Installation Instructions

RAS Series – 3 Phase
Package Air Conditioner
Dual Compressor Units
With R–410A Refrigerant

7.5, 10, & 12.5 Ton with Microchannel Coil
7.5, 8.5 & 10 Ton with Round Tube/Plate Fin Coil

RAS090–120 SHOWN

PACKAGED ROOFTOP ELECTRIC COOLING UNITS

International Comfort Products, LLC
Lewisburg, TN. 37091

513 01 3304 00 11–12–09

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.

CONTENTS

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

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.

INSTALLATION

⚠ 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.

MODEL NOMENCLATURE

MODEL SERIES	R	A	S	0	9	0	H	D	A	A	0	A	G	A
Position Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14

R = Rooftop

A = Air Conditioning (Cooling Only)
G = Gas/Electric — **Type**

S = Standard ASHRAE 90.1-2010 Efficiency — **Efficiency**

090 = 90,000 = 7.5 Tons (Two Compressors)
102 = 102,000 = 8.5 Tons (Two Compressors)
120 = 120,000 = 10 Tons (Two Compressors)
150 = 150,000 = 12.5 Tons (Two Compressors) — **Nominal Cooling Capacity**

H = 208/230-3-60
L = 460-3-60
S = 575-3-60 — **Voltage**

0 = No Heat — **Heating Capacity**

A = Standard Motor
B = High Static Motor — **Motor Option**

A = None
B = Economizer w/Bara-relief, OA Temp Sensor
Outdoor Air Options / Control (See specifications for details)

0A = No Options
Factory Installed Options (See specifications for details)

A = Aluminum / Copper Cond & Evap Coil (RTPF)
G = Alum / Alum Cond & Alum / Cu Evap (MCHX-Microchannel))
Standard Condenser / Evaporator Coil Configuration (See specifications for details)

A = Sales Digit

Jobsite Survey

Complete the following checks before installation.

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

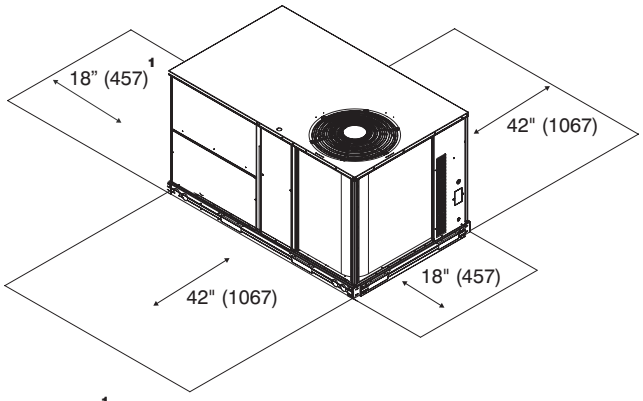
Step 1 — Plan for Unit Location

Select a location for the unit and its support system (curb or other) that provides for the minimum clearances required for safety. This includes the clearance to combustible surfaces, unit performance and service access below, around and above unit as specified in unit drawings. See Fig. 1.

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

Select a unit mounting system that provides adequate height to allow installation of condensate trap per requirements. Refer to Step 9 — Install External Condensate Trap and Line – for required trap dimensions.

FIGURE 1 — **Service Clearance Dimensional Drawing**



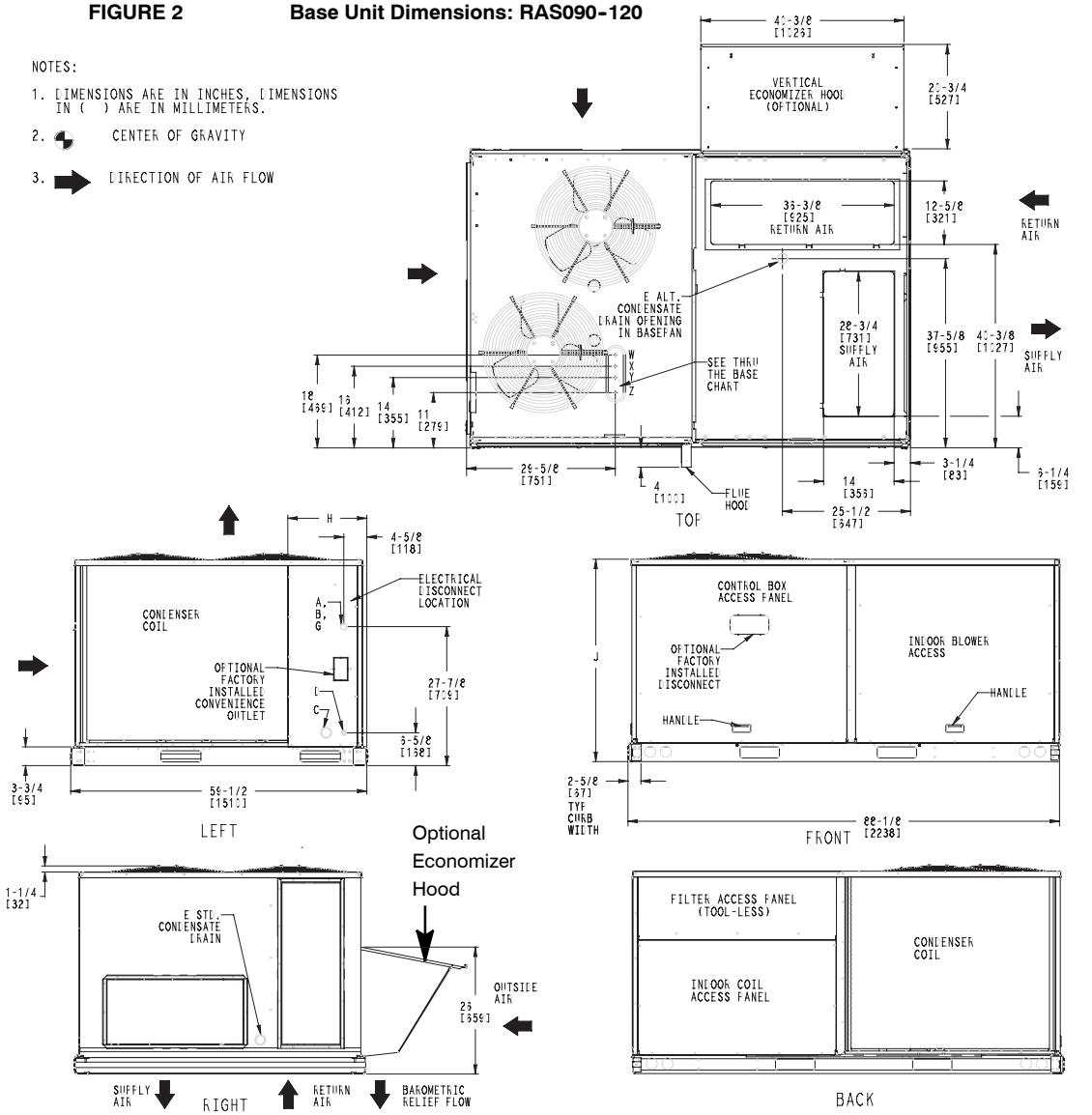
[1] **Required bottom condensate drain connection. Otherwise, 36" (914mm) for condensate connection.**

NOTE:Consider also the effect of adjacent units.

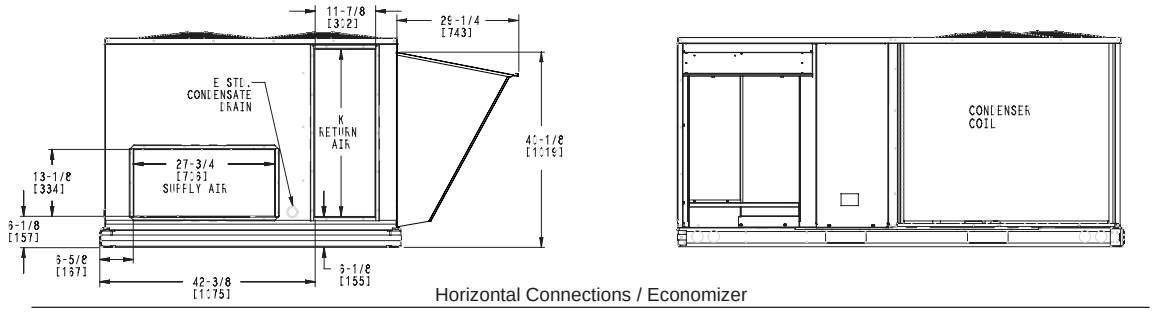
Roof mount —

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

FIGURE 2 **Base Unit Dimensions: RAS090-120**



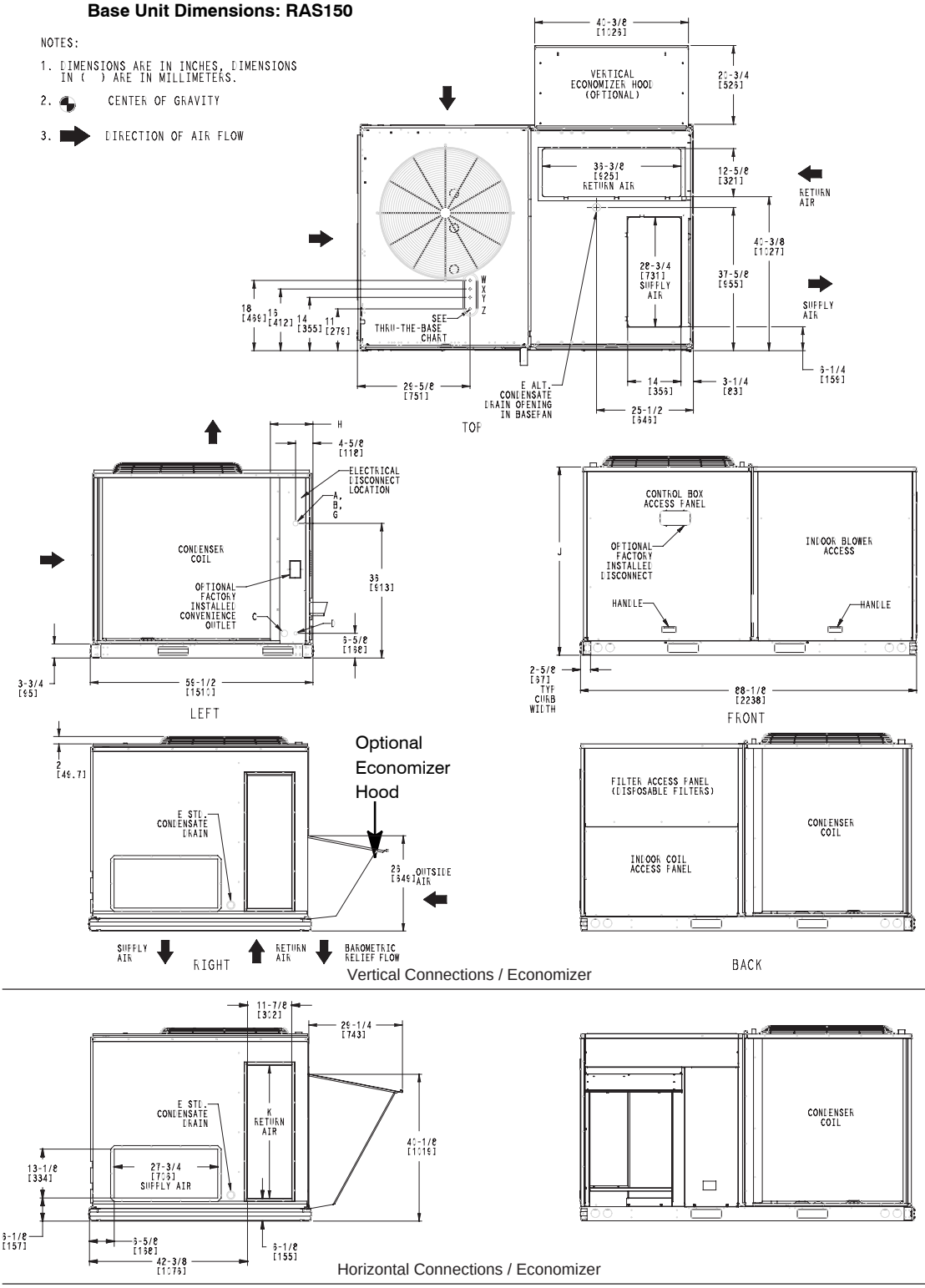
Vertical Connections / Economizer



Horizontal Connections / Economizer

	Connection Sizes		Thru the Base Chart These Holes Req'd For Use CRBTMPWR002A01						
			Threaded Conduit Size	Wire Use	Req'd Hole Sizes (Max.)	Unit	J	K	H
A	1-3/8" [35] DIA Field Power Supply Hole	W	1/2"	Acc.	7/8" [22.2]	090	41-1/4 [1048]	33 [658]	15-7/8 [403]
B	2-1/2" [64] DIA Power Supply Knockout	X	1/2"	24V	7/8" [22.2]	102	49-3/8 [1253]	37-1/4 [946]	15-7/8 [403]
C	1-3/4" [51] DIA Gauge Access Plug	Y	1-1/4" (002)	Power*	1-3/4" [44.4]	120	49-3/8 [1253]	37-1/4 [946]	15-7/8 [403]
D	7/8" [22] DIA Field Control Wiring Hole		For "Thru-the-Basepan" factory option, fittings for only X & Y are provided.			090*	41-1/4 [1048]	33 [658]	23 [584.2]
E	3/4" 14 NPT Condensate Drain					120*	49-3/8 [1253]	37-1/4 [946]	11 [279.4]
G	2" [51] DIA Power Supply Knockout					* Two Stage cooling models with Microchannel Condenser coil			

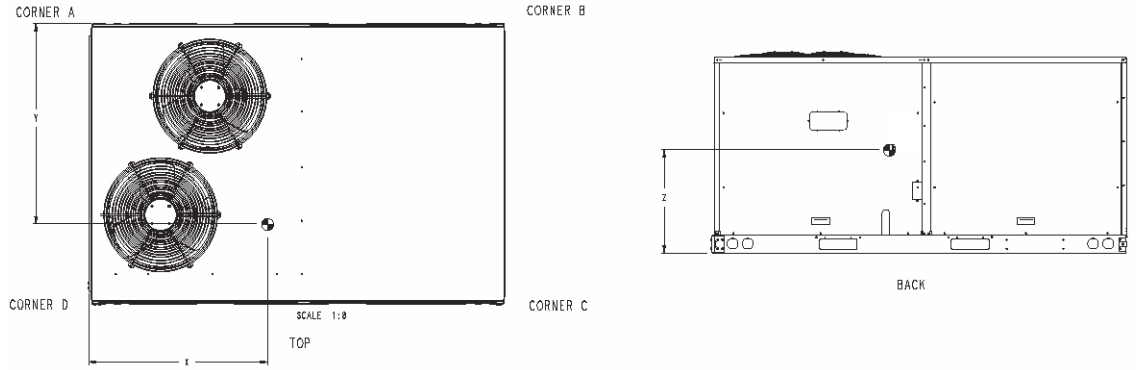
Figure 2A **Base Unit Dimensions: RAS150**



	Connection Sizes		Thru the Base Chart These Holes Req'd For Use CRBTMPWR002A01, 004A01			Unit	H	J	K
			Threaded Conduit Size	Wire Use	Req'd Hole Sizes (Max.)				
A	1-3/8" [35] DIA Field Power Supply Hole	W	1/2"	Acc.	7/8" [22.2]	150*	11-3/8 [1048]	49-3/8 [1253]	35-5/8 [905]
B	2-1/2" [64] DIA Power Supply Knockout	X	1/2"	24V	7/8" [22.2]	* Two Stage cooling model with Microchannel condenser coil.			
C	1-3/4" [51] DIA Gauge Access Plug	Y	1-1/4" (002, 004)	Power*	1-3/4" [44.4]				
D	7/8" [22] DIA Field Control Wiring Hole	For "Thru-the-Basepan" factory option, fittings for only X & Y are provided.							
E	3/4" 14 NPT Condensate Drain								
G	2" [51] DIA Power Supply Knockout								

Unit Dimensional Drawing (Cont.)													
	BASE UNIT WEIGHT		Corner Weight A		Corner Weight B		Corner Weight C		Corner Weight D		Center of Gravity In [mm]		Height In [mm]
UNIT	LBS	KG	LBS	KG	LBS	KG	LBS	KG	LBS	KG	X	Y	Z
RAS090	750	340.5	156	70.8	153	69.5	219	99.4	222	100.8	43-3/4 [111.3]	35 [889]	20 [508]
RAS102	855	388.2	223	101.2	171	77.6	200	90.8	261	118.5	38-3/8 [975]	32-1/8 [816]	19-1/8 [486]
RAS120	865	392.7	225	102.2	173	78.5	203	92.2	264	120	38-3/8 [975]	32-1/8 [816]	19-1/8 [486]

FIGURE 3



Unit Dimensional Drawing (Cont.)													
	BASE UNIT WEIGHT		Corner Weight A		Corner Weight B		Corner Weight C		Corner Weight D		Center of Gravity In [mm]		Height In [mm]
UNIT	LBS	KG	LBS	KG	LBS	KG	LBS	KG	LBS	KG	X	Y	Z
RAS150	1030	467	294	133	146	66	197	89	395	179	28-3/8 [721]	33-1/8 [841]	21-3/8 [543]

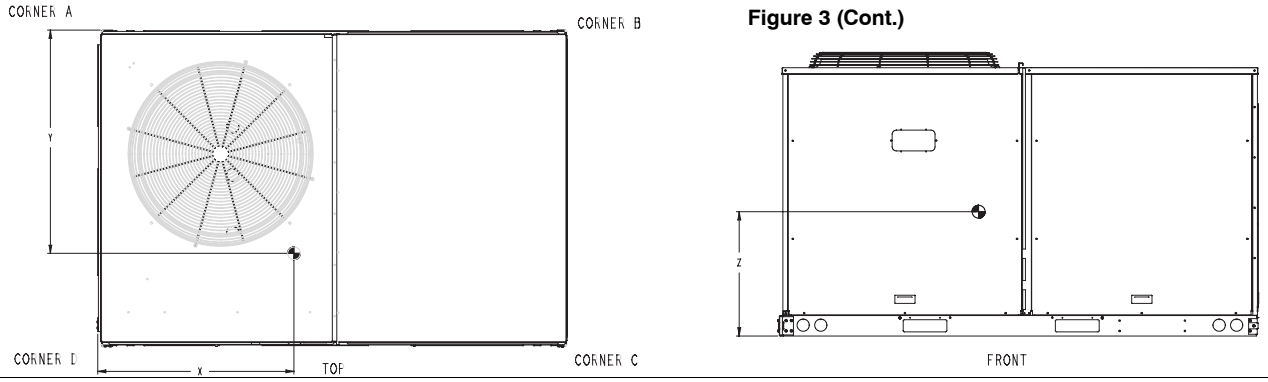


Figure 3 (Cont.)

Table 1—Operating Weights

	UNITS LB (KG)			
Component	RAS090	RAS102	RAS120	RAS150
Base Unit *	750 (341)	855 (388.2)	865 (393)	1030 (467)
Size (Tons)	7.5	8.5	10	12.5
Number of Compressors	2	2	2	2
Economizer				
Vertical	80 (36)	80 (36)	80 (36)	80 (36)
Horizontal	105 (48)	105 (48)	105 (48)	105 (48)
Curb				
14-in/356 mm	133 (60)	133 (60)	133 (60)	133 (60)
24-in/610 mm	174 (79)	174 (79)	174 (79)	174 (79)

* Weights represent the RTPF models.

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 roof curb

Install field-fabricated ductwork inside curb

Install accessory thru-base service connection package, if used, (affects curb and unit) (refer to accessory installation instructions for details)

Prepare 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

Install outdoor air hood

Convert unit to side duct connection arrangement

Install field-fabricated ductwork at unit duct openings

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. 4. 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. 4. 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.

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

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

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.

FIGURE 4	Roof Curb Details

RoofCurb Accessory	A	Unit Size
CRRFCURB003A01	1’ 2 “ [356]	RAS090−150
CRRFCURB004A01	2’ 0” [610]	

NOTES:
1. Roofcurb accessory is shipped disassembled.
2. Insulated panels, 1” thick polyurethane foam, 1−3/4# density.
3. Dimensions in. [ ] in millimeters.
4. Roofcurb 18 ga steel.
5. Attach ductwork to curb (Flanges of duct rest on curb)
6. Service clearance 4’ on each side.
7⇨ Direction of airflow.
8. Connector pkg. CRBTMPWR002A01 is for thru−the−curb connections. Pkg. CRBTMPWR004A01 is for thru−the−bottom connections.

Connector Pkg. Acc.	B	C	D Alt. Drain Hole	Gas	Power	Control	Accessory Power
CRBTMPWR002A01	2’ 8V−7/16” [827]	1’ 10I−15/16” [583]	1I−3/4” [44.5]	3/4” [19] NPT	3/4” [19] NPT 1I−1/4” [31.7] NPT	1/2” [12.7] NPT	1/2” [12.7] NPT
CRBTMPWR004A01				3/4” [19] NPT	1I−1/4” [31.7] NPT		

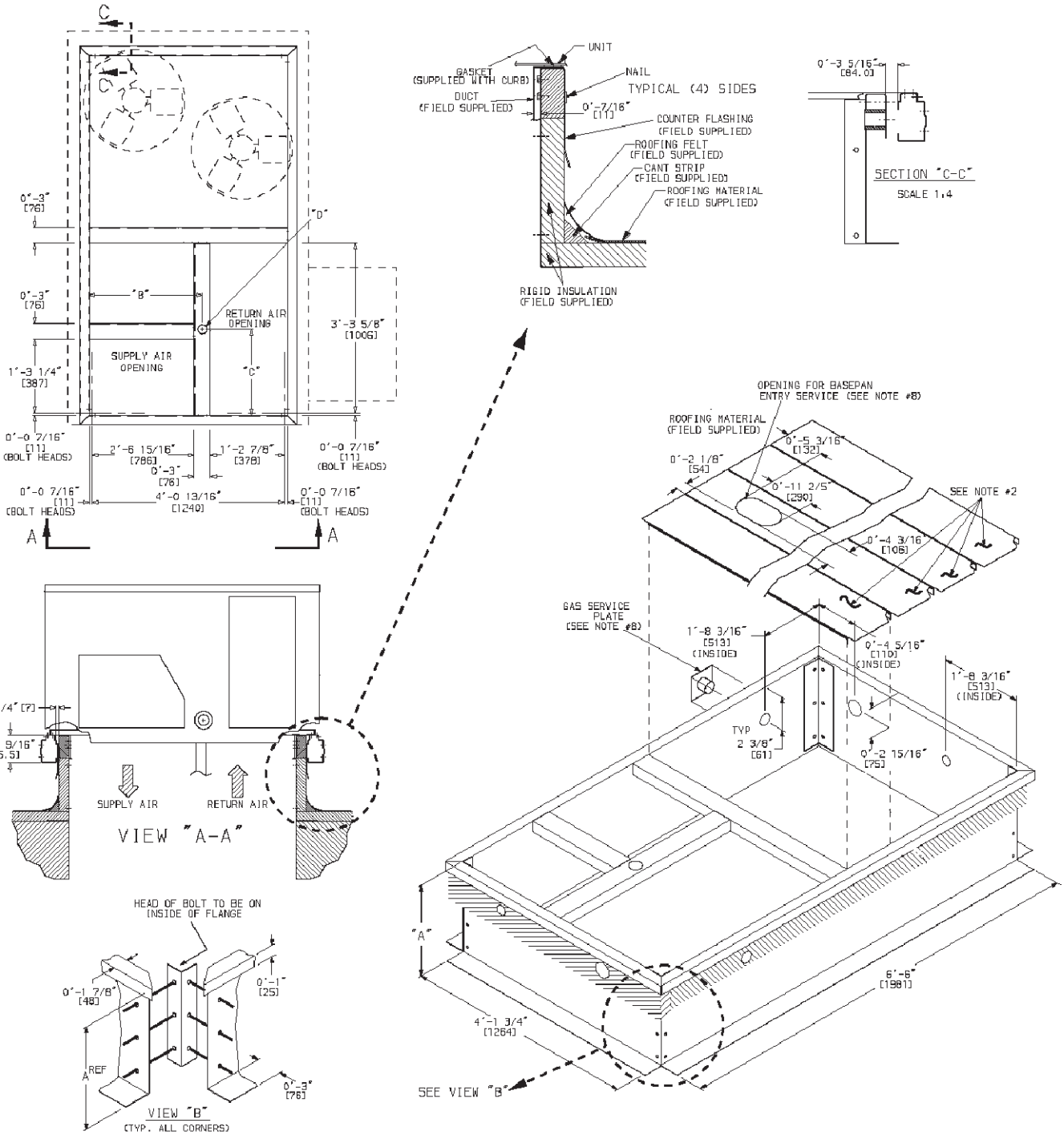
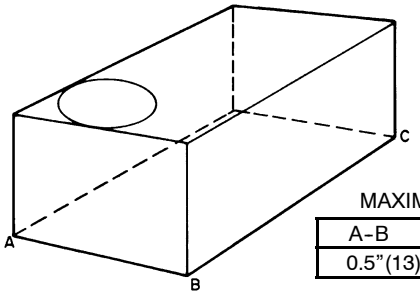


FIGURE 5 Unit Leveling Tolerances



MAXIMUM ALLOWABLE

A-B	B-C	A-C
0.5"(13)	1.0" (25)	1.0" (25)

Step 5 — Field Fabricate Ductwork

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

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

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.

For units with accessory electric heaters: Horizontal applications require a minimum clearance to combustible surfaces of 1-in (25 mm) from duct for first 12-in (305 mm) away from unit. Vertical applications do not require a minimum clearance.

A minimum clearance is not required around ductwork.

Step 6 — Rig and Place Unit

Keep unit upright and do not drop. Spreader bars are not required if top crating is left on unit. 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. 6. Refer to rigging instructions on unit.

⚠ CAUTION

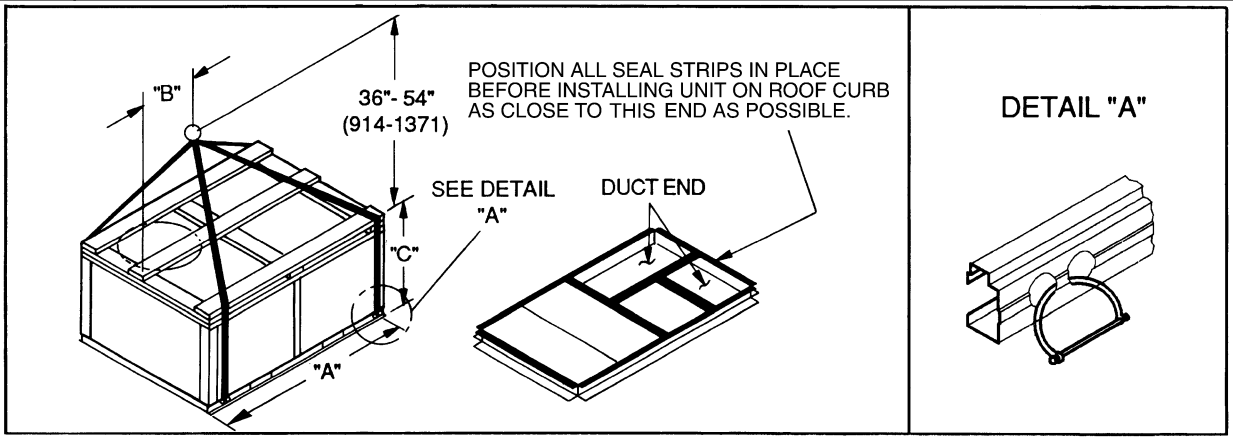
UNIT DAMAGE HAZARD

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 6 Rigging Details



NOTES:
1. Dimensions in ( ) are in millimeters.
2. Hook rigging shackles through holes in base rail, as shown in detail "A." Holes in base rails are centered around the unit center of gravity. Use wooden top skid when rigging to prevent rigging straps from damaging unit.
3. Unit weights do not include economizer. See Table 1 for economizer weights.

UNIT	MAX WEIGHT		DIMENSIONS					
			A		B		C	
	LB	KG	IN	MM	IN	MM	IN	MM
RAS090	1410	641	88.0	2235	41.0	1040	41.5	1055
RAS102	1525	693	88.0	2235	40.5	1030	49.5	1255
RAS120	1565	711	88.0	2235	40.0	1015	49.5	1255
RAS150	1720	782	88.0	2235	28.4	725	53.0	1345

Positioning on Curb

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

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

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

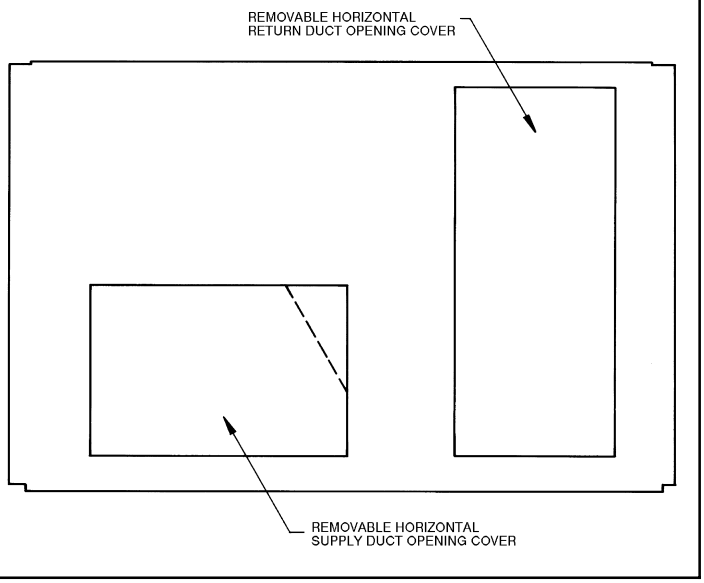
All panels must be in place when rigging. Unit is not designed for handling by fork truck.

After unit is in position, remove rigging skids and 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 may be field-converted to horizontal ducted configuration. To convert to horizontal configuration, remove screws from side duct opening covers and remove covers. Using the same screws, install covers on vertical duct openings with the insulation-side down. Seals around duct openings must be tight. See Fig. 7.

FIGURE 7 HORIZONTAL CONVERSION PANELS



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 Optional 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. 8.)
3. Locate and cut the (2) plastic tie--wraps, being careful to not damage any wiring. (See Fig. 9.)
4. Carefully lift the hood assembly through the filter access opening and assemble per the steps outlined in Economizer Hood and Two–Position Hood.

FIGURE 8 Typical Access Panel Locations

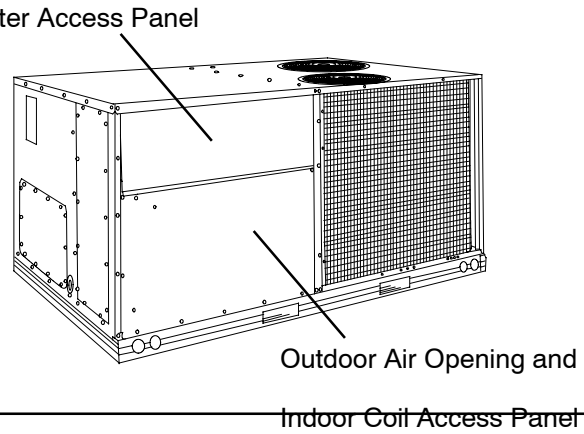
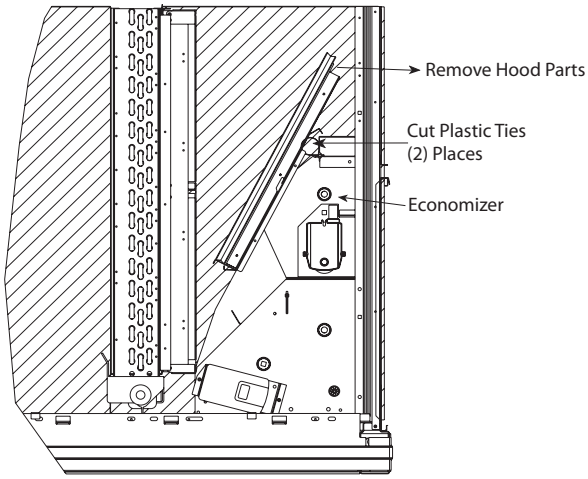


FIGURE 9 Economizer Wiring

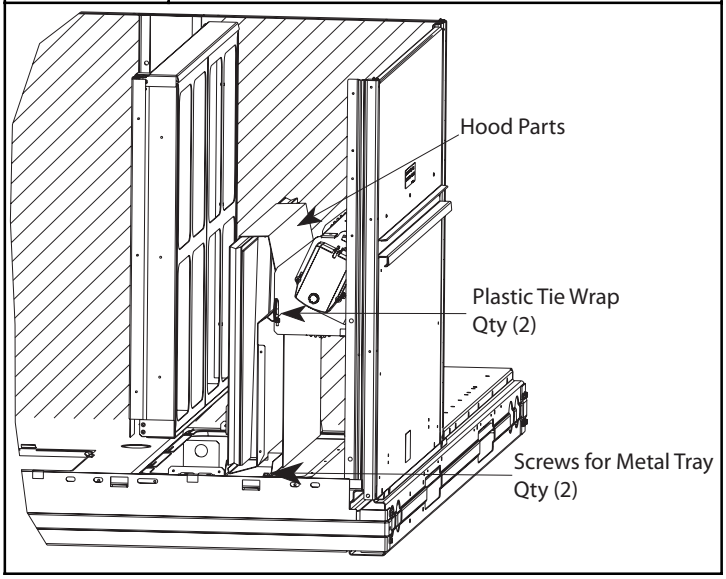


Motorized 2-Position Damper Hood (Optional) —

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. 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* on page 11.

FIGURE 10 **Damper Details**

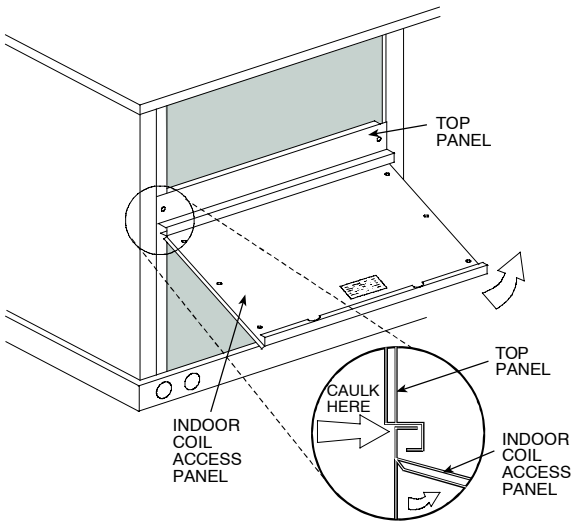


Economizer Hood and Two Position Hood (Optional)

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

1. The indoor coil access panel will be used as the top of the hood. Remove the screws along the sides and bottom of the indoor coil access panel. See Fig. 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). Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 12.
3. Remove the shipping tape holding the economizer barometric relief damper in place.
4. Insert the hood divider between the hood sides. See Fig. 12 and 13. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.
5. Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 13.
6. Caulk the ends of the joint between the unit top panel and the hood top.
7. Replace the filter access panel.

FIGURE 12 **Economizer Hood Construction**

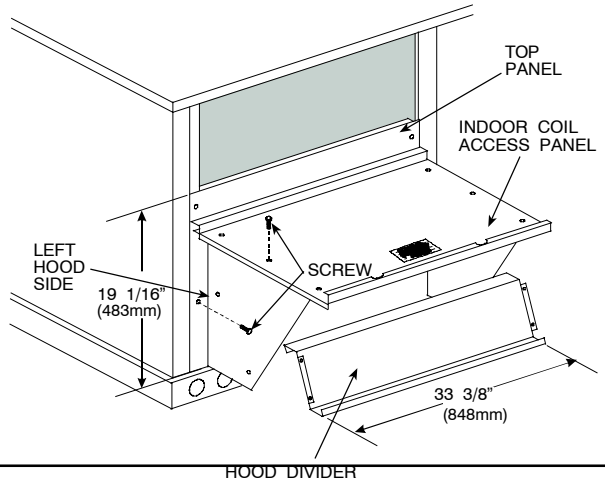
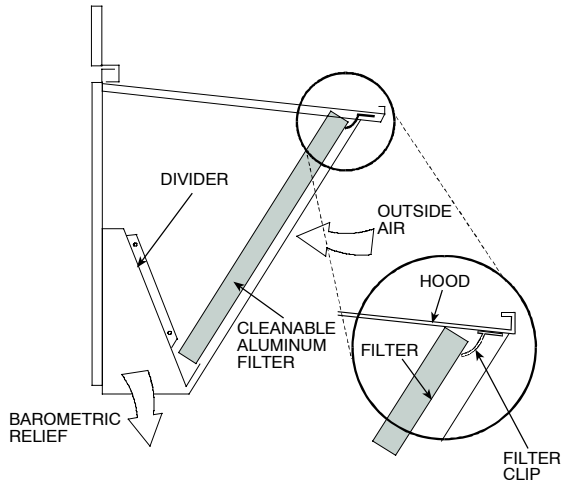


FIGURE 13 **Economizer Filter Installation**



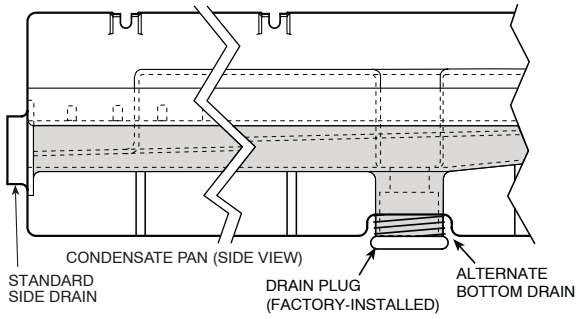
Step 9 — Install External Condensate Trap and Line

The unit has one $^3/_4$-in. condensate drain connection on the end of the condensate pan and an alternate connection on the bottom. See Fig. 14. Unit airflow configuration does not determine which drain connection to use. Either drain connection can be used with vertical or horizontal applications.

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.

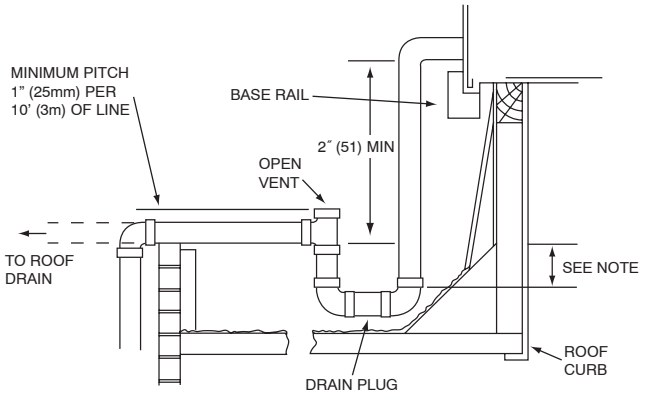
To use the alternate bottom drain connection, remove the red drain plug from the bottom connection (use a 1/2–in. square socket drive extension) and install it in the side drain connection.

FIGURE 14 | **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. 15.

FIGURE 15 | **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 10 — 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.

Field Power Supply —

All units except 208/230-v units are factory wired for the voltage shown on the nameplate. *If the 208/230-v unit is to be connected to a 208-v power supply, the control transformer must be rewired by moving the black wire with the $^1/_4$-in. female spade connector from the 230-v connection and moving it to the 200-v $^1/_4$-in. male terminal on the primary side of the transformer.* Refer to unit label diagram for additional information. Field power wires will be connected line–side pressure lugs on the power terminal block or at factory–installed option non–fused disconnect.

Field power wires are connected to the unit at line–side pressure lugs on compressor contactor C and indoor fan contactor IFC (see wiring diagram label for control box component arrangement) or at factory–installed option non–fused disconnect switch. Max wire size is #2 AWG (copper only).

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

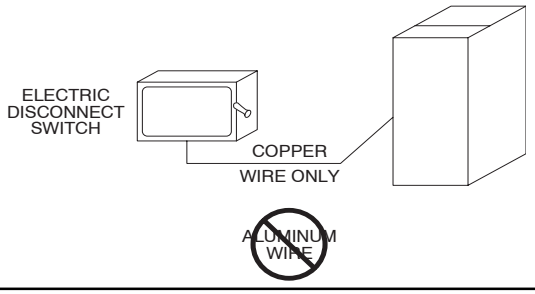
⚠ WARNING

ELECTRICAL SHOCK 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. 16.)

FIGURE 16 | **Disconnect Switch and Unit**



Units Without Factory-Installed Disconnect —

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

Convenience Outlets (Non-Powered) —

⚠ WARNING

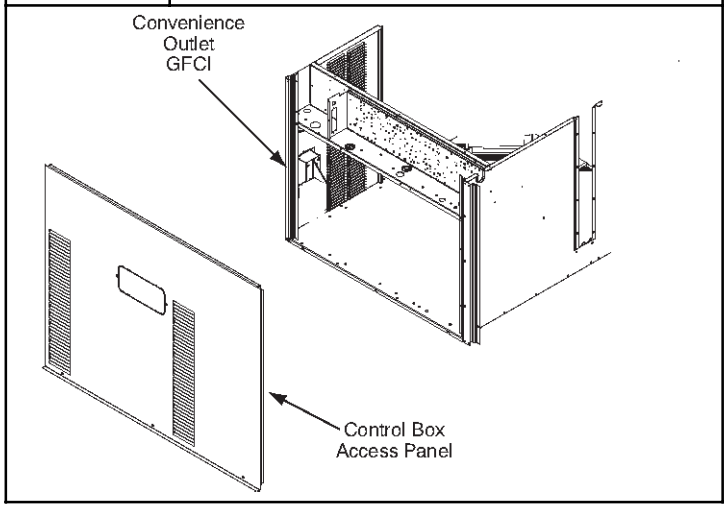
ELECTRICAL OPERATION HAZARD

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.

An optional non-powered convenience outlet are offered on RAS models: Non-powered provide a 125-volt GFCI (ground-fault circuit-interrupter) duplex receptacle rated at 15-A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 17.

FIGURE 17 | **Non-Powered Convenience Outlet Location**



Installing Weatherproof Cover –

A weatherproof while-in-use cover for the factory-installed convenience outlets is now required by UL standards. This cover cannot be factory-mounted due 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.

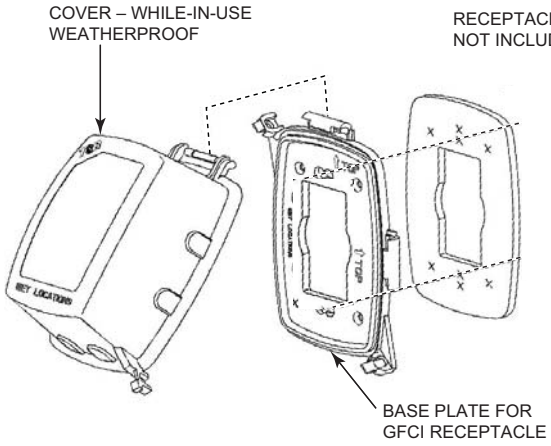
DISCONNECT ALL POWER TO UNIT AND CONVENIENCE OUTLET.

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).

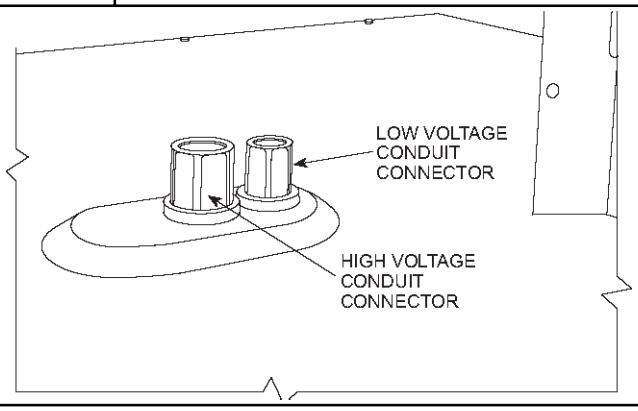
Mount the weatherproof cover to the backing platd as shown in Fig. 18. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover. Check for full closing and latching.

FIGURE 18 | **Weatherproof Cover Installation**



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, 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.

FIGURE 19 | **Thru-Base Connection Fittings**



Optional Thru-Base Connections —

This accessory (field installed) service connection kit consists of a 1-1/4-in and a 1/2-in electrical bulkhead connector, all must be installed in the embossed (raised) section of the unit basepan in the condenser section. The 1/2-in bulkhead connector enables the low-voltage control wires to pass through the basepan. The 1-1/4-in electrical bulkhead connector allows the high-voltage power wires to pass through the basepan. See Fig. 19.

Note: This must be installed prior to mounting unit on roof curb.

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.

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate. See Table 3. 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 3, Note 2 to determine the percent of voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable warranty.

Field Control Wiring —

The RAS unit requires an external temperature control device. This device typically applied with a commercial thermostat (field-supplied) with both occupied and unoccupied setpoints at a minimum.

Thermostat —

Install an approved accessory commercial thermostat according to installation instructions included with the accessory. For complete economizer function, select a two-stage cooling thermostat. Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions.

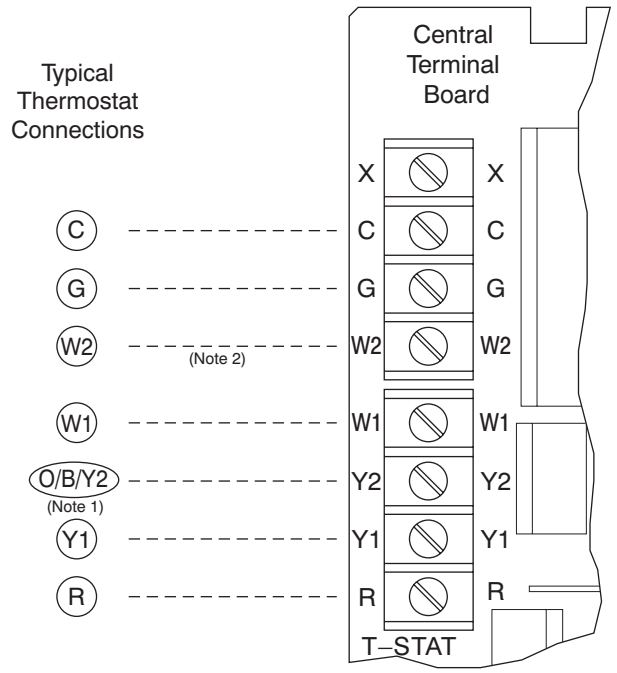
If the thermostat contains a logic circuit requiring 24-v power, use a thermostat cable or equivalent single leads of different colors with minimum of seven leads. If the thermostat does not require a 24-v source (no “C” connection required), use a thermostat cable or equivalent with minimum of six leads. 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.

Unit without thru-base connection kit —

Pass the thermostat control wires through the hole provided in the corner post; then feed the wires through the raceway built into the corner post to the control box. Pull the wires over to the terminal strip on the upper-left corner of the Controls Connection Board. See Fig. 20 and 21.

FIGURE 20 | **Typical Low Voltage Control Connections**

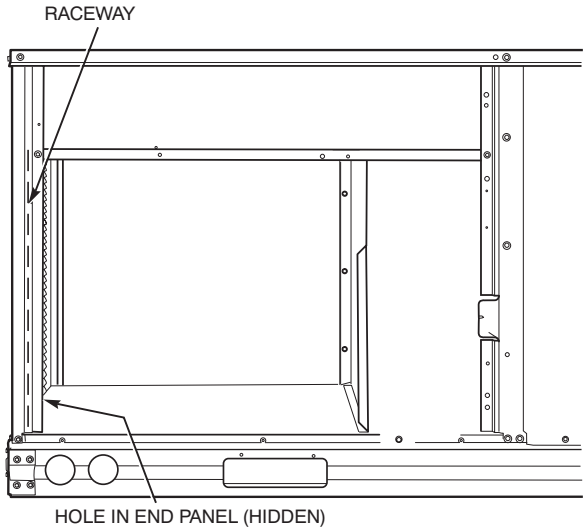


Note 1: Typical multi-function marking. Follow manufacturer’s configuration instructions to select Y2.

Note 2: W2 connection not required on units with single-stage heating.

– – – Field Wiring

FIGURE 21 | **Field Control Wiring Raceway**



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.

Electric Heaters

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

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

Heater modules are installed in the compartment below the indoor (supply) fan outlet. Access is through the indoor access panel. Heater modules slide into the compartment on tracks along the bottom of the heater opening. See Fig. 22, Fig. 23 and Fig. 24.

Unit heaters are marked with Heater Model Numbers. But heaters are ordered as and shipped in cartons marked with a corresponding heater Sales Package part number. See Table 2 for correlation between heater Model Number and Sales Package part number.

NOTE:The value in position 9 of the part number differs between the sales package part number (value is 1) and a bare heater model number (value is 0).

FIGURE 22 Typical Access Panel Location

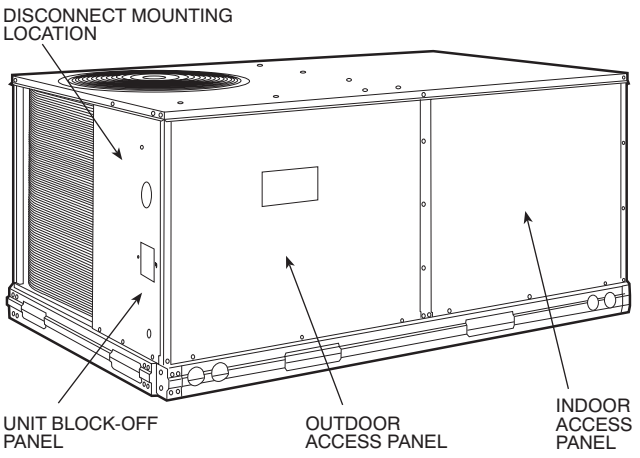


FIGURE 23 Typical Component Location

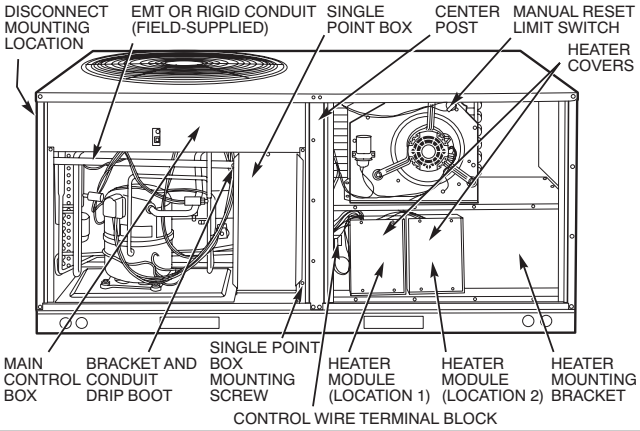


FIGURE 24 Typical Module Installation

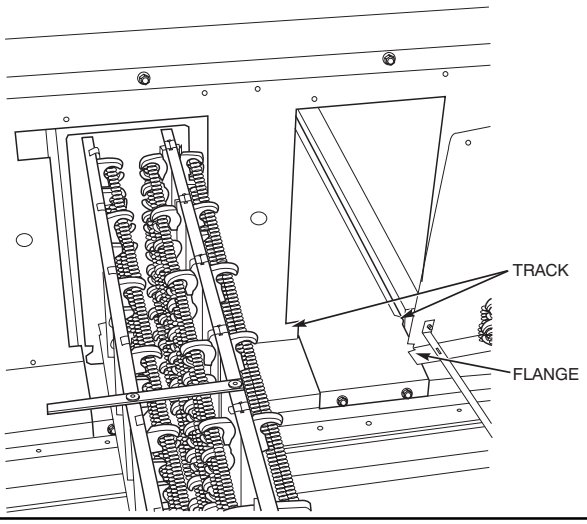


Table 2—Heater Model Number

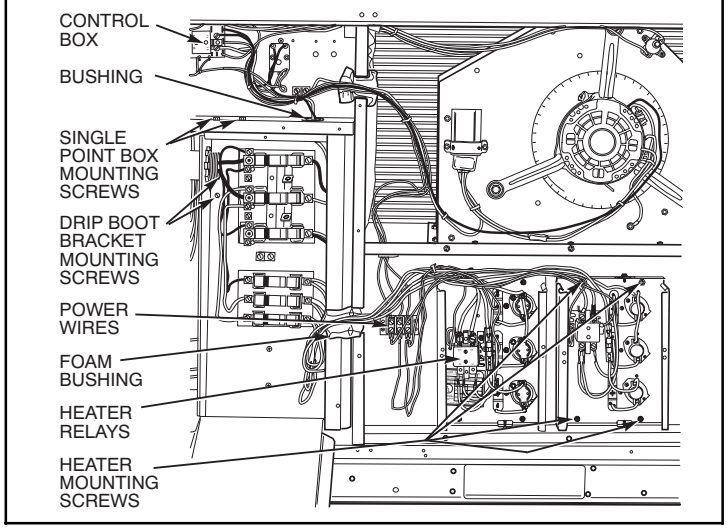
Bare Heater Model Number	C	R	H	E	A	T	E	R	0	0	1	A	0	0
Heater Sales Package PNO Includes: **Bare Heater** **Carton and packing materials** **Installation sheet**	**C**	**R**	**H**	**E**	**A**	**T**	**E**	**R**	**1**	**0**	**1**	**A**	**0**	**0**

Single Point Boxes and Supplementary Fuses — When the unit MOCP device value exceeds 60–A, unit–mounted supplementary fuses are required for each heater circuit. These fuses are included in accessory Single Point Boxes, with power distribution and fuse blocks. The single point box will be installed directly under the unit control box, just to the left of the partition separating the indoor section (with electric heaters) from the outdoor section. The Single Point Box has a hinged access cover. See Fig. 25. The Single Point Box also includes a set of power taps and pigtails to complete the wiring between the Single Point Box and the unit's main control box terminals. Refer to the accessory heater and Single Point Box installation instructions for details on tap connections.

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

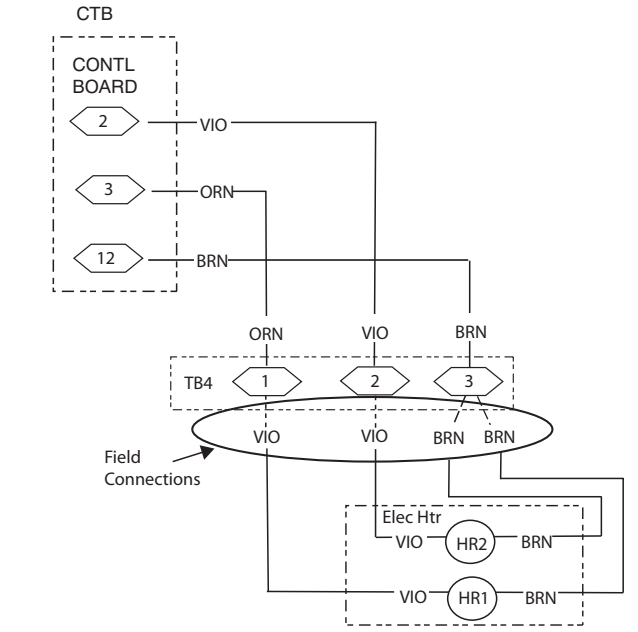
Single Point Boxes without Fuses — Unit heater applications not requiring supplemental fuses require a special Single Point Box without any fuses. The accessory Single Point Boxes contain a set of power taps and pigtails to complete the wiring between the Single Point Box and the unit's main control box terminals. Refer to accessory heater and Single Point Box installation instructions for details on tap connections.

FIGURE 25 **Typical Single Point Installation**



Low–Voltage Control Connections — Pull the low–voltage control leads from the heater module(s) – VIO and BRN (two of each if two modules are installed; identify for Module #1) – to the 4–pole terminal board TB4 located on the heater bulkhead to the left of Heater #1. Connect the VIO lead from Heater #1 to terminal TB4–1. For 2 stage heating, connect the VIO lead from Heater #2 to terminal TB4–2. For 1 stage heating with 2 heater modules connect the VIO lead from both Heater #1 and #2 to terminal TB4–1. Connect both BRN leads to terminal TB4–3. See Fig. 26.

FIGURE 26 **Accessory Electric Heater Control Connections**



HR1: On Heater 1 in Position #1
HR2: On Heater 2 in Position #2 (if installed)

SMOKE DETECTORS

Smoke detectors are available as factory–installed options on RAS models. Smoke detectors may be specified for Supply Air only without or with economizer. 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.

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. 27) 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 (on the cover face).

Sensor

The sensor (see Fig. 28) 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 is shipped in the blower section and is wire tied to the blower housing. See Fig. 29. 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).

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.

FIGURE 27 Controller Assembly

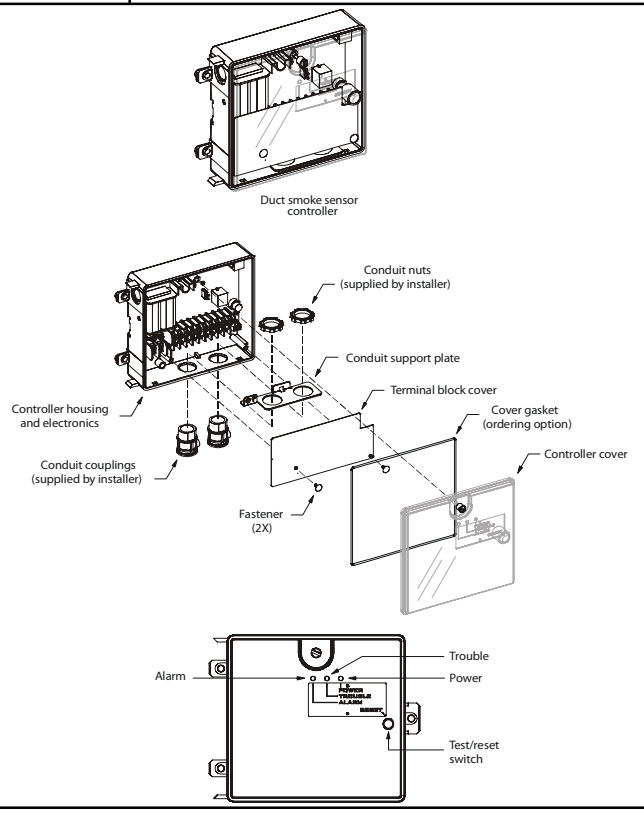
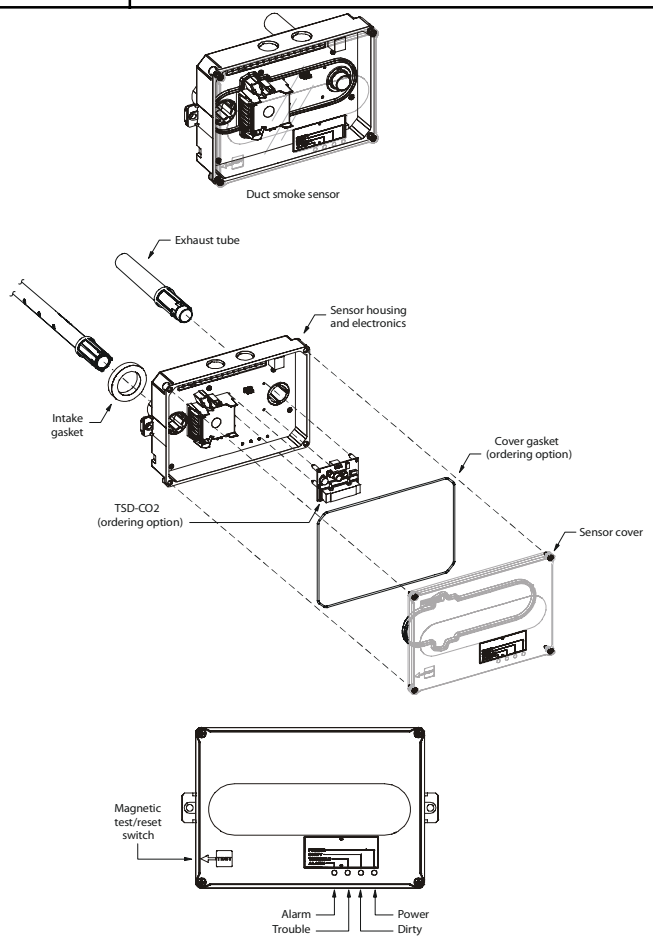


FIGURE 28 Smoke Detector Sensor



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. 29. Access is through the fan 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.

FIGURE 29 Typical Supply Air Smoke Detector Sensor Locations

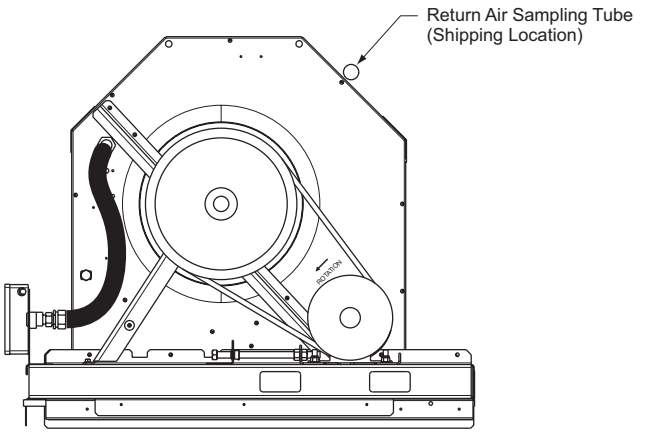


Table 3—MCA/MOCP Determination No C.O. or UNPWRD C.O.

UNIT	Volt–Ph–Hz	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
					NO P.E.				w/ P.E. (pwrd fr/unit)			
							DISC. SIZE				DISC. SIZE	
			Nom* (kW)	FLA	MCA	MOCP	FLA	LRA	MCA	MOCP	FLA	LRA
RAS090	208/230–3–60	STD	None	None	38.8	50	41	193	42.6	50	45	195
			7.8/10.4	21.7/25.0	38.8/38.8	50/50	41/41	193/193	42.6/42.6	50/50	45/45	197/197
			12.0/16.0	33.4/38.5	48.3/54.6	50/60	44/50	193/193	53.0/59.4	60/60	49/55	197/197
			18.6/24.8	51.7/59.7	71.1/81.1	80/90	65/75	193/193	75.9/85.9	80/90	70/79	197/197
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	193/193	94.6/107.5	100/110	87/99	197/197
			31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	193/193	121.8/138.8	125/150	112/128	197/197
		MED**	None	None	41.8	50	43	230	44.9	50	48	234
			7.8/10.4	21.7/25.0	41.8/41.8	50/50	43/43	230/230	44.9/44.9	50/50	48/48	234/234
			12.0/16.0	33.4/38.5	51.1/57.5	60/60	47/53	230/230	55.9/62.3	60/70	51/57	234/234
			18.6/24.8	51.7/59.7	74.0/84.0	80/90	68/77	230/230	78.8/88.8	80/90	72/82	234/234
			24.0/32.0	66.7/77.0	92.8/105.6	100/110	85/97	230/230	97.5/110.4	100/125	90/102	234/234
			31.8/42.4	88.4/102.0	119.9/136.9	125/150	110/126	230/230	124.6/141.6	125/150	115/130	234/234
		HIGH	None	None	49.3	60	52	256	52.8	60	56	260
			7.8/10.4	21.7/25.0	49.3/50.0	60/60	52/52	256/256	52.8/54.8	60/60	56/56	260/260
			12.0/16.0	33.4/38.5	60.5/66.9	70/70	56/62	256/256	65.3/71.6	70/80	60/66	260/260
			18.6/24.8	51.7/59.7	83.4/93.4	90/100	77/86	256/256	88.1/98.1	90/100	81/90	260/260
			24.0/32.0	66.7/77.0	102.1/115.0	110/125	94/106	256/256	106.9/119.8	110/125	98/110	260/260
			31.8/42.4	88.4/102.0	129.3/146.3	150/150	119/135	256/256	134.0/151.0	150/175	123/139	260/260
	460–3–60	STD	None	None	17.9	20	19	95	19.7	25	21	97
			13.9	16.7	24.1	25	22	95	26.4	30	24	97
			16.5	19.8	28.0	30	26	95	30.3	35	28	97
			27.8	33.4	45.0	50	41	95	47.3	50	43	97
			33.0	39.7	52.9	60	49	95	55.1	60	51	97
			41.7	50.2	66.0	70	61	95	68.3	70	63	97
		MED**	None	None	18.7	25	20	114	20.5	25	22	116
			13.9	16.7	25.1	30	23	114	27.4	30	25	116
			16.5	19.8	29.0	30	27	114	31.3	35	29	116
			27.8	33.4	46.0	50	42	114	48.3	50	44	116
			33.0	39.7	53.9	60	50	114	56.1	60	52	116
			41.7	50.2	67.0	70	62	114	69.3	70	64	116
		HIGH	None	None	23.1	30	24	127	24.9	30	26	129
			13.9	16.7	30.1	35	28	127	32.4	35	30	129
			16.5	19.8	34.0	35	31	127	36.3	40	33	129
			27.8	33.4	51.0	60	47	127	53.3	60	49	129
			33.0	39.7	58.9	60	54	127	61.1	70	56	129
			41.7	50.2	72.0	80	66	127	74.3	80	68	129
	575–3–60	STD	None	None	13.1	15	14	77	16.9	20	19	81
			17.0	20.4	28.5	30	26	77	33.3	35	31	81
			34.0	40.9	54.1	60	50	77	58.9	60	54	81
		MED**	None	None	13.5	15	14	92	17.3	20	19	96
			17.0	20.4	29.0	30	27	92	33.8	35	31	96
			34.0	40.9	54.6	60	50	92	59.4	60	55	96
		HIGH	None	None	16.6	20	17	106	20.4	25	23	110
			17.0	20.4	32.5	35	30	106	37.3	40	34	110
			34.0	40.9	58.1	60	53	106	62.9	70	58	110

* Nominal valves, listed as 208/240V, 480V or 600V as appropriate.

** Available from Fast Parts.

LEGEND:

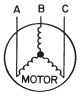
CO	–	Convenient outlet
DISC	–	Disconnect
FLA	–	Full load amps
IFM	–	Indoor fan motor
LRA	–	Locked rotor amps
MCA	–	Minimum circuit amps
MOCP	–	Maximum over current protection
PE	–	Power exhaust
UNPWRD CO	–	Unpowered convenient outlet

NOTES:

1. 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

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

$$= 227$$

Determine maximum deviation from average voltage.
(AB) 227 – 224 = 3 v . . . . . Maximum deviation is 4 v.
(BC) 231 – 227 = 4 v . . . . . Determine percent of voltage imbalance.

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

$$= 1.76\%$$

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.

Table 4—MCA/MOCP Determination No C.O. or UNPWRD C.O.

UNIT	Volt–Ph–Hz	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
					NO P.E.				w/ P.E. (pwrd fr/unit)			
							DISC. SIZE				DISC. SIZE	
			Nom* (kW)	FLA	MCA	MOCP	FLA	LRA	MCA	MOCP	FLA	LRA
RAS102	208/230–3–60	STD	None	None	40.0	50	42	193	42.6	50	45	195
			7.8/10.4	21.7/25.0	40.0/40.0	50/50	42/42	193/193	42.6/42.6	50/50	45/45	197/197
			12.0/16.0	33.4/38.5	48.3/54.6	50/60	44/50	193/193	53.0/59.4	60/60	49/55	197/197
			18.6/24.8	51.7/59.7	71.1/81.1	80/90	65/75	193/193	75.9/85.9	80/90	70/79	197/197
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	193/193	94.6/107.5	100/110	87/99	197/197
			31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	193/193	121.8/138.8	125/150	112/128	197/197
		MED**	None	None	40.0	50	42	230	44.9	50	48	234
			7.8/10.4	21.7/25.0	40.0/40.0	50/50	42/42	230/230	44.9/44.9	50/50	48/48	234/234
			12.0/16.0	33.4/38.5	48.3/54.6	60/60	44/50	230/230	55.9/62.3	60/70	51/57	234/234
			18.6/24.8	51.7/59.7	71.1/81.1	80/90	65/75	230/230	78.8/88.8	80/90	72/82	234/234
			24.0/32.0	66.7/77.0	89.9/102.8	100/110	83/95	230/230	97.5/110.4	100/125	90/102	234/234
			31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	230/230	124.6/141.6	125/150	115/130	234/234
		HIGH	None	None	44.8	50	47	256	52.8	60	56	260
			7.8/10.4	21.7/25.0	44.8/44.8	50/50	47/47	256/256	52.8/54.8	60/60	56/56	260/260
			12.0/16.0	33.4/38.5	54.3/60.6	50/60	50/56	256/256	65.3/71.6	70/80	60/66	260/260
			18.6/24.8	51.7/59.7	77.1/87.1	80/90	71/80	256/256	88.1/98.1	90/100	81/90	260/260
			24.0/32.0	66.7/77.0	95.9/108.8	90/110	88/100	256/256	106.9/119.8	110/125	98/110	260/260
			31.8/42.4	88.4/102.0	123.0/140.0	125/150	113/129	256/256	134.0/151.0	150/175	123/139	260/260
	460–3–60	STD	None	None	18.4	25	19	95	19.7	25	21	97
			13.9	16.7	24.1	25	22	95	26.4	30	24	97
			16.5	19.8	28.0	30	26	95	30.3	35	28	97
			27.8	33.4	45.0	50	41	95	47.3	50	43	97
			33.0	39.7	52.9	60	49	95	55.1	60	51	97
			41.7	50.2	66.0	70	61	95	68.3	70	63	97
		MED**	None	None	18.4	25	19	114	20.5	25	22	116
			13.9	16.7	25.1	25	22	114	27.4	30	25	116
			16.5	19.8	28.0	30	26	114	31.3	35	29	116
			27.8	33.4	45.0	50	41	114	48.3	50	44	116
			33.0	39.7	52.9	60	49	114	56.1	60	52	116
			41.7	50.2	66.0	70	61	114	69.3	70	64	116
		HIGH	None	None	20.2	25	21	127	24.9	30	26	129
			13.9	16.7	26.4	30	24	127	32.4	35	30	129
			16.5	19.8	30.3	35	28	127	36.3	40	33	129
			27.8	33.4	47.3	50	43	127	53.3	60	49	129
			33.0	39.7	55.1	60	51	127	61.1	70	56	129
			41.7	50.2	68.3	70	63	127	74.3	80	68	129
	575–3–60	STD	None	None	14.3	20	15	77	16.9	20	19	81
			17.0	20.4	28.5	30	26	77	33.3	35	31	81
			34.0	40.9	54.1	60	50	77	58.9	60	54	81
		MED**	None	None	13.9	20	15	92	17.3	20	19	96
			17.0	20.4	28.0	30	26	92	33.8	35	31	96
			34.0	40.9	53.6	60	50	92	59.4	60	55	96
		HIGH	None	None	14.7	20	15	106	20.4	25	23	110
			17.0	20.4	29.0	30	27	106	37.3	40	34	110
			34.0	40.9	54.6	60	50	106	62.9	70	58	110

* Nominal valves, listed as 208/240V, 480V or 600V as appropriate.

** Available from Fast Parts.

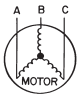
LEGEND:

CO	–	Convenient outlet
DISC	–	Disconnect
FLA	–	Full load amps
IFM	–	Indoor fan motor
LRA	–	Locked rotor amps
MCA	–	Minimum circuit amps
MOCP	–	Maximum over current protection
PE	–	Power exhaust
UNPWRD CO	–	Unpowered convenient outlet

NOTES:

3. 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.
4. **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.

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



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

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

$$= 227$$

Determine maximum deviation from average voltage.

(AB) 227 – 224 = 3 v . . . . . Maximum deviation is 4 v.

(BC) 231 – 227 = 4 v . . . . . Determine percent of voltage imbalance.

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

$$= 1.76\%$$

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.

Table 5—MCA/MOCP Determination No C.O. or UNPWRD C.O.

UNIT	NOM. V–PH–HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
					NO P.E.				w/ P.E. (pwrd fr/unit)			
							DISC. SIZE				DISC. SIZE	
			Nom* (kW)	FLA	MCA	MOCP	FLA	LRA	MCA	MOCP	FLA	LRA
RAS120	208/230–3–60	STD	None	None	43.7	50	46	258	47.5	60	50	262
			7.8/10.4	21.7/25.0	43.7/43.7	50/50	46/46	258/258	47.5/47.5	60/60	50/50	262/262
			12.0/16.0	33.4/38.5	48.3/54.6	50/60	46/50	258/258	53.0/59.4	60/60	50/55	262/262
			24.0/32.0	66.7/77.0	89.9/102.8	90/100	83/95	258/258	94.6/107.5	100/110	87/99	262/262
			31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	258/258	121.8/138.8	125/150	112/128	262/262
			37.6/50.0	104.2/120.3	136.8/126.8	150/150	126/144	258/258	141.5/131.6	150/150	130/149	262/262
		MED**	None	None	48.5	60	51	301	52.3	60	56	305
			7.8/10.4	21.7/25.0	48.5/48.5	60/60	51/51	301/301	523./52.3	60/60	56/56	305/305
			12.0/16.0	33.4/38.5	54.3/60.6	60/70	51/56	301/301	59.0/65.4	60/70	56/60	305/305
			24.0/32.0	66.7/77.0	95.9/108.8	110/110	88/100	301/301	10.6/113.5	110/125	93/104	305/305
			31.8/42.4	88.4/102.0	123.0/140.0	125/150	113/129	301/301	127.8/144.8	150/150	118/133	305/305
			37.6/50.0	104.2/120.3	142.8/132.8	150/150	130/150	301/301	147.5/137.6	150/150	136/154	305/305
		HIGH	None	None	53.5	60	57	310	57.3	70	61	314
			7.8/10.4	21.7/25.0	53.5/53.5	60/60	57/57	310/310	57.3/57.3	70/70	61/61	314/314
			12.0/16.0	33.4/38.5	60.5/66.9	70/70	57/62	310/310	65.3/71.6	70/80	61/66	314/314
			24.0/32.0	66.7/77.0	102.1/115.0	110/125	94/106	310/310	106.9/119.8	110/125	98/110	314/314
			31.8/42.4	88.4/102.0	129.3/146.3	150/150	119/135	310/310	134.0/151.0	150/175	123/139	314/314
			37.6/50.0	104.2/120.3	149.0/139.1	150/175	137/156	310/310	153.8/143.8	175/175	141/150	314/314
	460–3–60	STD	None	None	21.5	25	23	123	23.3	30	25	125
			13.9	16.7	24.1	25	23	123	26.4	30	25	125
			16.5	19.8	28.0	30	26	123	30.3	35	28	125
			33.0	39.7	52.9	60	49	123	55.1	60	51	125
			41.7	50.2	66.0	70	61	123	68.3	70	63	125
			50.0	60.1	63.4	70	72	123	65.6	70	74	125
		MED**	None	None	23.3	30	25	145	25.1	30	27	147
			13.9	16.7	26.4	30	25	145	28.6	30	27	147
			16.5	19.8	30.3	35	28	145	32.5	35	30	147
			33.0	39.7	55.1	60	51	145	57.4	60	53	147
			41.7	50.2	68.3	70	63	145	70.5	80	65	147
			50.0	60.1	65.6	80	74	145	67.9	80	76	147
		HIGH	None	None	26.3	30	28	149	28.1	35	30	151
			13.9	16.7	30.1	35	28	149	32.4	35	30	151
			16.5	19.8	34.0	35	31	149	36.3	40	33	151
			33.0	39.7	58.9	60	54	149	61.1	70	56	151
			41.7	50.2	72.0	80	66	149	74.3	80	68	151
			50.0	60.1	69.4	80	78	149	71.6	80	80	151
	575–3–60	STD	None	None	16.2	20	17	93	20.0	25	21	97
			17.0	20.4	28.0	30	26	93	32.8	35	30	97
			34.0	40.9	53.6	60	49	93	58.4	60	54	97
			51.0	61.3	63.8	70	73	93	68.6	80	77	97
		MED**	None	None	17.0	20	18	104	20.8	25	22	108
			17.0	20.4	29.0	30	27	104	33.8	35	31	108
			34.0	40.9	54.6	60	50	104	59.4	60	55	108
			51.0	61.3	64.8	70	74	104	69.6	80	78	108
		HIGH	None	None	19.8	25	21	118	23.6	30	25	122
			17.0	20.4	32.5	35	30	118	37.3	40	34	122
			34.0	40.9	58.1	60	53	118	62.9	70	58	122
			51.0	61.3	68.3	80	77	118	73.1	80	81	122

* Nominal valves, listed as 208/240V, 480V or 600V as appropriate.

** Available from Fast Parts.

See Legend on page 20.

Table 6—MCA/MOCP Determination No C.O. or UNPWRD C.O.

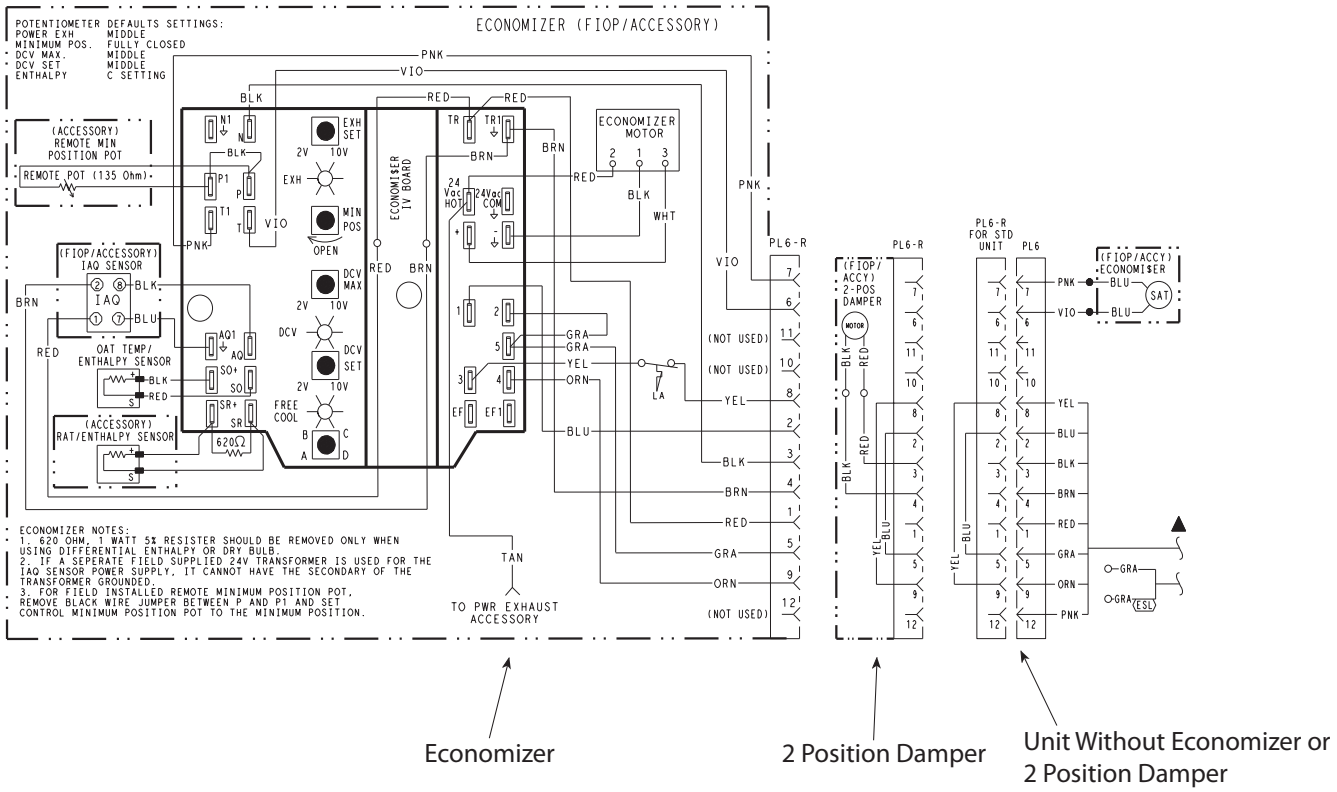
UNIT	NOM. V–PH–HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
					NO P.E.				w/ P.E. (pwrd fr/unit)			
							DISC. SIZE				DISC. SIZE	
			Nom* (kW)	FLA	MCA	MOCP	FLA	LRA	MCA	MOCP	FLA	LRA
RAS150	208/230–3–60	STD	None	None	60.7	80	63	360	64.5	80	68	364
			7.8/10.4	21.7/25.0	60.7/60.7	80/80	63/63	360/360	64.5/64.5	80/80	68/68	364/364
			12.0/16.0	33.4/38.5	60.7/60.7	80/80	63/63	360/360	64.5/64.5	80/80	68/68	364/364
			24.0/32.0	66.7/77.0	92.8/105.6	100/110	85/97	360/360	97.5/110.4	100/125	90/102	364/364
			31.8/42.4	88.4/102.0	119.9/136.9	125/150	110/126	360/360	124.6/141.6	125/150	115/130	364/364
			37.6/50.0	104.2/120.3	139.6/129.7	150/150	128/147	360/360	144.4/134.4	150/150	133/154	364/364
		MED**	None	None	63.2	80	66	377	67.0	80	71	381
			7.8/10.4	21.7/25.0	63.2/63.2	80/80	66/66	377/377	67.0/67.0	80/80	71/71	381/381
			12.0/16.0	33.4/38.5	63.2/63.2	80/80	66/66	377/377	37.0/67.0	80/80	71/71	381/381
			24.0/32.0	66.7/77.0	95.9/108.8	100/110	88/100	377/377	100.6/113.5	110/125	93/104	381/381
			31.8/42.4	88.4/102.0	123.0/140.0	125/150	113/129	377/377	127.8/144.8	150/150	118/133	381/381
			37.6/50.0	104.2/120.3	142.8/132.8	150/150	131/150	377/377	147.5/137.6	150/150	136/154	381/381
		HIGH	None	None	68.2	80	72	386	72.0	80	76	390
			7.8/10.4	21.7/25.0	68.2/68.2	80/80	72/72	386/386	72.0/72.0	80/80	76/76	390/390
			12.0/16.0	33.4/38.5	68.2/68.2	80/80	72/72	386/386	72.0/72.0	80/80	76/76	390/390
			24.0/32.0	66.7/77.0	102.1/115.0	110/125	94/106	386/386	106.9/119.8	110/125	98/110	390/390
			31.8/42.4	88.4/102.0	129.3/146.3	125/150	119/135	386/386	134.0/151.0	150/175	123/139	390/390
			37.6/50.0	104.2/120.3	149.0/139.1	150/175	137/156	386/386	153.8/143.8	175/175	141/160	390/390
	460–3–60	STD	None	None	29.5	40	31	181	31.3	40	33	183
			13.9	16.7	29.5	40	31	181	31.3	40	33	183
			16.5	19.8	29.5	40	31	181	31.3	40	33	183
			33.0	39.7	53.9	60	50	181	56.1	60	52	183
			41.7	50.2	67.0	70	62	181	69.3	70	64	183
			50.0	60.1	64.4	70	73	181	66.6	70	75	183
		MED**	None	None	30.5	40	32	190	32.3	40	34	192
			13.9	16.7	30.5	40	32	190	32.3	40	34	192
			16.5	19.8	30.5	40	32	190	32.5	40	34	192
			33.0	39.7	55.1	60	51	190	57.4	60	53	192
			41.7	50.2	68.3	80	63	190	70.5	80	64	192
			50.0	60.1	65.6	80	74	190	67.9	80	75	192
		HIGH	None	None	33.5	40	35	194	35.3	45	37	196
			13.9	16.7	33.5	40	35	194	35.3	45	37	196
			16.5	19.8	34.0	40	35	194	36.3	45	37	196
			33.0	39.7	58.9	60	54	194	61.1	70	56	196
			41.7	50.2	72.0	80	66	194	74.3	80	68	196
			50.0	60.1	69.4	80	78	194	71.6	80	80	196
	575–3–60	STD	None	None	22.3	30	23	142	26.1	30	28	146
			17.0	20.4	29.0	30	27	142	33.8	35	31	146
			34.0	40.9	54.6	60	50	142	59.4	60	55	146
			51.0	61.3	64.8	70	74	142	69.6	80	78	146
		MED**	None	None	22.3	30	23	142	26.1	30	28	146
			17.0	20.4	29.0	30	27	142	33.8	35	31	146
			34.0	40.9	54.6	60	50	142	59.4	60	55	146
			51.0	61.3	64.8	70	74	142	69.6	80	78	146
		HIGH	None	None	25.1	30	27	156	28.9	35	31	160
			17.0	20.4	32.5	35	30	156	37.3	40	34	160
			34.0	40.9	58.1	60	53	156	62.9	70	58	160
			51.0	61.3	68.3	80	77	156	73.1	80	81	160

* Nominal valves, listed as 208/240V, 480V or 600V as appropriate.

** Available from Fast Parts.

See Legend on page 20.

FIGURE 30 | **Wiring for Optional Economizer**



Step 11 — Adjust Factory-Installed Options

Smoke Detector —

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

Economizer Occupancy Switch —

Refer to Fig. 30 for general economizer wiring. External occupancy control is managed through a connection on the Controls Connections Board.

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

Step 12 — Install Accessories, As Required

Available accessories include:

- Roof Curb
- Thru-base connection kit (must be installed before unit is set on curb)
- Manual outside air damper
- Two-Position motorized outside air damper
- Economizer (with control and integrated barometric relief)
- Winter start kit
- Power exhaust
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- CO2 sensor
- Low ambient control
- Hood-type hail guard
- Phase monitor control

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