# WeatherMaster® Hybrid Heat 48QE**12 Single Package Rooftop Heat Pump with Gas Heat with Puron Advance™ (R-454B) Refrigerant and EcoBlue™ Fan Technology

# Installation Instructions

## CONTENTS



## SAFETY CONSIDERATIONS

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

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

Follow all safety codes, including ANSI (American National Standards Institute) Z223.1. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

It is important to recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices, which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.



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**⚠ DANGER**

ELECTRICAL SHOCK HAZARD

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

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

**⚠ WARNING**

UNIT OPERATION AND SAFETY HAZARD

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

R-454B is an A2L refrigerant. All service equipment or components must be A2L refrigerant rated. Do not use non-A2L rated equipment or components on R-454B refrigerant equipment.

**⚠ WARNING**

PERSONAL INJURY AND ENVIRONMENTAL HAZARD

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

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

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

**⚠ WARNING**

Use caution when servicing compressor terminal pins. System or compressor abnormalities can dislodge pins allowing oil and refrigerant to vent under pressure.

**⚠ AVERTISSEMENT**

Soyez prudent lors de l'entretien des bornes du compresseur. Les anomalies du système ou du compresseur peuvent déloger les bornes, permettant à l'huile et au réfrigérant de s'évacuer sous pression.

**⚠ WARNING**

CARBON-MONOXIDE POISONING HAZARD

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

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

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

**⚠ AVERTISSEMENT**

RISQUE D'INTOXICATION AU MONOXYDE DE CARBONE

Si ces directives ne sont pas suivies, cela peut entraîner des blessures graves ou une intoxication au monoxyde de carbone pouvant causer la mort, si des produits de combustion s'infiltrent dans le bâtiment.

Vérifier que toutes les ouvertures pratiquées dans le mur extérieur autour du ou des tuyaux d'évent (et de la prise d'air) sont scellées de manière à empêcher l'infiltration de produits de combustion dans le bâtiment.

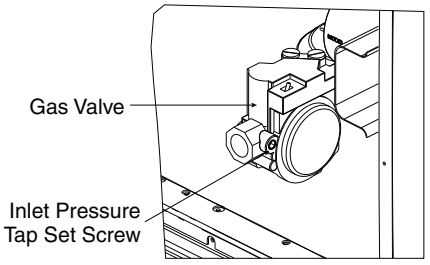
Veiller à ce que la ou les sorties de l'évent de l'appareil de chauffage (et la prise d'air) ne soient, en aucune façon, obstruées, quelle que soit la saison.

**⚠ WARNING**

FIRE HAZARD

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

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

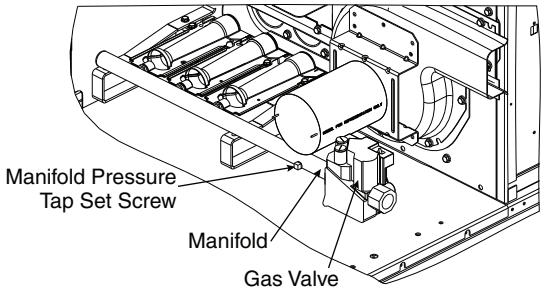



**⚠ WARNING**

FIRE HAZARD

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

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



**⚠ WARNING**

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warnings exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

**⚠ AVERTISSEMENT**

RISQUE D'INCENDIE OU D'EXPLOSION

Si les consignes de sécurité ne sont pas suivies à la lettre, cela peut entraîner la mort, de graves blessures ou des dommages matériels.

Ne jamais vérifier la présence de fuites de gaz au moyen d'une flamme nue. Vérifier tous les raccords en utilisant une solution savonneuse commerciale conçue spécialement pour la détection de fuites. Un incendie ou une explosion risque de se produire, ce qui peut entraîner la mort, des blessures ou des dommages matériels.

**⚠ CAUTION**

PERSONAL INJURY HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing air conditioning equipment.

## GENERAL

See Fig. 1 for model number nomenclature. See Fig. 2 for unit dimensions and Fig. 3 for service clearances.

### Rated Indoor Airflow

Table 1 lists the rated indoor airflow used for the AHRI efficiency rating for the units covered in this document.

**Table 1 — AHRI Efficiency — Rated Indoor Airflow**

| MODEL NUMBER | FULL LOAD AIRFLOW (cfm) |
|---|---|
| **48QE**12** | 4400 |

| Position: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Example: | 4 | 8 | Q | E | S | M | 1 | 2 | A | 2 | A | 6 | - | 3 | A | 0 | A | 0 |

**Unit Heat Type**
48 = Gas Heat Packaged Rooftop

**Model Series - WeatherMaster®**
QE = Mid Tier Hybrid Heat with Puron Advance™

**Heat Type**
S = Low Gas Heat, Stainless Steel (SS) Heat Exchanger
R = Medium Gas Heat, SS Heat Exchanger
T = High Gas Heat, SS Heat Exchanger

**Refrigerant Options**
M = Two Stage Cooling/Single Circuit
X = Two Stage Cooling/Single Circuit with Chicago Relief Valve

**Cooling Tons**
12 = 10 tons

**Sensor Options**
A = None
B = Return Air Smoke Detector (RA)
C = Supply Air Smoke Detector (SA)
D = RA + SA Smoke Detector
J = Condensate Overflow Switch (COFS)
K = Condensate Overflow Switch + RA Smoke Detector
L = Condensate Overflow Switch + RA and SA Smoke Detectors
M = Condensate Overflow Switch + SA Smoke Detector

**Indoor Fan Options - Vane Axial EcoBlue Fan System**
2 = Standard/Medium Static Motor
3 = High Static Motor
5 = Standard/Medium Static Motor, Filter Status Switch
6 = High Static Motor - Vertical Supply and Filter Status Switch

**Coil Options – RTPF (Outdoor – Indoor – Hail Guard)**
A = Al/Cu – Al/Cu
B = Precoat Al/Cu – Al/Cu
C = E-coat Al/Cu – Al/Cu
D = E-coat Al/Cu – E-coat Al/Cu
M = Al/Cu – Al/Cu – Louvered Hail Guard
N = Precoat Al/Cu – Al/Cu – Louvered Hail Guard
P = E-coat Al/Cu – Al/Cu – Louvered Hail Guard
Q = E-coat Al/Cu – E-coat Al/Cu – Louvered Hail Guards
R = Cu/Cu – Al/Cu – Louvered Hail Guard
S = Cu/Cu – Cu/Cu – Louvered Hail Guard

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

**Design Revision**
- = Factory Design Revision

**Base Unit Controls**
3 = SystemVu™ Controller

**Intake / Exhaust Options**
A = None
B = Temperature Economizer with Barometric Relief
F = Enthalpy Economizer with Barometric Relief
L = ULL (Ultra Low Leak) Temperature Economizer with Barometric Relief and $CO_2$ Sensor
M = ULL Enthalpy Economizer with Barometric Relief and $CO_2$ Sensor
U = ULL Temperature Economizer with Barometric Relief
W = ULL Enthalpy Economizer with Barometric Relief

**Service Options**
0 = None
1 = Unpowered Convenience Outlet (NPCO)
2 = Powered Convenience Outlet (PCO)
3 = Hinged Panels (HP)
4 = Hinged Panels + NPCO
5 = Hinged Access Panels + PCO
6 = MERV-13 Filters (M13)
7 = NPCO + MERV-13 Filters
8 = PCO + MERV-13 Filters
9 = Hinged Panels + MERV-13 Filters
A = HP + NPCO + MERV-13 Filters
B = HP + PCO + MERV-13 Filters
C = Foil Faced Insulation (FF)
D = FF + NPCO
E = FF + PCO
F = FF + HP
G = FF + HP + NPCO
H = FF + HP + PCO
J = FF + MERV-13 Filters
K = FF + NPCO + MERV-13 Filters
L = FF + PCO + MERV-13 Filters
M = FF + HP + MERV-13 Filters
N = FF + HP + NPCO + MERV-13 Filters
P = FF + HP + PCO + MERV-13 Filters

**Electrical Options**
A = None
B = HACR Breaker
C = Non-Fused Disconnect (NFDC)
D = Thru-The-Base Connections (TTB)
E = HACR +TTB
F = NFDC + TTB
N = Phase Monitor Protection (PMR)
P = PMR + HACR
Q = PMR + NFDC
R = PMR + TTB
S = PMR + HACR + TTB
T = PMR + NFDC + TTB
1 = HSCCR[a] (High Short Circuit Current Rating)
2 = HSCCR[a] + TTB

**Packaging Compliance**
0 = Standard

NOTE(S):
[a] Not available on the following models/options: 575V, Head Pressure Control, Phase Loss Monitor,Non-Fused Disconnect, HACR Breaker, Powered Convenience Outlet.

**Fig. 1 — 48QE**12 Unit Model Number Nomenclature**

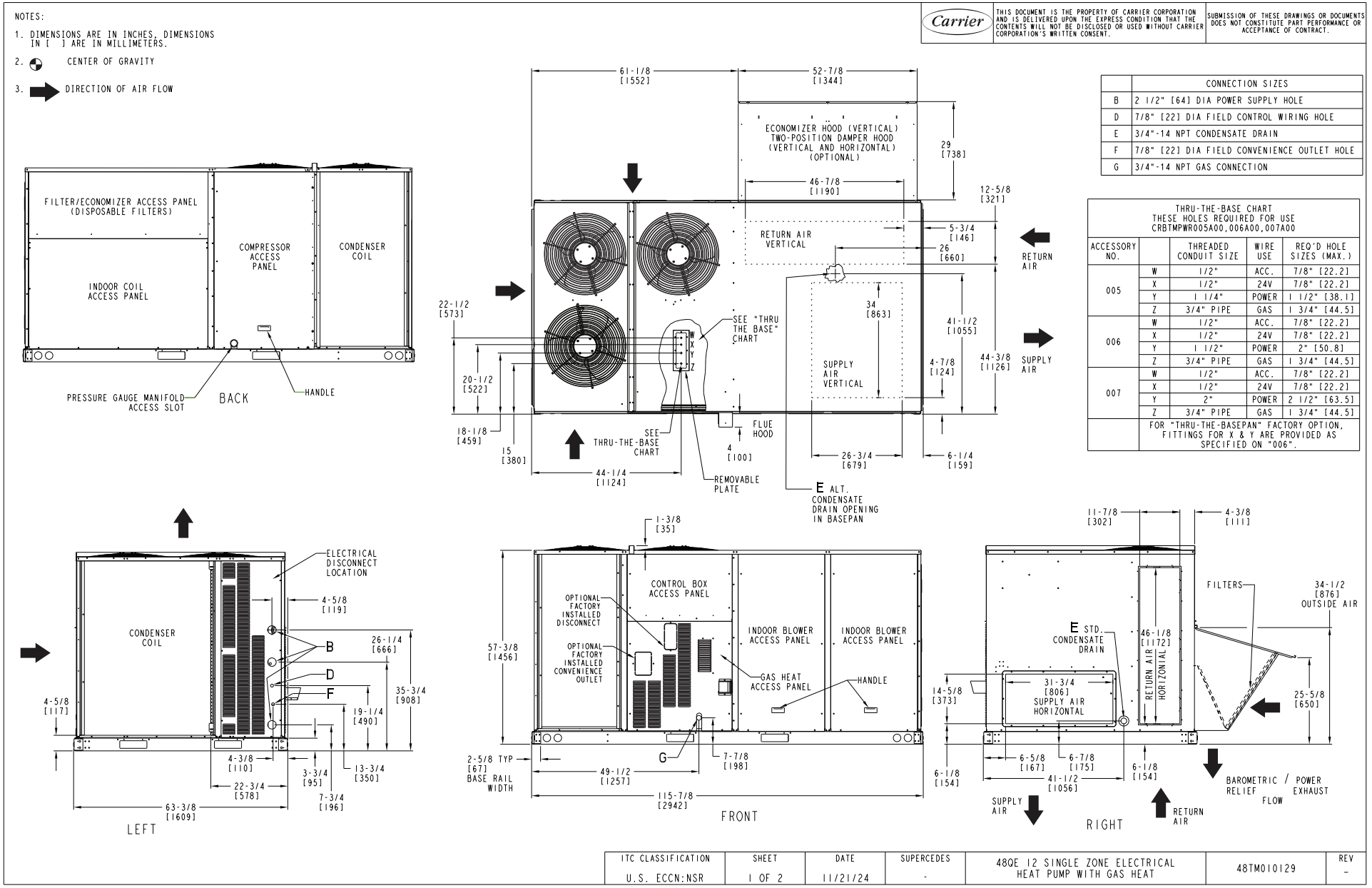
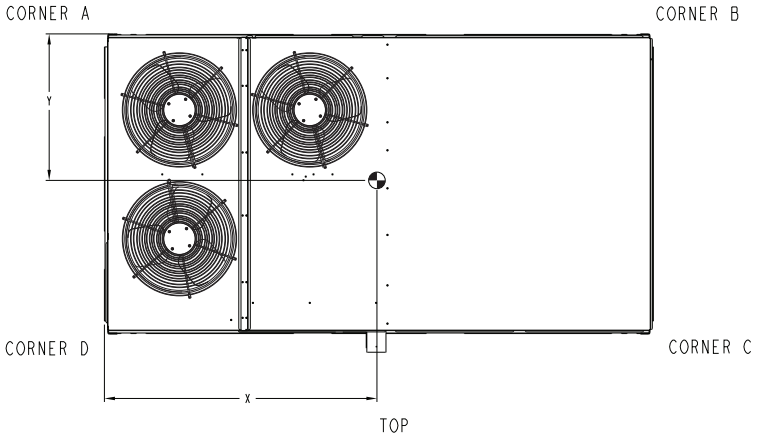
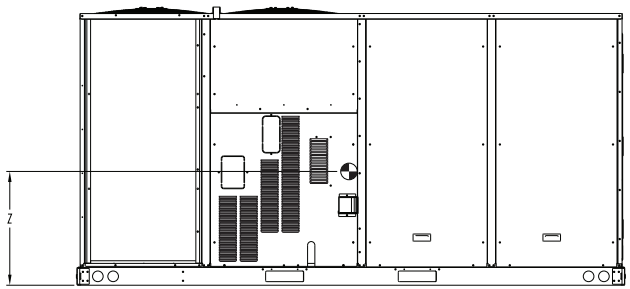


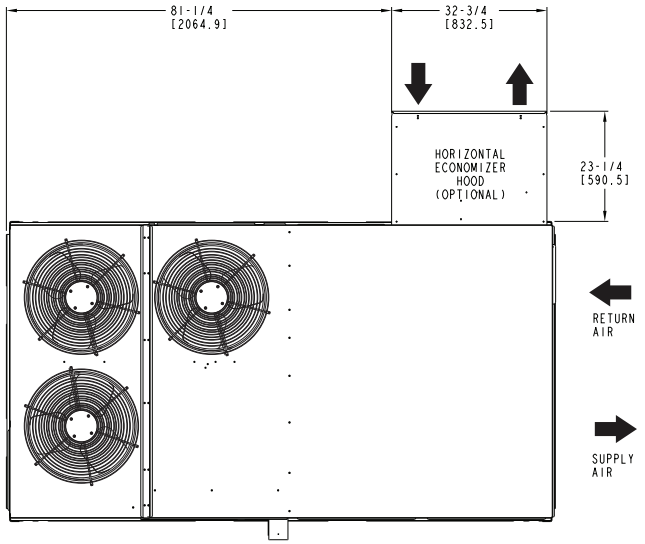

**Fig. 2 — 48QE**12 Unit Dimensional Drawing**

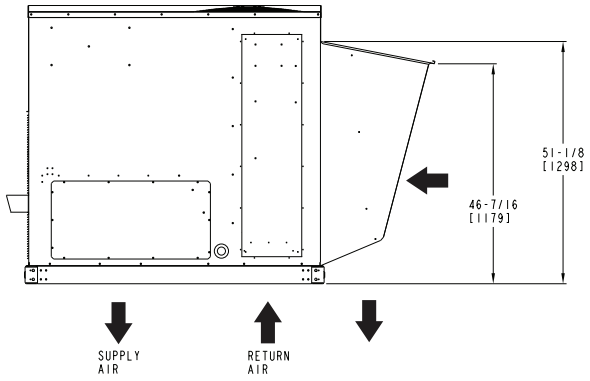
| UNIT | STD UNIT WEIGHT | | CORNER WEIGHT (A) | | CORNER WEIGHT (B) | | CORNER WEIGHT (C) | | CORNER WEIGHT (D) | | C.G. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LBS. | KG. | LBS. | KG. | LBS. | KG. | LBS. | KG. | LBS. | KG. | X | Y | Z |
| 48QE-M12 | 1296 | 588 | 296 | 134 | 287 | 130 | 351 | 159 | 362 | 164 | 57 [1448] | 28 1/2 [724] | 24 [610] |

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



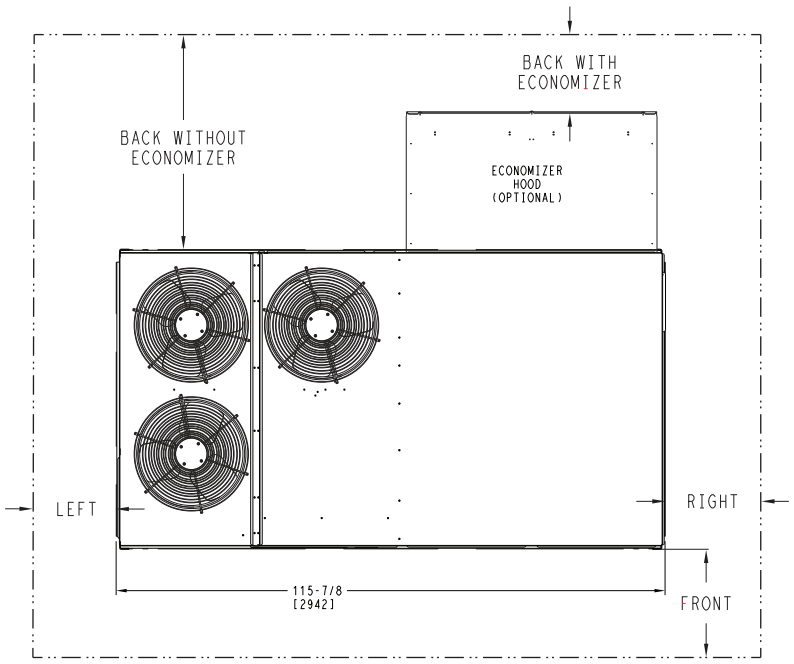

HORIZONTAL ECONOMIZER

| ITC CLASSIFICATION | SHEET | DATE | SUPERCEDES | | | REV |
|---|---|---|---|---|---|---|
| U.S. ECCN:NSR | 2 OF 2 | 11/21/24 | - | 48QE 12 SINGLE ZONE ELECTRICAL HEAT PUMP WITH GAS HEAT | 48TM010129 | - |





**Fig. 2 — 48QE**12 Unit Dimensional Drawing (cont)**




| CLEARANCE | | | |
|---|---|---|---|
| **SURFACE** | **Service with Conductive Barrier** | **Service with Non-conductive Barrier** | **Operating Clearance** |
| **FRONT** | 48 in. (1219 mm) | 36 in. (914 mm) | 18 in. (457 mm) |
| **LEFT** | 48 in. (1219 mm) | 42 in. (1067 mm) | 18 in. (457 mm) |
| **BACK WITHOUT ECONOMIZER** | 48 in. (1219 mm) | 42 in. (1067 mm) | 18 in. (457 mm) |
| **BACK WITH ECONOMIZER** | 36 in. (914 mm) | 36 in. (914 mm) | 18 in. (457 mm) |
| **RIGHT** | 36 in. (914 mm) | 36 in. (914 mm) | 18 in. (457 mm) |
| **LEFT** | 72 in. (1829 mm) | 72 in. (1829 mm) | 72 in. (1829 mm) |

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

**Fig. 3 — Service Clearances — 48QE**12 Units**

# INSTALLATION

## Jobsite Survey

Complete the following checks before installation.

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

## Step 1 — Plan for Unit Location

Select a location for the unit and its support system (curb or other) that provides for the minimum clearances required for safety. This includes the clearance to combustible surfaces, unit performance and service access below, around and above unit as specified in Fig. 3.

NOTE: Consider also the effect of adjacent units.

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

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

Do not install unit in an indoor location. Do not locate air inlets near exhaust vents or other sources of contaminated air. For proper unit operation, adequate combustion and ventilation air must be provided in accordance with Section 5.3 (Air for Combustion and Ventilation) of the National Fuel Gas Code, ANSI Z223.1 (American National Standards Institute) and NFPA (National Fire Protection Association) 54 TIA-54-84-1. In Canada, installation must be in accordance with the CAN1-B149 installation codes for gas burning appliances.

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

Select a unit mounting system that provides adequate height to allow for removal and disposal of frost and ice that will form during the heating-defrost mode as well as allow installation of condensate trap per requirements. See Install External Condensate Trap and Line on page 16 for required trap dimensions.

ROOF MOUNT

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

**Table 2 — Operating Weights**

| 48QE**12 | LB (kg) |
|---|---|
| **BASE UNIT** | 1296 (588) |
| **ECONOMIZER** | |
| **VERTICAL** | 130 (47) |
| **HORIZONTAL** | 242 (110) |
| **POWERED OUTLET** | 35 (16) |
| **CURB** | |
| **14 in. (356 mm)** | 180 (82) |
| **16 in. (610 mm)** | 245 (116) |

## Step 2 — Plan for Sequence of Unit Installation

The support method used for this unit will dictate different sequences for the steps of unit installation. For example, on curb-mounted units, some accessories must be installed on the unit before the unit is placed on the curb. Review the following for recommended sequences for installation steps.

CURB-MOUNTED INSTALLATION

1. Install curb
2. Install field-fabricated ductwork inside curb
3. Install accessory thru-base service connection package (affects curb and unit) (refer to accessory installation instructions for details)
4. Prepare bottom condensate drain connection to suit planned condensate line routing (see Install External Condensate Trap and Line on page 16 for details)
5. Rig and place unit
6. Install outdoor air hood
7. Install flue hood
8. Install gas piping
9. Install condensate line trap and piping
10. Make electrical connections
11. Install other accessories

PAD-MOUNTED INSTALLATION

1. Prepare pad and unit supports
2. Check and tighten the bottom condensate drain connection plug
3. Rig and place unit
4. Convert unit to side duct connection arrangement
5. Install field-fabricated ductwork at unit duct openings
6. Install outdoor air hood
7. Install flue hood
8. Install gas piping
9. Install condensate line trap and piping
10. Make electrical connections
11. Install other accessories

FRAME-MOUNTED INSTALLATION

Frame-mounted applications generally follow the sequence for a curb installation. Adapt as required to suit specific installation plan.

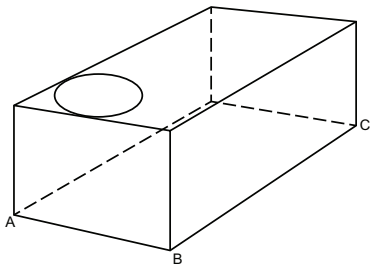
## Step 3 — Inspect Unit

Inspect unit for transportation damage. File any claim with transportation agency. Confirm before installation of unit that voltage, amperage and circuit protection requirements listed on unit data plate agree with power supply provided.

## Step 4 — Provide Unit Support

ROOF CURB MOUNT

Accessory roof curb details and dimensions are shown in Fig. 5. Assemble and install accessory roof curb in accordance with instructions shipped with the curb. Curb should be level. This is necessary for unit drain to function properly. Unit leveling tolerances are shown in Fig. 4. Refer to Accessory Roof Curb Installation Instructions for additional information as required.




**MAXIMUM ALLOWABLE DIFFERENCE in. (mm)**

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

**Fig. 4 — Unit Leveling Tolerances**

NOTE: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 5. Improperly applied gasket can also result in air leaks and poor unit performance.

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

SLAB MOUNT (HORIZONTAL UNITS ONLY)

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

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

ALTERNATE UNIT SUPPORT
(IN LIEU OF CURB OR SLAB MOUNT)

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

## Step 5 — Field Fabricate Ductwork

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

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

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

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

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

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

A minimum clearance is not required around ductwork.

**⚠ CAUTION**

PROPERTY DAMAGE HAZARD

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

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

Outlet grilles must not lie directly below unit discharge.

**⚠ WARNING**

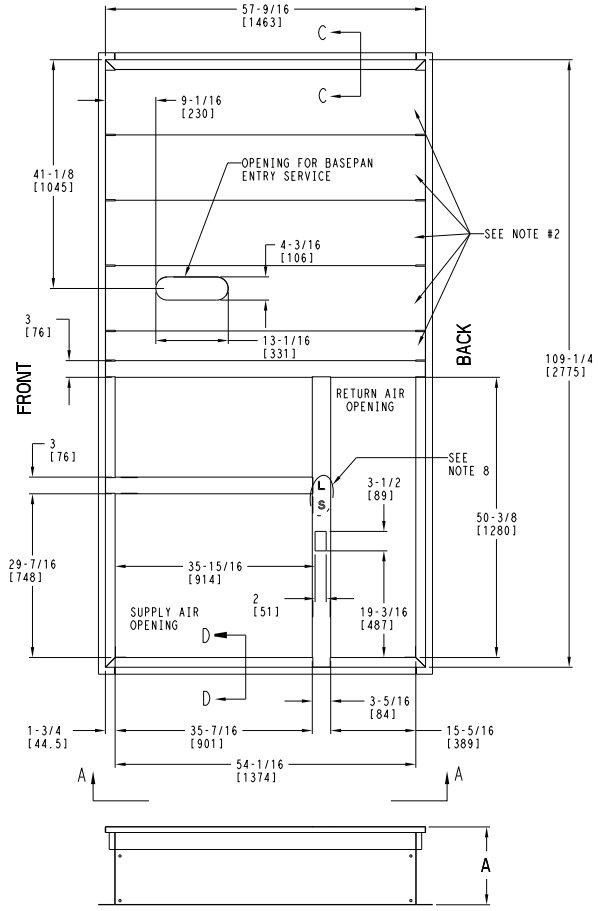
PERSONAL INJURY HAZARD

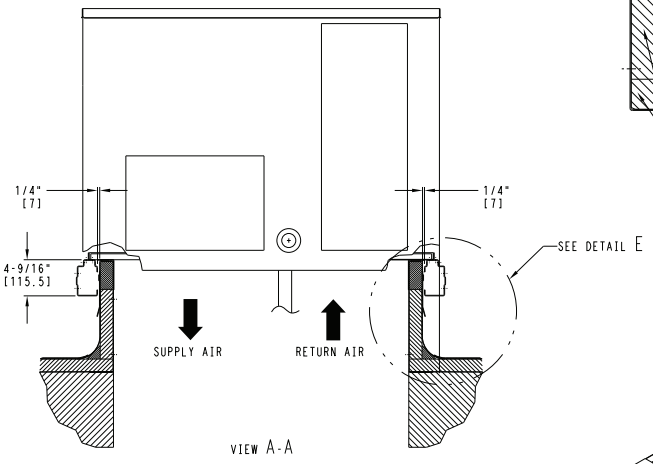
Failure to follow this warning could cause personal injury.

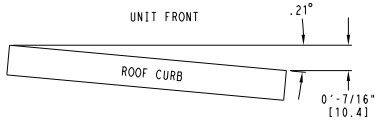
For vertical supply and return units, tools or parts could drop into ductwork and cause an injury. Install a 90 degree turn in the return ductwork between the unit and the conditioned space. If a 90 degree elbow cannot be installed, then a grille of sufficient strength and density should be installed to prevent objects from falling into the conditioned space.

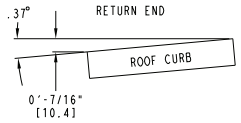
| ROOF CURB ACCESSORY # | A |
|---|---|
| CRRFCURB074A00 | 14" [356] |
| CRRFCURB075A00 | 24" [610] |

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

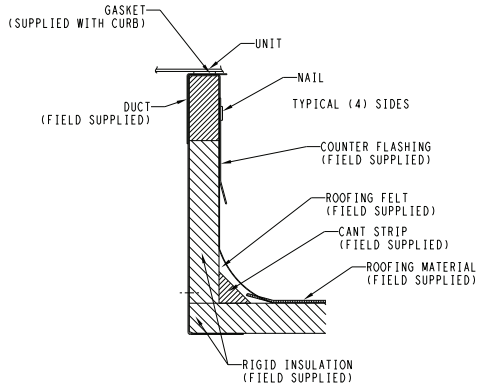


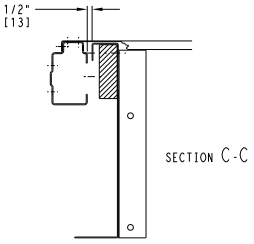



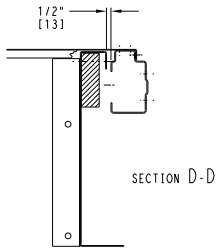



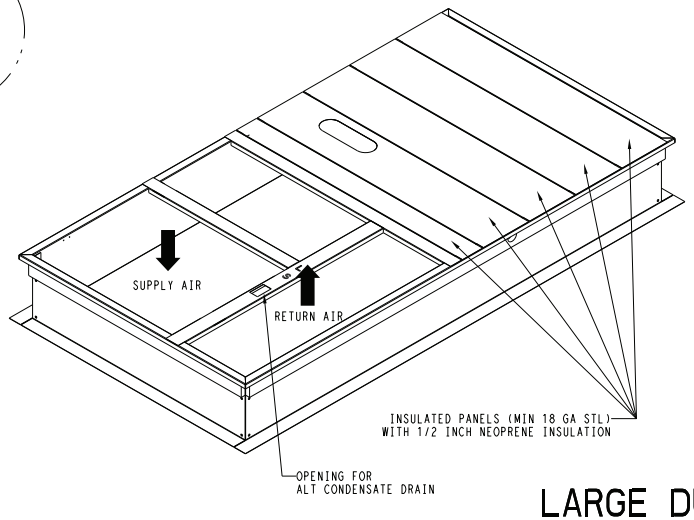

MAX CURB LEVELING TOLERANCES




DETAIL E



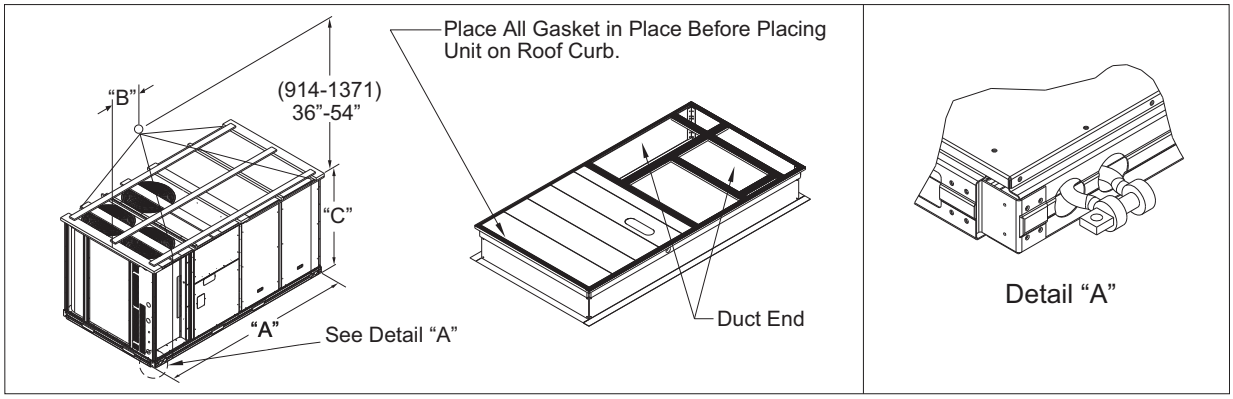




## LARGE DUCT OPENINGS

| 50TM500780 | REV B |
|---|---|

**Fig. 5 — 48QE**12 Roof Curb Details**




| UNIT | MAX WEIGHT | | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | A | | B | | C | |
| | lb | kg | in. | mm | in. | mm | in. | mm |
| **48QE**12** | 2009 | 911 | 116.0 | 2945 | 57.0 | 1450 | 59.0 | 1500 |

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

**Fig. 6 — Rigging Details**

## Step 6 — Rig and Place Unit

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

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

Rigging materials under unit (cardboard or wood to prevent base pan damage) must be removed PRIOR to placing the unit on the roof curb.

When using the standard side drain connection, ensure the red plug in the alternate bottom connection is tight. Do this before setting the unit in place. The red drain pan can be tightened with a 1/2 in. square socket drive extension. For further details see Install External Condensate Trap and Line on page 16.

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

**⚠ CAUTION**

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

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

If using top crate as spreader bar, once unit is set, carefully lower wooden crate off building roof top to ground. Ensure that no people or obstructions are below prior to lowering the crate.

POSITIONING ON CURB

For full perimeter curbs CRRFCURB074A00 and 075A00, the clearance between the roof curb and the front and rear base rails should be 1/4 in. (6.4 mm). The clearance between the curb and the end base rails should be 1/2 in. (13 mm).

If the alternative condensate drain location through the bottom of the unit is used in conjunction with a retrofit curb, the hole in the curb must be moved 12-1/2 in. (320 mm) towards the duct end of the unit. See Fig. 7.

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

Remove all shipping materials and top skid. Remove extra center post from the condenser end of the unit so that the condenser end of the unit matches Fig. 24 and 25. Recycle or dispose of all shipping materials.

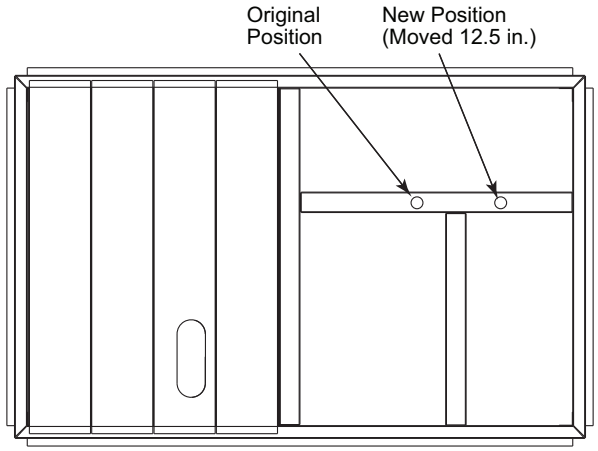



**Fig. 7 — Alternative Condensate Drain Hole Positions**

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

Unit is shipped in the vertical duct configuration. Unit without factory-installed economizer or return air smoke detector option may be field-converted to horizontal ducted configuration using accessory CRDUCTCV002A00. To convert to horizontal configuration, remove screws from side duct opening covers and remove covers.

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

ALL UNITS

Field-supplied flanges should be attached to horizontal duct openings and all ductwork should be secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof or building openings with counter flashing and mastic in accordance with applicable codes.

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

## Step 8 — Install Outside Air Hood

ECONOMIZER HOOD REMOVAL
(FACTORY OPTION)

1. The hood is shipped in knock-down form and located in the return air compartment. It is attached to the economizer using 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 (see Fig. 9). 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 Setup,* below.

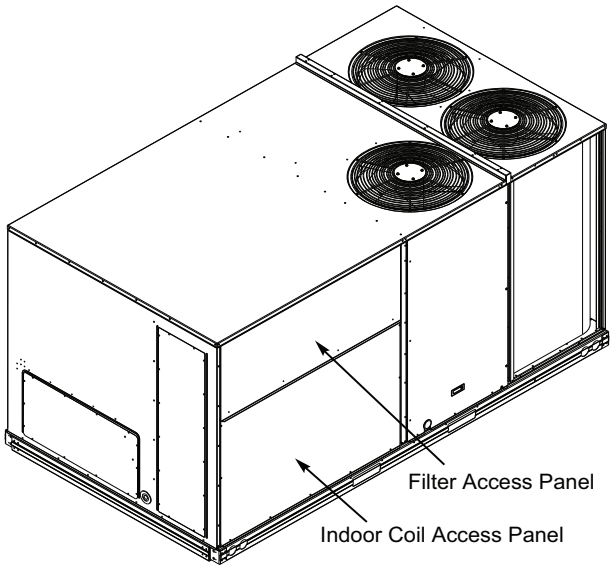



**Fig. 8 — Typical Access Panel Locations**

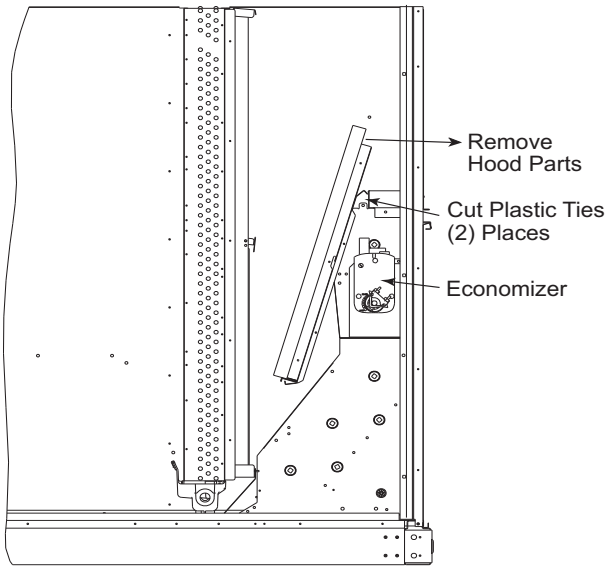



**Fig. 9 — Economizer Hood Package Location**

ECONOMIZER HOOD SETUP

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

1. The indoor coil access panel will be used as the top of the hood. If the panel is still attached to the unit, remove the screws along the sides and bottom of the panels. See Fig. 10.
2. Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Be careful not to lift the panel too far, as it might fall out. Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 11.
3. Remove the shipping tape holding the economizer barometric relief damper in place (economizer only).
4. Insert the hood divider between the hood sides. See Fig. 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.
7. Replace the filter access panel.

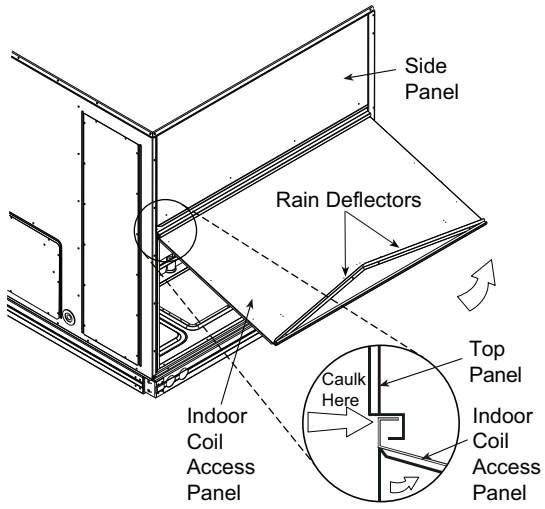



**Fig. 10 — Indoor Coil Access Panel Relocation**

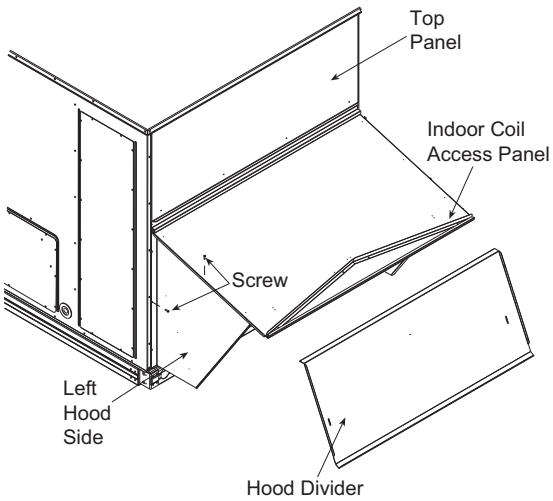



**Fig. 11 — Economizer Hood Construction**

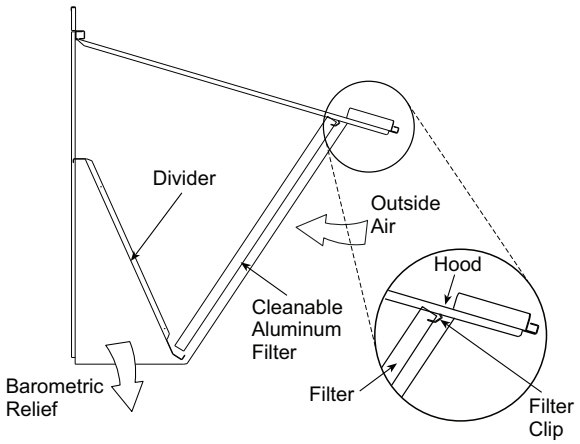



**Fig. 12 — Economizer Filter Installation**

## Step 9 — Install Flue Hood

Flue hood is shipped screwed to the basepan beside the burner compartment access panel. Remove from shipping location and using screws provided, install flue hood and screen in location shown in Fig. 13.

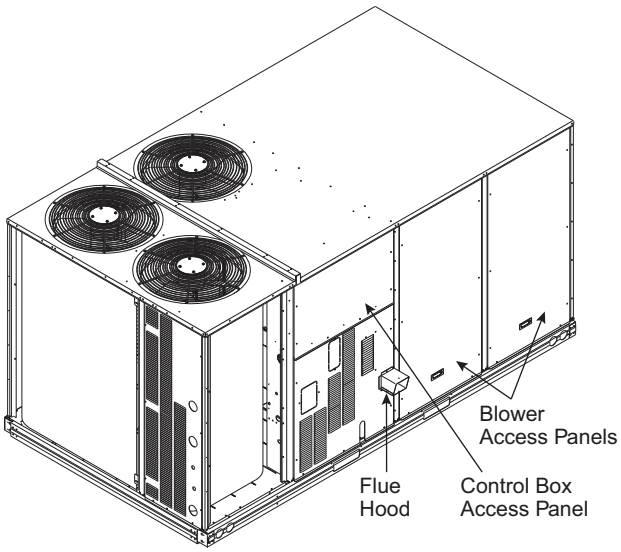



**Fig. 13 — Flue Hood Details**

## Step 10 — Install Gas Piping

Installation of the gas piping must be accordance with local building codes and with applicable national codes. In U.S.A., refer to NFPA 54/ANSI Z223.1 National Fuel Gas Code (NFGC). In Canada, installation must be in accordance with the CAN/CSA B149.1 and CAN/CSA B149.2 installation codes for gas-burning appliances. This unit is factory equipped for use with natural gas (NG) fuel at elevations up to 2000 ft (610 m) above sea level. Unit may be field converted for operation at elevations above 2000 ft (610 m) and/or for use with liquefied petroleum (LP) fuel. See accessory kit installation instructions regarding these accessories.

NOTE: Furnace gas input rate on rating plate is for installation up to 2000 ft (610 m) above sea level. The input rating for altitudes above 2000 ft (610 m) must be derated by 4% for each 1000 ft (305 m) above sea level.

NOTE: Installation of this furnace at altitudes above 2000 ft (610 m) shall be made in accordance with the Listed High Altitude Conversion Kit available with this furnace.

NOTE: L'installation de ce générateur de chaleur à des altitudes supérieures à 2000 pi (610 mm) doit être effectuée conformément aux instructions accompagnant la trousse de conversion pour haute altitude fournie avec cet appareil.

For natural gas applications, gas pressure at unit gas connection must not be less than 4 in. wg (996 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating (see Table 3). For liquefied petroleum applications, the gas pressure must not be less than 11 in. wg (2740 Pa) or greater than 13.0 in. wg (3240 Pa) at the unit connection (see Table 4).

**Table 3 — Natural Gas Supply Line Pressure Ranges**

| UNIT MODEL | UNIT SIZE | MIN. | MAX. |
|---|---|---|---|
| 48QES/R/T | 12 | 4.0 in. wg (996 Pa) | 13.0 in. wg (3240 Pa) |

**Table 4 — Liquid Propane Supply Line Pressure Ranges**

| UNIT MODEL | UNIT SIZE | MIN. | MAX. |
|---|---|---|---|
| 48QES/R/T | 12 | 11.0 in. wg (2740 Pa) | 13.0 in. wg (3240 Pa) |

The gas supply pipe enters the unit at the burner access panel on the front side of the unit through the long slot at the bottom of the access panel. The gas connection to the unit is made to the 3/4-in. FPT gas inlet port on the unit gas valve (see Table 5).

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

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

| UNIT MODEL | UNIT SIZE | HIGH FIRE | LOW FIRE |
|---|---|---|---|
| 48QES/R/T | 12 | 3.5 in. wg (872 Pa) | 2.0 in. wg (498 Pa) |

Manifold pressure for LP fuel use must be adjusted to specified range (see Table 6). Follow instructions in the accessory kit to make initial readjustment.

**Table 6 — Liquid Propane Manifold Pressure Ranges**

| UNIT MODEL | UNIT SIZE | HIGH FIRE | LOW FIRE |
|---|---|---|---|
| 48QES/R/T | 12 | 10.0 in. wg (2490 Pa) | 5.7 in. wg (1420 Pa) |

**⚠CAUTION**

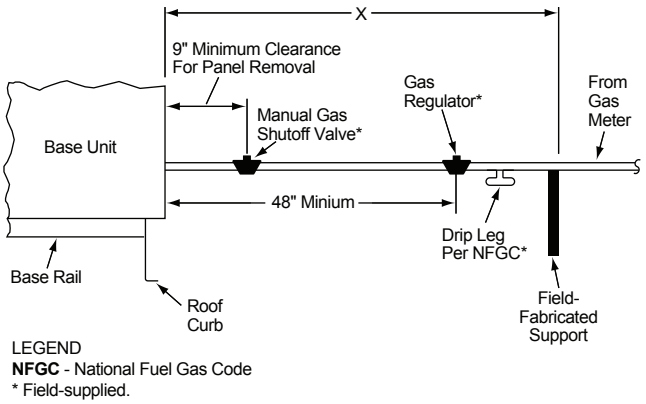
EQUIPMENT DAMAGE

Failure to follow this caution may result in equipment damage.

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

Install a gas supply line that runs to the unit heating section. Refer to the NFPA 54/NFGC or equivalent code for gas pipe sizing data. Do not use a pipe size smaller than 1/2-inch. Size the gas supply line to allow for a maximum pressure drop of 0.5 in. wg (124 Pa) between gas regulator source and unit gas valve connection when unit is operating at high-fire flow rate.

The gas supply line can approach the unit in three ways: horizontally from outside the unit (across the roof), thru-curb/under unit basepan (accessory kit required) or through unit basepan (factory-option or accessory kit required). Consult accessory kit installation instructions for details on these installation methods. Observe clearance to gas line components per Fig. 14.




| STEEL PIPE NOMINAL DIAMETER (in.) | SPACING OF SUPPORTS X DIMENSION (ft) |
|---|---|
| 1/2 | 6 |
| 3/4 or 1 | 8 |
| 1- 1/4 or larger | 10 |

**Fig. 14 — Gas Piping Guide (with Accessory Thru-the-Curb Service Connections)**

FACTORY-OPTION THRU-BASE
GAS CONNECTIONS

This service connection kit consists of a 3/4-in. NPT gas adapter fitting (stainless steel), a 1/2-in. electrical bulkhead connector and a 1-1/2-in. electrical bulkhead connector, connected to an "L" bracket covering the embossed (raised) section of the unit basepan in the condenser section. See Fig. 15.

1. Remove the "L" bracket assembly from the unit (see Fig. 15).
2. Cut and discard the wire tie on the gas fitting. Hand-tighten the fitting if it has loosened in transit.
3. Remove connector plate assembly from the "L" bracket and discard the "L" bracket, but retain the washer head screws and the gasket (located between the "L" bracket and the connector plate assembly

NOTE: Take care not to damage the gasket, as it is reused in the following step.

4. Place the gasket over the embossed area in the basepan, aligning the holes in the gasket to the holes in the basepan. See Fig. 16.
5. Install the connector plate assembly to the basepan using 8 of the washer head screws.

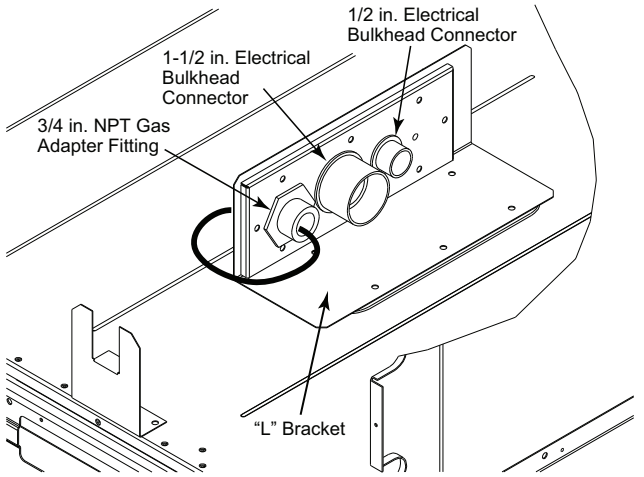



**Fig. 15 — Thru-Base Connection Fittings**

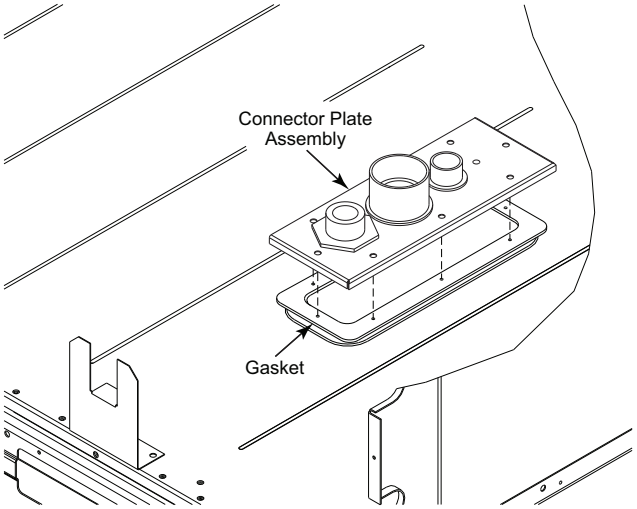



**Fig. 16 — Completing Installation of Thru-the-Base Option**

NOTE: If gas and/or electrical connections are not going to occur at this time, tape or otherwise cover the fittings so that moisture does not get into the building or conduit in the interim.

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

Check tightness of connector lock nuts before connecting gas piping.

Install a 3/4-in. NPT street elbow (field-supplied) on the thru-base gas fitting. Attach a 3/4-in. pipe nipple with minimum length of 16-in. (406 mm) (field-supplied) to the street elbow and extend it through the access panel at the gas support bracket (see Fig. 17).

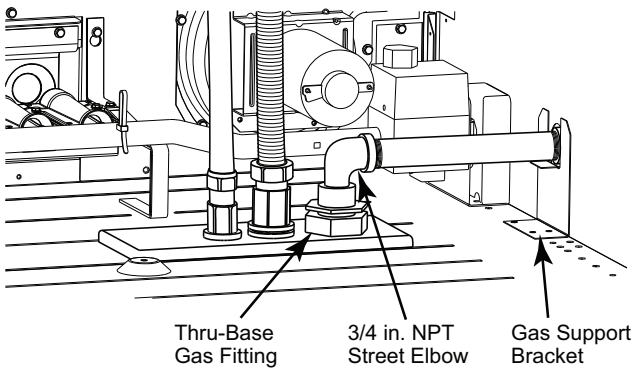



**Fig. 17 — Gas Line Piping**

***All Units***

Other hardware required to complete the installation of the gas supply line will include a manual shutoff valve, a sediment trap (drip leg), and a ground-joint union. A pressure regulator valve may also be required (to convert gas pressure from pounds to inches of pressure). The manual shutoff valve must be located within 6 ft (1.83 m) of the unit. The union, located in the final leg entering the unit, must be located at least 9-in. (230 mm) away from the access panel to permit the panel to be removed for service. If a regulator valve is installed, it must be located a minimum of 4 ft (1220 mm) away from the unit's flue outlet. Some municipal codes require that the manual shutoff valve be located upstream of the sediment trap. See Fig. 18 and 19 for typical piping arrangements for gas piping that has been routed through the sidewall of the curb. See Fig. 20 for typical piping arrangement when thru-base is used. Ensure that all piping does not block access to the unit's main control box or limit the required working space in front of the control box.

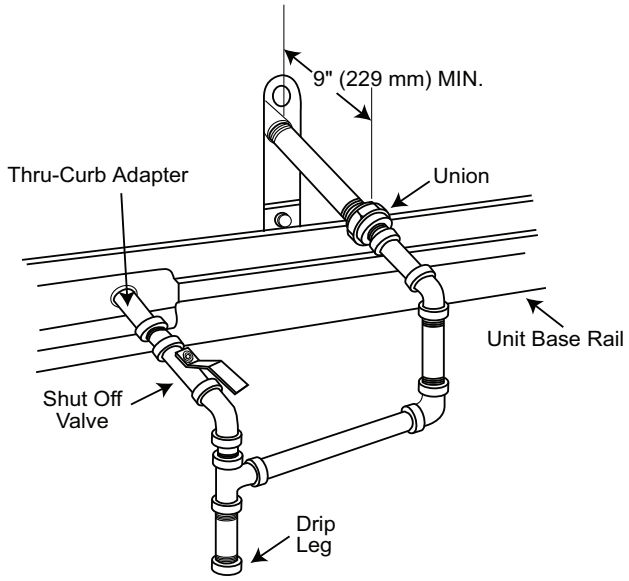



**Fig. 18 — Gas Piping with Thru-Curb Accessory**

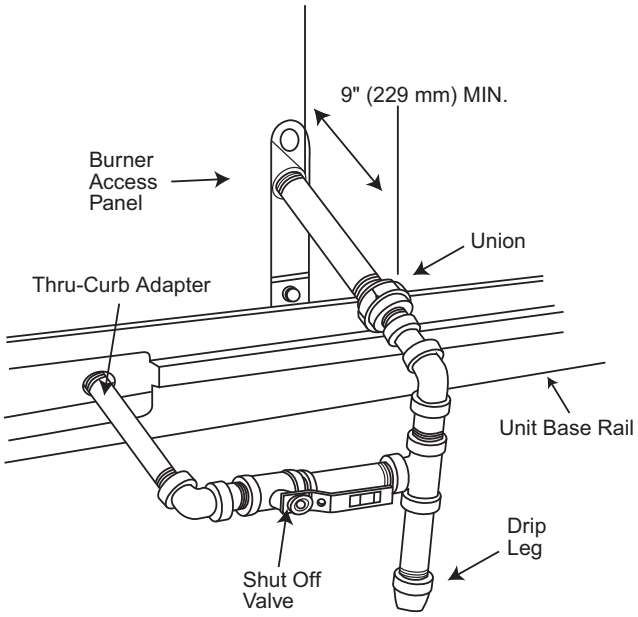



**Fig. 19 — Gas Piping with Thru-Curb Accessory (Alternate Layout)**

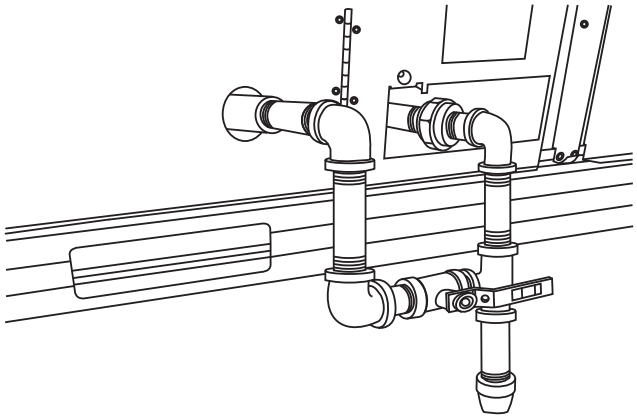


**Fig. 20 — Gas Piping Thru-Base Connections**

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

1. Avoid low spots in long runs of pipe. Grade all pipe 1/4-in. in every 15 ft (7 mm in every 5 m) to prevent traps. Grade all horizontal runs downward to risers. Use risers to connect to heating section and to meter.
2. Protect all segments of piping system against physical and thermal damage. Support all piping with appropriate straps, hangers, etc. Use a minimum of one hanger every 6 ft (1.8 m). For pipe sizes larger than 1/2-in., follow recommendations of national codes.
3. Apply joint compound (pipe dope) sparingly and only to male threads of joint when making pipe connections. Use only pipe dope that is resistant to action of liquefied petroleum gases as specified by local and/or national codes. If using PTFE (Teflon®[1]) tape, ensure the material is Double Density type and is labeled for use on gas lines. Apply tape per manufacturer's instructions.
4. Pressure-test all gas piping in accordance with local and national plumbing and gas codes before connecting piping to unit.

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

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

**⚠WARNING**

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

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

NOTE: If orifice hole appears damaged or it is suspected to have been re-drilled, check orifice hole with a numbered drill bit of correct size. Never re-drill an orifice (see Fig. 21). A burr-free and squarely aligned orifice hole is essential for proper flame characteristics.

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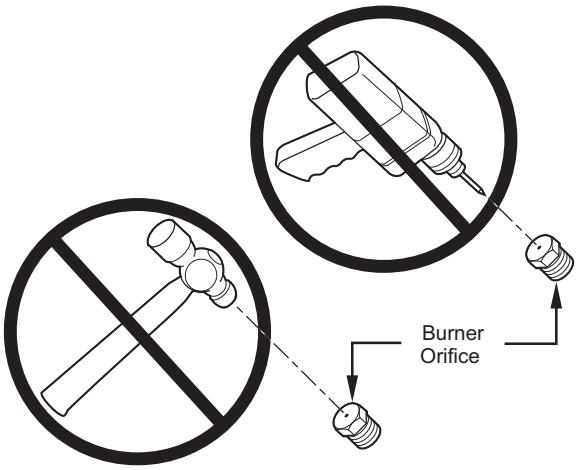



**Fig. 21 — Orifice Hole**

## Step 11 — 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. 22. Unit airflow configuration does not determine which drain connection to use. Either drain connection can be used with vertical or horizontal applications.

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

The piping for the condensate drain and external trap can be completed after the unit is in place. See Fig. 22 and 23.

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

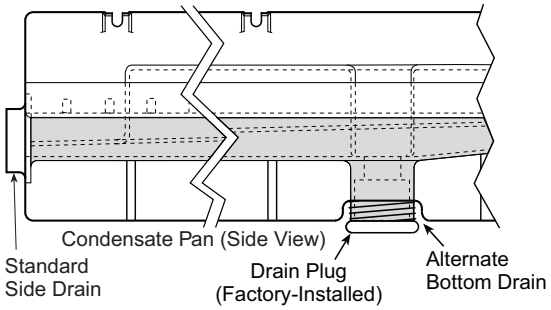
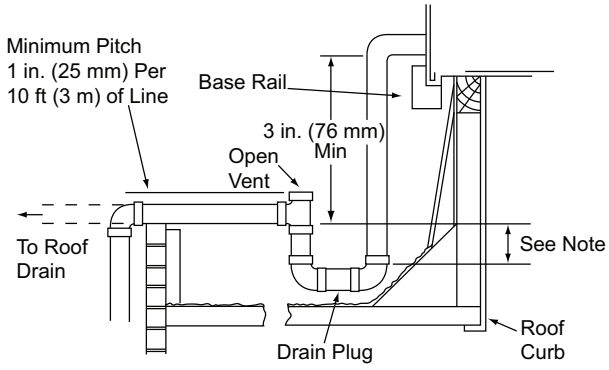



**Fig. 22 — Condensate Drain Pan (Side View)**




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

**Fig. 23 — Condensate Drain Piping Details**

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

## Step 12 — Make Electrical Connections

**⚠ WARNING**

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

Do not use gas piping as an electrical ground.

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code); ANSI/NFPA 70, latest edition (in Canada, Canadian Electrical Code CSA [Canadian Standards Association] C22.1), and local electrical codes.

NOTE: Check all factory and field electrical connections for tightness. Field-supplied wiring shall conform with the limitations of minimum 63°F (33°C) rise.

***Field Power Supply***

For those units without through-the-curb power, conduit must be used to route the main power from the condenser end, via the power entry in the corner post of the unit (see Fig. 24-26) to either the factory option disconnect or the bottom of the control box. A 1 in. conduit is provided wrapped around compressor. A second conduit is provided with factory-installed powered convenience outlet. For those units that require a conduit larger than 1 in., the conduit must be field-supplied. Figures 24-26 show the wire routings.

If the field disconnect is larger than 100-A, it must be attached to the unit using accessory CRDISBKT001A00 — disconnect switch bracket (see Fig. 27). Follow the instructions provided with this accessory. For smaller field disconnects, be sure to use 1/2 in. screws to mount the disconnect directly to the end panel (see Fig. 28). In either case, set the disconnect vertical location on the unit so that a 90 degree fitting can be used to connect the conduit to the disconnect.

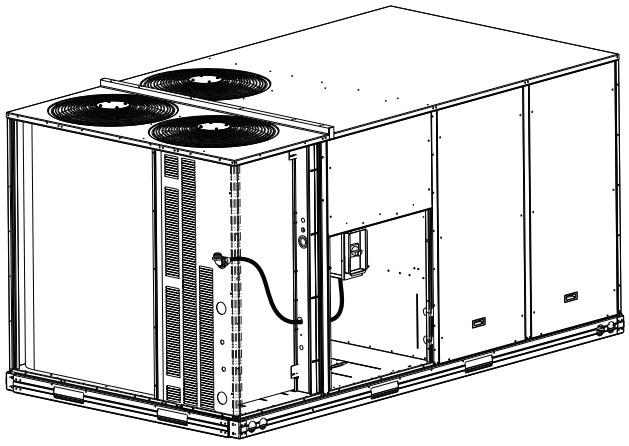


**Fig. 24 — Conduit into Factory Option Disconnect**

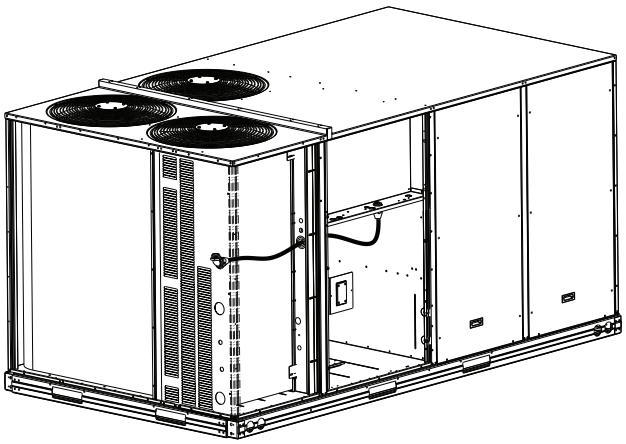


**Fig. 25 — Conduit into Control Box**

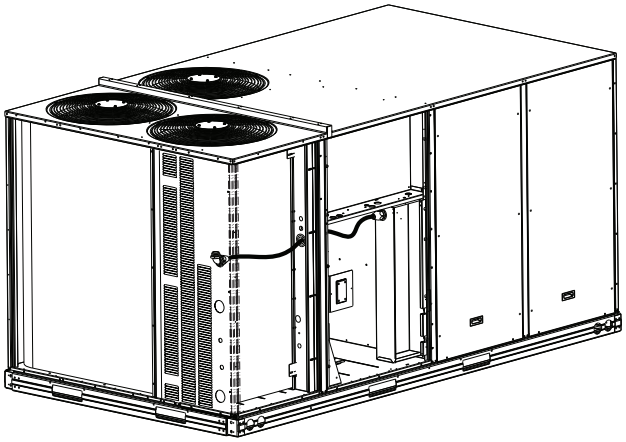


**Fig. 26 — Conduit into Single Point Box**

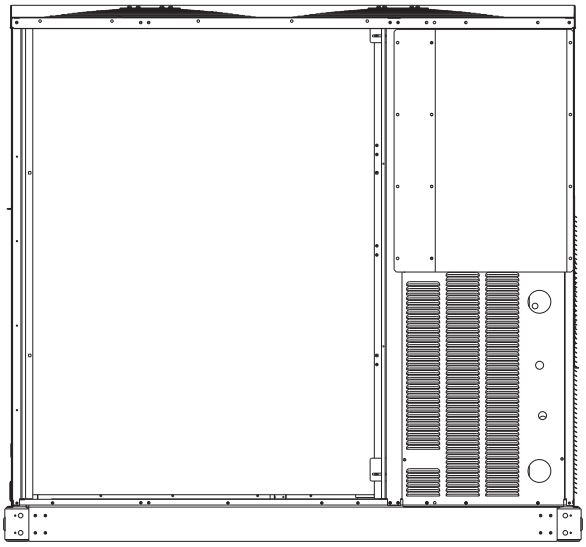


**Fig. 27 — Mounting Position for Field Disconnects (over 100A)**

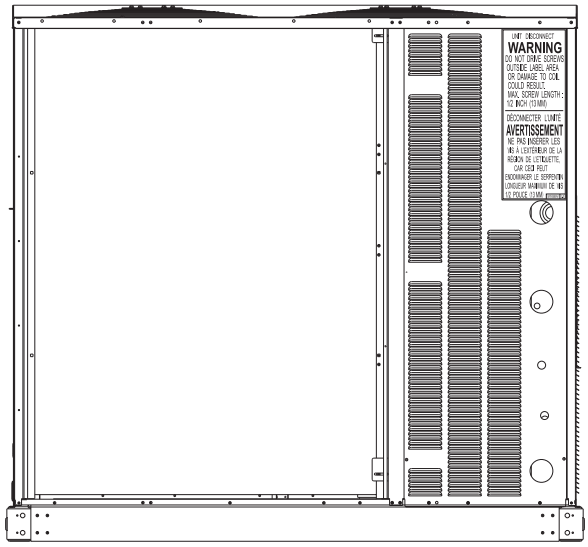



**Fig. 28 — Mounting Position for Field Disconnects (up to 100A)**

Field power wires are connected to the unit at line-side pressure lugs at the main terminal block (TB1) or at factory-installed option non-fused disconnect switch. See Fig. 29. Max wire size is no. 2 AWG (copper only). See Fig. 30.

**⚠ WARNING**

FIRE HAZARD

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

Do not connect aluminum wire between disconnect switch and unit. Use only copper wire. See Fig. 29.

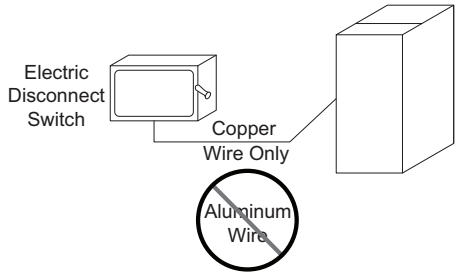



**Fig. 29 — Disconnect Switch and Unit**

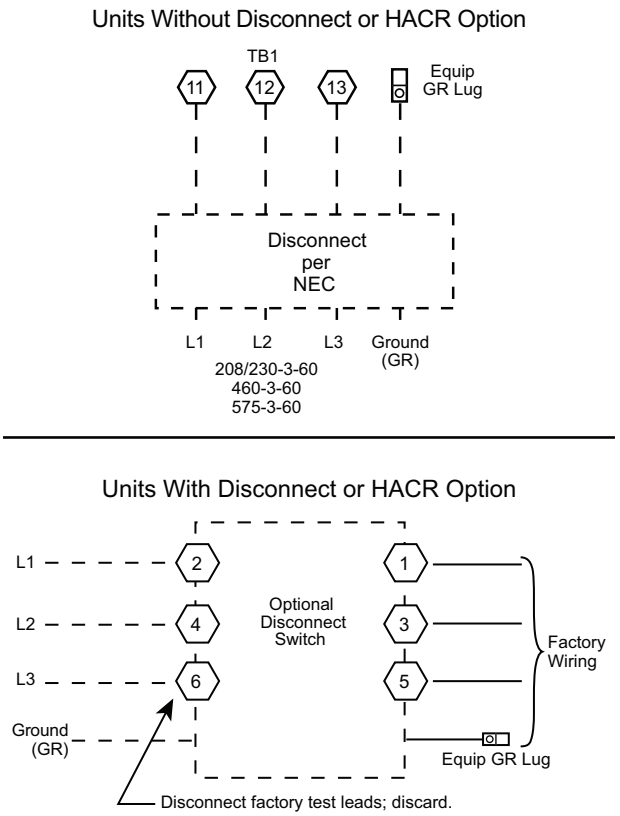



**Fig. 30 — Power Wiring Connections**

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

Refer to Table 7 for maximum wire size at connection lugs. Use copper wire only. See Fig. 29 and 30.

**Table 7 — Connection Lug Min/Max Wire Sizes**

| CONNECTION | MINIMUM | MAXIMUM |
|---|---|---|
| **TB1 In Unit Control Box** | No. 14 | No. 1 |
| **80A Disconnect Option** | No. 14 | No. 4 |
| **100A Disconnect Option** | No. 8 | 1/0 |
| **25A HACR Option** | No. 14 | 1/0 |
| **30A HACR Option** | No. 14 | 1/0 |
| **35A HACR Option** | No. 14 | 1/0 |
| **40A HACR Option** | No. 14 | 1/0 |
| **50A HACR Option** | No. 14 | 1/0 |
| **60A HACR Option** | No. 14 | 1/0 |
| **70A HACR Option** | No. 14 | 1/0 |
| **80A HACR Option** | No. 14 | 1/0 |
| **90A HACR Option** | No. 14 | 1/0 |
| **100A HACR Option** | No. 14 | 1/0 |

FIELD WIRING

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

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

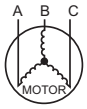
Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 30 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is 2/0 AWG per pole.

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

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate. On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the following formula to determine the percent of voltage imbalance.

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

Example: Supply voltage is 230-3-60




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

(BC) 231-227 = 4-v

(AC) 227-226 = 1-v

Maximum deviation is 4-v.

Determine percent of voltage imbalance.

$$\text{\% Voltage Imbalance} = 100x \frac{4}{227} = 1.76\%$$

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.

**⚠ CAUTION**

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

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

UNITS WITH FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR CIRCUIT BREAKER

The factory-installed option non-fused disconnect (NFD) switch (see Fig. 31) or HACR circuit breaker (see Fig. 32) is located in a weatherproof enclosure located under the main control box. The manual switch handle is shipped in the disconnect or HACR circuit breaker enclosure. Assemble the shaft and handle to the switch or HACR circuit breaker at this point. Discard the factory test leads (see Fig. 32). The factory disconnect is either an 80A or 100A depending on the unit voltage, indoor motor and options.

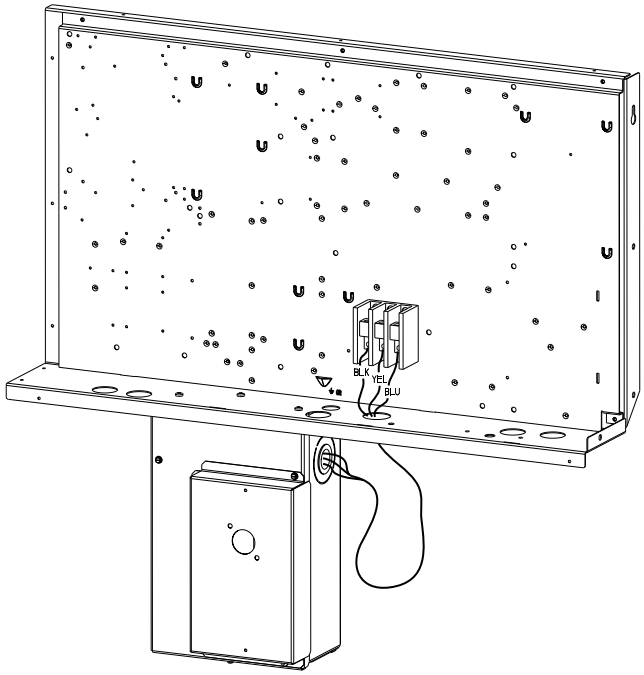



**Fig. 31 — Location of Non-Fused Disconnect Enclosure**

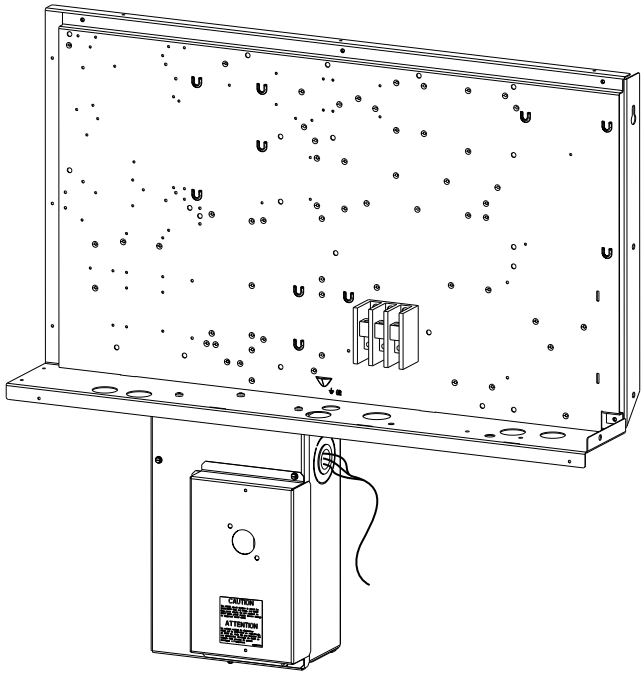


**Fig. 32 — Location of HACR Circuit Breaker Enclosure**

To field install the NFD shaft and handle:

1. Remove the unit front panel (see Fig. 2).
2. Remove (3) hex screws on the NFD enclosure - (2) on the face of the cover and (1) on the bottom (see Fig. 33).
3. Remove the front cover of the NFD enclosure. Make sure the NFD shipped from the factory is at OFF position (the arrow on the black handle knob is at OFF).
4. Insert the shaft with the cross pin on the top of the shaft in the horizontal position.
5. Measure the tip of the shaft to the top surface of the pointer to be 3.75 to 3.88 in. (95 to 99 mm) for 80A and 100A NFD and 3.43 to 3.56 in. (87 to 90 mm) for 200A NFD.
6. Tighten the locking screw to secure the shaft to the NFD.
7. Turn the handle to the OFF position with red arrow pointing at OFF.
8. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
9. Secure the handle to the painted cover with (2) screws and lock washers supplied.
10. Engaging the shaft into the handle socket, reinstall (3) hex screws on the NFD enclosure.
11. Reinstall the unit front panel.

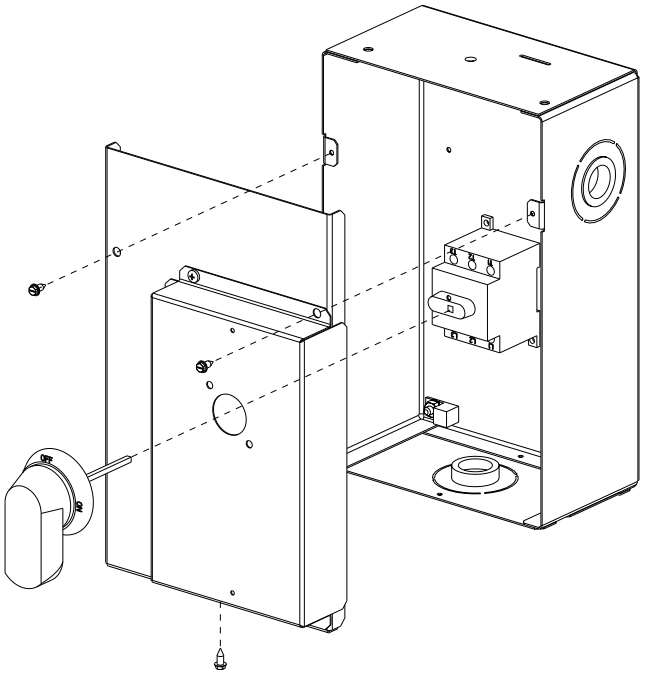


**Fig. 33 — Handle and Shaft Assembly for NFD**

To field install the HACR circuit breaker shaft and handle:

1. Remove the unit front panel (see Fig. 2).
2. Remove (3) hex screws on the HACR circuit breaker enclosure - (2) on the face of the cover and (1) on bottom (see Fig. 34).
3. Remove the front cover of the HACR circuit breaker enclosure.
4. Make sure the HACR circuit breaker shipped from the factory is at OFF position (the white arrow pointing at OFF).
5. Insert the shaft all the way with the cross pin on the top of the shaft in the horizontal position.
6. Tighten the locking screw to secure the shaft to the HACR circuit breaker.
7. Turn the handle to the OFF position with red arrow pointing at OFF.
8. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
9. Secure the handle to the painted cover with (2) screws and lock washers supplied.
10. Engaging the shaft into the handle socket, reinstall (3) hex screws on the HACR circuit breaker enclosure.
11. Reinstall the unit front panel.

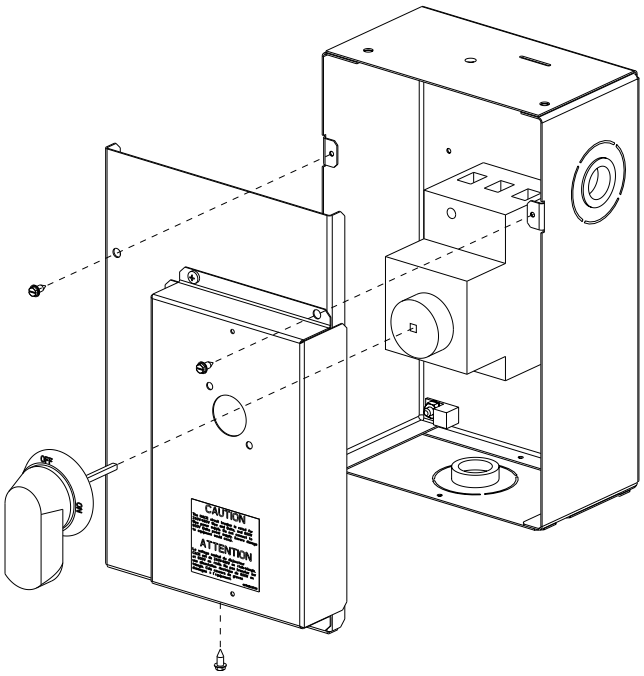



**Fig. 34 — Handle and Shaft Assembly for HACR Circuit Breaker**

UNITS WITHOUT FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR CIRCUIT BREAKER

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

CONVENIENCE OUTLETS

**⚠ WARNING**

ELECTRICAL OPERATION HAZARD

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

Units with convenience outlet circuits may use multiple disconnects. Check convenience outlet for power status before opening unit for service. Locate its disconnect switch, if appropriate, and open it. Lock-out and tag-out this switch, if necessary.

Two types of convenience outlets are offered on 48QE models: non-powered and unit-powered. Both types provide a 125-v GFCI (ground-fault circuit-interrupter) duplex receptacle rated at 15-A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 35.

***Installing Weatherproof Cover***

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

On units with electromechanical controls the weatherproof cover kit is shipped in the unit's control box. The kit includes the hinged cover, a backing plate and gasket. See Fig. 36.

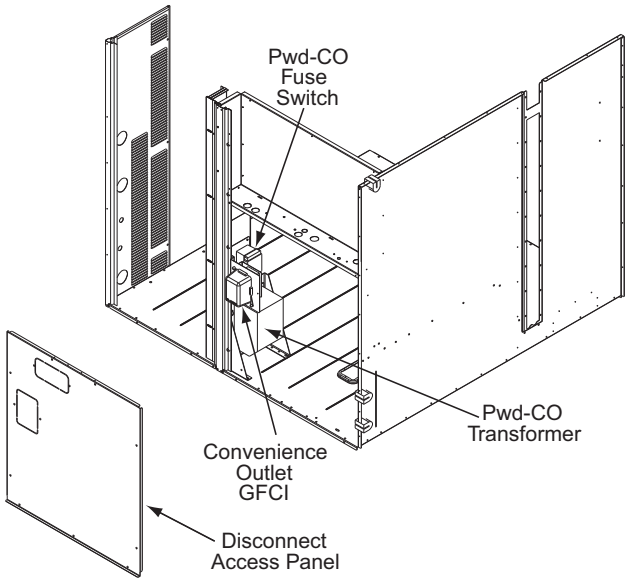



**Fig. 35 — Convenience Outlet Location**

***Disconnect All Power to Unit and Convenience Outlet. Lock-Out and Tag-Out All Power***

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

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

Mount the weatherproof cover to the backing plate as shown in Fig. 36. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover. Check for full closing and latching.

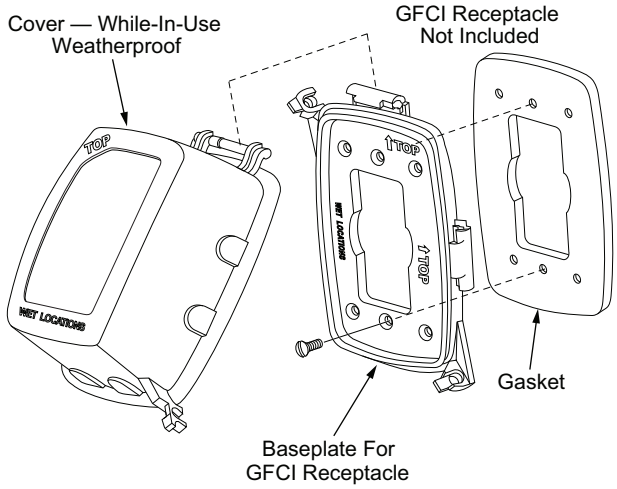



**Fig. 36 — Weatherproof Cover Installation**

Non-Powered Type

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

Unit-Powered Type

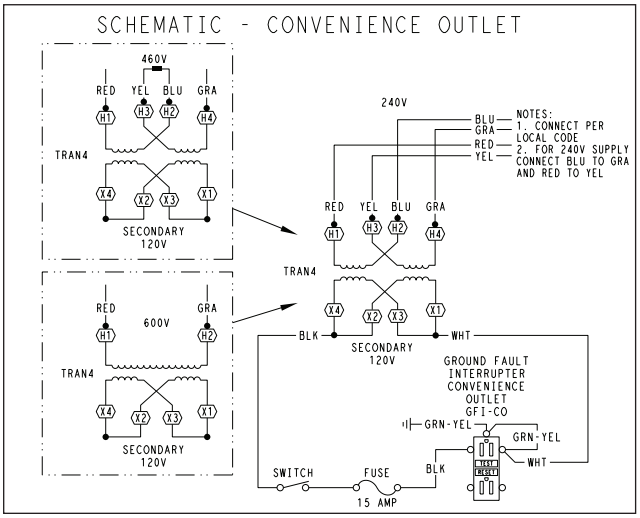
A unit-mounted transformer is factory-installed to step-down the main power supply voltage to the unit to 115-v at the duplex receptacle. This option also includes a manual switch with fuse,

located in a utility box and mounted on a bracket behind the convenience outlet; access is through the unit's control box access panel. See Fig. 35.

The primary leads to the convenience outlet transformer are not factory-connected. Selection of primary power source is a customer option. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect or HACR breaker switch; this will provide service power to the unit when the unit disconnect switch or HACR switch is open. Other connection methods will result in the convenience outlet circuit being de-energized when the unit disconnect or HACR switch is open. See Fig. 37. On a unit without a unit-mounted disconnect, connect the source leads to the main terminal block (TB3).

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

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




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

**Fig. 37 — Powered Convenience Outlet Wiring**

ALL UNITS

Test the GFCI receptacle by pressing the TEST button on the face of the receptacle to trip and open the receptacle. Check for proper grounding wires and power line phasing if the GFCI receptacle does not trip as required. Press the RESET button to clear the tripped condition.

***Unit-Mounted Convenience Outlets***

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

***Fuse on Power Type***

The factory fuse is a Bussman™[1] Fusetron™[1] T-15, non-renewable screw-in (Edison base) type plug fuse. See Fig. 38 for maximum continuous use amp limitations.

**NOTICE**

**Convenience Outlet Utilization**

**Maximum Continuous use: 15 Amps for receptacle outlets, and 8 Amps for factory supplied transformers**

50HJ542739 C

**Fig. 38 — Convenience Outlet Utilization Notice Label**

FACTORY-OPTION THRU-BASE CONNECTIONS (ELECTRICAL CONNECTIONS)

This service connection kit consists of a 1/2 in. electrical bulkhead connector and a 1-1/2 in. electrical bulkhead connector, connected to an "L" bracket covering the embossed (raised) section of the unit basepan in the condenser section. See Fig. 39. The 1/2 in. bulkhead connector enables the low-voltage control wires to pass through the basepan. The 1-1/2 in. electrical bulkhead connector allows the high-voltage power wires to pass through the basepan.

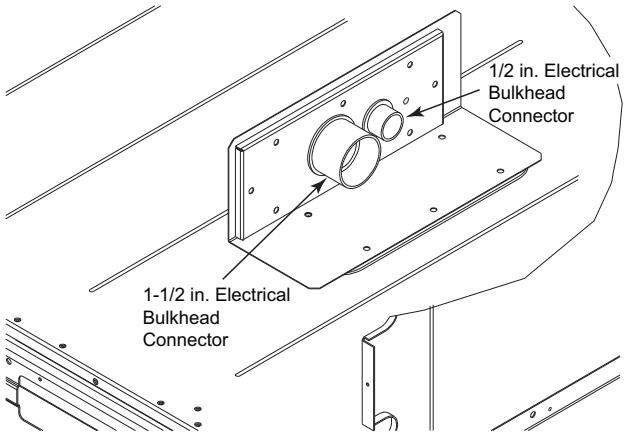



**Fig. 39 — Thru-the-Base Option, Shipping Position**

12. Remove the "L" bracket assembly from the unit.
13. Remove connector plate assembly from the "L" bracket and discard the "L" bracket, but retain the washer head screws and the gasket (located between the "L" bracket and the connector plate assembly).

NOTE: Take care not to damage the gasket, as it is reused in the following step.

14. Place the gasket over the embossed area in the basepan, aligning the holes in the gasket to the holes in the basepan. See Fig. 40.
15. Install the connector plate assembly to the basepan using 8 of the washer head screws.

NOTE: If electrical connections are not going to occur at this time, tape or otherwise cover the fittings so that moisture does not get into the building or conduit in the interim.

1. Third-party trademarks and logos are the property of their respective owners.

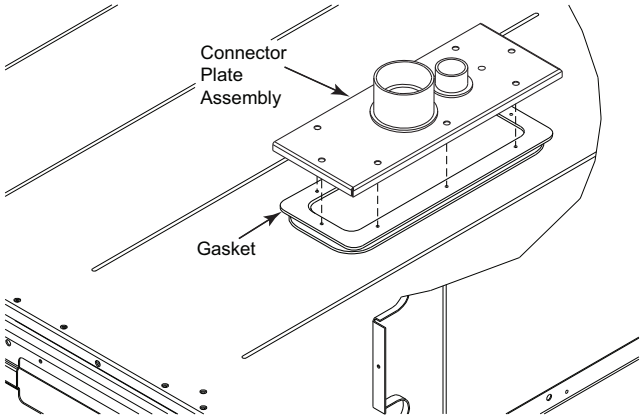



**Fig. 40 — Completing Installation of Thru-the-Base Option**

Check tightness of connector lock nuts before connecting electrical conduits.

Field-supplied and field-installed liquid tight conduit connectors and conduit may be attached to the connectors on the basepan. Pull correctly rated high voltage through appropriate conduits. Connect the power conduit to the internal disconnect (if unit is so equipped) or to the external disconnect (through unit side panel). A hole must be field cut in the main control box bottom on the left side so the 24-v control connections can be made.

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

***Units Without Thru-Base Connections***

1. Install power wiring conduit through side panel openings. Install conduit between disconnect and control box.
2. Install power lines to terminal connections as shown in Fig. 30.

***Field Control Wiring***

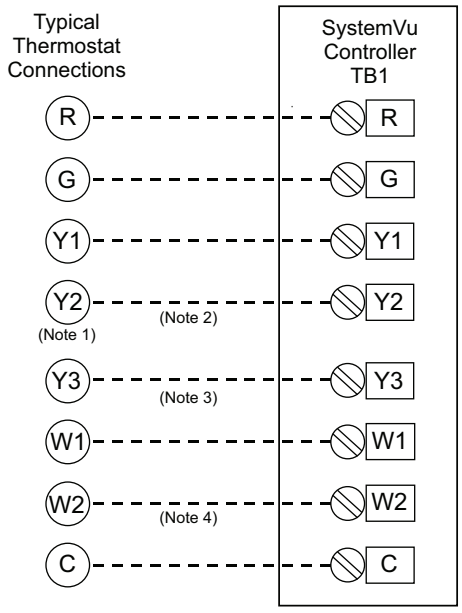
48QE units are equipped with the SystemVu™ controller which can be used on a Carrier Comfort Network® or as a stand-alone control. All field added wire must comply with UL and local NEC standards. See  (below) and use the routing path shown in Fig. 42 to help with compliance as needed.

***Thermostat***

Install a Carrier-approved accessory 2-stage Cooling/Heating thermostat according to installation instructions included with the accessory. If using an electronic thermostat, configure it for "non-heat pump" operation. Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions.

If the thermostat contains a logic circuit requiring 24-v power, use a thermostat cable or equivalent single leads of different colors with minimum of 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. See Fig. 41. Check the thermostat installation instructions for additional features which might require additional conductors in the cable. For wire runs up to 50 ft (15 m), use no. 18 AWG (American Wire Gauge) insulated wire 95°F (35°C minimum).

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




NOTES:
1. Typical multi-function marking. Follow manufacturer's configuration instructions to select Y2.
2. Y2 to Y2 connection required on single-stage cooling units when integrated economizer function is desired.
3. Y3 terminal is configurable in the software.
4. W2 connection not required on units with single-stage heating.

– – – Field Wiring

**Fig. 41 — Typical Low-Voltage Control Connections**

***Unit without Thru-Base Connection Kit***

Pass the thermostat control wires through the bushing on the unit end panel. Route the wire through the snap-in wire tie and up to the web bushing near the control box. Route the wire through the bushing and into the bottom left side of the control box after removing one of the two knockouts in the corner of the box. Use a connector at the control box to protect the wire as it passes into the control box. Pull the wires over to the terminal strip at the lower left corner of the SystemVu controller. Use the connector at the control box and the wire tie to take up any slack in the thermostat wire to ensure that it will not be damaged by contact with the condenser coil. See Fig. 42.

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

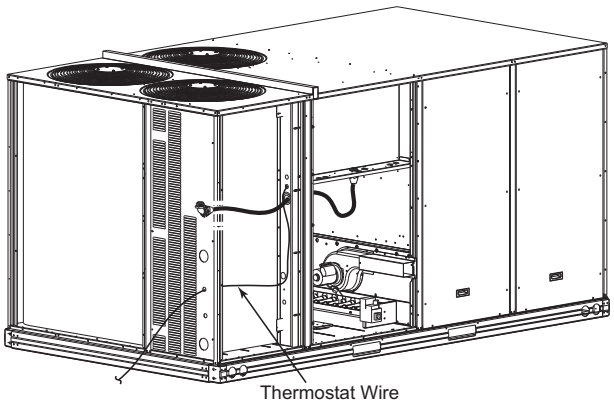



**Fig. 42 — Thermostat Wire Routing**

ZS SPACE SENSOR

The ZS Standard, Plus, or Pro can be wired into J20 or J24 of the SystemVu controller (see Fig. 43), J20 provides an easy field connection plug. A maximum of 5 ZS sensors can be connected but a separate power supply may be needed. Use the ZS SENSOR CFG menu (***SETTINGS→NETWORK SETTINGS***) when setting up the ZS sensors in SystemVu. The Sensor addresses have to be unique and set in the actual sensors via DIP also. The Typical default for the ZS Sensor is address 1. Follow the ZS installation instruction for further details on the sensors. ZS sensor data can be monitored on SystemVu in the ZS Sensor Info menu (***INPUTS→NETWORK→ZS SENSOR INFO***).

J20-1 Sensor Common

J20-2 Sensor Communication Positive (+)

J20-3 Sensor Communication Negative(–)

J20-4 Sensor +12 vdc Power

CONTROL AND POWER WIRING DIAGRAMS

Figures 43-44 are typical control and power wiring diagrams. These wiring diagrams are mounted on the inside of the unit control box. Refer to the wiring diagrams in the unit control box when making field power wiring connections.

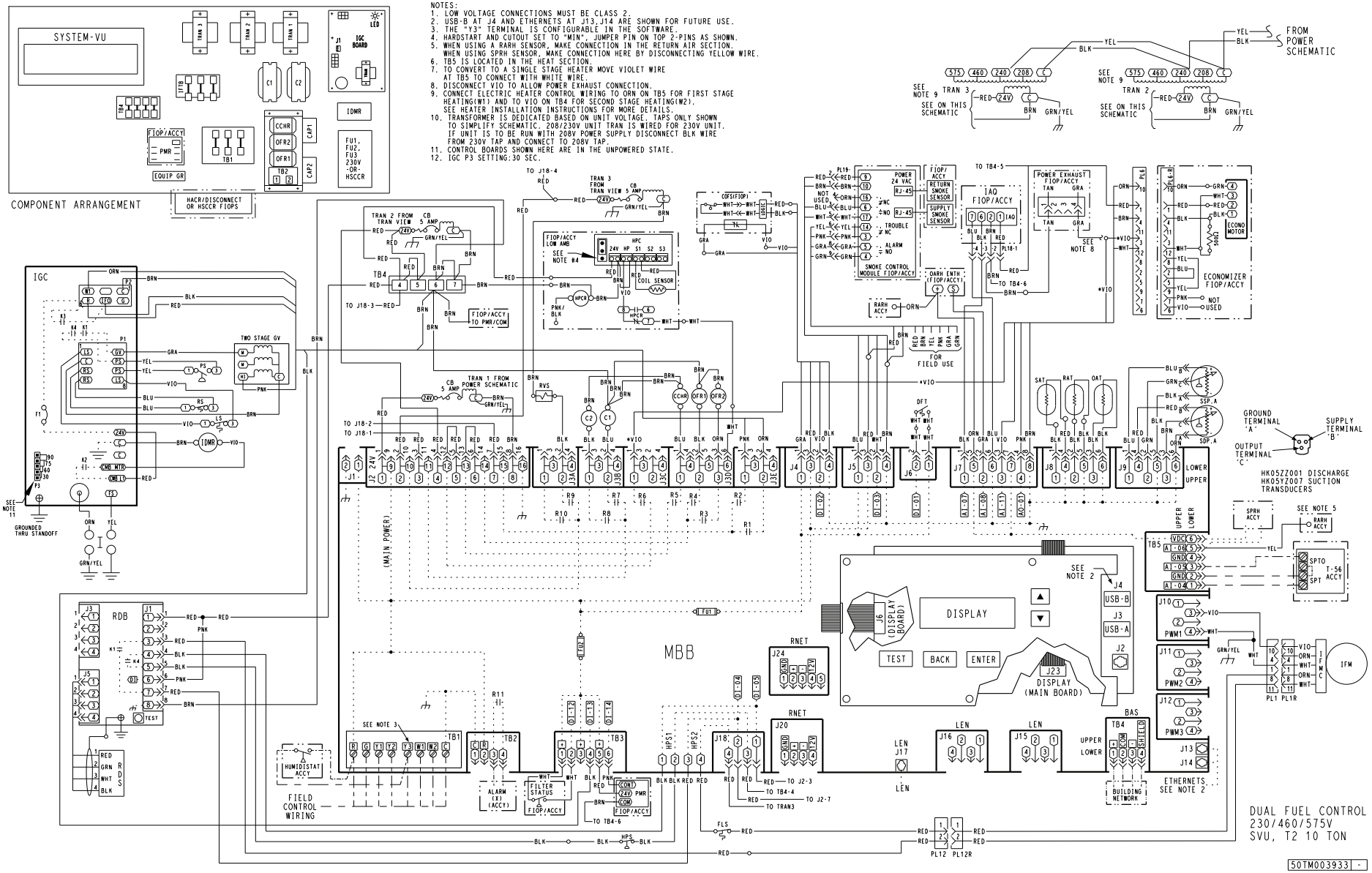
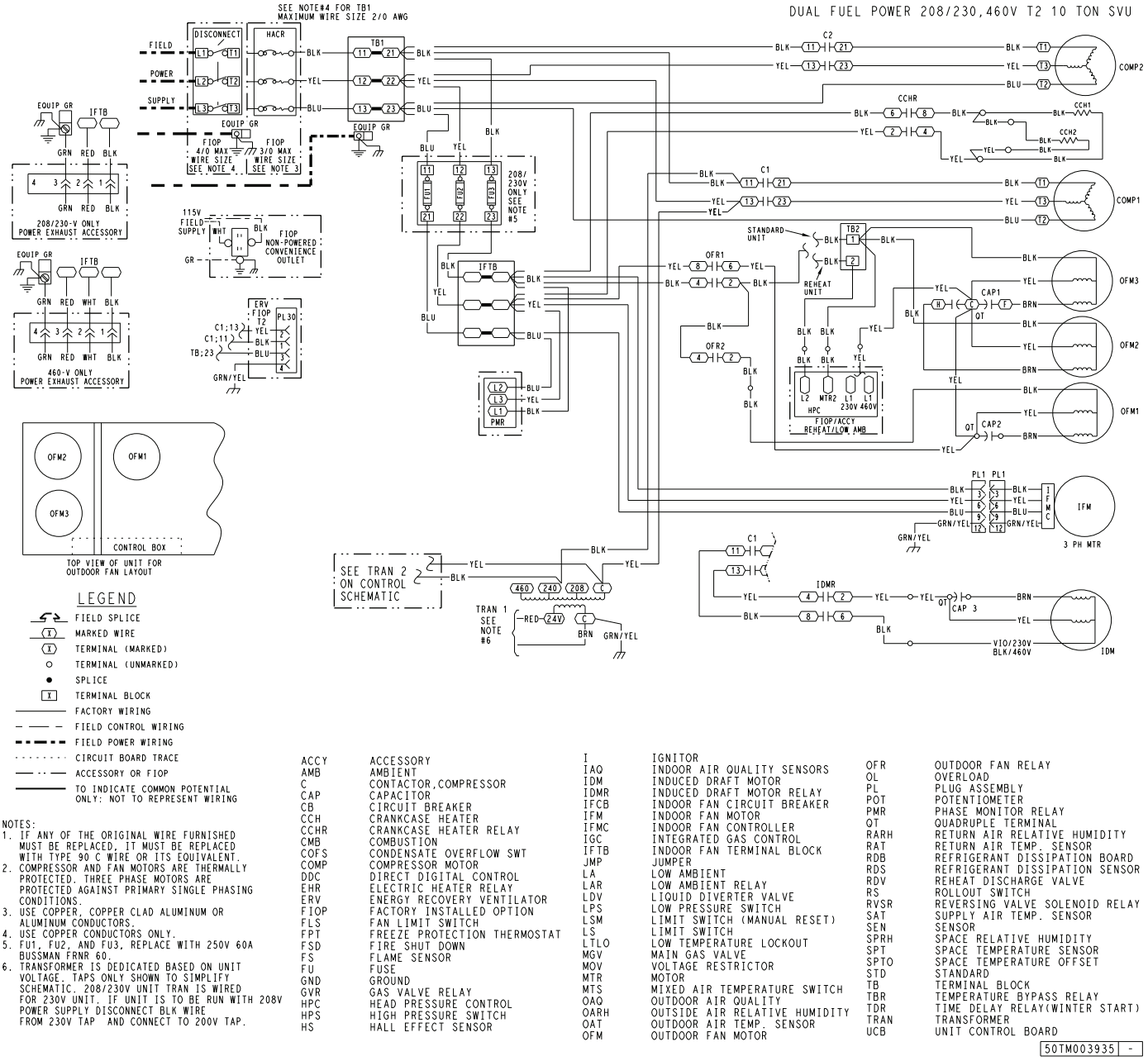



**Fig. 43 — Typical 48QE 12 Control Wiring Diagram, SystemVu™ Controller, 230, 460, 575-3-60 Unit Shown**




## LEGEND

- FIELD SPLICE
- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- SPLICE
- TERMINAL BLOCK
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR FIOP
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

NOTES:
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
4. USE COPPER CONDUCTORS ONLY.
5. FU1, FU2, AND FU3, REPLACE WITH 250V 60A BUSSMAN FRNR 60.
6. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.

| | |
|---|---|
| ACCY | ACCESSORY |
| AMB | AMBIENT |
| C | CONTACTOR,COMPRESSOR |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CMB | COMBUSTION |
| COFS | CONDENSATE OVERFLOW SWT |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| EHR | ELECTRIC HEATER RELAY |
| ERV | ENERGY RECOVERY VENTILATOR |
| FIOP | FACTORY INSTALLED OPTION |
| FLS | FAN LIMIT SWITCH |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FSD | FIRE SHUT DOWN |
| FS | FLAME SENSOR |
| FU | FUSE |
| GND | GROUND |
| GVR | GAS VALVE RELAY |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HS | HALL EFFECT SENSOR |
| I | IGNITOR |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFCB | INDOOR FAN CIRCUIT BREAKER |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN CONTROLLER |
| IGC | INTEGRATED GAS CONTROL |
| IFTB | INDOOR FAN TERMINAL BLOCK |
| JMP | JUMPER |
| LA | LOW AMBIENT |
| LAR | LOW AMBIENT RELAY |
| LDV | LIQUID DIVERTER VALVE |
| LPS | LOW PRESSURE SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LS | LIMIT SWITCH |
| LTLO | LOW TEMPERATURE LOCKOUT |
| MGV | MAIN GAS VALVE |
| MOV | VOLTAGE RESTRICTOR |
| MTR | MOTOR |
| MTS | MIXED AIR TEMPERATURE SWITCH |
| OAQ | OUTDOOR AIR QUALITY |
| OARH | OUTSIDE AIR RELATIVE HUMIDITY |
| OAT | OUTDOOR AIR TEMP. SENSOR |
| OFM | OUTDOOR FAN MOTOR |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| QT | QUADRUPLE TERMINAL |
| RARH | RETURN AIR RELATIVE HUMIDITY |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RS | ROLLOUT SWITCH |
| RVSR | REVERSING VALVE SOLENOID RELAY |
| SAT | SUPPLY AIR TEMP. SENSOR |
| SEN | SENSOR |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| STD | STANDARD |
| TB | TERMINAL BLOCK |
| TBR | TEMPERATURE BYPASS RELAY |
| TDR | TIME DELAY RELAY(WINTER START) |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |

50TM003935 -

**Fig. 44 — Typical 48QE 12 Power Wiring Diagram, SystemVu Controller — 208/230, 460-3-60 Unit Shown**

## Integrated Gas Controller

This unit contains an Integrated Gas Controller (IGC) board. The IGC control board uses a flue gas pressure switch that senses pressure drop in the heat exchanger due to the combustion inducer. See Fig. 45.

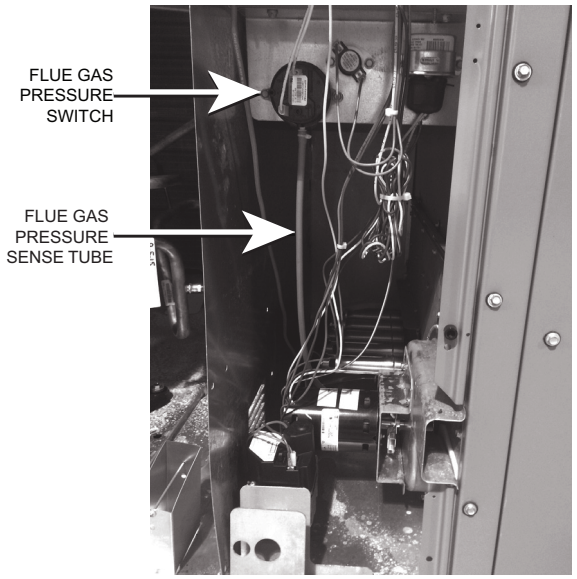



**Fig. 45 — Flue Gas Pressure Switch and Pressure Sense Tube (Typical Location)**

When the thermostat calls for heating, power is sent to W on the Integrated Gas Controller (IGC) board. An LED (light emitting diode) on the IGC board turns on and remains on during normal operation. A check is made to ensure that the rollout switch and limit switch are closed, and that the pressure switch is open. If the check was successful, the induced draft motor is energized. When the pressure in the heat exchanger is low enough to close the pressure switch, the ignition activation period begins. Once ignition occurs, the IGC board will continue to monitor the condition of the rollout switch, the limit switches, the pressure switch, and the flame sensor. Assuming the unit is controlled through a room thermostat set for "fan auto," 45 seconds after ignition occurs, the IFO sends 24vac to TB3-4 to prove fan output to DI-13, and the outdoor air dampers will open to their minimum position. If the "over temperature limit" opens prior to the start of the indoor fan blower, the IGC will shut down the burners, and the control will shorten the 45 second delay to 5 seconds less than the time to trip the limit. For example, if the limit trips at 37 seconds, the control will change the "fan on delay" from 45 seconds to 32 seconds. Once the "fan on delay" has been modified, it will not change back to 45 seconds unless power is reset to the control. On units with 2 stages of heat, W2 closes and initiates power to the second stage of the main gas valve when additional heat is required. See Fig. 47 for IGC operating sequence.

When the thermostat is satisfied, W1 and W2 open and the gas valve closes, interrupting the flow of gas to the main burners. If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto, the indoor fan motor will continue to operate for an additional 90 seconds, then stop. An LED indicator is provided on the IGC to monitor operation. See Table 8 for details on the IGC board LED alarm codes.

See Fig. 46 for IGC board component layout. See Fig. 43 for typical IGC control wiring connections to the SystemVu controller. Table 8 lists the IGC Board LED Alarm Codes.

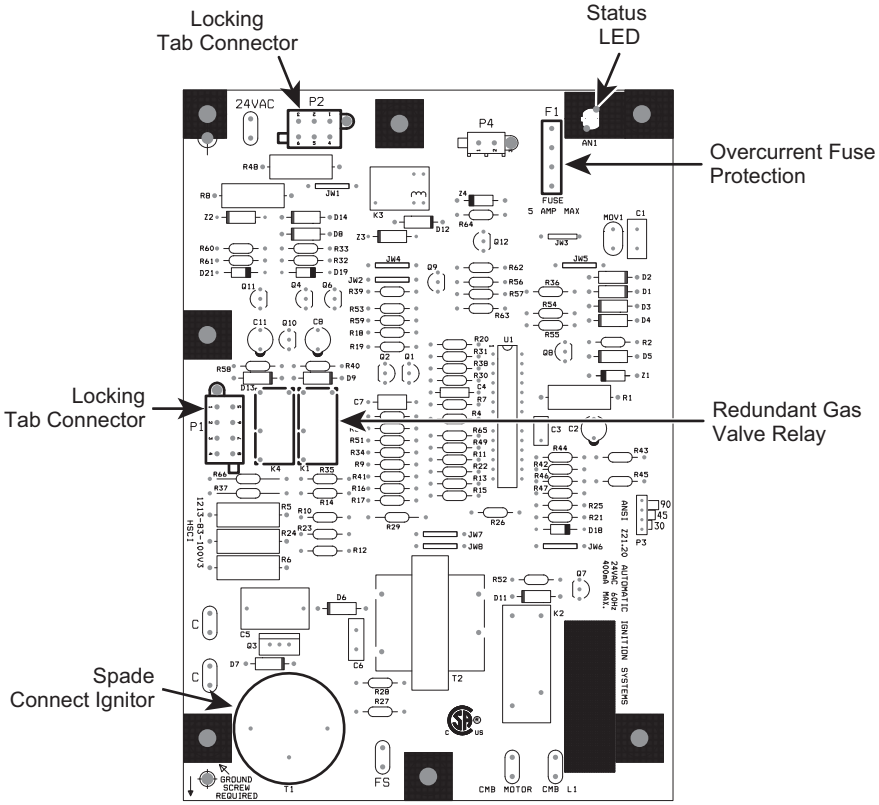



**Fig. 46 — IGC Board Component Layout**

## Table 8 — IGC Board LED Alarm Codes[a,b,c,d]

| LED FLASH CODE | DESCRIPTION | ACTION TAKEN BY CONTROL | RESET METHOD | PROBABLE CAUSE |
|---|---|---|---|---|
| **On** | Normal Operation | — | — | — |
| **Off** | Hardware Failure | No gas heating. | — | Loss of power to the IGC. Check 5 amp fuse on IGC, power to unit, 24-v circuit breaker, transformer, and wiring to the IGC. |
| **1 Flash** | Indoor Fan On/Off Delay Modified | 5 seconds subtracted from On delay. 5 seconds added to Off delay (3 minute maximum). | Power reset. | High temperature limit switch opens during heat exchanger warm-up period before fan-on delay expires. High temperature limit switch opens within 10 minutes of heat call (W) Off. See Limit Switch Fault. |
| **2 Flashes** | Limit Switch Fault | Gas valve and igniter Off. Indoor fan and inducer On. | Limit switch closed or heat call (W) Off. | High temperature limit switch is open. Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is within the range on the unit nameplate. Check wiring and limit switch operation. |
| **3 Flashes** | Flame Sense Fault | Indoor fan and inducer On. | Flame sense normal. Power reset for LED reset. | The IGC sensed a flame when the gas valve should be closed. Check wiring, flame sensor, and gas valve operation. |
| **4 Flashes** | Four Consecutive Limit Switch Fault | No gas heating. | Heat call (W) Off. Power reset for LED reset. | Four consecutive limit switch faults within a single call for heat. See Limit Switch Fault. |
| **5 Flashes** | Ignition Fault | No gas heating. | Heat call (W) Off. Power reset for LED reset. | Unit unsuccessfully attempted ignition for 15 minutes. Check igniter and flame sensor electrode spacing, gaps, etc. Check flame sense and igniter wiring. Check gas valve operation and gas supply. |
| **6 Flashes** | Induced Draft Motor/Pressure Switch Fault | If heat off: no gas heating. If heat on: gas valve Off and inducer On. | Inducer sense normal or heat call (W) Off. | Inducer sense On when heat call Off, or inducer sense Off when heat call On. Check wiring, voltage, and operation of IGC motor. Check inducer motor and flue gas pressure switch. |
| **7 Flashes** | Rollout Switch Lockout | Gas valve and igniter Off. Indoor fan and inducer On. | Power reset. | Rollout switch has opened. Check gas valve operation. Check induced-draft blower wheel is properly secured to motor shaft. |
| **8 Flashes** | Internal Control Lockout | No gas heating. | Power reset. | IGC has sensed internal hardware or software error. If fault is not cleared by resetting 24-v power, check for bad gas valve, replace the IGC. |
| **9 Flashes** | Temporary Software Lockout | No gas heating. | One hour auto reset or power reset. | Electrical interference is disrupting the IGC software. |

NOTE(S):

a. There is a 3-second pause between alarm code displays.
b. If more than one alarm code exists, then all applicable alarm codes will be displayed in numerical sequence.
c. Alarm codes on the IGC will be lost if power to the unit is interrupted.
d. If the flue gas inducer pressure switch is stuck closed on a W1 call, then the unit will sit idle, and the IGC will produce no fault codes.

LEGEND

**IGC** — Integrated Gas Unit Control
**LED** — Light-Emitting Diode

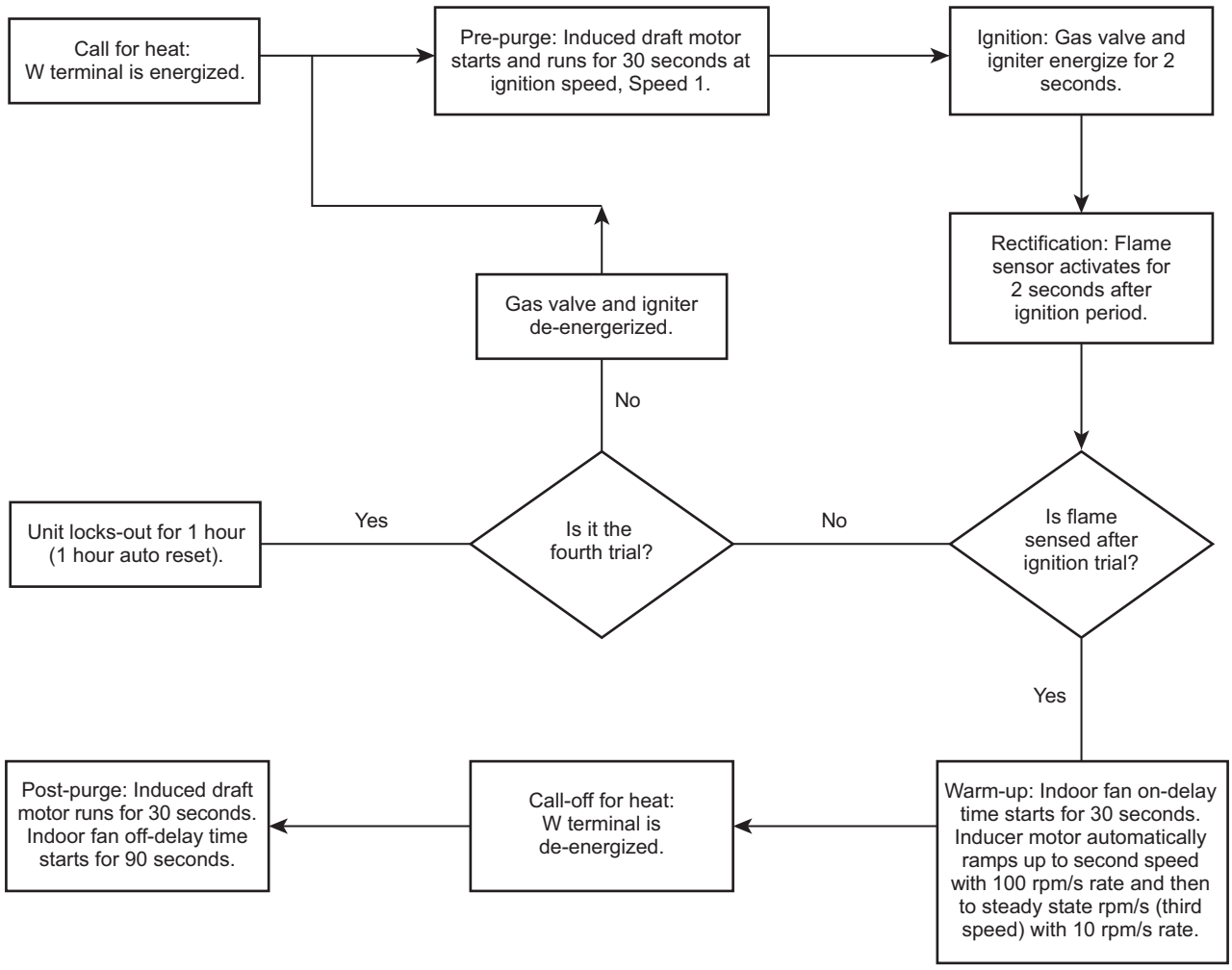



**Fig. 47 — IGC Operating Sequence**

## Leak Dissipation System

48QE units use R-454B refrigerant. These units are equipped with a factory installed R-454B leak dissipation system to ensure safe operation in the event of a refrigerant leak. This systems consists of an A2L sensor (Fig. 48) and the dissipation control board (see Fig. 49) which are located in the Indoor Coil section of the unit (see the view labeled “BACK” in Fig. 2 on page 5). The A2L sensor is located between the indoor coil and the air filters.

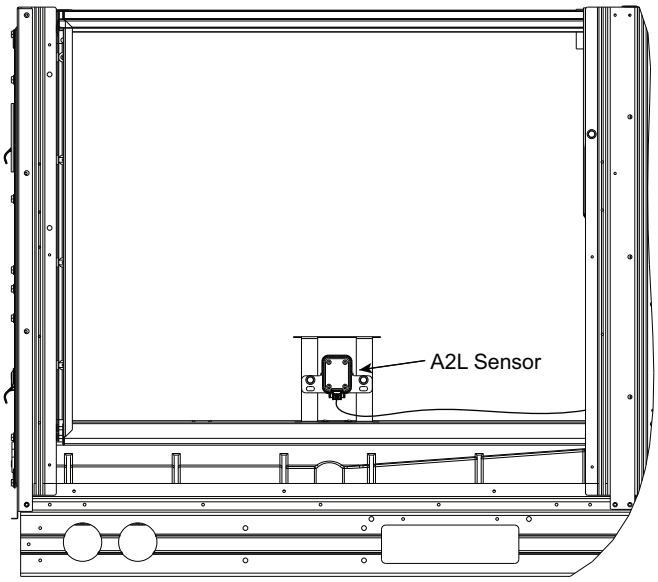



**Fig. 48 — Location of AL2 Sensor**

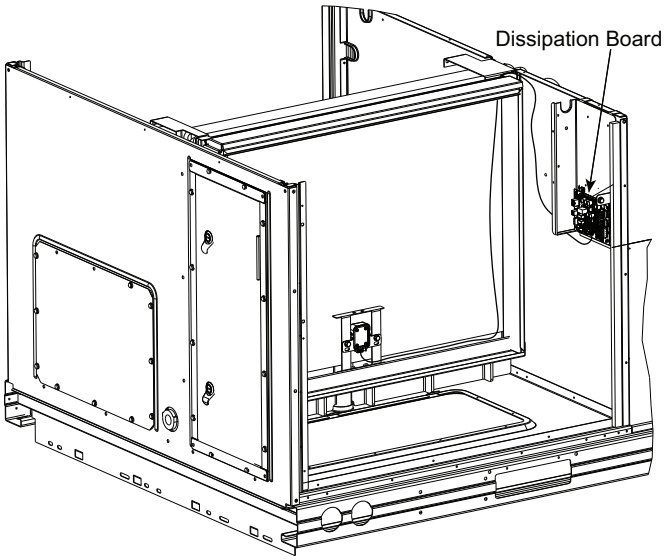



**Fig. 49 — Location of Dissipation Control Board (shown with dust cover removed)**

The A2L detection sensor communicates via a wiring harness to the dissipation board. The sensor harness is routed on the bottom of the filter rack towards the unit bulkhead and secured with wire ties. The sensor harness then runs up the side of the filter rack and exits over the top of the rack towards the dissipation board.

NOTE: The drain wire must be properly connected to the ground lug on the dissipation board via the quick connect and ground harness. Failure of proper sensor harness grounding can lead to false dissipation events.

SEQUENCE OF OPERATION

The control functions as an R454B refrigerant dissipation system. If the refrigerant detection sensor sends a signal indicating a refrigerant leak, the control board will prevent heating and cooling operation and begin dissipating the sensed refrigerant with a blower request. The refrigerant dissipation board will display a flash code from the yellow status LED (see Fig. 50) indicating the sensor that detected the refrigerant. See Fig. 52 on page 31 for the full text on the Dissipation Control dust cover label.

When the sensor signal indicates the refrigerant has dissipated, the dissipation board yellow status LED will display a flash code 3 and return to its normal state and allow unit operations after a 5 minute delay.

LEAK DISSIPATION SYSTEM SELF-TEST

Power on the unit and verify proper functioning of equipment. The yellow Status LED on the dissipation board should be steady (see Fig. 50). If flash codes are present, see Troubleshooting on page 31.

NOTE: Operation of the Test Mode is only possible if no faults exist on the dissipation board.

Remove the dust cover from the Dissipation control board to access the Test button (see Fig. 51). The Test button is located above the COMM LED.

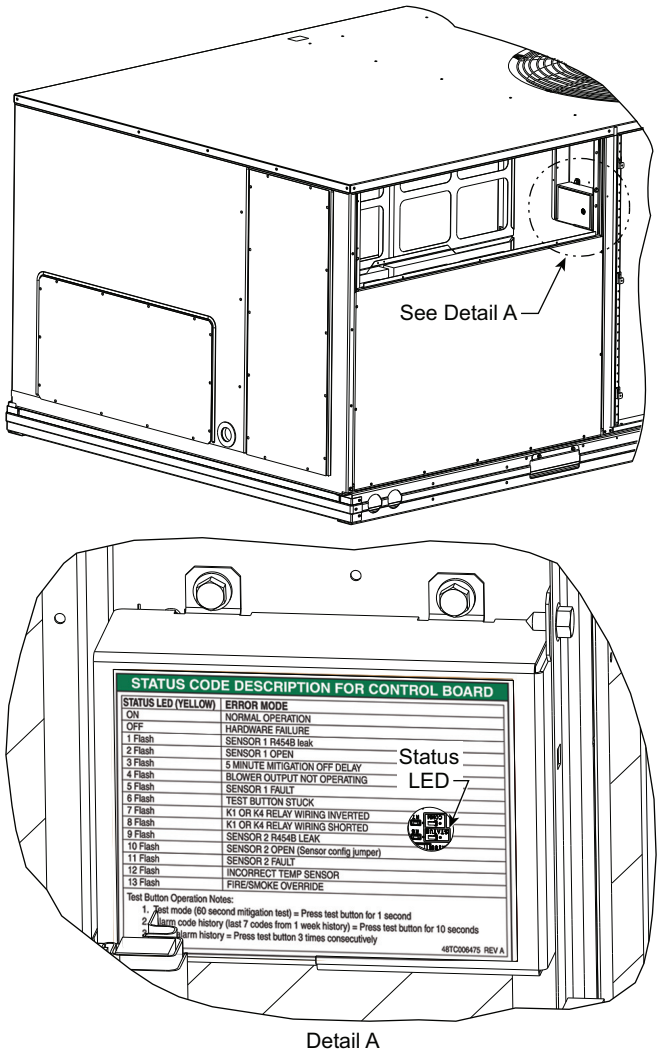
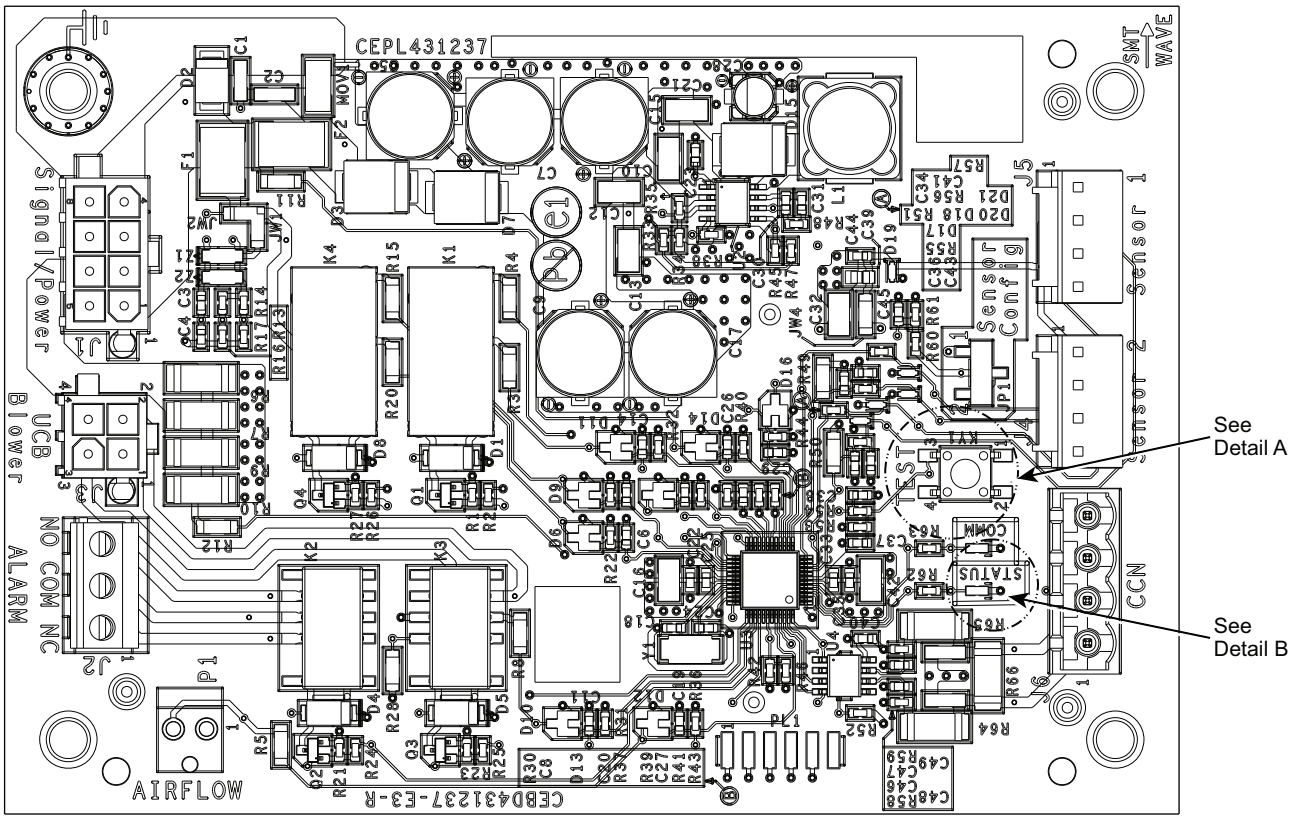
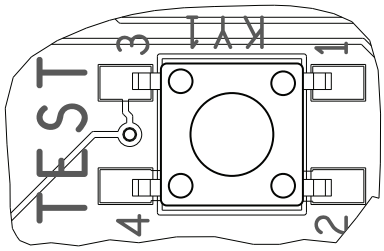
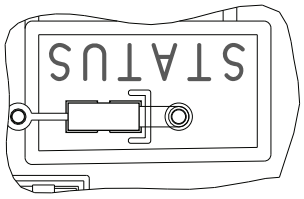



**Fig. 50 — Yellow STATUS LED**




Detail A — Test Button




Detail B — Status LED

**Fig. 51 — Dissipation Control Board — shown without dust cover**

Press the Test button on the dissipation system control board to ensure proper dissipation system operation under each test condition listed below. After pressing the Test button, system will enter Dissipation Mode for 60 seconds to help verify correct operation.

IMPORTANT: Press the Test button for roughly ONE SECOND to enter Test Mode. Pressing the Test button for a longer periods enables different functions (see Table 9).

**Table 9 — Dissipation Board Test Button Functions**

| HOLD BUTTON TIME (SEC) | FUNCTION |
|---|---|
| 1-4 | Dissipation Mode for 60 seconds |
| 5-29 | Display flash code history |
| 30+ | Flash code 6 |
| 3 Rapid Presses | Clear flash code history |

Ensure that the unit is able to meet the minimum required dissipation mode airflows. These required minimum airflow rates during Dissipation Mode are listed in Table 10. They are based on the total system refrigerant charge quantity.

**Table 10 — Minimum Dissipation Air Flows**

| MINIMUM DISSIPATION AIR FLOW (cfm) | |
|---|---|
| UNIT | cfm |
| 48QE*M12 | 550 |

Table 11 details the required operational checks to ensure proper dissipation system function.

**Table 11 — Dissipation System Required Operational Checks**

| NORMAL OPERATION | | | | |
|---|---|---|---|---|
| TEST NO. | UNIT DEMAND | COMPRESSOR | INDOOR FAN | ELECTRIC/ GAS HEAT |
| 1 | None | Off | Off | Off |
| 2 | Cool | On | On | Off |
| 3 | Heat | On | On | On |
| DISSIPATION ACTIVATED | | | | |
| 4 | None | Off | On | Off |
| 5 | Cool | Off | On | Off |
| 6 | Heat | Off | On | Off |

Figure 52 shows the flash codes displayed on the Dissipation Control Board.

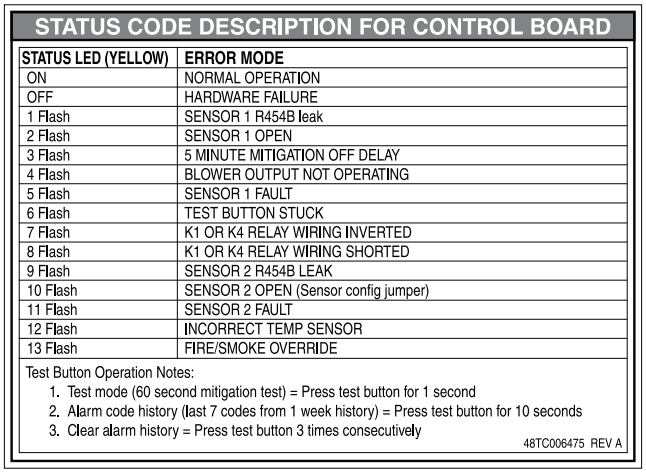



**Fig. 52 — Dissipation Control Cover Label**

TROUBLESHOOTING

For all flash codes, first try power cycling the system to remove the code.

***No Power***

Verify the wiring to/from pins 1 and 8 on the power harness plug. Check the 24V system wiring from the transformer.

See Table 12 for details on the operating status and troubleshooting of the Dissipation system for the various flash codes.

**Table 12 — Status LED Troubleshooting Table**

| STATUS LED | REASON | CONTROL VERBIAGE | MODE |
|---|---|---|---|
| **Flashing 1** | Sensor 1 ≥ 20% LFL | SENSOR 1 R454B LEAK | Dissipation in Process |
| **Flashing 2** | Sensor 1 Open | SENSOR 1 OPEN | Dissipation in Process |
| **Flashing 3** | 5 Minute Blower Operating, Sensor < 20% LFL and sensors are not opened (done after fault 1, 2, 9 and 10) | MITIGATION OFF DELAY ACTIVE | Dissipation in Process |
| **Flashing 4** | 0 VAC sensed on G output. | BLOWER OUTPUT NOT OPERATING | Dissipation in Process |
| **Flashing 5** | Fault with the A2L digital sensor | SENSOR 1 FAULT | Dissipation in Process |
| **Flashing 6** | If KY1 is stuck pressed for more than 30 seconds. | TEST BUTTON STUCK | To prevent a shorted KY1 to keep the mitigation running continuously. |
| **Flashing 7** | Y out switched with Y in or W out switched with W in | Y (K4) OR W (K1) WIRING INVERTED | Normal mode |
| **Flashing 8** | Y or W shorted (relay detects both sides are high) | Y (K4) OR W (K1) OUTPUT SHORTED TO Y (K4) OR W (K1) INPUT | Normal mode |
| **Flashing 9**[a] | Sensor 2 ≥ 20% LFL | SENSOR 2 R454B LEAK | Dissipation in Process |
| **Flashing 10**[a] | Sensor 2 Open | SENSOR 2 OPEN | Dissipation in Process |
| **Flashing 11**[a] | Fault with the second A2L digital sensor | SENSOR 2 FAULT | Dissipation in Process |
| **Flashing 12** | High temperature sensor attached on commercial | INCORRECT TEMP SENSOR | Normal mode |
| **Flashing 13** | G input signal is lost. Indicates another unit safety will override dissipation. | EXT SAFETY OVERRIDE | Normal mode |

NOTE(S):

a. There is only one sensor mounted in these units. This table represents the standard label being put on all commercial equipment. The hardware changes only allow one sensor to be connected to the board; the software remains the same for a one or two sensor board. Although unlikely these flash codes may appear if the board malfunctions.

LEGEND

**LFL** — Lower Flammable Limit

## SystemVu™ Controller

48QE units are equipped with the SystemVu controller (standard), refer to the FEQ/GEQ/QE Series Single Package Rooftop Units with SystemVu Controller Controls, Start-up, Operation and Troubleshooting manual.

SMOKE DETECTORS

Smoke detectors are available as factory-installed options on 48QE models. Smoke detectors may be specified for supply air only, for return air without or with economizer, or in combination of supply air and return air. All components necessary for operation are factory-provided and mounted. The unit is factory-configured for immediate smoke detector shutdown operation; additional wiring or modifications to SystemVu controller may be necessary to complete the unit and smoke detector configuration to meet project requirements.

Units equipped with factory-optional return-air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 53 for the as-shipped location.

COMPLETING INSTALLATION OF RETURN-AIR SMOKE SENSOR

1. Unscrew the two screws holding the return-air smoke detector assembly. See Fig. 54, Step 1.
2. Save the screws.
3. Turn the assembly 90 degrees and then rotate end to end. Make sure that the elbow fitting is pointing down. See Fig. 54, Step 2.
4. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 54, Step 3.
5. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

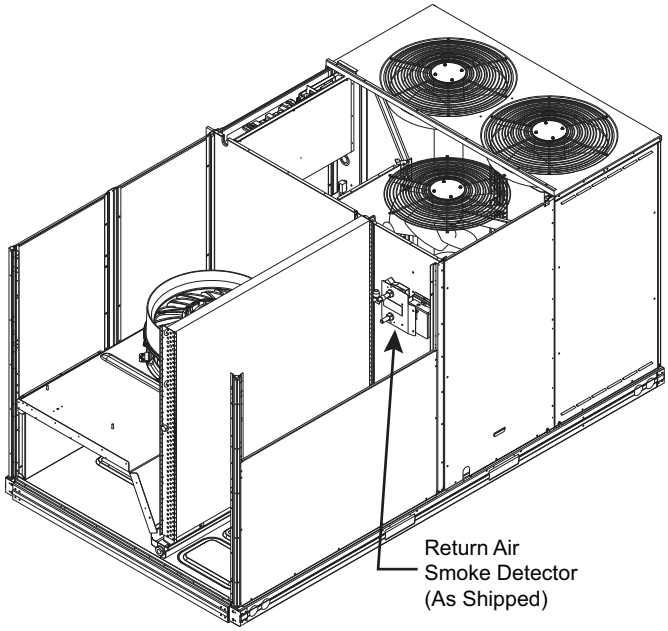



**Fig. 53 — Return Air Smoke Detector; Shipping Position**

ADDITIONAL APPLICATION DATA

Refer to the application data sheet titled "*Factory-Installed Smoke Detector, for Small and Medium Rooftop Units 2 to 25 Tons*" for discussions on additional control features of these smoke detectors including multiple unit coordination.

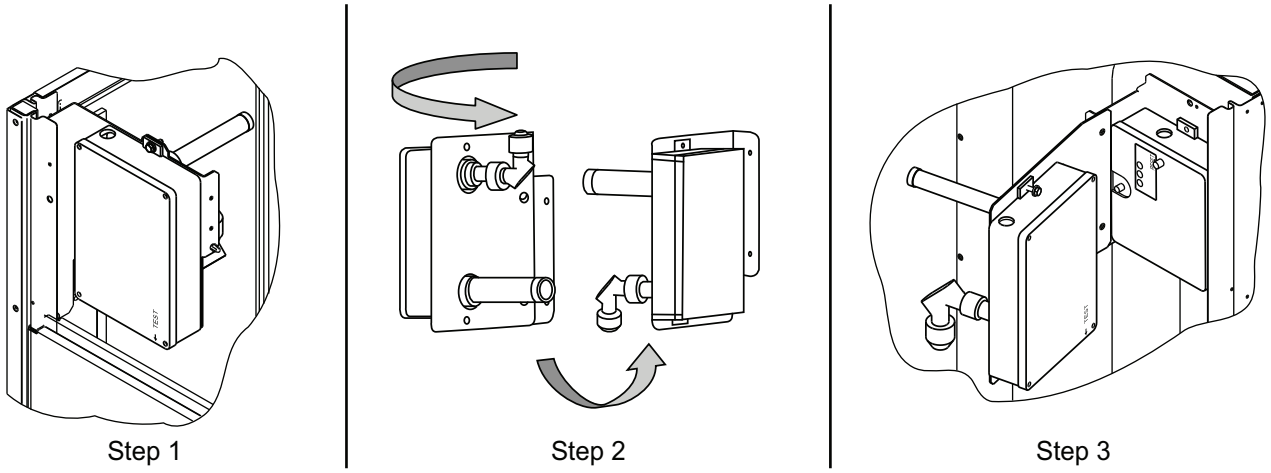



**Fig. 54 — Completing Installation of Return Air Smoke Sensor**

## Step 13 — Install Accessories

Available accessories include:

- Roof curb
- Thru-base connection kit (must be installed before unit is set on curb)
- LP conversion kit
- Economizer
- Manual outside air damper
- Two-Position motorized outside air damper
- Power exhaust
- Differential dry-bulb sensor
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- Low ambient controls
- Thermostat / Sensors
- $CO_2$ sensor
- Louvered hail guard
- Flue discharge deflector
- Phase monitor control

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

## Step 14 — Fan Speed Set Up

NOTE: The Indoor Fan motor is equipped with an internal protection relay that is designed to disable unit operation if it detects a problem. See Typical Wiring Diagram (Fig. 43) for the red wires in the Indoor fan plug.

The Fan Speed settings are accessed through the SystemVu interface.

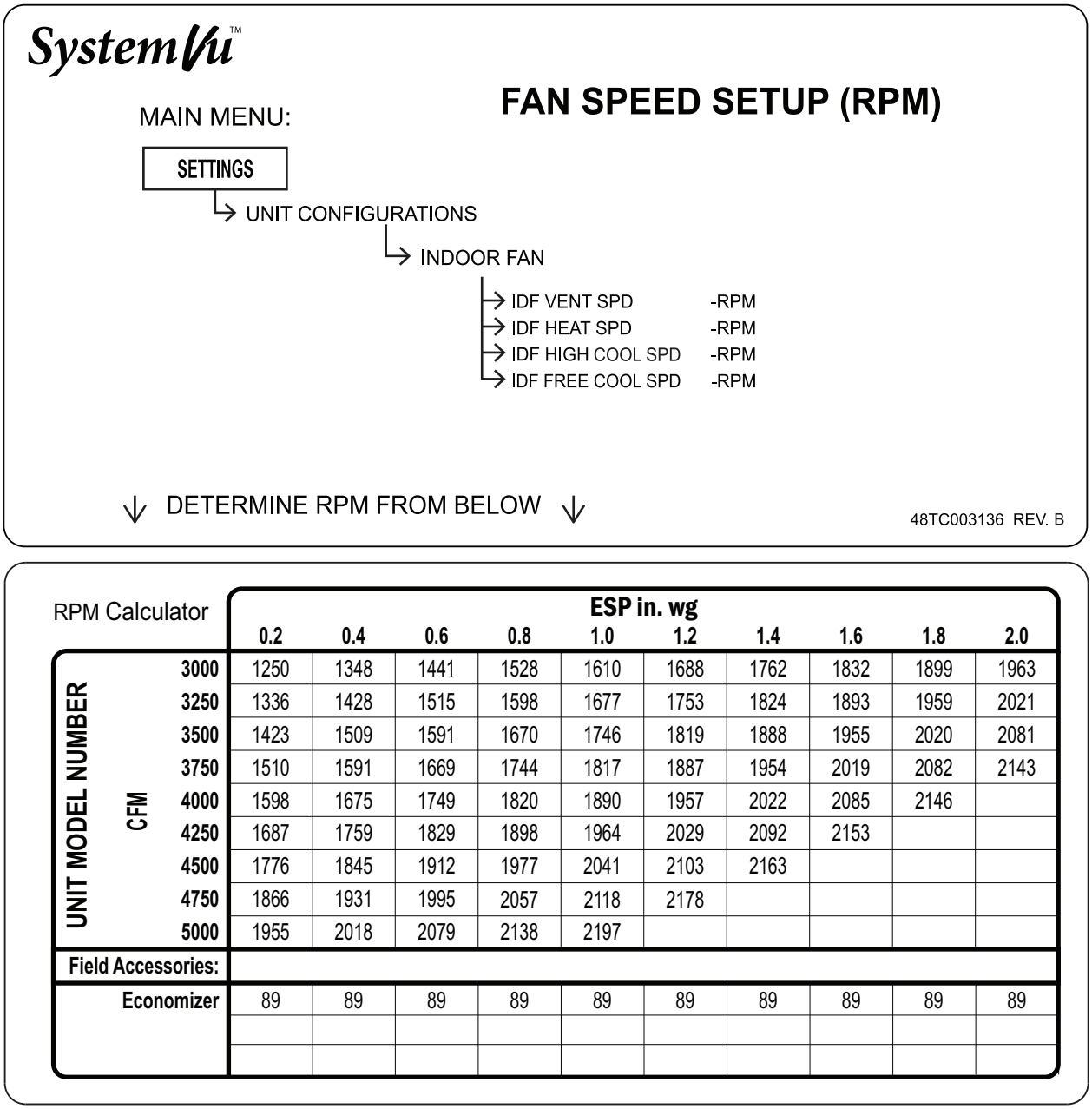
1. Check the job specifications for the cfm (cubic feet per minute) and ESP (external static pressure) required.
2. Using the chart on the Fan Speed Set Up labels (see Fig. 55), calculate the RPM from the cfm and ESP for the base unit plus any field accessories (as listed on the label).
3. If installing any accessories listed at the bottom of the Set Up Label, add accessory rpm to base unit rpm in upper portion of label.

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

4. Press any key on the SystemVu interface to activate the display backlight and then press the MENU key.
5. Using the UP and DOWN arrow keys highlight SETTINGS and then press ENTER.
6. Use the DOWN arrow key highlight the UNIT CONFIGURATIONS menu then press ENTER.
7. Highlight UNIT CONFIGURATIONS then press ENTER.
8. Highlight INDOOR FAN and then press ENTER.
9. Refer to the job specifications to set the following, determining the values per the RPM Calculator label (see Fig. 55). Use the UP and DOWN arrow keys and the BACK key to set the values. Press ENTER after setting each value to continue to the next selection.

- IDF VENT SPD
- IDF HEAT SPD
- IDF HIGH COOL SPD
- IDF FREE COOL SPD

For further details, see the *FEQ/GEQ/QE Series Single Package Rooftop Units with SystemVu Controller Controls, Start-up, Operation and Troubleshooting* manual.




RPM Calculator

| UNIT MODEL NUMBER / CFM | ESP in. wg 0.2 | 0.4 | 0.6 | 0.8 | 1.0 | 1.2 | 1.4 | 1.6 | 1.8 | 2.0 |
|---|---|---|---|---|---|---|---|---|---|---|
| 3000 | 1250 | 1348 | 1441 | 1528 | 1610 | 1688 | 1762 | 1832 | 1899 | 1963 |
| 3250 | 1336 | 1428 | 1515 | 1598 | 1677 | 1753 | 1824 | 1893 | 1959 | 2021 |
| 3500 | 1423 | 1509 | 1591 | 1670 | 1746 | 1819 | 1888 | 1955 | 2020 | 2081 |
| 3750 | 1510 | 1591 | 1669 | 1744 | 1817 | 1887 | 1954 | 2019 | 2082 | 2143 |
| 4000 | 1598 | 1675 | 1749 | 1820 | 1890 | 1957 | 2022 | 2085 | 2146 | |
| 4250 | 1687 | 1759 | 1829 | 1898 | 1964 | 2029 | 2092 | 2153 | | |
| 4500 | 1776 | 1845 | 1912 | 1977 | 2041 | 2103 | 2163 | | | |
| 4750 | 1866 | 1931 | 1995 | 2057 | 2118 | 2178 | | | | |
| 5000 | 1955 | 2018 | 2079 | 2138 | 2197 | | | | | |
| **Field Accessories:** | | | | | | | | | | |
| Economizer | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 |
| | | | | | | | | | | |
| | | | | | | | | | | |

NOTE(S): Values in the Field Accessories section are RPM adders.

**Fig. 55 — Example of Fan Speed Set Up Labels for SystemVu™ Controls**

## COMPRESSOR ROTATION

**⚠ CAUTION**

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution can result in premature wear and damage to equipment.

Scroll compressors can only compress refrigerant if rotating in the right direction. Reverse rotation for extended times can result in internal damage to the compressor. Scroll compressors are sealed units and cannot be repaired on site location.

NOTE: When the compressor is rotating in the wrong direction, the unit makes an elevated level of noise and does not provide cooling.

On 3-phase units with scroll compressors, it is important to be certain compressor is rotating in the proper direction. To determine whether or not compressor is rotating in the proper direction:

1. Connect service gauges to suction and discharge pressure fittings.
2. Energize the compressor.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

NOTE: If the suction pressure does not drop and the discharge pressure does not rise to normal levels, the evaporator fan is probably also rotating in the wrong direction.

4. Turn off power to the unit.
5. Reverse any two of the three unit power leads.
6. Reapply electrical power to the compressor. The suction pressure should drop and the discharge pressure should rise which is normal for scroll compressors on start-up.

7. Replace compressor if suction/discharge pressures are not within specifications for the specific compressor.

The suction and discharge pressure levels should now move to their normal start-up levels.

## PRESSURE RELIEF VALVES

Units with the pressure relief option contain a pressure relief valve in the unit liquid line for compliance with Chicago Municipal Code 18-28-1102.3. The pressure relief valve is set to open above 650 PSI and is intended to vent refrigerant in the event the refrigerant pressure exceeds the equipment design pressure. The pressure relief valve is single use and must be replaced after refrigerant discharge.

The relief valve can be found behind the unit access panel with a label indicating its location. See Fig. 56 and Fig. 57 for example location details.

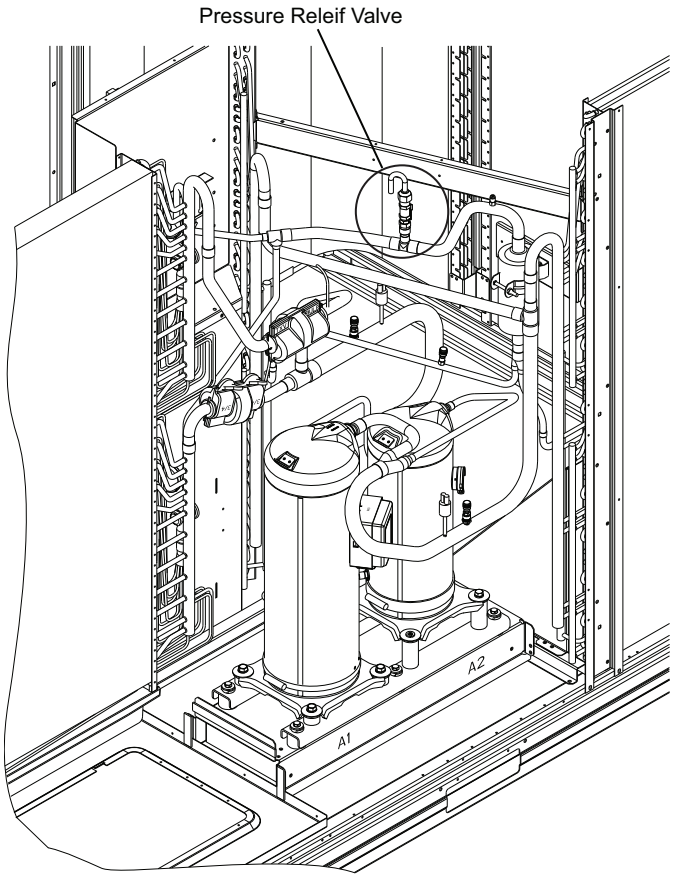



**Fig. 56 — Pressure Relief Valve Location**

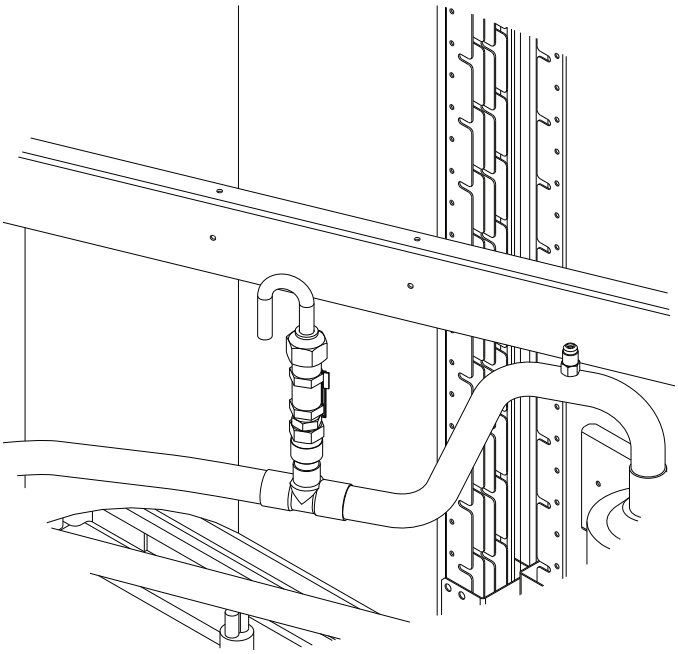


**Fig. 57 — Pressure Relief Valve Detail**

## FASTENER TORQUE VALUES

Table 13 details the torque values for fasteners referenced in this installation instruction.

**Table 13 — Fastener Torque Values**

| | |
|---|---|
| **Stator motor mounting screws** | 50 in.-lb (5.7 Nm) ± 5 in.-lb (0.6 Nm) |
| **Fan rotor mounting screws (2.4 HP)** | 50 in.-lb (5.7 Nm) ± 5 in.-lb (0.6 Nm) |
| **Fan rotor mounting screws (3 and 5 HP)** | 30 in.-lb (3.4 Nm) ± 2 in.-lb (0.2 Nm) |
| **Fan deck bracket screws** | 50 in.-lb (5.7 Nm) ± 5 in.-lb (0.6 Nm) |
| **Fan casing screws** | 10 in.-lb (1.1 Nm) ± 1 in.-lb (0.1 Nm) |
| **Heat shield screws** | 30 in.-lb (3.4 Nm) ± 2 in.-lb (0.2 Nm) |
| **Condenser motor mounting screws** | 30 in.-lb (3.4 Nm) ± 2 in.-lb (0.2 Nm) |
| **Condenser hub set screw** | 84 in.-lb (9.5 Nm) ± 12 in.-lb (1.5 Nm) |
| **Compressor mounting bolts** | 12 ft-lb (16.2 Nm) ± 2 ft-lb (2.7 Nm) |
| **Tandem rail mounting bolts** | 8 ft-lb (10.8 Nm) ± 0.5 ft-lb (0.6 Nm) |
| **Crankcase heater** | 22.5 in.-lb (2.5 Nm) ± 2.5 in.-lb (0.3 Nm) |

## TYPICAL UNIT PIPING

48QE**12 heat pump systems include two compressors, a reversing valve, dual-function outdoor and indoor coils, a common liquid line with bi-flow TXV, and dedicated cooling and heating TXVs. 48QE**12 unit indoor coils contain a vapor header check valve. See Fig. 58-59 and Tables 14-16 for typical unit piping schematic parallel coil circuits during evaporator-function operation and converging coil circuits during the condenser-function operation.

### Table 14 — 48QE**12 — Cooling Mode

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

### Table 15 — 48QE**12 — Heating Mode

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

### Table 16 — 48QE**12 — Defrost Mode

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

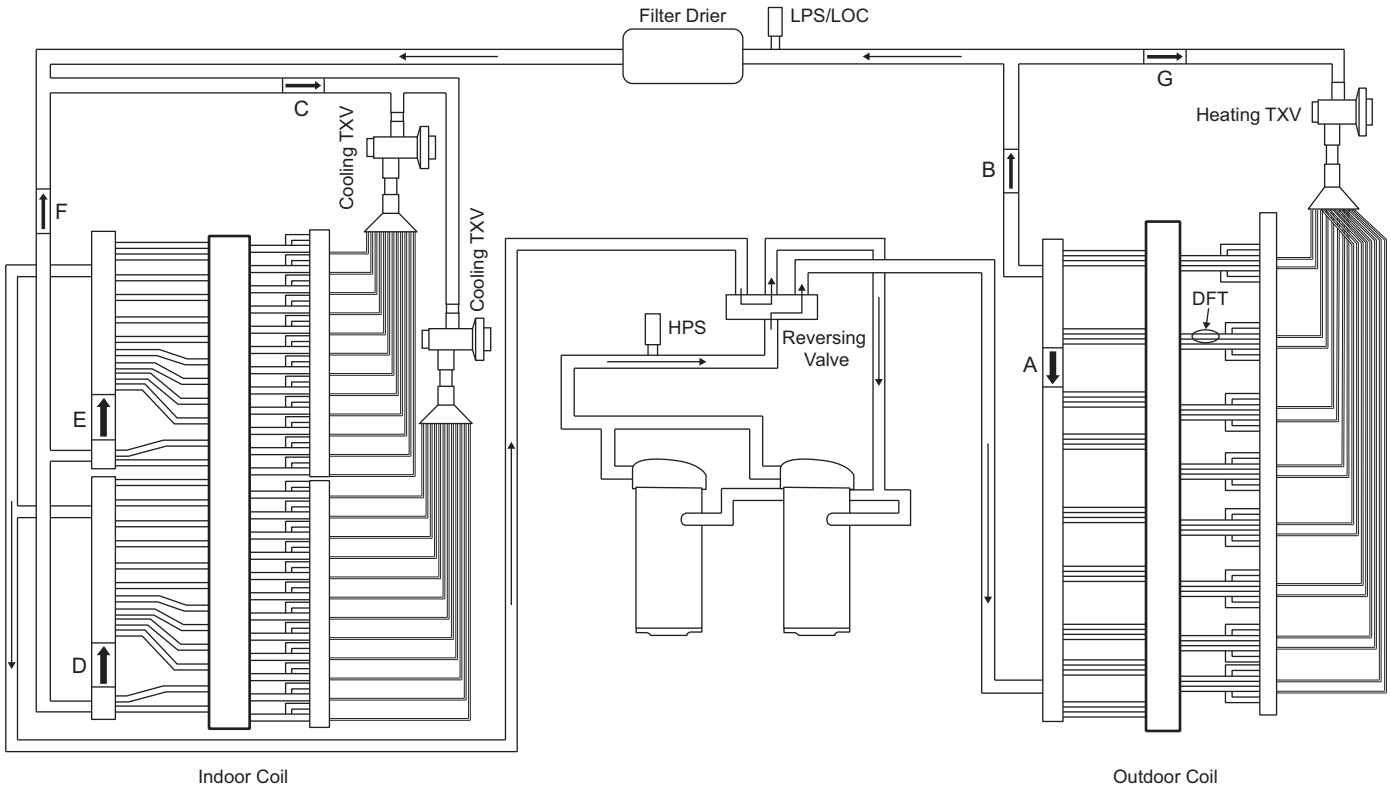



**Fig. 58 — Piping Schematic — 48QE**12 Cooling Mode**

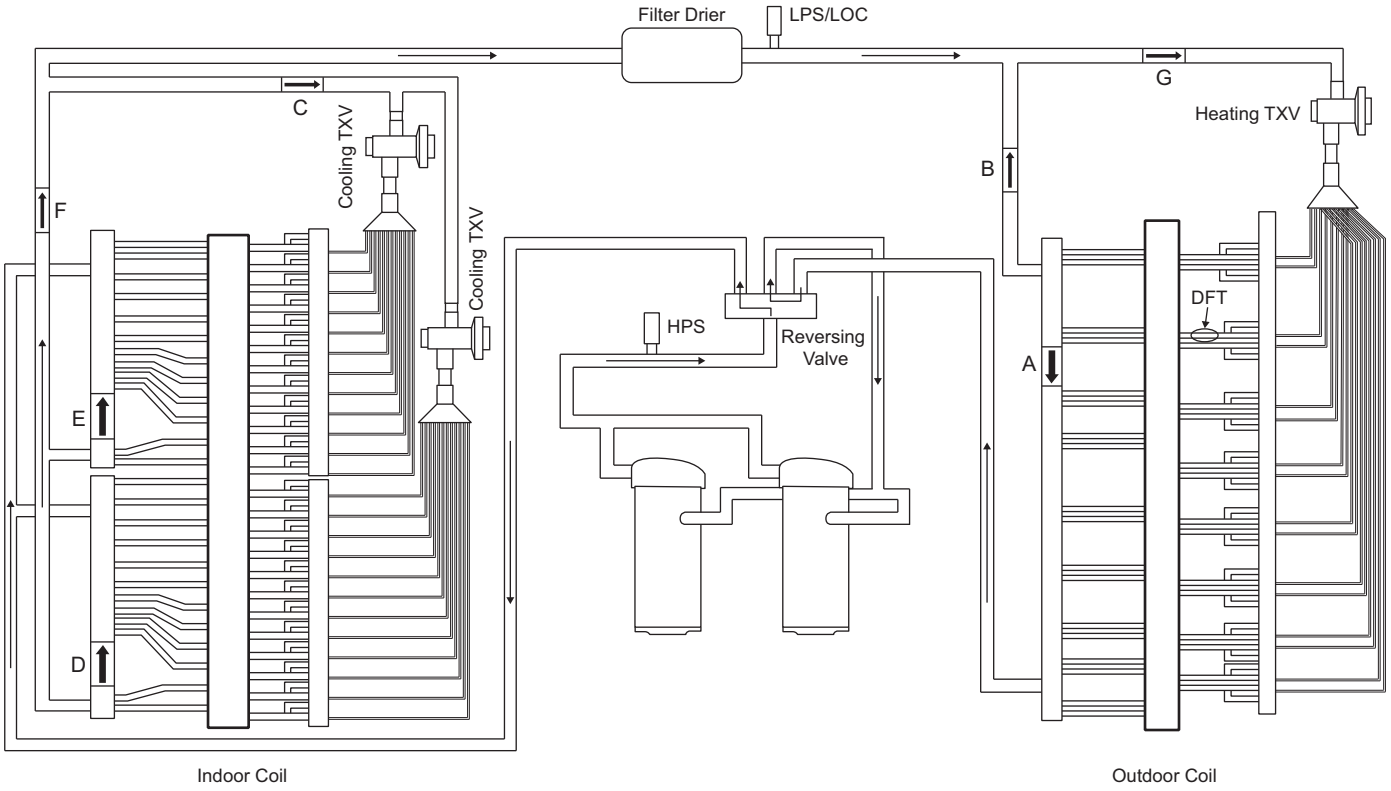



**Fig. 59 — Piping Schematic — 48QE**12 Heating Mode**

## TEMPORARY FURNACE OPERATION DURING CONSTRUCTION

The furnace may be operated during the finishing stage of construction. To ensure proper operation follow the steps below.

1. Prior to the finishing stage of construction, ensure that return air and vent openings are covered to minimize penetration of dust and construction debris into the unit.
2. Interior drywall installation shall be completed and covered with paint or primer prior to unit operation.
3. Premises shall be substantially free of debris and dust.
4. Ensure all return and vent coverings have been removed.
5. Verify the return ducts and supply ducts are connected, are free from obstructions, are clean, and are properly sealed.
6. Ensure proper vent installation per installation instructions.
7. Ensure gas piping has been connection per installation instructions.
8. Verify that the gas piping is free of leaks.
9. Furnace to be set to operate under appropriate control to ensure proper operation.
10. Minimum MERV 11 air filters to be installed during the finishing stages of construction.
11. Set furnace input rate and temperature rise per rating plate marking.
12. Ensure means for providing combustion air in accordance with the manufacturer's shipped installation instructions.
13. Return air temperature to be maintained between 55°F (13°C) and 80°F (27°C).
14. Furnace shall be set up to operate in accordance with installation instructions and shall be verified for operating conditions including ignition, input rate, temperature rise, and venting.
15. Install new filters as per installation instructions prior to final occupancy.

## START-UP CHECKLIST

48QE**12 Packaged Rooftop Units Hybrid Heat Unit
(Remove and use for job file)

**NOTE: To avoid injury to personnel and damage to equipment or property when completing the procedures listed in this start-up checklist, use good judgment, follow safe practices, and adhere to the safety considerations/information as outlined in preceding sections of this Installation Instruction document.**

### I. PRELIMINARY INFORMATION

MODEL NO. _____
JOB NAME _____
SERIAL NO. _____
ADDRESS _____
START-UP DATE _____
TECHNICIAN NAME _____
ADDITIONAL ACCESSORIES _____
_____

### II. PRE-START-UP

| | |
|---|---|
| Verify that all packaging materials have been removed from unit. | (Y/N) _____ |
| Verify installation of outdoor air hood. | (Y/N) _____ |
| Verify installation of flue exhaust and inlet hood. | (Y/N) _____ |
| Verify that condensate connection is installed per instructions. | (Y/N) _____ |
| Verify gas pressure to unit gas valve is within specified range. | (Y/N) _____ |
| Check gas piping for leaks. | (Y/N) _____ |
| Verify that all electrical connections and terminals are tight. | (Y/N) _____ |
| Verify ground integrity with a continuity test. | (Y/N) _____ |
| Check that indoor-air filters are clean and in place. | (Y/N) _____ |
| Check that outdoor air inlet screens are in place. | (Y/N) _____ |
| Verify that unit is level. | (Y/N) _____ |
| Verify that fan assembly is free of obstructions and rotor spins freely. | (Y/N) _____ |
| Verify that scroll compressors are rotating in the correct direction. | (Y/N) _____ |
| Verify yellow LED light on dissipation board is steady. | (Y/N) _____ |
| Verify the dissipation board test button will operate the indoor fan for 1 minute. | (Y/N) _____ |
| Verify installation of thermostat. | (Y/N) _____ |

### III. START-UP

### ELECTRICAL

| | | | |
|---|---|---|---|
| Supply Voltage | L1-L2_____ | L2-L3_____ | L3-L1_____ |
| Supply Voltage to Ground | L1 to Ground _____ | L2 to Ground _____ | L3 to Ground _____ |
| Compressor Amps 1 | L1 _____ | L2 _____ | L3 _____ |
| Compressor Amps 2 | L1 _____ | L2 _____ | L3 _____ |
| Supply Fan Amps | L1 _____ | L2 _____ | L3 _____ |

### TEMPERATURES

| | | |
|---|---|---|
| Outdoor-air Temperature | _____ °F DB (Dry Bulb) | |
| Return-air Temperature | _____ °F DB | _____ °F WB (Wet Bulb) |
| Cooling Supply Air Temperature | _____ °F | |
| Gas Heat Supply Air | _____ °F | |

## PRESSURES

| | | |
|---|---|---|
| Gas Inlet Pressure | _____ in. wg | |
| Gas Manifold Pressure | STAGE 1 | _____ in. wg |
| | STAGE 2 | _____ in. wg |
| Refrigerant Suction | STAGE 1 | _____ PSIG |
| | STAGE 2 | _____ PSIG |
| Refrigerant Discharge | STAGE 1 | _____ PSIG |
| | STAGE 2 | _____ PSIG |

Verify Refrigerant Charge using Charging Charts (Y/N) _____

## GENERAL

Economizer minimum vent and changeover settings to job requirements (if equipped) (Y/N) _____

Verify smoke detector unit shutdown by utilizing magnet test (Y/N) _____

## IV. TEMPORARY FURNACE OPERATION DURING CONSTRUCTION

The furnace may be operated during the finishing stage of construction. To ensure proper operation follow checklist below:

1. Prior to the finishing stage of construction, ensure that return air and vent openings are covered to minimize penetration of dust and construction debris into the unit (Y/N) _____
2. Interior drywall installation shall be completed and covered with paint or primer prior to unit operation (Y/N) _____
3. Premises shall be substantially free of debris and dust (Y/N) _____
4. Ensure all return and vent coverings have been removed (Y/N) _____
5. Verify the return ducts and supply ducts are connected, are free from obstructions, are clean, and are properly sealed (Y/N) _____
6. Ensure proper vent installation per installation instructions (Y/N) _____
7. Ensure gas piping has been connection per installation instructions (Y/N) _____
8. Verify that the gas piping is free of leaks (Y/N) _____
9. Furnace to be set to operate under appropriate control to ensure proper operation (Y/N) _____
10. Minimum MERV 11 air filters to be installed during the finishing stages of construction (Y/N) _____
11. Set furnace input rate and temperature rise per rating plate marking (Y/N) _____
12. Ensure means for providing combustion air in accordance with the manufacturer's shipped installation instructions (Y/N) _____
13. Return air temperature to be maintained between 55°F (13°C) and 80°F (27°C) (Y/N) _____
14. Furnace shall be set up to operate in accordance with installation instructions and shall be verified for operating conditions including ignition, input rate, temperature rise, and venting (Y/N) _____
15. Install new filters as per installation instructions prior to final occupancy (Y/N) _____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE