alarms. A rapid change in environmental conditions, such as smoke from a fire, causes the sensor to signal an alarm state but dust and debris accumulated over time does not.

For installations using two sensors, the duct smoke detector does not differentiate which sensor signals an alarm or trouble condition.

Smoke Detector Locations

Supply Air —

The Supply Air smoke detector sensor is located to the left of the unit's indoor (supply) fan. See Fig. 37. Access is through the left side blower access panel. There is no sampling tube used at this location. The sampling tube inlet extends through the side plate of the fan housing (into a high pressure area). The controller is located on a bracket to the right of the return filter, accessed through the lift-off filter panel.

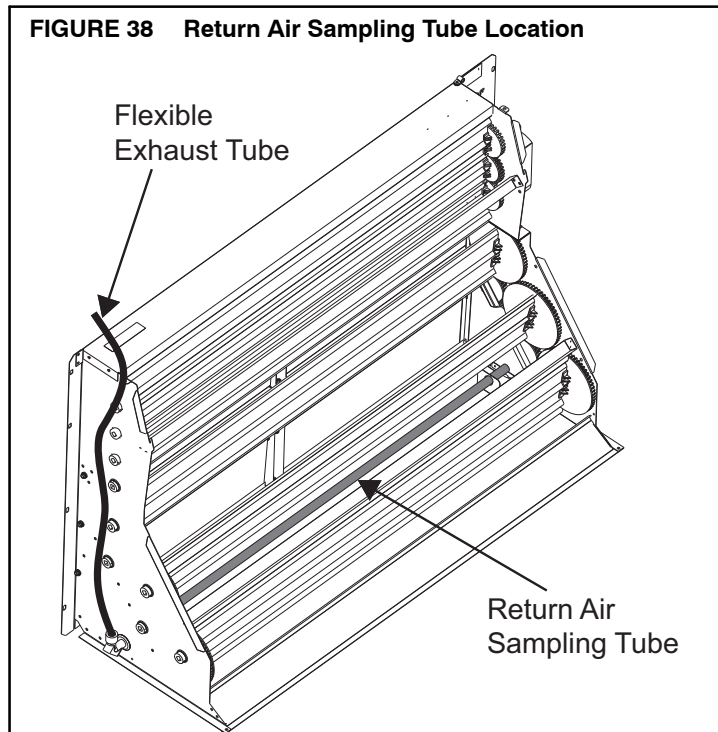


Return Air without Economizer —

The sampling tube is located across the return air opening on the unit basepan. See Fig. 38. The holes in the sampling tube face downward, into the return air stream. The sampling tube is connected via tubing to the return air sensor that is mounted on a bracket high on the partition between return filter and controller location. (This sensor is shipped in a flat-mounting location. Installation requires that this sensor be relocated to its operating location and the tubing to the sampling tube be connected. See "Completing Installation of Return Air Smoke Sensor:" for details.)

Return Air with Economizer —

The sampling tube is inserted through the side plates of the economizer housing, placing it across the return air opening on the unit basepan. See Fig. 38. The holes in the sampling tube face downward, into the return air stream. The sampling tube is connected via tubing to the return air sensor that is mounted on a bracket high on the partition between return filter and controller location. (This sensor is shipped in a flat-mounting location. Installation requires that this sensor be relocated to its operating location and the tubing to the sampling tube be connected. See the following installation procedure.)



Completing Installation of Return Air Smoke Sensor:

1. Unscrew the two screws holding the Return Air Sensor detector or plate. See Fig. 39. Save the screws.
2. Remove the Return Air Sensor and its detector plate.
3. Rotate the detector plate so the sensor is facing outwards and the sampling tube connection is on the bottom. See Fig. 40.
4. Screw the sensor and detector plate into its operating position using screws from Step 1. Make sure the sampling tube connection is on the bottom and the exhaust tube is on the top. See Fig. 40.
5. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

FIGURE 39 Return Air Detector Shipping Position

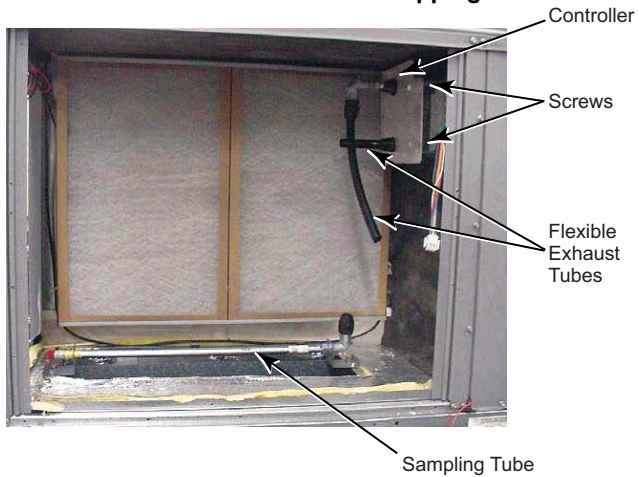


FIGURE 40 Return Air Sensor Operating Position



Table 2—Unit Wire/Fuse or HACR Breaker Sizing Data

Unit RGH	NOM. V—Ph—Hz	IFM TYPE	COMBUSTION FAN MOTOR	POWER EXHAUST	NO C.O. or UNPWR C.O.							
			FLA	FLA	NO P.E.				w/ P.E. (pwrd fr/ unit)			
					MCA	FUSE or HACR BRKR	DISC. SIZE		MCA	FUSE or HACR BRKR	DISC. SIZE	
							FLA	LRA			FLA	LRA
150	208/230—3—60	STD	0.48	3.8	54.8	60	58	314	58.6	70	62	318
		MED			57.3	70	60	331	61.1	80	65	335
		HIGH			68.0	80	72	350	71.8	80	77	354
	460—3—60	STD	0.25	1.8	27.6	35	29	158	29.4	35	31	160
		MED			28.6	35	30	167	30.4	40	32	169
		HIGH			34.6	40	37	176	36.4	45	39	178
	575—3—60	STD	0.24	3.8	21.6	25	23	128	25.4	30	27	132
		MED			21.6	25	23	128	25.4	30	27	132
		HIGH			28.2	35	30	140	32	40	34	144

Legend and Notes for Table 2

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 convenient outlet
UNPWR CO	—	Unpowered convenient 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.

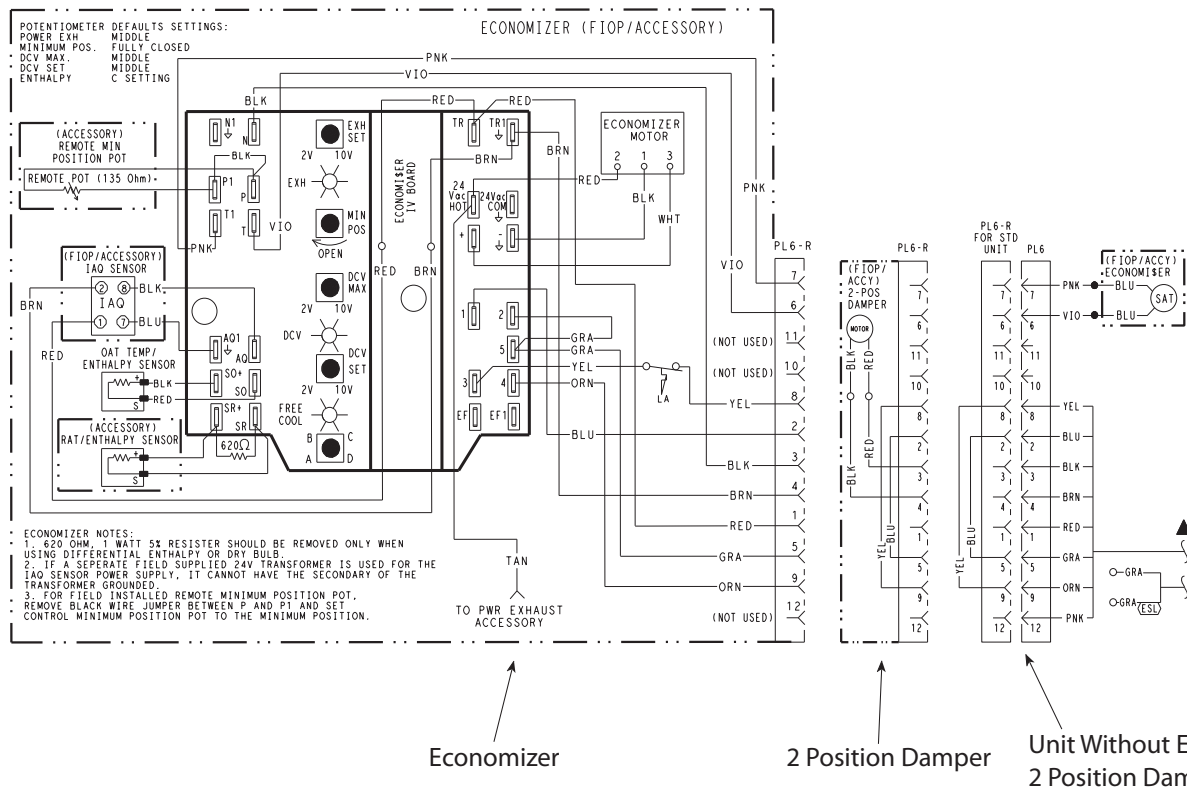
Determine percent of voltage imbalance.

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

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.

FIGURE 41 Wiring for Optional Economizer



Step 13 — Adjust Factory-Installed Options

Smoke Detectors —

Smoke detector(s) will be connected at the Central Terminal Board (CTB, at terminals marked "Smoke Shutdown". Remove jumper JMP 3 when ready to energize unit.

EconoMi\$er IV Occupancy Switch —

Refer to Fig. 42 for general EconoMi\$er IV wiring. External occupancy control is managed through a connection on the Central Terminal Board.

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

Step 14 — 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)
- Manual outside air damper
- Two-Position motorized outside air damper
- EconoMi\$er IV (with control and integrated barometric relief)

Barometric relief

Power Exhaust

Differential dry-bulb sensor (EconoMi\$er IV)

Outdoor enthalpy sensor

Differential enthalpy sensor

Time Guard II compressor anti-cycle control

Outdoor coil protector grille

Head pressure control

Programmable thermostat

Thermostat / Sensors

CO₂ sensor

Louvered hail guard

Phase monitor control

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