Installation Instructions

RAS Series – 3 Phase

7.5 to 10 Ton

With R–410A Refrigerant

PACKAGED AIR CONDITIONING UNITS

International Comfort Products, LLC
Lewisburg, TN. 37091

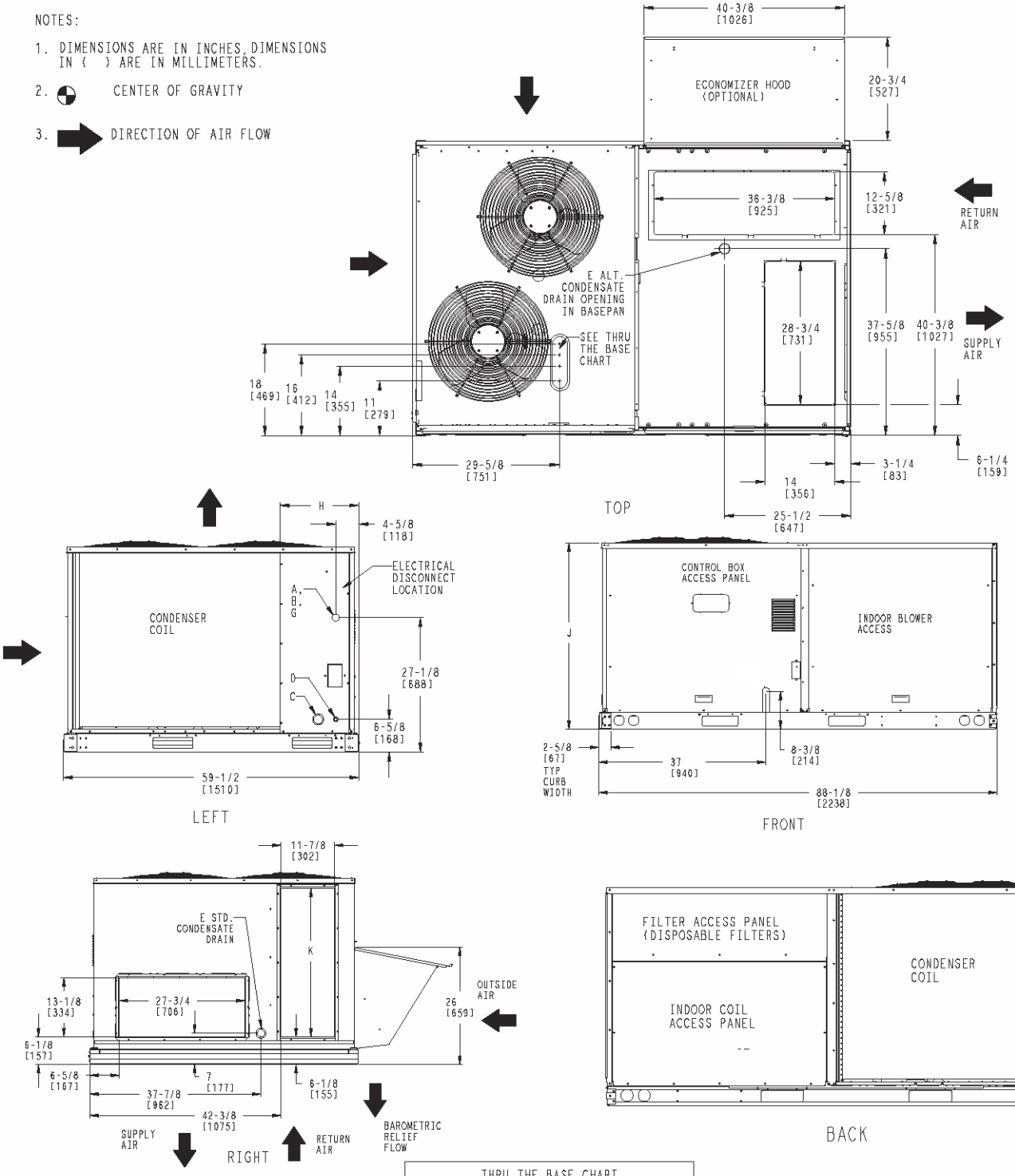
513 01 3301 00 09–29–08

Printed in U.S.A.

FIGURE 1
Base Unit Dimensions:
RAS091-121

NOTES:

1. DIMENSIONS ARE IN INCHES, DIMENSIONS IN ( ) ARE IN MILLIMETERS.
2. ⊕ CENTER OF GRAVITY
3. ➡ DIRECTION OF AIR FLOW



	CONNECTION SIZES
A	1 3/8" DIA [35] FIELD POWER SUPPLY HOLE
B	2 1/2" [64] DIA POWER SUPPLY KNOCKOUT
C	1 3/4" DIA [51] GAUGE ACCESS PLUG
D	7/8" DIA [22] FIELD CONTROL WIRING HOLE
E	3/4"-14 NPT CONDENSATE DRAIN
G	2 " DIA [51] POWER SUPPLY KNOCK-OUT

THRU THE BASE CHART THESE HOLES REQ'D FOR USE CRBTMPWR001A01, 002A01, 003A01, 004A01		
THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)
1/2"	ACC.	7/8" (22.2)
1/2"	24V	7/8" (22.2)
3/4" (001,003)	POWER*	1 1/8" (28.4)
1 1/4" (002,004)	POWER*	1 3/4" (44.4)
(004) 3/4" FTP	GAS	1 5/8" (41.3)
* SELECT EITHER 3/4" OR 1 1/4" FOR POWER, DEPENDING ON WIRE SIZE		

UNIT	J	K	H
RAS091	41-1/4 (1048)	33 (658)	15-7/8 (403)
RAS101	49-3/8 (1253)	37-1/4 (377)	23-7/8 (609)
RAS121	49-3/8 (1253)	37-1/4 (377)	15-7/8 (403)

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.

⚠ WARNING

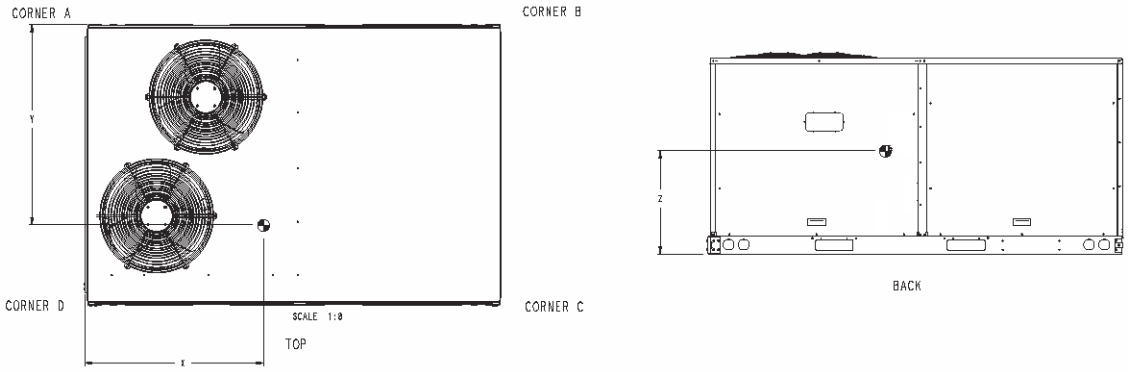
UNIT OPERATION AND SAFETY HAZARD

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.

Figure 1 **Unit Dimansional Drawing (Cont.)**

UNIT	Std. Unit Weight		Corner Weight A		Corner Weight B		Corner Weight C		Corner Weight D		Center of Gravity					
											X		Y		Z	
	LB	KG	LB	KG	LB	KG	LB	KG	LB	KG	IN	MM	IN	MM	IN	MM
RAS091	730	332	171	78	164	74	233	106	242	110	41-7/8	1064	33-7/8	860	20-1/4	514
RAS101	830	377	193	88	181	72	260	118	276	125	41-3/8	1051	22-7/8	581	22-7/8	581
RAS121	885	402	207	94	204	93	275	125	279	127	42-3/8	1076	24-1/8	613	24-1/8	613



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.

Jobsite Survey

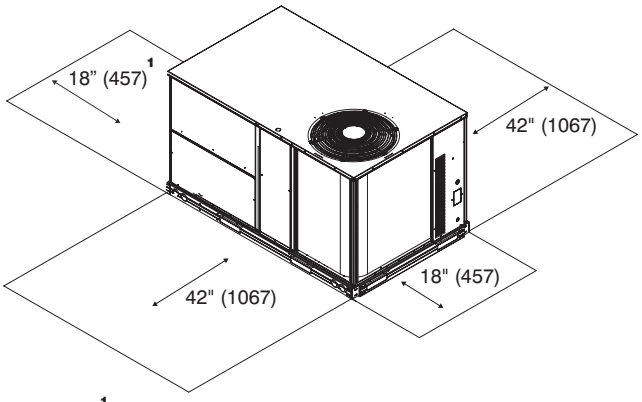
Complete the following checks before installation.

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. 2.

FIGURE 2 **Service Clearance Dimansional Drawing**



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

NOTE:Consider also the effect of adjacent units.

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

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

Do not install unit in an indoor location. Do not locate air inlets near exhaust vents or other sources of contaminated air.

Table 1—Operating Weights

	UNITS LB (KG)		
Component	RAS091	RAS101	RAS121
Size (Tons)	7.5	8.5	10
Number of Compressors	1	1	1
Base Unit	730 (331)	830 (376)	885 (441)
Economizer			
Vertical	80 (36)	80 (36)	80 (36)
Horizontal	105 (48)	105 (48)	105 (48)
Curb			
14–in/356 mm	143 (65)	143 (65)	143 (65)
24–in/610 mm	153 (69)	153 (69)	153 (69)

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

Locate mechanical draft system flue assembly at least 4 ft (1.2 m) from any opening through which combustion products could enter the building, and at least 4 ft (1.2 m) from any adjacent building (or per local code). Locate the flue assembly at least 10 ft (3.05 m) from an adjacent unit's fresh air intake hood if within 3 ft (0.91 m) of same elevation (or per local code). When unit is located adjacent to public walkways, flue assembly must be at least 7 ft (2.1 m) above grade.

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

Roof mount —

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

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

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.

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. The accessory thru–the–base power connection package must be installed before the unit is set on the roof curb. P*ower connections to the unit must be field installed after the unit is installed on the roof curb.

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

NOTE:The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 3. Improperly applied gasket can also result in air leaks and poor unit performance.

Slab Mount (Horizontal Units Only) —

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

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

Alternate Unit Support (In Lieu of Curb or Slab Mount) —

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

FIGURE 3 **Roof Curb Details**

ROOFCURB ACCESSORY	A	UNIT SIZE
CRRFCURB003A01	1' - 2" (356)	RAS091–121
CRRFCURB004A01	2' - 0" (610)	

NOTES:
1. ROOFCURB ACCESSORY IS SHIPPED DISASSEMBLED.
2. INSULATED PANELS: 1" THK. POLYURETHANE FOAM, 1-3/4 # DENSITY.
3. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
4. ROOFCURB: 16 GAGE STEEL.
5. ATTACH DUCTWORK TO CURB. (FLANGES OF DUCT REST ON CURB)
6. SERVICE CLEARANCE 4' ON EACH SIDE.
7. ▨ DIRECTION OF AIR FLOW.
8. CONNECTOR PACKAGES CRBTMPWR001A01 AND 2A01 ARE FOR THRU-THE-CURB GAS TYPE. PACKAGES CRBTMPWR003A01 AND 4A01 ARE FOR THE THRU-THE-BOTTOM TYPE GAS CONNECTIONS.

CONNECTOR PKG. ACC.	B	C	D ALT DRAIN HOLE	GAS	POWER	CONTROL	ACCESSORY PWR
CRBTMPWR001A01 CRBTMPWR002A01	2'-8 7/16" [827]	1'-10 15/16" [583]	1 3/4" [44.5]	3/4" [19] NPT	3/4" [19] NPT 1 1/4" [31.7]	1/2" [12.7] NPT	1/2" [12.7] NPT
CRBTMPWR003A01				1/2" [12.7] NPT	3/4" [19] NPT		
CRBTMPWR004A01				3/4" [19] NPT	1 1/4" [31.7]		

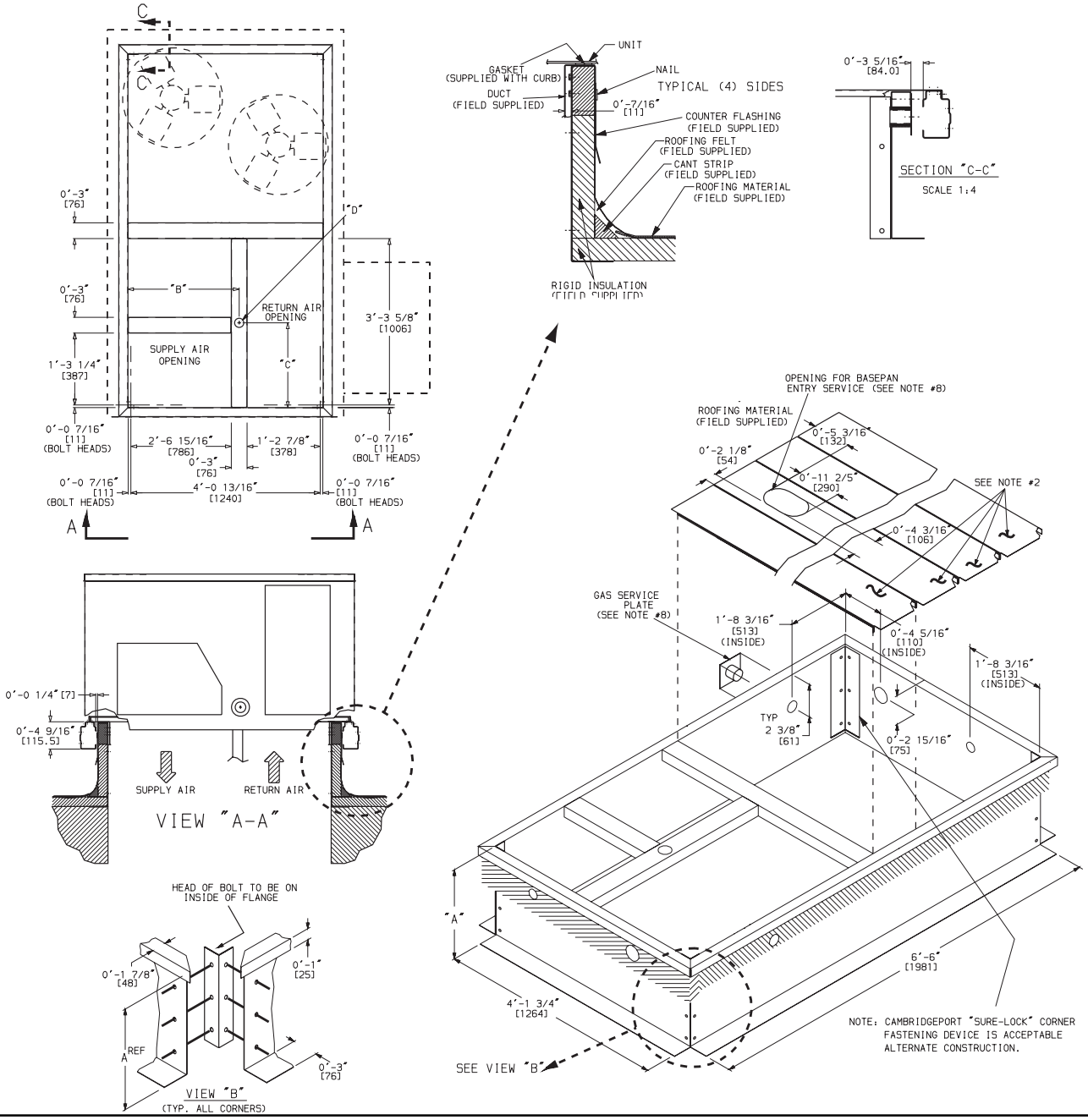
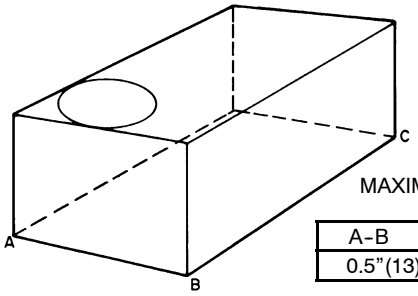


FIGURE 4 Unit Leveling Tolerances



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 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. 5. Refer to rigging instructions on unit.

⚠ CAUTION

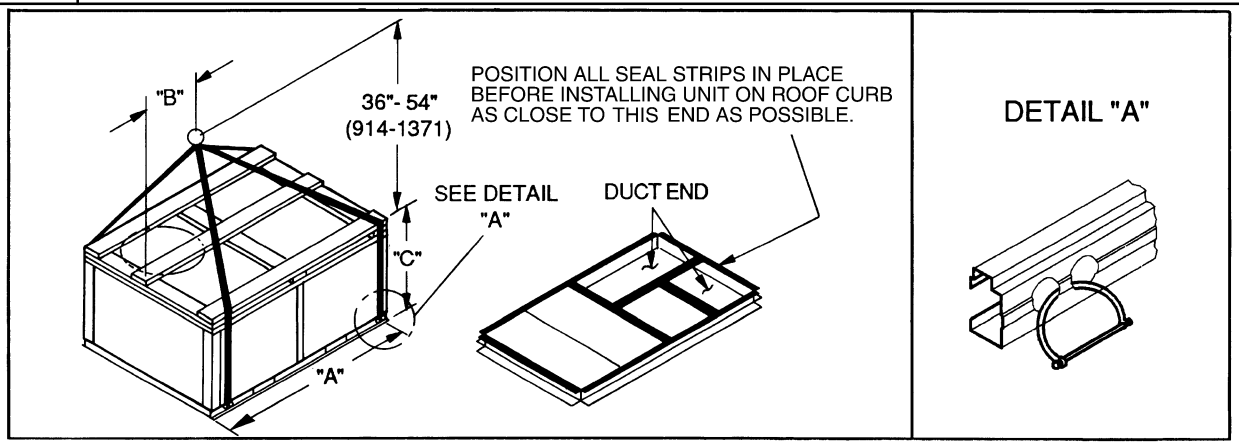
UNIT DAMAGE HAZARD

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



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		DIMENSION					
			A		B		C	
	LB	KG	IN	MM	IN	MM	IN	MM
RAS091	730	332	88.18	2240	40	1016	41.14	1045
RAS101	830	377	88.18	2240	40	1016	49.38	1254
RAS121	885	402	88.18	2240	40	1016	49.38	1254

Positioning on Roof 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. 3, 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.

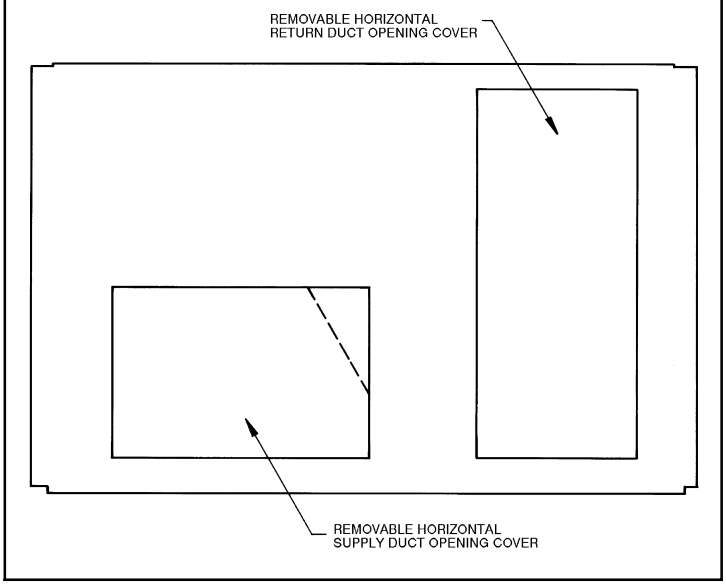
All panels must be in place when rigging. Unit is not designed for handling by fork truck.

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 or return air smoke detector option may be field–converted to horizontal ducted configuration. To convert to horizontal configuration, remove screws from side duct opening covers 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. 6.

FIGURE 6 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

The optional outdoor hood components are shipped in a box located in the unit return air compartment behind the outdoor–ar opening access panel (or economizer). Access is through the filter access panel. See Fig. 7.

1. To remove the existing unit filter access panel, raise the panel and swing the bottom outward. The panel is now disengaged from the track and can be removed.
2. To remove the component box from its shipping position, remove the screw holding the hood box bracket to the top of the economizer. Slide the hood box out of the unit. See Fig. 8.

FIGURE 7 Typical Access Panel Locations

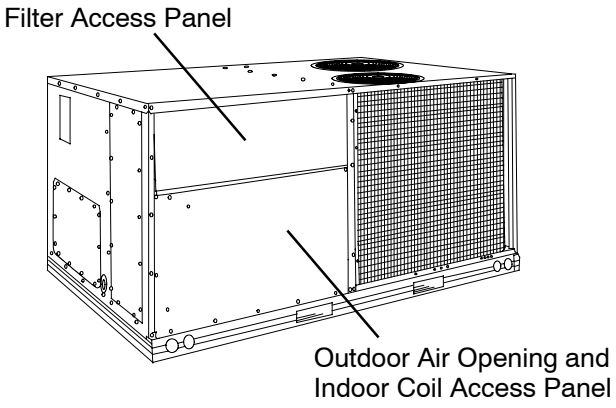
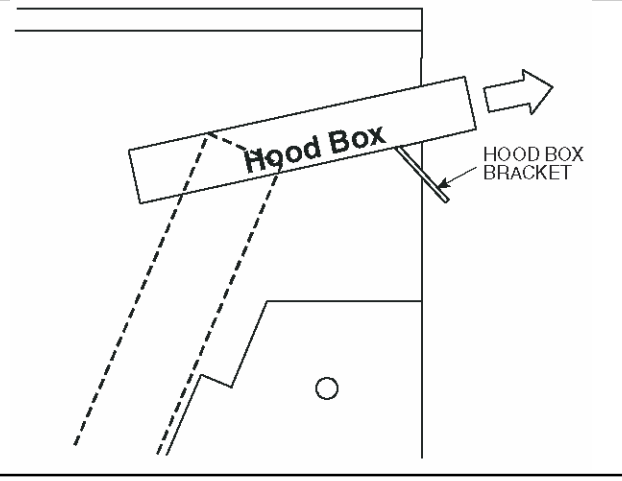


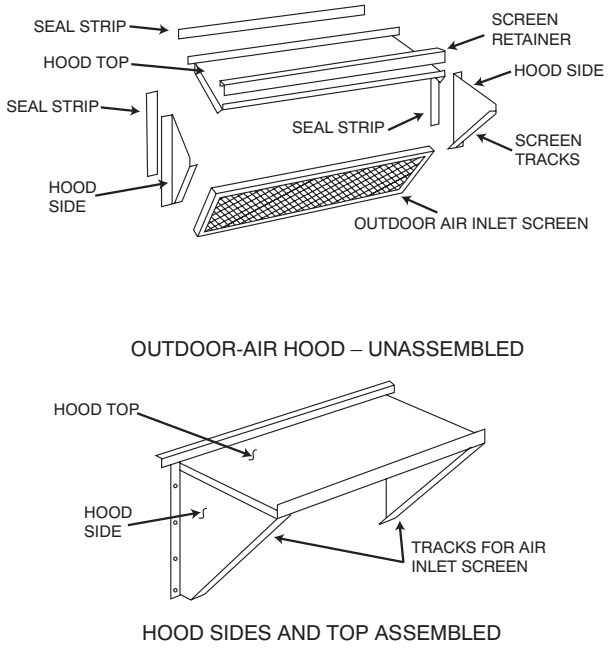
FIGURE 8 Hood Box Removal



Motorized 2–Position Damper Hood (Optional)—

1. Assemble outdoor–air hood top and side plates as shown in Fig. 9. Install seal strips on hood top and sides. Put aside screen retainer and screws for later assembly.
2. Fasten hood top and side plate assembly to unit with screws provided. See Fig. 9.
3. Slide outdoor–air inlet screen into screen track on hood side plates. While holding screen) in place, fasten screen retainer to hood using screws provided.
4. Replace filter access panel. See Fig. 7.

FIGURE 9 **Outdoor Air Hood Details**



Economizer 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. 10.
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. 11.
3. Remove the shipping tape holding the economizer barometric relief damper in place.
4. Insert the hood divider between the hood sides. See Fig. 11 and 12. 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. 12.
6. Caulk the ends of the joint between the unit top panel and the hood top. See Fig. 10.
7. Replace the filter access panel.

FIGURE 10 **Indoor Coil Access Panel Relocation**

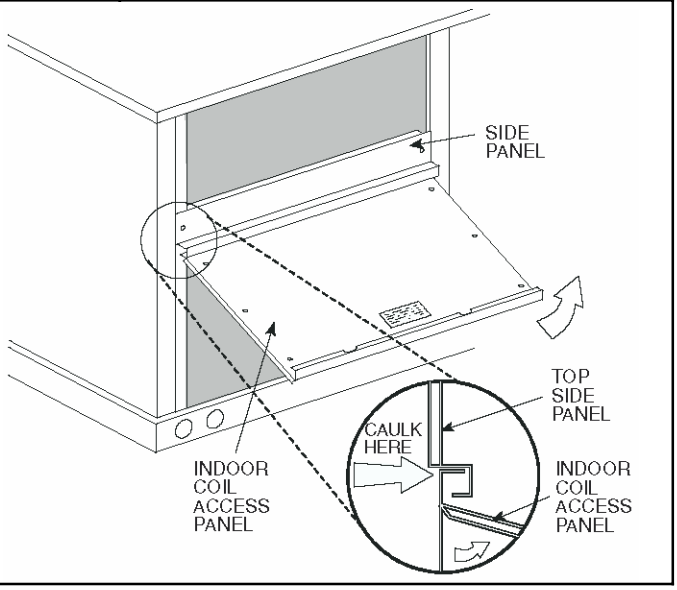


FIGURE 11 **Economizer Hood Construction**

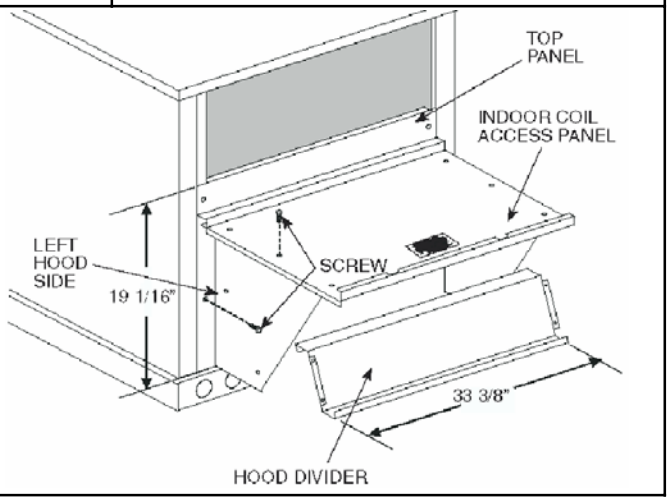
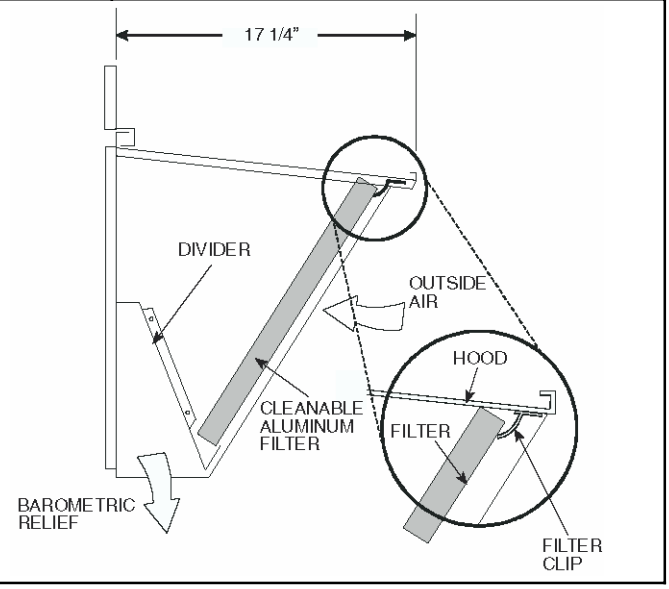


FIGURE 12 **Economizer Filter Installation**



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. 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 before installing unit.

To use the bottom drain connection for a roof curb installation, relocate the factory-installed red plug from the bottom connection to the side connection. The center drain plug looks like a star connection, however it can be removed with a 1/2–in. square socket drive extension. See Fig. 12. The piping for the condensate drain and external trap can be completed after the unit is in place. See Fig. 13.

FIGURE 13 **Condensate Drain Pan (Side View)**

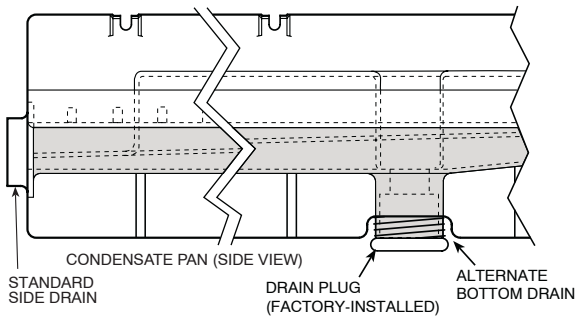
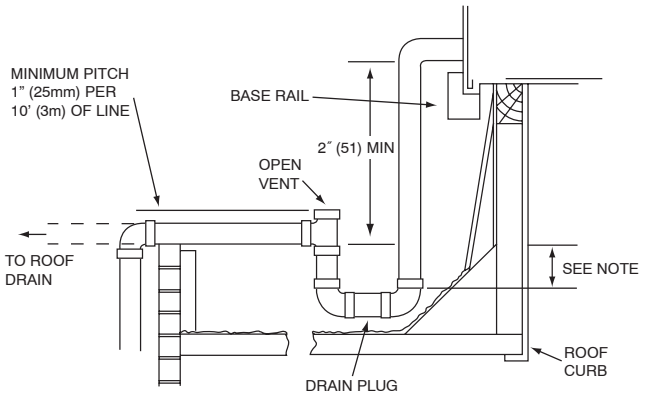


FIGURE 14 **Condensate Drain Piping Details**



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 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.

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.

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.

All units –

All field wiring must comply with NEC and all local codes. Size wire based on MCA (Minimum Circuit Amps) on the unit

informative plate. See Fig. 14 for power wiring connections to the unit power terminal block and equipment ground. Maximum wire size is #2 ga 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.

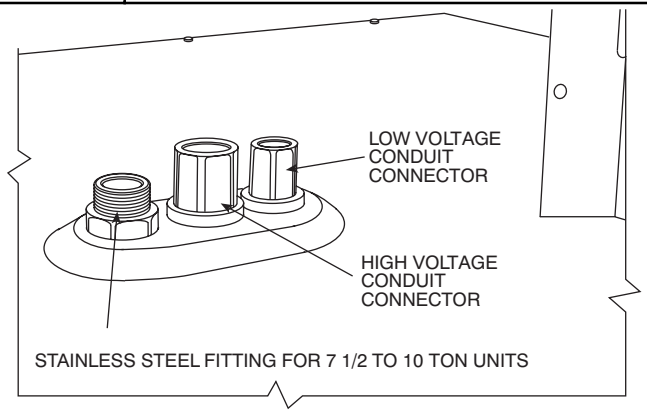
All field wiring must comply with the NEC and local requirements.

Optional Thru-Base Connections —

This accessory (field installed) service connection kit consists of an appropriate size NPT gas adapter fitting, a 1-1/4-in and a 1/2-in electrical bulkhead connector, all 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. 15.

Note: This accessory must be installed prior to RTU being mounted on roof curb.

FIGURE 15 Fittings



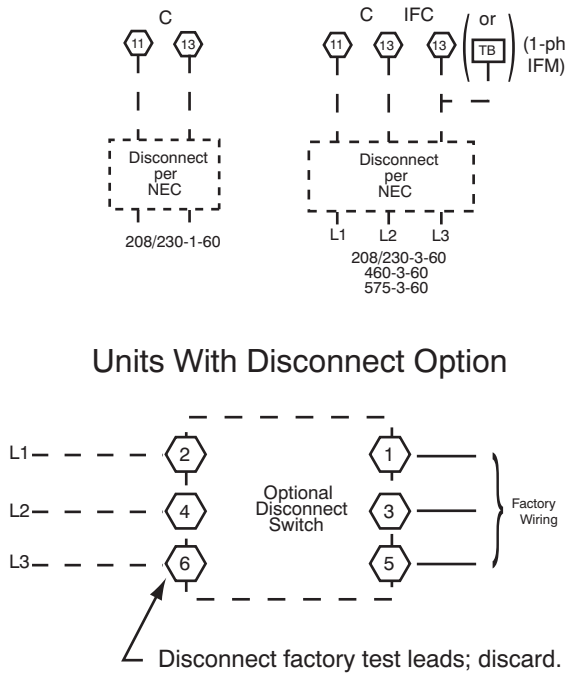
Check tightness of connector lock nuts before connecting electrical conduits.

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. 16.

FIGURE 16 Power Wiring Connections



Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate. See Table 2. 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 2, 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 Bryant 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.

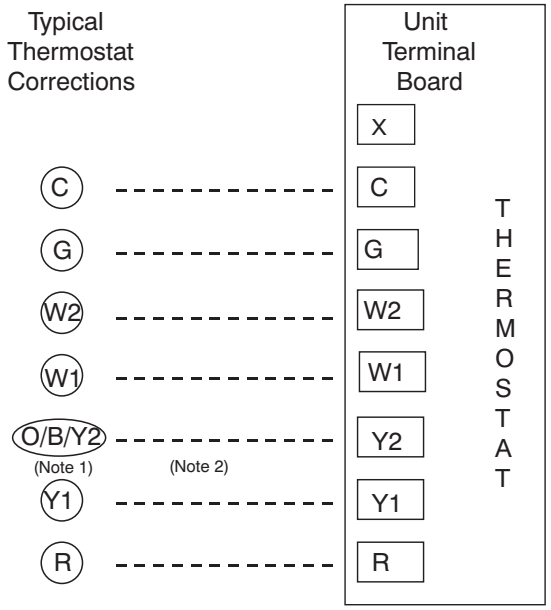
For wire runs up to 50 ft. (15 m), use no. 18 AWG (American Wire Gage) insulated wire (35°C minimum). For 50 to 75 ft.

(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 —

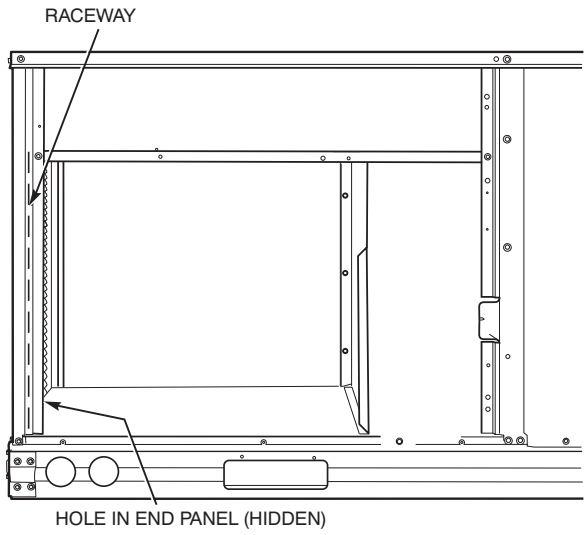
Pass the thermostat control wires through the hole provided in the corner post; then feed the wires through the raceway built into the corner post to the control box. Pull the wires over to the terminal strip on the upper-left corner of the Controls Connection Board. See Fig. 18.

FIGURE 17 **Typical Low Voltage Control Connections (7 Wire shown)**



Note 1: Typical multi-function marking.Follow manufacturer's configuration instructions to select Y2.
Note 2: Y2 to Y2 connection required on single-stage cooling units when integrated economizer function is desired.
- - - Field Wiring

FIGURE 18 **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.

Table 2—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
RAS091	208/230–3–60	STD	None	None	39.5	60	38	191	43.3	60	43	195
			7.8/10.4	21.7/25.0	39.5/39.5	60/60	38/38	191/191	43.3/43.3	60/60	43/43	195/195
			12.0/16.0	33.4/38.5	48.3/54.6	60/60	44/50	191/191	53.0/59.4	60/60	49/55	195/195
			18.6/24.8	51.7/59.7	71.1/81.1	80/90	65/75	191/191	75.9/85.9	80/90	70/79	195/195
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	191/191	94.6/107.5	100/110	87/99	195/195
			31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	191/191	121.8/138.8	125/150	112/128	195/195
		MED**	None	None	41.8	60	41	228	45.6	60	45	232
			7.8/10.4	21.7/25.0	41.8/41.8	60/60	41/41	228/228	45.6/45.6	60/60	45/45	232/232
			12.0/16.0	33.4/38.5	51.1/57.5	60/60	47/53	228/228	55.9/62.3	60/70	51/57	232/232
			18.6/24.8	51.7/59.7	74.0/84.0	80/90	68/77	228/228	78.8/88.8	80/90	72/82	232/232
			24.0/32.0	66.7/77.0	92.8/105.6	100/110	85/97	228/228	97.5/110.4	100/125	90/102	232/232
			31.8/42.4	88.4/102.0	119.9/136.9	125/150	110/126	228/228	124.6/141.6	125/150	115/130	232/232
		HIGH	None	None	49.3	60	49	254	53.1	60	54	258
			7.8/10.4	21.7/25.0	49.3/50.0	60/60	49/49	254/254	53.1/54.8	60/60	54/54	258/258
			12.0/16.0	33.4/38.5	60.5/66.9	70/70	56/62	254/254	65.3/71.6	70/80	60/66	258/258
			18.6/24.8	51.7/59.7	83.4/93.4	90/100	77/86	254/254	88.1/98.1	90/100	81/90	258/258
			24.0/32.0	66.7/77.0	102.1/115.0	110/125	94/106	254/254	106.9/119.8	110/125	98/110	258/258
			31.8/42.4	88.4/102.0	129.3/146.3	150/150	119/135	254/254	134.0/151.0	150/175	123/139	258/258
	460–3–60	STD	None	None	19.5	30	19	113	21.3	30	21	115
			13.9	16.7	24.1	30	22	113	26.4	30	24	115
			16.5	19.8	28.0	30	26	113	30.3	35	28	115
			27.8	33.4	45.0	50	41	113	47.3	50	43	115
			33.0	39.7	52.9	60	49	113	55.1	60	51	115
			41.7	50.2	66.0	70	61	113	68.3	70	63	115
		MED**	None	None	20.3	30	20	132	22.1	30	22	134
			13.9	16.7	25.1	30	23	132	27.4	30	25	134
			16.5	19.8	29.0	30	27	132	31.3	35	29	134
			27.8	33.4	46.0	50	42	132	48.3	50	44	134
			33.0	39.7	53.9	60	50	132	56.1	60	52	134
			41.7	50.2	67.0	70	62	132	69.3	70	64	134
		HIGH	None	None	24.3	30	24	145	26.1	30	26	147
			13.9	16.7	30.1	35	28	145	32.4	35	30	147
			16.5	19.8	34.0	35	31	145	36.3	40	33	147
			27.8	33.4	51.0	60	47	145	53.3	60	49	147
			33.0	39.7	58.9	60	54	145	61.1	70	56	147
			41.7	50.2	72.0	80	66	145	74.3	80	68	147
	575–3–60	STD	None	None	14.9	20	14	89	18.7	25	19	93
			17.0	20.4	28.5	30	26	89	33.3	35	31	93
			34.0	40.9	54.1	60	50	89	58.9	60	54	93
		MED**	None	None	15.3	20	15	104	19.1	25	19	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
		HIGH	None	None	18.1	25	18	118	21.9	30	23	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

LEGEND:

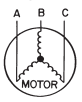
CO	–	Convenient outlet
DISC	–	Disconnect
FLA	–	Full load amps
IFM	–	Indoor fan motor
LRA	–	Locked rotor amps
MCA	–	Minimum circuit amps
MOCP	–	Maximum over current protection
PE	–	Power exhaust
UNPWRD CO	–	Unpowered convenient outlet

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 2 (cont.) – 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
RAS101	208/230–3–60	STD	None	None	45.1	60	43	222	48.9	60	48	226
			7.8/10.4	21.7/25.0	45.1/45.1	60/60	43/43	222/222	48.9/48.9	60/60	48/48	226/226
			12.0/16.0	33.4/38.5	48.3/54.6	60/60	44/50	222/222	53.0/59.4	60/60	49/55	226/226
			18.6/24.8	51.7/59.7	71.1/81.1	80/90	65/75	222/222	75.9/85.9	80/90	70/79	226/226
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	222/222	94.6/107.5	100/110	87/99	226/226
			31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	222/222	121.8/138.8	125/150	112/128	226/226
		MED**	None	None	45.1	60	43	233	48.9	60	48	237
			7.8/10.4	21.7/25.0	45.1/45.1	60/60	43/43	233/233	48.9/48.9	60/60	48/48	237/237
			12.0/16.0	33.4/38.5	48.3/54.6	60/60	44/50	233/233	53.0/59.4	60/60	49/55	237/237
			18.6/24.8	51.7/59.7	71.1/81.1	80/90	65/75	233/233	75.9/85.9	80/90	70/79	237/237
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	233/233	94.6/107.5	100/110	87/99	237/237
			31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	233/233	121.8/138.8	125/150	112/128	237/237
		HIGH	None	None	49.9	60	49	276	53.7	80	53	280
			7.8/10.4	21.7/25.0	49.9/49.9	60/60	49/49	276/276	53.7/53.7	80/80	53/53	280/280
			12.0/16.0	33.4/38.5	54.3/60.6	60/70	50/56	276/276	59.0/65.4	80/80	54/60	280/280
			18.6/24.8	51.7/59.7	77.1/87.1	80/90	71/80	276/276	81.9/91.9	90/100	75/85	280/280
			24.0/32.0	66.7/77.0	95.9/108.8	100/110	88/100	276/276	100.6/113.5	110/125	93/104	280/280
			31.8/42.4	88.4/102.0	123.0/140.0	125/150	113/129	276/276	127.8/144.8	150/150	118/133	280/280
	460–3–60	STD	None	None	22.6	30	22	108	24.4	30	24	110
			13.9	16.7	24.1	30	22	108	26.4	30	24	110
			16.5	19.8	28.0	30	26	108	30.3	35	28	110
			27.8	33.4	45.0	50	41	108	47.3	50	43	110
			33.0	39.7	52.9	60	49	108	55.1	60	51	110
			41.7	50.2	66.0	70	61	108	68.3	70	63	110
		MED**	None	None	22.6	30	22	114	24.4	30	24	116
			13.9	16.7	24.1	30	22	114	26.4	30	24	116
			16.5	19.8	28.0	30	26	114	30.3	35	28	116
			27.8	33.4	45.0	50	41	114	47.3	50	43	116
			33.0	39.7	52.9	60	49	114	55.1	60	51	116
			41.7	50.2	66.0	70	61	114	68.3	70	63	116
		HIGH	None	None	24.4	30	24	136	26.2	30	26	138
			13.9	16.7	26.4	30	24	136	28.6	30	26	138
			16.5	19.8	30.3	35	28	136	32.5	40	30	138
			27.8	33.4	47.3	50	43	136	49.5	50	46	138
			33.0	39.7	55.1	60	51	136	57.4	60	53	138
			41.7	50.2	68.3	70	63	136	70.5	80	65	138
	575–3–60	STD	None	None	18.9	30	18	91	22.7	30	23	95
			17.0	20.4	28.5	30	26	91	33.3	35	31	95
			34.0	40.9	54.1	60	50	91	58.9	60	54	95
		MED**	None	None	18.5	30	18	95	22.3	30	22	99
			17.0	20.4	28.0	30	26	95	32.8	35	30	99
			34.0	40.9	53.6	60	49	95	58.4	60	54	99
		HIGH	None	None	19.3	30	19	106	23.1	30	23	110
			17.0	20.4	29.0	30	27	106	33.8	35	31	110
			34.0	40.9	54.6	60	50	106	59.4	60	55	110

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

** Available from Fast Parts.

See Legend on page 13.

Table 2 (cont.) – MCA/MOCP Determination No C.O. or UNPWRD C.O.

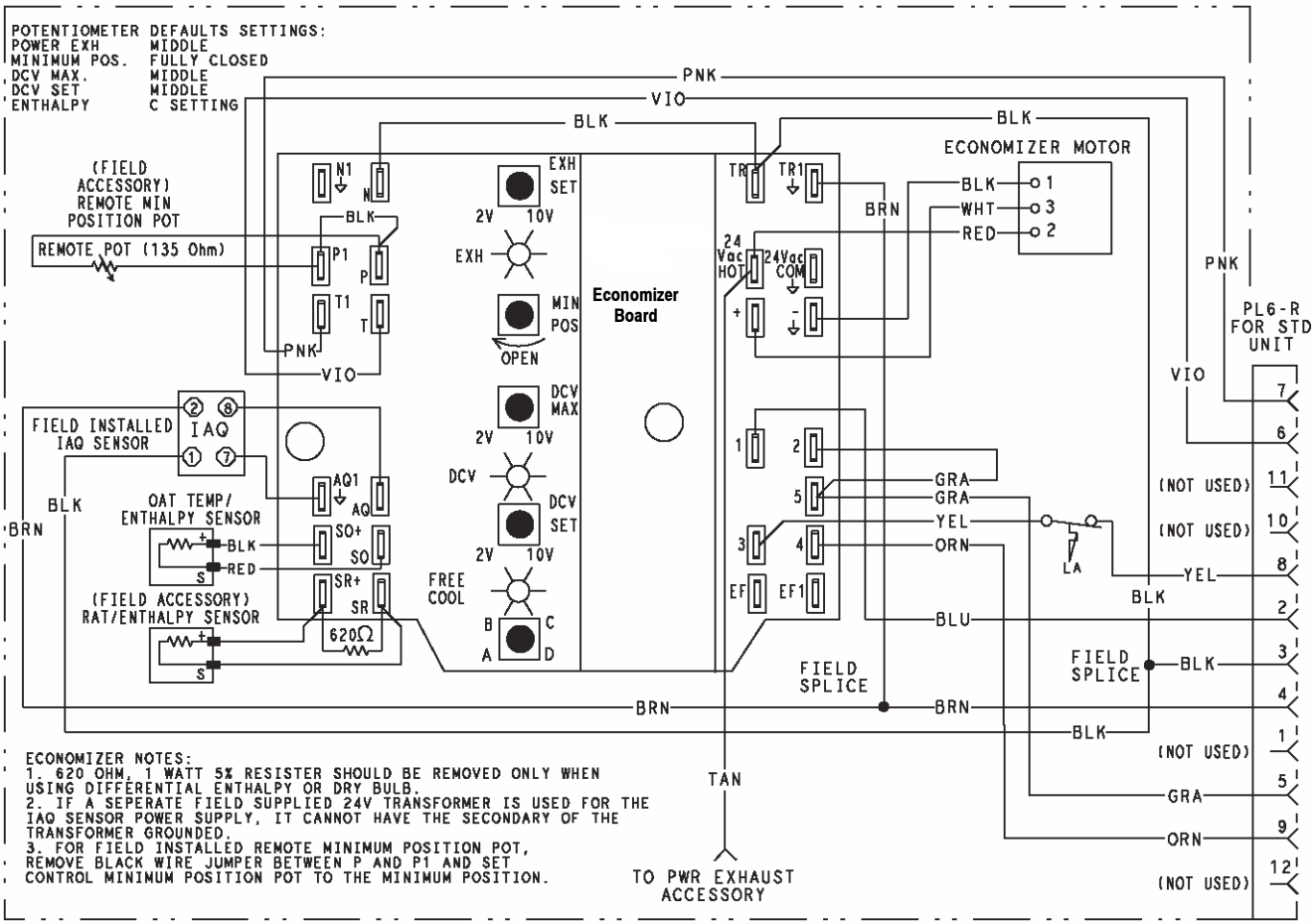
UNIT	NOM. V–PH–HZ	IFM TYPE	ELECTRIC HEATER		NO C.O. or UNPWR C.O.							
					NO P.E.				w/ P.E. (pwrd fr/unit)			
							DISC. SIZE				DISC. SIZE	
			Nom* (kW)	FLA	MCA	MOCP	FLA	LRA	MCA	MOCP	FLA	LRA
RAS121	208/230–3–60	STD	None	None	45.8	60	44	263	49.6	60	48	267
			7.8/10.4	21.7/25.0	45.8/45.8	60/60	44/44	263/263	49.6/49.6	60/60	48/48	267/267
			12.0/16.0	33.4/38.5	48.3/54.6	60/60	44/50	263/263	53.0/59.4	60/60	49/55	267/267
			24.0/32.0	66.7/77.0	89.9/102.8	90/110	83/95	263/263	94.6/107.5	100/110	87/99	267/267
			31.8/42.4	88.4/102.0	117.0/134.0	125/150	108/123	263/263	121.8/138.8	125/150	112/128	267/267
			37.6/50.0	104.2/120.3	136.8/126.8	150/150	126/144	263/263	141.5/131.6	150/150	130/149	267/267
		MED**	None	None	50.6	60	50	306	54.4	80	54	310
			7.8/10.4	21.7/25.0	50.6/50.6	60/60	50/50	306/306	54.4/54.4	80/80	54/54	310/310
			12.0/16.0	33.4/38.5	54.3/60.6	60/80	50/56	306/306	59.0/65.4	80/80	54/60	310/310
			24.0/32.0	66.7/77.0	95.9/108.8	100/110	88/100	306/306	100.6/113.5	110/125	93/104	310/310
			31.8/42.4	88.4/102.0	123.0/140.0	125/150	113/129	306/306	127.8/144.8	150/150	118/133	310/310
			37.6/50.0	104.2/120.3	142.8/132.8	150/150	131/150	306/306	147.5/137.6	150/150	136/154	310/310
		HIGH	None	None	55.6	80	55	315	59.4	80	60	319
			7.8/10.4	21.7/25.0	55.6/55.6	80/80	55/55	315/315	59.4/59.4	80/80	60/60	319/319
			12.0/16.0	33.4/38.5	60.5/66.9	80/80	56/62	315/315	65.3/71.6	80/80	60/66	319/319
			24.0/32.0	66.7/77.0	102.1/115.0	110/125	94/106	315/315	106.9/119.8	110/125	98/110	319/319
			31.8/42.4	88.4/102.0	129.3/146.3	150/150	119/135	315/315	134.0/151.0	150/175	123/139	319/319
			37.6/50.0	104.2/120.3	149.0/139.1	150/175	137/156	315/315	153.8/143.8	175/175	141/160	319/319
	460–3–60	STD	None	None	25.1	30	24	133	26.9	40	26	135
			13.9	16.7	25.1	30	24	133	26.9	40	26	135
			16.5	19.8	28.0	30	26	133	30.3	40	28	135
			33.0	39.7	52.9	60	49	133	55.1	60	51	135
			41.7	50.2	66.0	70	61	133	68.3	70	63	135
			50.0	60.1	63.4	70	72	133	65.6	70	74	135
		MED**	None	None	26.9	40	26	155	28.7	45	28	157
			13.9	16.7	26.9	40	26	155	28.7	45	28	157
			16.5	19.8	30.3	40	28	155	32.5	45	30	157
			33.0	39.7	55.1	60	51	155	57.4	60	53	157
			41.7	50.2	68.3	70	63	155	70.5	80	65	157
			50.0	60.1	65.6	80	74	155	67.9	80	76	157
		HIGH	None	None	29.9	45	30	159	31.7	45	32	161
			13.9	16.7	30.1	45	30	159	32.4	45	32	161
			16.5	19.8	34.0	45	31	159	36.3	45	33	161
			33.0	39.7	58.9	60	54	159	61.1	70	56	161
			41.7	50.2	72.0	80	66	159	74.3	80	68	161
			50.0	60.1	69.4	80	78	159	71.6	80	80	161
	575–3–60	STD	None	None	18.5	30	18	95	22.3	30	22	99
			17.0	20.4	28.0	30	26	95	32.8	35	30	99
			34.0	40.9	53.6	60	49	95	58.4	60	54	99
			51.0	61.3	63.8	70	73	95	68.6	80	77	99
		MED**	None	None	19.3	30	19	106	23.1	30	23	110
			17.0	20.4	29.0	30	27	106	33.8	35	31	110
			34.0	40.9	54.6	60	50	106	59.4	60	55	110
			51.0	61.3	64.8	70	74	106	69.6	80	78	110
		HIGH	None	None	22.1	30	22	120	25.9	30	26	124
			17.0	20.4	32.5	35	30	120	37.3	40	34	124
			34.0	40.9	58.1	60	53	120	62.9	70	58	124
			51.0	61.3	68.3	80	77	120	73.1	80	81	124

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

** Available from Fast Parts.

See Legend on page 13.

FIGURE 19 | **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.

Economiser Occupancy Switch —

Refer to Fig. 19 for general Economiser 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)

Electric Heaters and Single Point Connection Kits

Manual outside air damper

Two-Position motorized outside air damper

Economizer (with control and integrated barometric relief)

Winter start kit

Power Exhaust

Differential dry-bulb sensor

Outdoor enthalpy sensor

Differential enthalpy sensor

CO2 sensor

Low Ambient control

Louvered hail guard

Hood-type hail guard

UV-C lamp kit

Phase monitor control

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