Carrier

**WeatherMaster® 48QE**04-06**
**Hybrid Heat Single Package Rooftop**
**with Puron Advance™ (R-454B) Refrigerant**
**3 to 5 Nominal Tons**

# Service and Maintenance 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. 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.

**⚠ 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.

The following symbols may be seen on the equipment:

| SYMBOL | CODE | MEANING |
|---|---|---|
|  | GHS02: Flammable | Flammable gas |
|  | ISO 7000-0790 (2004-01) | Read operator's manual. |
|  | ISO 7000-1659 (2004-01) | Service indicator: read technical manual. |
|  | ISO 7000-1641 (2004-01) | Operator's manual: operating instructions |

**⚠ WARNING**

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

**⚠ WARNING**

FIRE, EXPLOSION HAZARD

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

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

**⚠ ADVERTISSEMENT**

RISQUE D'INCENDIE OU D'EXPLOSION

Le non-respect de cet avertissement peut entraîner la mort, des blessures graves et/ou des dommages matériels.

Débranchez la tuyauterie de gaz de l'appareil lors d'un essai de pression à une pression supérieure à 0,5 psig (3450 Pa). Une pression supérieure à 0,5 psig endommagera la valve de gaz et créera une situation dangereuse. Si la valve de gaz est soumise à une pression supérieure à 0,5 psig, elle doit être remplacée avant utilisation. Lors d'un essai de pression sur une tuyauterie de gaz fournie sur site à une pression inférieure ou égale à 0,5 psig, l'appareil raccordé à cette tuyauterie doit être isolé en fermant la ou les valves de gaz manuelles.

## ⚠ DANGER

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

## ⚠ WARNING

RISK OF FIRE OR EXPLOSION

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Leave the building immediately.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

## ⚠ 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 pas entreposer ni utiliser d´essence ni autres vapeurs ou liquides inflammables à proximité de cet appareil ou de tout autre appareil.

QUE FAIRE SI UNE ODEUR DE GAZ EST DÉTECTÉE

- Ne mettre en marche aucun appareil.
- Ne toucher aucun interrupteur électrique; ne pas utiliser de téléphone dans le bâtiment.
- Quitter le bâtiment immédiatement.
- Appeler immédiatement le fournisseur de gaz en utilisant le téléphone d´un voisin. Suivre les instructions du fournisseur de gaz.
- Si le fournisseur de gaz n´est pas accessible, appeler le service d´incendie.

L´installation et l´entretien doivent être effectués par un installateur ou une entreprise d´entretien qualifié, ou le fournisseur de gaz.

## ⚠ 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.

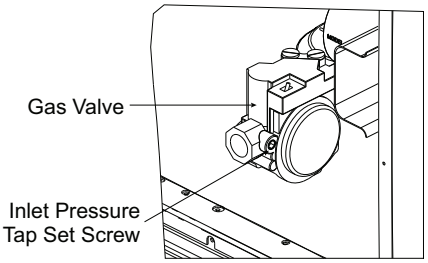
Veiller à ce que la ou les sorties de l'évent de l'appareil de chauffage (et la prise d'air) ne soient, en aucune façon, obstruées, quelle que soit la saison.

## ⚠ 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.

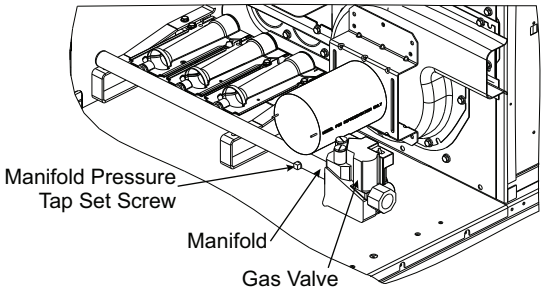



## ⚠ WARNING

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.

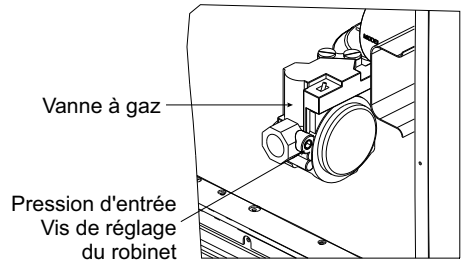


## ⚠ ADVERTISSEMENT

RISQUE D'INCENDIE

Le non-respect de cet avertissement pourrait entraîner des blessures graves et/ou des dommages matériels.

La vis de réglage du robinet de pression d'entrée doit être serrée et un bouchon de tuyau NPT de 1/8 po doit être installé pour éviter les fuites de gaz.

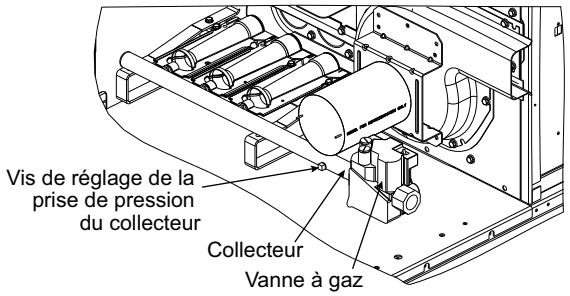



## ⚠ ADVERTISSEMENT

RISQUE D'INCENDIE

Le non-respect de cet avertissement pourrait entraîner des blessures graves et/ou des dommages matériels.

La vis de réglage du robinet de pression du collecteur doit être serrée et un bouchon de tuyau NPT de 1/8 po doit être installé pour éviter les fuites de gaz.




## ⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Before performing installation, service, or maintenance on this unit, turn off the main power disconnect to the unit and install lock and lockout tag. Some equipment may have multiple power disconnects.

## ⚠ ADVERTISSEMENT

RISQUE DE CHOC ÉLECTRIQUE

Le non-respect de cet avertissement pourrait entraîner des blessures corporelles, voire la mort.

Avant d'effectuer l'installation, l'entretien ou la maintenance de cet appareil, coupez l'alimentation principale de l'appareil et installez des verrous et des étiquettes de verrouillage. Certains équipments peuvent avoir plusieurs alimentations de courant.

## ⚠ WARNING

This equipment is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

## ⚠ ADVERTISSEMENT

Cet équipement n'est pas destiné à être utilisé par des personnes (y compris des enfants) ayant des capacités physiques, sensorielles ou mentales réduites, ou un manque d'expérience et de connaissances, à moins qu'elles n'aient reçu une supervision ou des instructions concernant l'utilisation de l'appareil par une personne responsable de leur sécurité. Les enfants doivent être surveillés pour s'assurer qu'ils ne jouent pas avec l'appareil.

## ⚠ 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.

## ⚠ ADVERTISSEMENT

RISQUE DE BLESSURE CORPORELLE

Le non-respect de cette mise en garde peut entraîner des blessures corporelles.

Les pièces en tôle peuvent présenter des bords tranchants ou des bavures. Soyez prudent et portez des vêtements de protection appropriés, des lunettes de sécurité et des gants lors de la manipulation des pièces et de l'entretien des équipements de climatisation.

## ⚠ 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

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**

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.

## UNIT ARRANGEMENT AND ACCESS

### General

Figures 1 and 2 show general unit arrangement and access locations.

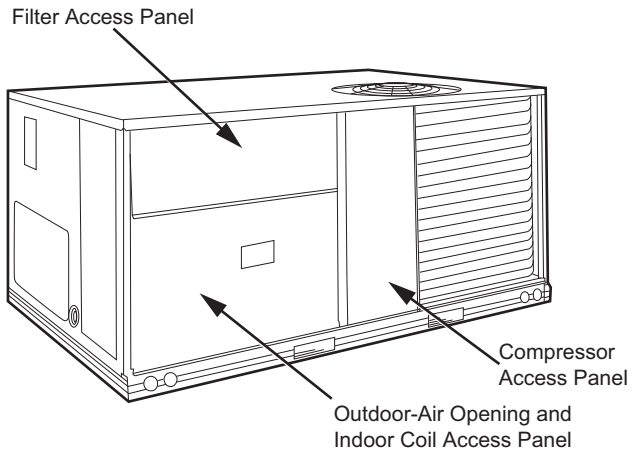



**Fig. 1 — Typical Access Panel Locations**

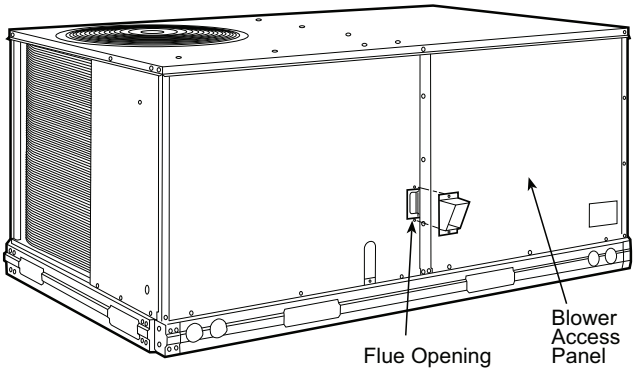



**Fig. 2 — Blower Access Panel Location**

### Routine Maintenance

These items should be part of a routine maintenance program, to be checked every month or 2, until a specific schedule for each can be identified for this installation:

QUARTERLY INSPECTION (AND 30 DAYS AFTER INITIAL START)

- Return air filter replacement
- Outdoor hood inlet filters cleaned
- Condenser coil cleanliness checked
- Condensate drain checked

SEASONAL MAINTENANCE

These items should be checked at the beginning of each season (or more often if local conditions and usage patterns dictate):

***Air Conditioning***

- Ensure outdoor fan motor mounting bolts are tight
- Ensure compressor mounting bolts are tight
- Inspect outdoor fan blade positioning
- Ensure control box is clean
- Check control box wiring condition
- Ensure wire terminals are tight
- Check refrigerant charge level
- Ensure indoor coils are clean
- Check supply blower motor amperage
- Heat exchanger flue passageways

***Cleanliness***

- Gas burner condition
- Gas manifold pressure
- Heating temperature rise

***Economizer or Outside Air Damper***

- Check inlet filters condition
- Check damper travel (economizer)
- Check gear and dampers for debris and dirt

***Air Filters and Screens***

Each unit is equipped with return air filters. If the unit has an economizer, it will also have an outside air screen. If a manual outside air damper is added, an inlet air screen will also be present.

Each of these filters and screens will need to be periodically replaced or cleaned.

## Filters

RETURN AIR FILTERS

**⚠ CAUTION**

EQUIPMENT DAMAGE HAZARD

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

DO NOT OPERATE THE UNIT WITHOUT THE RETURN AIR FILTERS IN PLACE.

Dirt and debris can collect on heat exchangers and coils possibly resulting in a small fire. Dirt buildup on components can cause excessive current used resulting in motor failure.

Return air filters are disposable fiberglass media type. Access to the filters is through the small lift-out panel located on the rear side of the unit, above the evaporator/return air access panel. (See Fig. 1.)

To remove the filters:

1. Grasp the bottom flange of the upper panel.
2. Lift up and swing the bottom out until the panel disengages and pulls out.
3. Reach inside and extract the filters from the filter rack.
4. Replace these filters as required with similar replacement filters of same size.

To reinstall the access panel:

1. Slide the top of the panel up under the unit top panel.
2. Slide the bottom into the side channels.
3. Push the bottom flange down until it contacts the top of the lower panel (or economizer top).

OUTSIDE AIR HOOD

Outside air hood inlet screens are permanent aluminum-mesh type filters. Check these for cleanliness. Remove the screens when cleaning is required. Clean by washing with hot low-pressure water and soft detergent and replace all screens before restarting the unit. Observe the flow direction arrows on the side of each filter frame.

ECONOMIZER INLET AIR SCREEN

This air screen is retained by filter clips under the top edge of the hood. (See Fig. 3.)

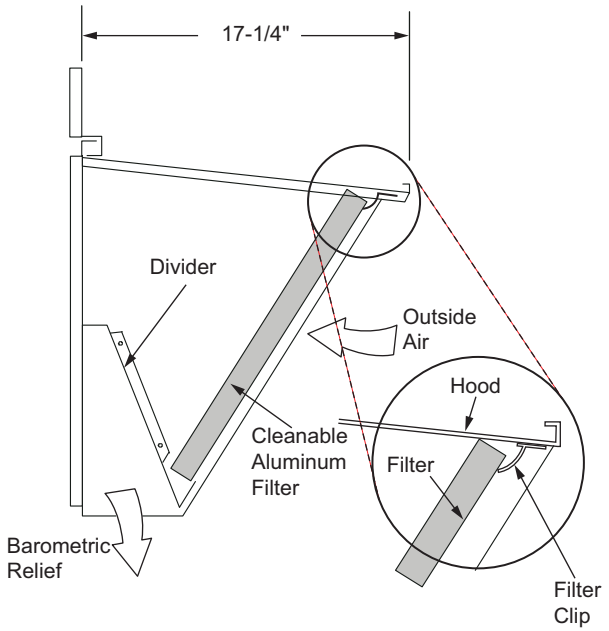



**Fig. 3 — Filter Installation**

To remove the filter, open the filter clips. Reinstall the filter by placing the frame in its track, then closing the filter clips.

MANUAL OUTSIDE AIR HOOD SCREEN

This inlet screen is secured by a retainer angle across the top edge of the hood. (See Fig. 4.)

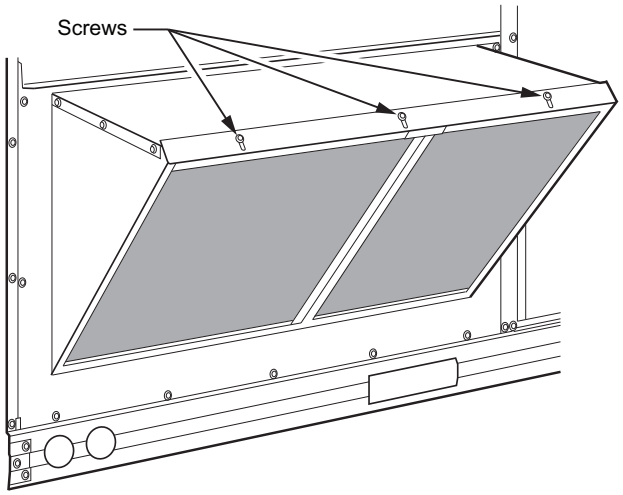



**Fig. 4 — Screens Installed on Outdoor-Air Hood**

To remove the screen, loosen the screws in the top retainer and slip the retainer up until the filter can be removed. Reinstall by placing the frame in its track, rotating the retainer back down, and tightening all screws.

## SUPPLY FAN (BLOWER) SECTION

**⚠ WARNING**

ELECTRICAL OPERATION HAZARD

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

Before performing service or maintenance operations on unit, LOCKOUT/TAGOUT the main power switch to unit. Electrical shock and rotating equipment could cause severe injury.

All low-voltage wiring should be routed through the provided raceway built into the corner post of the unit or secured to the unit control box with the electrical conduit in order to provide UL-required clearance between high and low-voltage wiring.

### Supply Fan (Direct-Drive)

All 48QE units have the EcoBlue™ direct drive vane axial fan system. The fan is driven by an ECM motor with speed that is user set through the SystemVu™ controller. Speeds are fully configurable from 40% to 100% of motor's maximum speed. See Fig. 5 and 6.

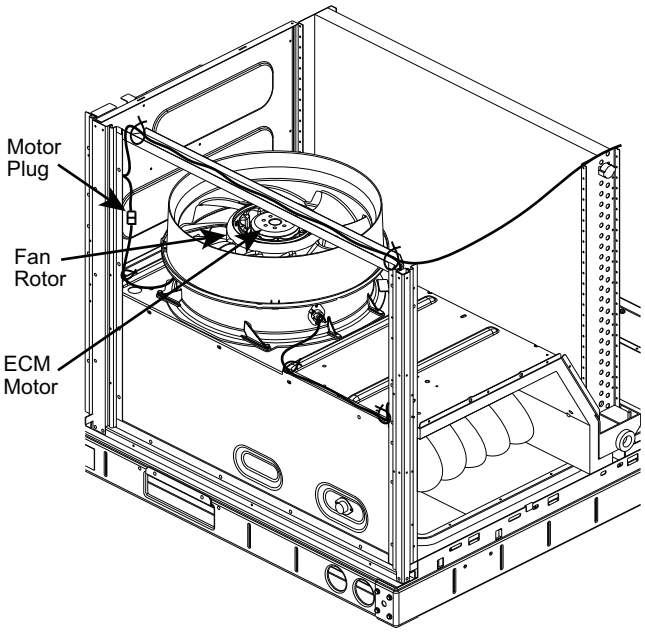



**Fig. 5 — Direct-Drive Supply Fan Assembly**

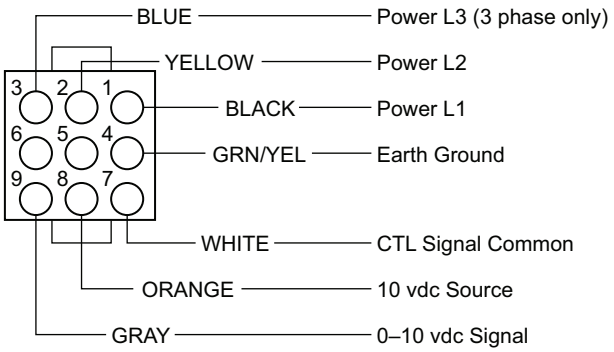



**Fig. 6 — ECM Motor Plug Connectors**

EVALUATING MOTOR SPEED

The direct drive ECM blower motor uses a constant speed design. Motor speed is controlled by a PWM signal sent from SystemVu to directly control rpm.

***Selecting Fan Speed with the SystemVu™ Controls***

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. 7), calculate the rpm from the cfm and ESP for the base unit.
3. If installing any accessories listed at the bottom of the Fan Speed 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. Using the DOWN arrow key, highlight the UNIT CONFIGURATIONS menu, then press ENTER.
7. Highlight INDOOR FAN and then press ENTER.
8. Refer to the job specifications to set the following, determining the values per the RPM Calculator label (see Fig. 7). 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.

SystemVu™

## FAN SPEED SETUP (RPM)

MAIN MENU:

SETTINGS

→ UNIT CONFIGURATIONS

→ INDOOR FAN

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

↓ DETERMINE RPM FROM BELOW ↓

48TC003136 REV. C

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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1500 | 1425 | 1609 | 1764 | 1902 | 2028 | 2147 | 2260 | 2367 | | |
| 1625 | 1512 | 1688 | 1839 | 1974 | 2097 | 2212 | 2322 | | | |
| 1750 | 1601 | 1768 | 1916 | 2047 | 2168 | 2280 | 2387 | | | |
| 1875 | 1692 | 1850 | 1994 | 2123 | 2241 | 2351 | | | | |
| 2000 | 1784 | 1933 | 2073 | 2200 | 2316 | | | | | |
| 2125 | 1878 | 2018 | 2153 | 2277 | | | | | | |
| 2250 | 1973 | 2104 | 2235 | 2356 | | | | | | |
| 2375 | 2069 | 2192 | 2317 | | | | | | | |
| 2500 | 2166 | 2282 | | | | | | | | |
| **Field Accessories:** | | | | | | | | | | |
| Economizer | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

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

**Fig. 7 — Example of Fan Speed Set Up Labels for SystemVu™ Controls**

TROUBLESHOOTING THE ECM MOTOR

EcoBlue™ motors are designed with several built-in protections included in the motor software. If the motor detects a fault it will safely shut down. For temperature related faults the motor requires a line voltage reset to continue operation. For all others, the motor will resume operation automatically as soon as the fault condition is cleared. See Table 1 for a complete list.

**Table 1 — Fault Condition/Reset Trigger**

| FAULT CONDITION | RESET TRIGGER | DESCRIPTION |
|---|---|---|
| **Phase Failure** | Automatic | One phase is missing or imbalanced. In this case the motor will come to a stop and then automatically restart when all phases are present. |
| **Locked/ Blocked Rotor** | Automatic | The rotor is blocked. Once the locking mechanism has been removed, the motor will automatically restart. |
| **Motor Overheated** | Manual | The motor will stop in the event the motor overheats. In this case there has to be a manual restart. |
| **Power Module Overheated** | Manual | The motor will stop in the event the electronics overheat. In this case there has to be a manual restart. |
| **Line under-voltage** | Automatic | Once the line voltage returns within permitted operating range, the fan will automatically restart. |
| **Communication Error** | Automatic | Internal communication error of the fan's electronics. The fan will restart automatically, if error is cleared. |

Troubleshooting the motor requires a voltmeter.

1. Disconnect main power to the unit.
2. Disconnect motor plug in supply section of the unit.
3. Restore main unit power.
4. Check for proper line voltage at motor power leads Black (PL1-1), Yellow (PL1-2), and Blue (PL1-3). See the following table.

| 48QE UNIT VOLTAGE | MOTOR VOLTAGE | MINIMUM-MAXIMUM VOLTS |
|---|---|---|
| **208/230** | 230 | 187-253 |
| **460** | 460 | 414-506 |
| **575** | 575 | 518-633 |

5. Check for Control voltage. YEL (PL1-9) to BRN (PL1-7) should be 10-20 vdc with no commanded speed.
6. Verify the J10 plug at the SystemVu board is wired per Fig. 8, connected tight, and wires are secured in the plug
7. Disconnect main power.
8. Reconnect motor plug in supply section of unit.
9. Restore main power.
10. Use SystemVu test mode to control the motor. Press the TEST button. Turn the TEST MODE to on, enter the SERVICE TEST menu, and then enter the FAN TEST menu.
11. Verify with IDF SPEED TEST set to 0% the LED6 on the board (to the left of the J10 plug) is off. Verify when the IDF SPEED TEST is set to 10% or higher the LED6 turns on green.
12. Verify there are no alarms active on SystemVu controller.
13. If all above is verified and the motor does not start and run, remove the fan assembly and replace the motor with one having the same part number. Do not substitute with an alternate design motor as the voltage/speed programming will not be the same as that on an original factory motor.

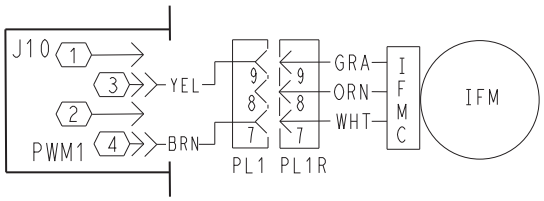



**Fig. 8 — Supply Fan Control Wiring Diagram**

***Removing the Motor and Fan Assembly***

NOTE: Due to press fit design of composite Rotor on Motor, it is highly recommended that any time a motor is replaced the fan rotor is replaced as well. The rest of the assembly may be reused.

See Fig. 9.

1. Unplug motor harness from control box harness and cut wire tie at the fan deck.
2. Unplug connectors from stator temperature limit switch.
3. Remove 2 screws at front of stator on fan deck.
4. Slide fan assembly forward a couple of inches to clear rear brackets and lift assembly out.

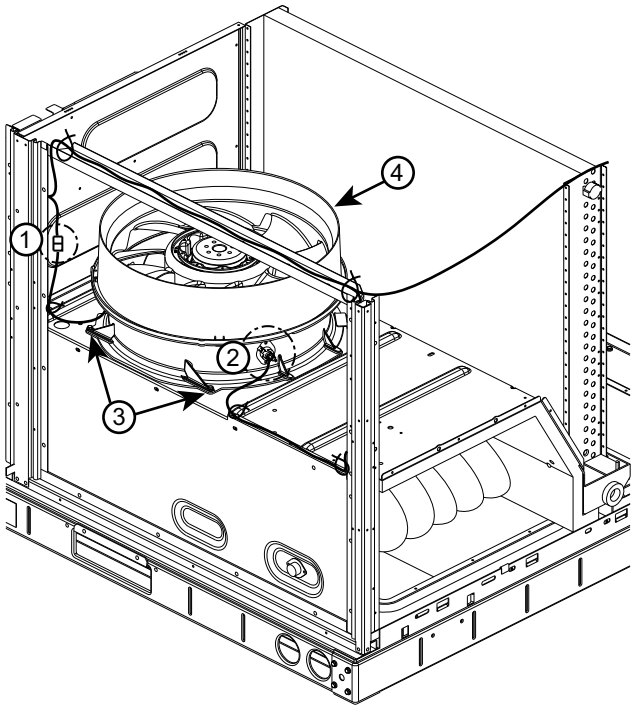



**Fig. 9 — Fan Assembly Removal**

***Disassembling Motor and Fan Assembly***

See Fig. 10.

1. Remove 6 screws from retaining rings in the top of the fan rotor.
2. Remove rotor from motor.
3. Remove 4 screws connecting motor to stator flange.
4. Remove stator from motor.
5. If required, remove stator limit switch on stator.
6. Remove 3 screws from the heat shield. Retain the heat shield if a new heat shield has not been ordered.

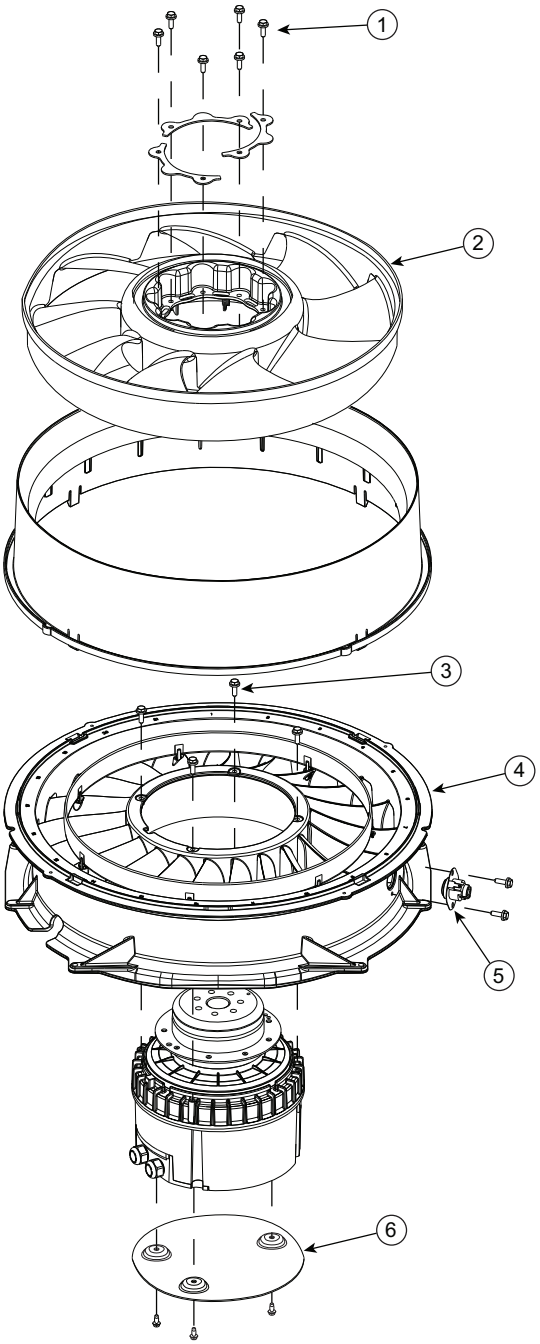



**Fig. 10 — Disassembling Motor and Fan Assembly**

***Reassembly of Motor and Fan Assembly***

See Fig. 11.

1. Install heat shield on motor with 3 no. 8-32 x 3/8 in. thread cutting screws (P/N: AK92AB100). Tighten to 30 in.-lb (3.39 Nm).
2. Place motor on flat surface.

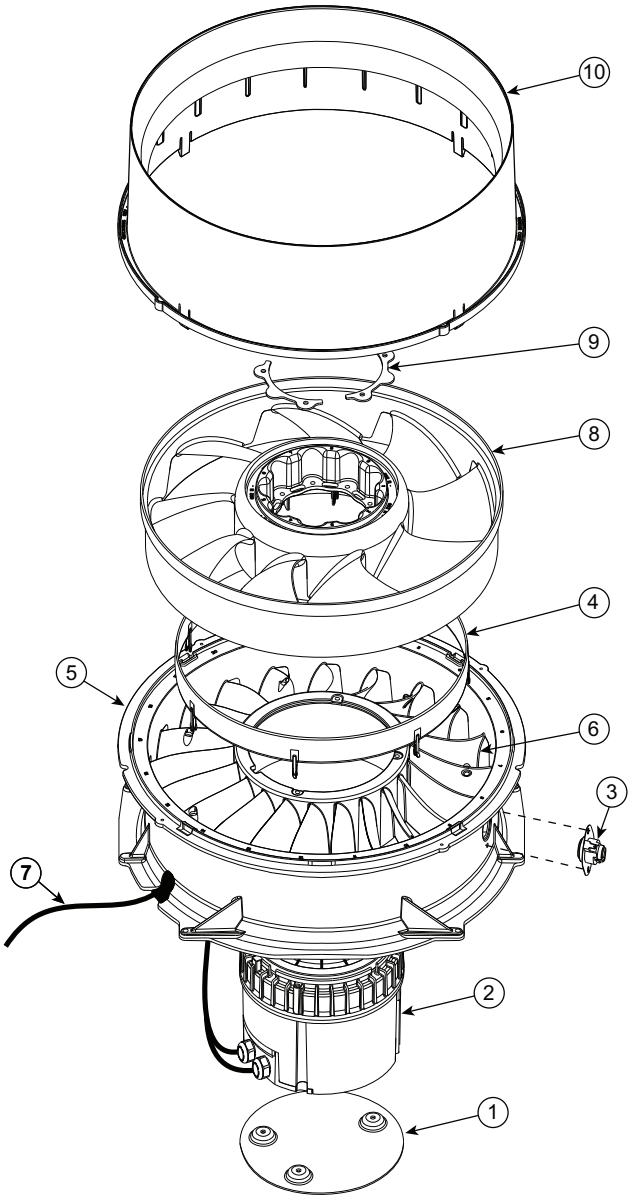



**Fig. 11 — Fan System Re-Assembly**

3. If required, install stator limit switch on stator with 2 no. 10 x 5/8 in. hex head screws (P/N: AL48AM217). Tighten to 50 in.-lb (5.65 Nm).
4. If required, insert composite ring into stator where pegs match up with holes.
5. Line up rectangle keyway in the center of stator with rectangle feature on motor and set stator onto motor.
6. Install 4 no. 10-32 x 1/2 in. hex head machine screws (P/N: AD07AB126) to connect stator to motor. Tighten to 23 in.-lb (2.6 Nm).
7. Fit grommet on motor wire harness into keyhole feature on the side of the stator and pull wire harness out through grommet.
8. Install rotor on motor by lining up one of 9 holes on composite rotor with one of 9 holes on motor flange. This can be done by adjusting motor and the top of the motor hub

and aligning using a 3/16 in. Allen key or similar pin. Press fan rotor down until it is flush with the motor flange.

9. Set retaining rings (x3) into composite rotor and install 6 no. 10-32 x 1/2 in. hex head machine screws (P/N: AD07AB126) through the holes in retaining rings. Tighten to 23 in.-lb (2.6 Nm). It is recommended this screw installation be done in a star pattern.
10. Align tabs of composite casing with rectangular cutouts on top of stator and snap into place.
11. Final assembly should have a small clearance between top of plastic rotor and underside of casing lip. Spin rotor by hand to ensure no contact or rubbing between these 2 parts.

***Reinstalling Motor and Fan Assembly***

See Fig. 12.

1. Align motor harness/grommet at ~7 o'clock (facing installer) and align the bottom flats on right and left sides of fan stator with fan deck ribs. Drop fan assembly down into fan deck opening and slide back until stator is under the rear fan deck brackets.
2. Align (if necessary) 2 front holes and fasten stator to fan deck with 2 no. 10 x 5/8 in. hex head screws (P/N: AL48AM217). Tighten to 50 in.-lb (5.65 Nm).
3. Reconnect wires for stator temperature limit switch.
4. Pull motor harness tight through grommet and plug it in to the control box harness and secure in the corner with snap-in wire tie.

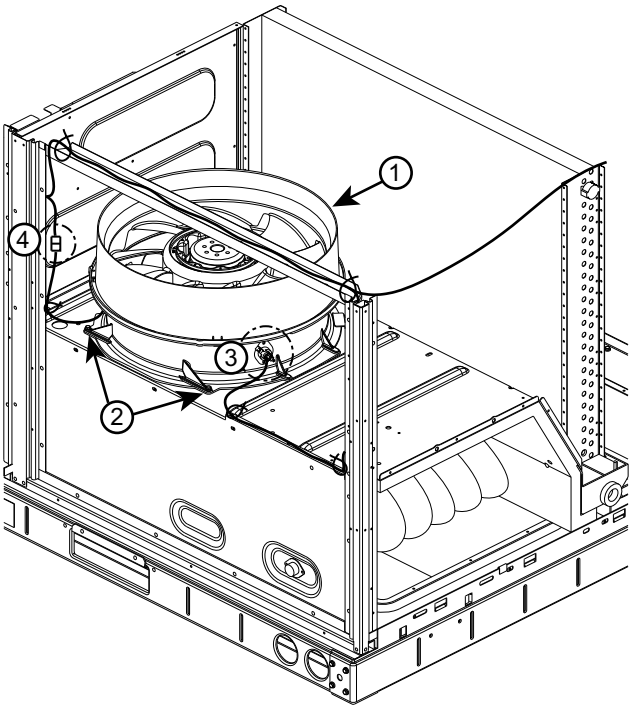



**Fig. 12 — Fan Assembly Install**

## Indoor Fan Operation

These units use the Staged Air Volume (SAV) method of controlling the supply fan for a typical constant volume rooftop unit. This control method employs an Electronic Commutated Motor (ECM) to operate the supply fan at different speeds in order to achieve energy savings through reduced fan power. This method is specifically not concerned with controlling static pressure in the supply duct, but rather with setting different fan speeds for different operating conditions, such as ventilation mode or part-load mechanical cooling.

The SAV function is NOT a Variable Air Volume (VAV) function. The fan adapts its speed to one of seven based on mode and current state to satisfy a demand. The speeds consist of off (0%) and six configurable values. The configurable fan speeds are: Maximum Speed (***MAXIMUM IDF SPEED***), Ventilation (***VENT IDF SPEED***), Heating (***HEATING IDF SPD***), Free Cool (***FREE COOL IDF SPD***), Mechanical Low Cooling (***LOW COOL IDF SPD***), and Mechanical High Cooling (***HIGH COOL IDF SPD***), The ECM is powered direct from the distribution block and is always on with power applied unless the CB is tripped. When the thermostat or space sensor control conditions require the fan on, the ECM will then be ramped to desired speed. Fan speed is always calculated by evaluating the current applicable conditions. Each fan speed condition is evaluated independently, and the highest fan speed is used. For example, if a cooling call occurs during Ventilation mode, the unit mode will transition to cooling but the fan speed is set to the higher of the two (***VENT IDF SPEED*** or ***LOW COOL IDF SPD***). Refer to the speed configurations below for when the fan will run at them.

The Commanded Fan Speed (***OUTPUTS → GENERAL OUTPUTS → COMMANDED IDF RPM***) represents the controls commanded speed for the fan at any given time. This commanded speed is determined by the unit's current HVAC mode and the unit control type. If configured for IAQ fan operation, the fan may be turned on to satisfy air quality demands. See the Indoor Air Quality section if using IAQ (indoor air quality) accessory sensors. The fan can run under thermostat or space sensor control and will remain on if compressors or heat relays are ever stuck on. If Shut Down on IDF Failure is enabled (***SHUTDOWN IDF FAIL*** = ***Yes***), the fan and unit will be shutdown without delay on fan alarm conditions. Fan off delays are honored when exiting specific HVAC modes. The Fan-off Delay delays are as follows: Cooling (***COOL FANOFF DELAY***), and Heating (***HEAT FANOFF DELAY***).

INDOOR (SUPPLY) FAN MAXIMUM SPEED
(***MAXIMUM IDF SPEED***)

Max speed is the highest fan speed allowed. This is set in terms of percentage instead of RPM and is defaulted to 100%. This max speed should be set lower if needed for building or duct protection. Most safety conditions for the unit will override the fan speed to this to help protect the unit.

IMPORTANT: ***MAXIMUM IDF SPEED*** is used in the minimum position curves and therefore important to set properly.

VENTILATION INDOOR FAN SPEED
(***VENT IDF SPEED***)

This configuration defines the fan speed used in Ventilation (fan-only) mode. Ventilation mode is when the supply fan is running, but there is no demand for heating or cooling. In thermostat mode, this is with just a G call. In space sensor control, this is when the unit is Occupied mode and the indoor fan is configured to always run while occupied (***OCCUPIED FAN?***). If the indoor fan is configured for intermittent fan (***OCCUPIED FAN?*** = ***No***), the Mode will be off instead of Ventilation and the fan will not run unless a heating or cooling mode is needed. During the unoccupied period, the fan will always operate intermittently. The economizer damper will adjust its position based on how far away this speed is from max speed for ventilation.

IMPORTANT: It is important that the ventilation rate is checked after setting this speed to verify that the unit can properly ventilate the space per requirements. Adjusting this configuration or the economizer minimum setting curve should be performed to meet job requirements.

HEATING INDOOR FAN SPEED (***HEATING IDF SPD)***

This configuration defines the fan speed used when in heating mode and running heat. On units configured for Electric heat (***UNIT TYPE OF HEAT***) and configured for Preheat without the fan (***PREHEAT W/O IDF***), this heat speed will be delayed on based on the Preheat fan delay time (***PREHEAT FAN DELAY***). Once this preheat time has expired or not configured for preheat, the fan will run at this heat speed while heat is on.

FREE COOLING INDOOR FAN SPEED (***FREE COOL IDF SPD***)

This configuration defines the initial fan speed used when in Free Cooling. Refer to the Economizer Controls Operation section for details on free cooling. The fan will stay at this configured speed whenever only the damper is being used for free cooling. If the damper is at 100% for 5 minutes the fan will ramp to the high cooling speed. It is locked there until the actual damper position falls below 75% at which time it will ramp back down to this configured speed.

LOW COOLING INDOOR FAN SPEED

This is the fan speed used when the first stage of mechanical cooling is being performed. This is determined by an offset configuration (LOW COOL OFFSET) based on the unit model number. This impacts the unit efficiency and should only be changed by service personal if needed.

HIGH COOLING INDOOR FAN SPEED (***HIGH COOL IDF SPD***)

This configuration defines the fan speed used when all (full load) stages of mechanical cooling is being performed. When performing integrated cooling with the economizer this speed will be used. When only free cooling with a high cool demand, this speed will be used.

## COOLING

**⚠ 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.

### Condenser Coil (Outdoor)

The condenser coil is fabricated with round tube copper hairpins and plate fins of various materials and/or coatings (see Appendix A — Model Number Nomenclature on page 55 to identify the materials provided in this unit). The coil may be one-row or composite-type 2-row. Composite 2-row coils are 2 single-row coils fabricated with a single return bend end tubesheet.

### Evaporator Coil (Indoor)

The evaporator coil is traditional round-tube, plate-fin technology. Tube and fin construction is of various optional materials and coatings (see Appendix A — Model Number Nomenclature on page 55). Coils are multiple-row.

### Condenser Coil Maintenance and Cleaning Recommendation

Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit. The following maintenance and cleaning procedures are recommended as part of the routine maintenance activities to extend the life of the coil.

REMOVE SURFACE LOADED FIBERS

Surface loaded fibers or dirt should be removed with a vacuum cleaner. If a vacuum cleaner is not available, a soft non-metallic bristle brush may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges can be easily bent over and damage to the coating of a protected coil) if the tool is applied across the fins.

NOTE: Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers must be completely removed prior to using low velocity clean water rinse.

PERIODIC CLEAN WATER RINSE

A periodic clean water rinse is very beneficial for coils that are applied in coastal or industrial environments. However, it is very important that the water rinse is made with a very low velocity water stream to avoid damaging the fin edges. Monthly cleaning as described below is recommended. Rinsing coils in the opposite direction of airflow is recommended.

ROUTINE CLEANING OF COIL SURFACES

Periodic cleaning with Totaline® coil cleaner is essential to extend the life of coils. This cleaner is available from Replacement Components as part number P902-0301 for a one gallon container, and part number P902-0305 for a 5 gallon container. It is recommended that all coils, including standard aluminum, pre-coated, copper/copper or e-coated coils be cleaned with the Totaline coil cleaner as described below. Coil cleaning should be part of the unit's regularly scheduled maintenance procedures to ensure long life of the coil. Failure to clean the coils may result in reduced durability in the environment.

Avoid use of:

- coil brighteners
- acid cleaning prior to painting
- high pressure washers
- poor quality water for cleaning

Totaline coil cleaner is nonflammable, hypo-allergenic, non-bacterial, and a USDA accepted biodegradable agent that will not harm the coil or surrounding components such as electrical wiring, painted metal surfaces, or insulation. Use of non-recommended coil cleaners is strongly discouraged since coil and unit durability could be affected.

***Two-Row Condenser Coils***

Clean coil as follows:

1. Turn off unit power, tag disconnect.
2. Remove all screws from the top panel except the screws securing the condenser fan to the top panel. See Fig. 13.

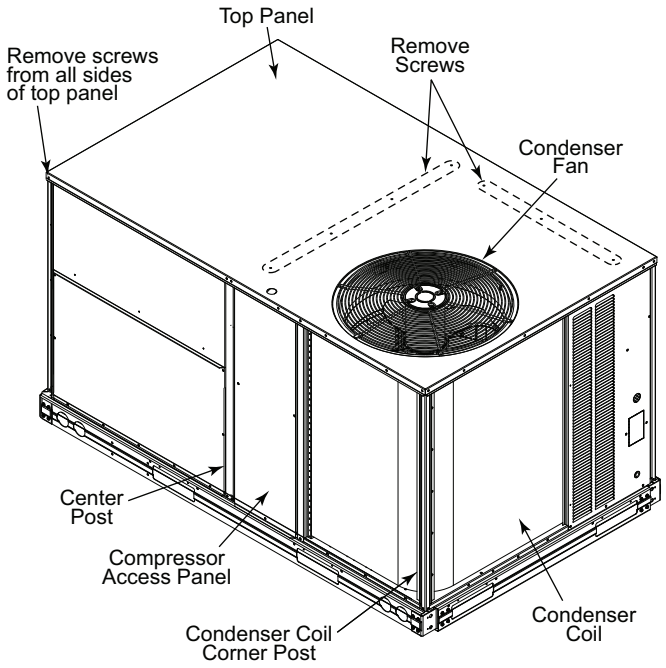



**Fig. 13 — Location of Screws and Coil Corner Post**

3. Lift and rotate the top panel at the condenser fan end and rotate the panel 90 degrees. Support the top panel so it remains level while resting on the condenser fan as shown in Fig. 14.

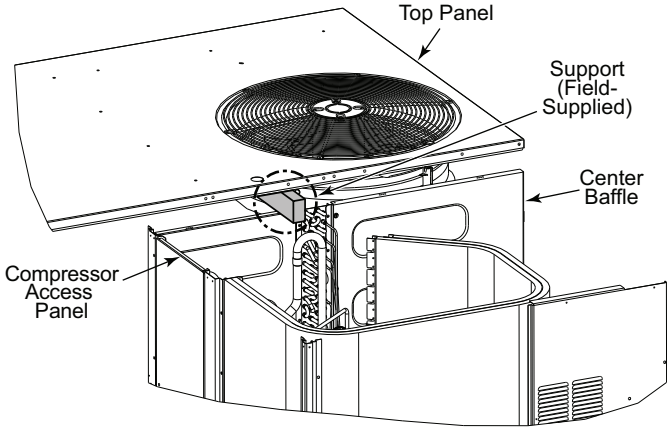



**Fig. 14 — Top Panel Position**

4. Remove the compressor access panel to access the lower coil clip. The condenser coil corner post may also be removed.
5. Remove the screws from both sides of the upper and lower coil retaining clips on the hairpin end of the coil tube sheets. See Fig. 15.

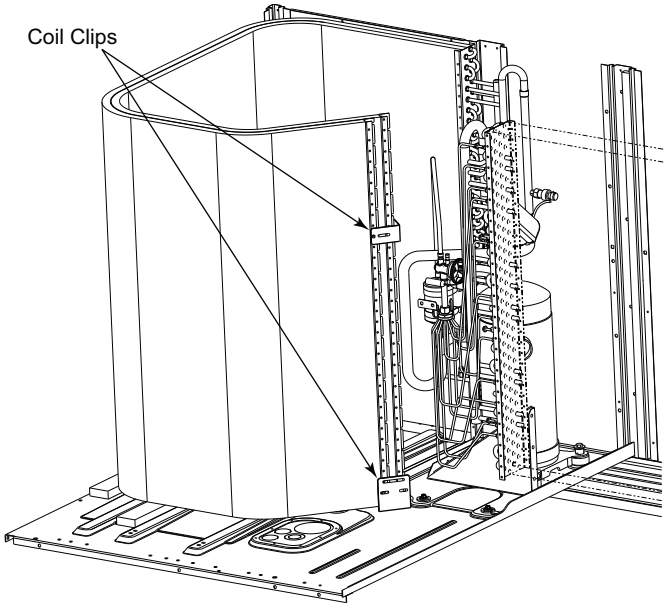



**Fig. 15 — Condenser Coil Clips**

6. Remove the upper and lower retaining clips.
7. Draw the inner coil inward to separate the coils for cleaning.
8. Insert a spacer (field-supplied) between the tube sheets to hold the coils apart. See Fig. 16.

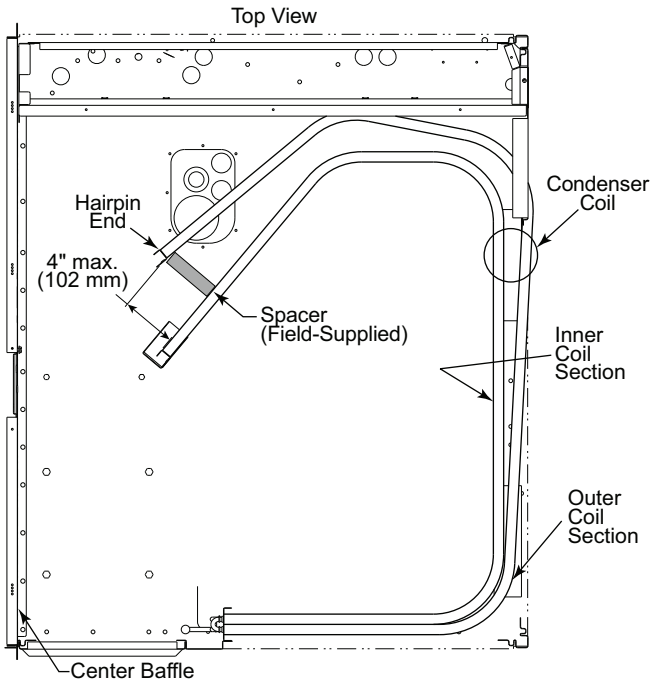



**Fig. 16 — Separating Coil Sections**

9. Clean the outer coil surface to remove surface loaded fibers or dirt. See “Remove Surface Loaded Fibers” on page 12 for details.
10. Use a water hose or other suitable equipment to flush down between the 2 coil sections to remove dirt and debris. If a coil cleaner is used be sure to rinse the coils completely before reassembly.
11. Move the inner coil back into position. Reinstall the lower and upper coil clips. Reinstall the top panel and replace all screws.

Totaline Coil Cleaner Application Equipment

- 2-1/2 gallon garden sprayer
- Water rinse with low velocity spray nozzle

**⚠ CAUTION**

UNIT DAMAGE HAZARD

Failure to follow this caution may result in reduced unit performance or unit shutdown.

High velocity water from a pressure washer, garden hose, or compressed air should never be used to clean a coil. The force of the water or air jet will bend the fin edges and increase airside pressure drop.

**⚠ CAUTION**

UNIT DAMAGE HAZARD

Failure to follow this caution may result in accelerated corrosion of unit parts.

Harsh chemicals, household bleach or acid or basic cleaners should not be used to clean outdoor or indoor coils of any kind. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion at the fin/tube interface where dissimilar materials are in contact. If there is dirt below the surface of the coil, use approved coil cleaner.

Totaline Coil Cleaner Application Instructions

1. Proper eye protection such as safety glasses is recommended during mixing and application.
2. Remove all surface loaded fibers and dirt with a vacuum cleaner as described above.
3. Thoroughly wet finned surfaces with clean water and a low velocity garden hose, being careful not to bend fins.
4. Mix Totaline coil cleaner in a 2-1/2 gallon garden sprayer according to the instructions included with the cleaner. The optimum solution temperature is 100°F.

   NOTE: DO NOT USE water in excess of 130°F, as the enzymatic activity will be destroyed.
5. Thoroughly apply Totaline coil cleaner solution to all coil surfaces including finned area, tube sheets and coil headers.
6. Hold garden sprayer nozzle close to finned areas and apply cleaner with a vertical, up-and-down motion. Avoid spraying in horizontal pattern to minimize potential for fin damage.
7. Ensure cleaner thoroughly penetrates deep into finned areas. Interior and exterior finned areas must be thoroughly cleaned. Finned surfaces should remain wet with cleaning solution for 10 minutes. Ensure surfaces are not allowed to dry before rinsing. Reapply cleaner as needed to ensure 10-minute saturation is achieved.
8. Thoroughly rinse all surfaces with low velocity clean water using downward rinsing motion of water spray nozzle. Protect fins from damage from the spray nozzle.

## Evaporator Coil

Cleaning the Evaporator Coil:

1. Turn unit power off. Install lockout tag. Remove evaporator coil access panel.
2. If economizer or two-position damper is installed, remove economizer by disconnecting Molex®[1] plug and removing mounting screws.
3. Slide filters out of unit.
4. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister. Wash both sides of coil and flush with clean water. For best results, backflush toward return-air section to remove foreign material. Flush condensate pan after completion.
5. Reinstall economizer and filters.
6. Reconnect wiring.
7. Replace access panels.

## Refrigeration System Components

Each heat pump refrigeration system includes a compressor, accumulator, reversing valve, dual-function outdoor coil with vapor header check valve, cooling liquid line with a filter drier and a check valve, dual-function indoor coil with a vapor header check valve, and heating liquid line with a check valve and a strainer. 48QE*04-06 units have a single compressor-circuit. See Fig. 17 and Tables 2-4 for typical unit piping schematic. Dual-function outdoor and indoor coils are designed to provide parallel coil circuits during evaporator-function operation and converging coil circuits during the condenser-function operation.

**Table 2 — Cooling Mode (each circuit)**

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

**Table 3 — Heating Mode (each circuit)**

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

**Table 4 — 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** | Closed |
| **Check Valve D** | Open |

## Evaporator Coil Metering Devices

48QE*04-06 units use a TXV-distributor system for evaporator metering.

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

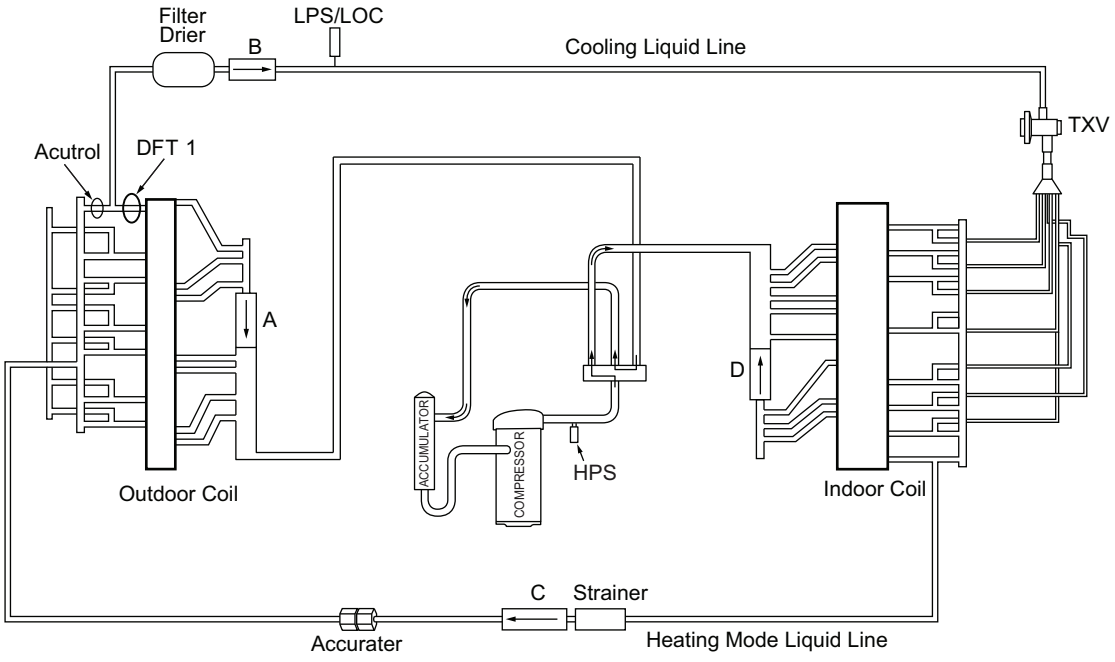



**Fig. 17 — Typical Piping Schematic**

## THERMOSTATIC EXPANSION VALVE (TXV)

All 48QE units have a factory-installed nonadjustable thermostatic expansion valve (TXV). The TXV is a bi-flow, bleed port expansion valve with an external equalizer. The TXVs are specifically designed to operate with Puron Advance™ (R-454B) refrigerant. Use only factory-authorized TXVs.

### TXV Operation

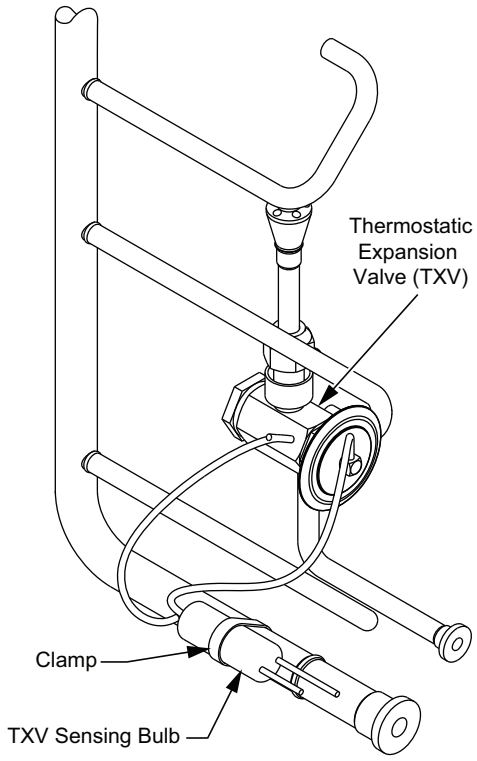
The TXV is a metering device that is used in air conditioning and heat pump systems to adjust to the changing load conditions by maintaining a preset superheat temperature at the outlet of the evaporator coil.

The volume of refrigerant metered through the valve seat is dependent upon the following:

1. Superheat temperature is sensed by cap tube sensing bulb on suction tube at outlet of evaporator coil. This temperature is converted into pressure by refrigerant in the bulb pushing downward on the diaphragm, which opens the valve using the push rods.
2. The suction pressure at the outlet of the evaporator coil is transferred through the external equalizer tube to the underside of the diaphragm.
3. The pin is spring loaded, which exerts pressure on the underside of the diaphragm. Therefore, the bulb pressure works against the spring pressure and evaporator suction pressure to open the valve. If the load increases, the temperature increases at the bulb, which increases the pressure on the top side of the diaphragm. This opens the valve and increases the flow of refrigerant. The increased refrigerant flow causes the leaving evaporator temperature to decrease. This lowers the pressure on the diaphragm and closes the pin. The refrigerant flow is effectively stabilized to the load demand with negligible change in superheat.

### Replacing TXV

1. Recover refrigerant.
2. Remove TXV support clamp using a 5/16 in. nut driver.
3. Remove TXV using a wrench and an additional wrench on connections to prevent damage to tubing.
4. Remove equalizer tube from suction line of coil. Use file or tubing cutter to cut brazed equalizer line approximately 2 inches above suction tube.
5. Remove bulb from vapor tube inside cabinet.
6. Install the new TXV using a wrench and an additional wrench on connections to prevent damage to tubing while attaching TXV to distributor.
7. Attach the equalizer tube to the suction line. If the coil has a mechanical connection, then use a wrench and an additional wrench on connections to prevent damage. If the coil has a brazed connection, use a file or a tubing cutter to remove the mechanical flare nut from the equalizer line. Then use a new coupling to braze the equalizer line to the stub (previous equalizer line) in suction line.
8. Attach TXV bulb in the same location where the original (in the sensing bulb indent) was when it was removed, using the supplied bulb clamps. See Fig. 18.
9. Route equalizer tube through suction connection opening (large hole) in fitting panel and install fitting panel in place.
10. Sweat the inlet of TXV marked “IN” to the liquid line. Avoid excessive heat which could damage the TXV valve. Use quenching cloth when applying heat anywhere on TXV.




NOTE: Sensing bulb insulation removed for clarity.

**Fig. 18 — TXV Valve and Sensing Bulb Location**

## Refrigerant System Pressure Access Ports

There are 2 access ports in the system: on the suction tube near the compressor and on the discharge tube near the compressor. These are brass fittings with black plastic caps. The hose connection fittings are standard 1/4 in. SAE male flare couplings.

The brass fittings are 2-piece high flow valves, with a receptacle base brazed to the tubing and an integral spring-closed check valve core screwed into the base. See Fig. 19. This check valve is permanently assembled into this core body and cannot be serviced separately; replace the entire core body if necessary. Service tools are available from Replacement Components that allow the replacement of the check valve core without having to recover the entire system refrigerant charge. Apply compressor refrigerant oil to the check valve core's bottom o-ring. Install the fitting body with 96 ±10 in.-lb (10.85 ±1.1 Nm) of torque; do not over-tighten.

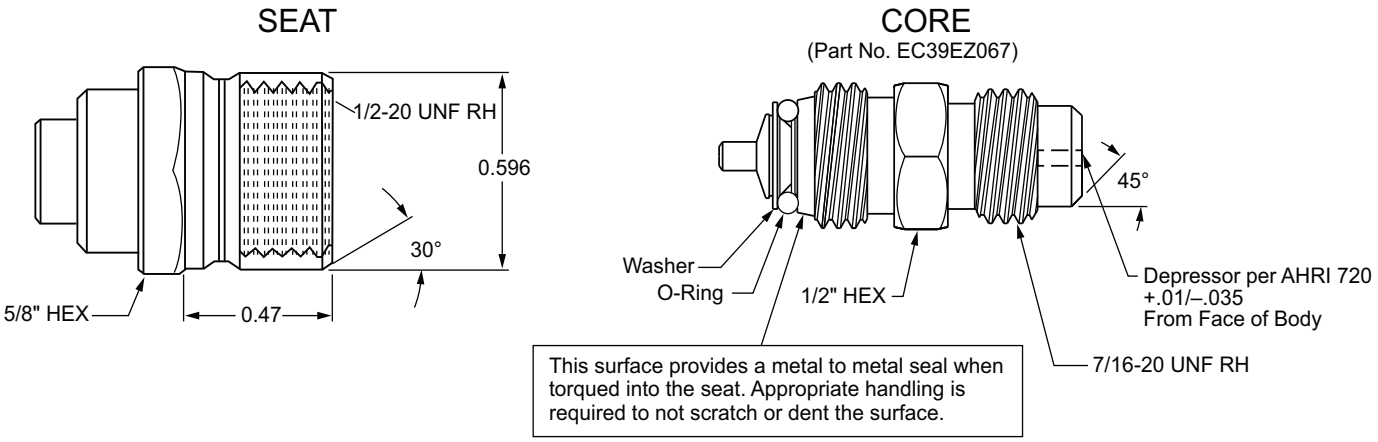



**Fig. 19 — CoreMax™[1] Access Port Assembly**

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

## PURON ADVANCE (R-454B) REFRIGERANT

This unit is designed for use with Puron Advance™ (R-454B) refrigerant. Do not use any other refrigerant in this system.

Puron Advance (R-454B) refrigerant is provided in gray cylinders with a red band near the top. Pay close attention to the cylinder labels to verify that the cylinder contains the correct refrigerant. These cylinders are available with and without dip tubes; cylinders with dip tubes will have a label indicating this feature. For a cylinder with a dip tube, place the cylinder in the upright position (access valve at the top) when removing liquid refrigerant for charging. For a cylinder without a dip tube, invert the cylinder (access valve on the bottom) when removing liquid refrigerant.

Because Puron Advance (R-454B) refrigerant is a zeotropic blend, it is strongly recommended that refrigerant always be removed from the cylinder as a liquid. Admit liquid refrigerant into the system in the discharge line. If adding refrigerant into the suction line, use a commercial metering/expansion device at the gauge manifold; remove liquid from the cylinder, pass it through the metering device at the gauge set and then pass it into the suction line as a vapor. Do not remove Puron Advance (R-454B) refrigerant from the cylinder as a vapor.

### Refrigerant Charge

Amount of refrigerant charge is listed on the unit's nameplate. Refer to *Carrier GTAC2-5 Charging, Recovery, Recycling and Reclamation* training manual and the following procedures.

Unit panels must be in place when unit is operating during the charging procedure.

NO CHARGE

Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant.

LOW-CHARGE COOLING

Using Cooling Charging Charts, Fig. 20-25, vary refrigerant until the conditions of the appropriate chart are met. Note the charging charts are different from type normally used. Charts are based on charging the units to the correct sub-cooling for the various operating conditions. Accurate pressure gauge and temperature sensing device are required. Connect the pressure gauge to the service port on the liquid line. Mount the temperature sensing device on the liquid line and insulate it so that outdoor ambient temperature does not affect the reading. Indoor-air cfm must be within the normal operating range of the unit.

| 48QE SIZE DESIGNATION | NOMINAL TONS REFERENCE |
|---|---|
| **04** | 3 |
| **05** | 4 |
| **06** | 5 |

EXAMPLE:

Model . . . . . 48QE*M04

Discharge Pressure . . . . . 400 psig (2758 kPa)

Outdoor Coil Leaving Temperature . . . . 105°F (37.7°C)

USING COOLING CHARGING CHARTS

Take the outdoor ambient temperature and read the liquid pressure gauge. Refer to chart to determine what liquid temperature should be. If liquid temperature is low, add refrigerant. If liquid temperature is high, carefully recover some of the charge. Recheck the liquid pressure as charge is adjusted.

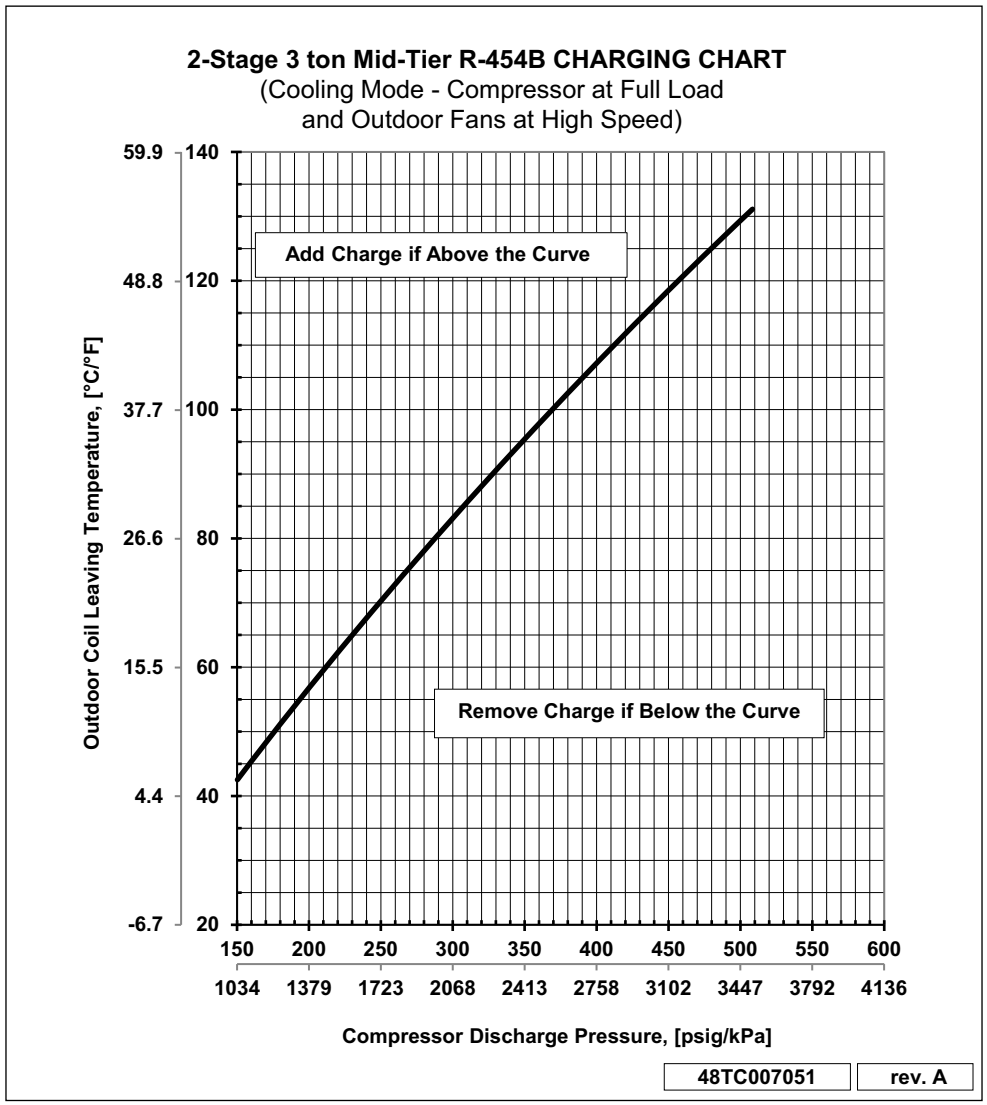



**Fig. 20 — Cooling Charging Chart — 3 Ton**

## COOLING CHARGING CHARTS

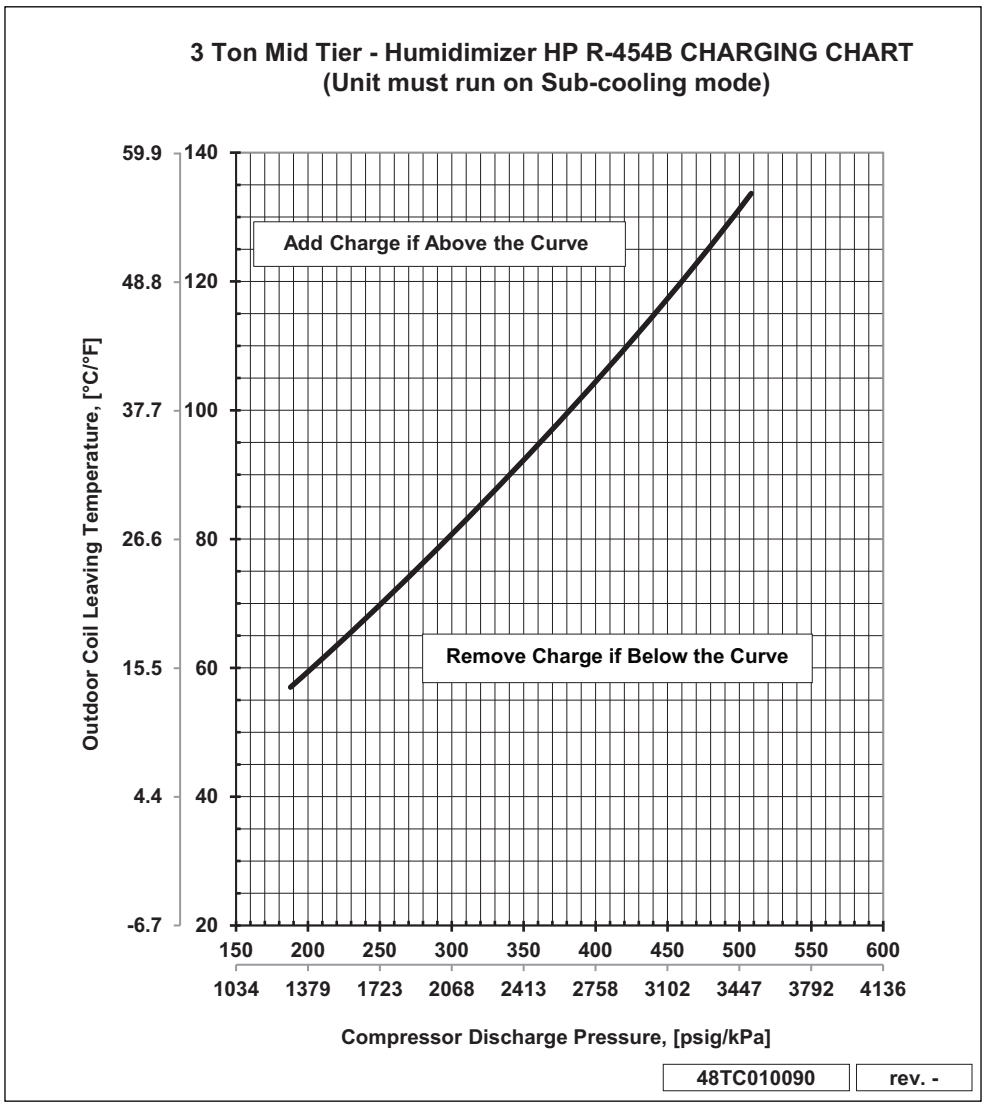



**Fig. 21 — Cooling Charging Chart — 3 Ton with Hot Gas Reheat (Humidi-MiZer® System) Option**

## COOLING CHARGING CHARTS

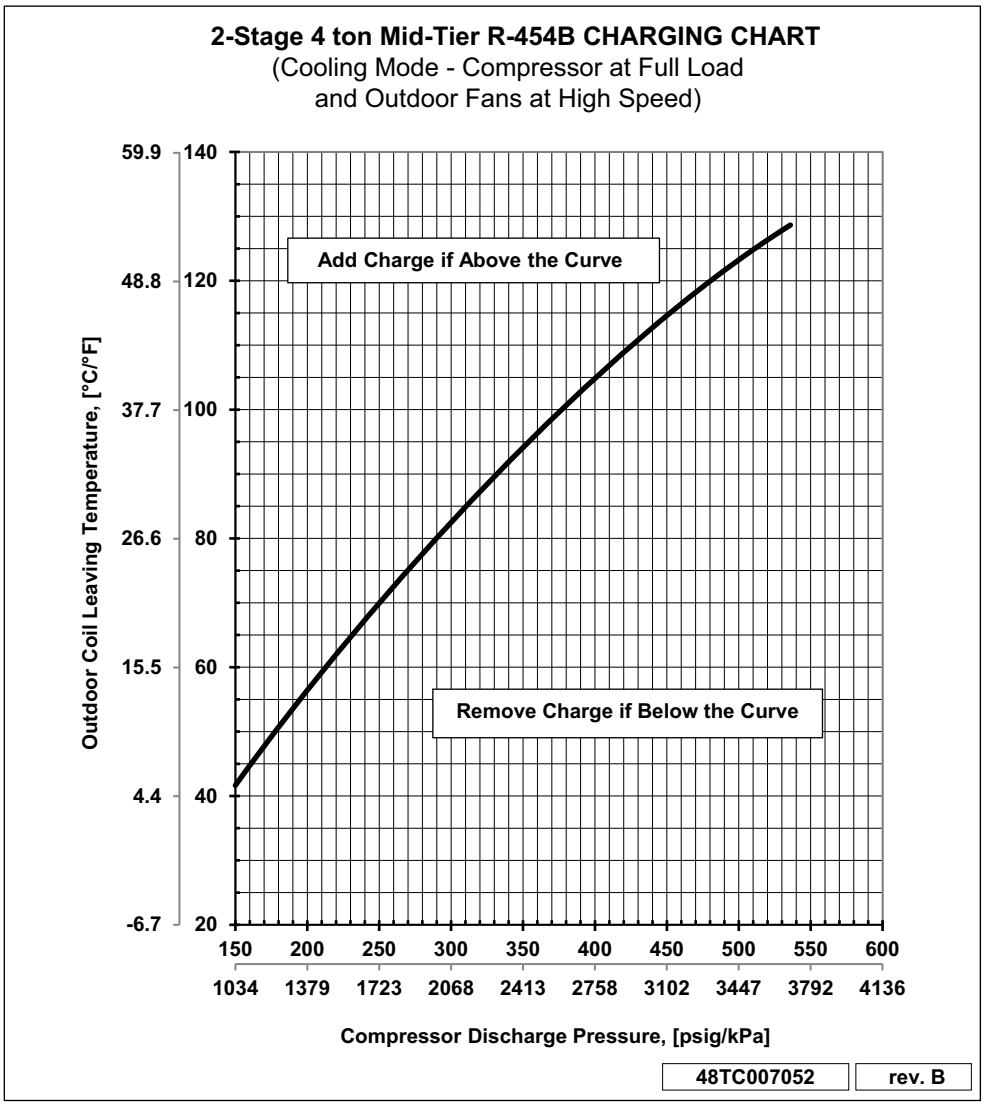



**Fig. 22 — Cooling Charging Chart — 4 Ton**

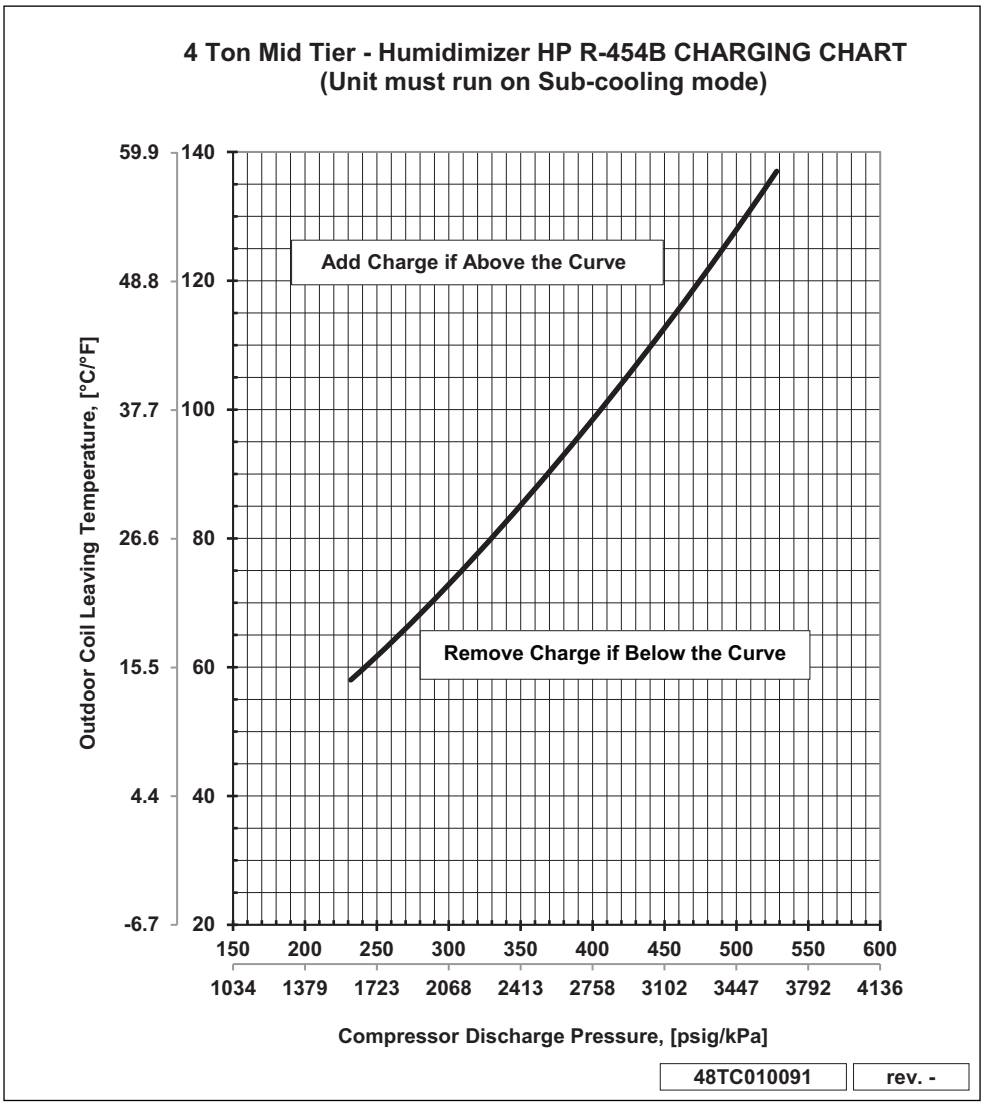



**Fig. 23 — Cooling Charging Chart — 4 Ton with Hot Gas Reheat (Humidi-MiZer® System) Option**

## COOLING CHARGING CHARTS

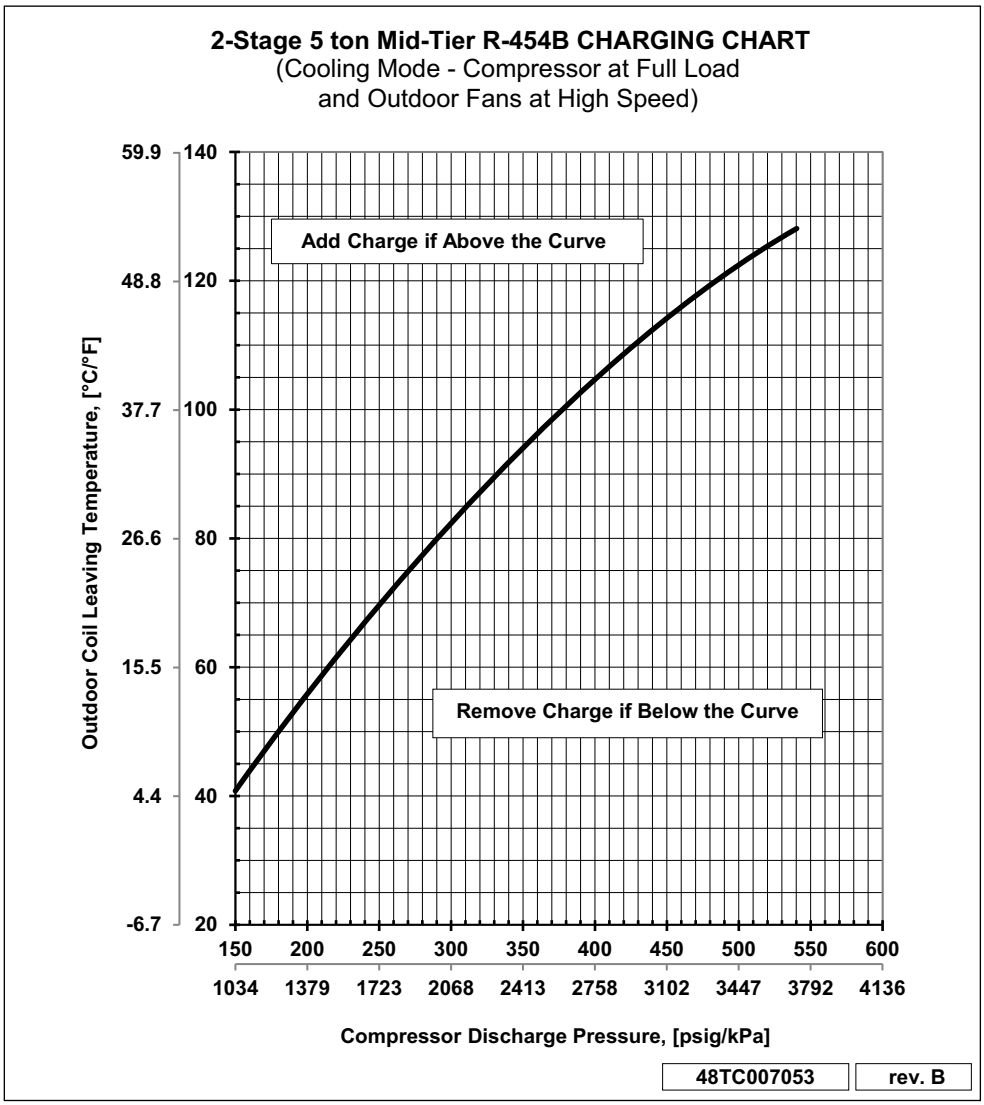



**Fig. 24 — Cooling Charging Chart — 5 Ton**

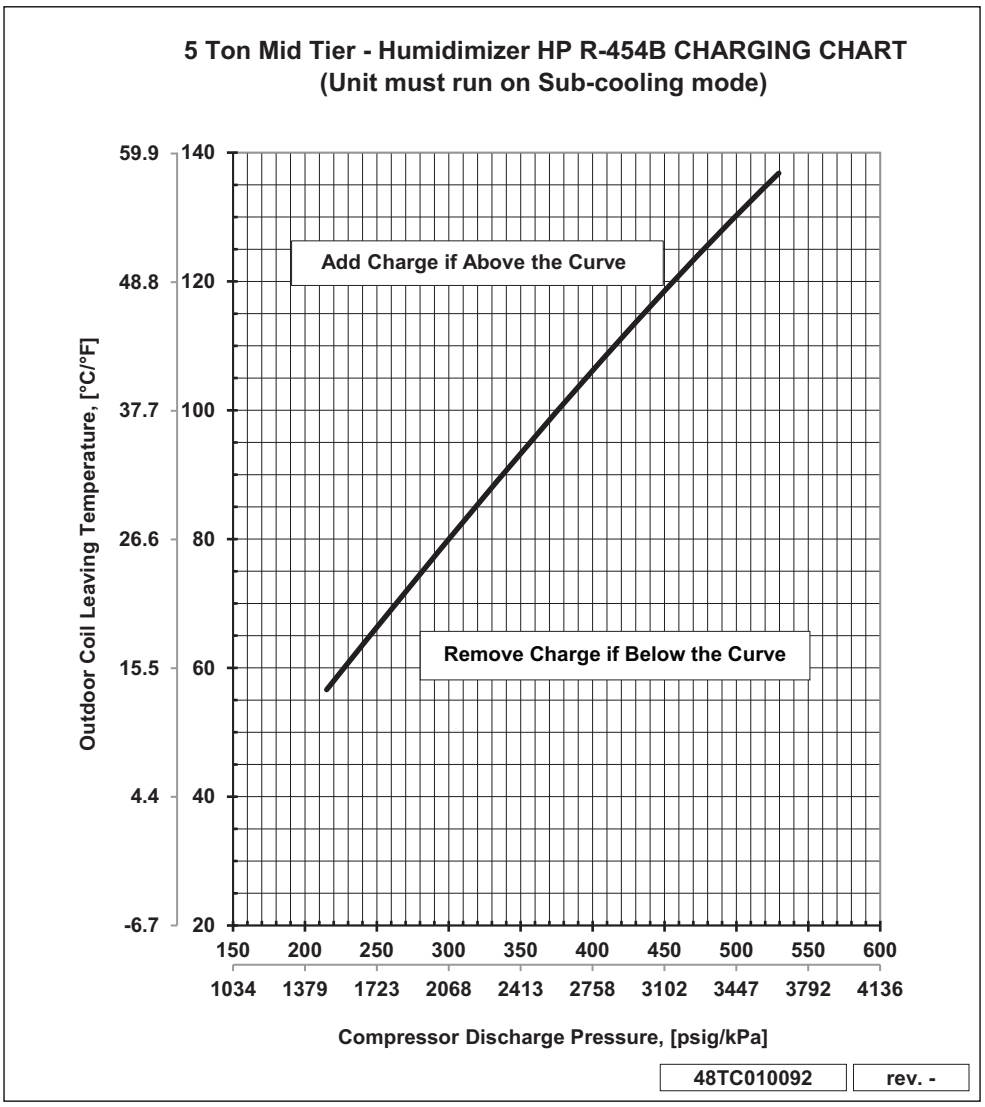



**Fig. 25 — Cooling Charging Chart — 5 Ton with Hot Gas Reheat (Humidi-MiZer System) Option**

## COMPRESSOR

### Lubrication

The compressor is charged with the correct amount of oil at the factory.

**⚠ CAUTION**

UNIT DAMAGE HAZARD

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

The compressor is in a R-454B refrigerant system and uses a polyolester (POE) oil. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oils can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Avoid exposure of the oil to the atmosphere.

**⚠ WARNING**

FIRE, EXPLOSION HAZARD

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

Never use air or gases containing oxygen for leak testing or for operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.

**⚠ WARNING**

FIRE, EXPLOSION HAZARD

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

Never use non-certified refrigerants in this product. Non-certified refrigerants could contain contaminates that could lead to unsafe operating conditions. Use ONLY refrigerants that conform to AHRI Standard 700.

### Replacing Compressor

NOTE: Only factory-trained service technicians should remove and replace compressor units.

**⚠ CAUTION**

INSTALLATION SITE DAMAGE

Failure to follow this caution can result in damage to equipment location site.

R-454B refrigerant contains polyolester (POE) oil that can damage the roof membrane. Caution should be taken to prevent POE oil from spilling onto the roof surface.

The factory also recommends that the suction and discharge lines be cut with a tubing cutter instead of using a torch to remove brazed fittings.

### 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 2 of the 3 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.

### Filter Drier

Replace whenever refrigerant system is exposed to atmosphere. Only use factory specified liquid-line filter driers with working pressures no less than 650 psig (4482 kPa).

**⚠ CAUTION**

EQUIPMENT DAMAGE

Failure to follow this caution can result in equipment damage.

Do not install a suction-line filter drier in liquid line. A liquid-line filter drier designed for use with R-454B refrigerant is required on every unit.

## Condenser-Fan Adjustment

1. Shut off unit power supply. Install lockout tag.
2. Remove condenser-fan assembly (grille, motor, and fan). See Fig. 26.
3. Loosen fan hub setscrews.
4. Adjust fan height by pushing fan until it stops on the fan shaft.
5. Tighten set screw to 60 in.-lb (6.78 Nm).
6. Replace condenser-fan assembly. When replacing the condenser-fan assembly follow the screw pattern sequence shown in Fig. 27. The screws must be replaced in the sequence shown in the figure.

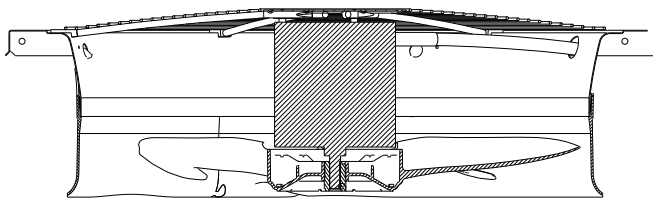


**Fig. 26 — Condenser-Fan Adjustment**

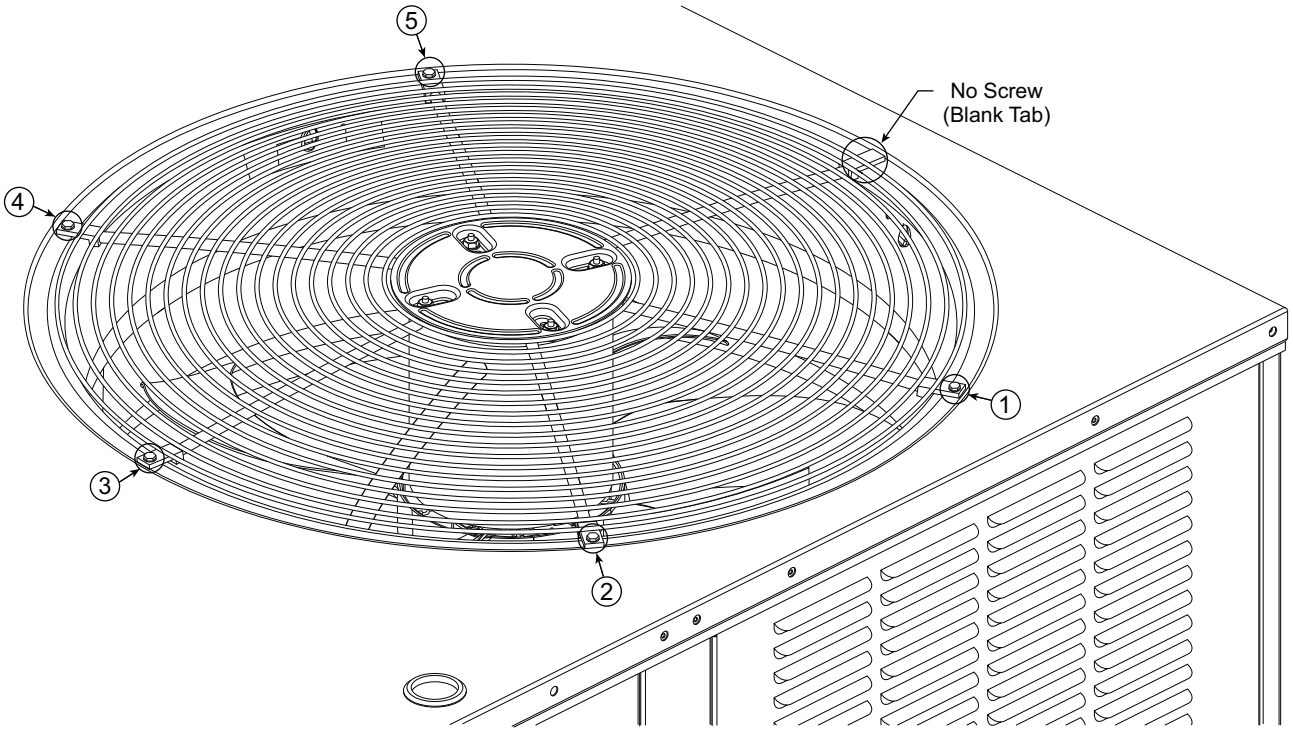



**Fig. 27 — Condenser-Fan Assembly — Screw Pattern Sequence**

## Troubleshooting Cooling System

Refer to Table 5 for additional troubleshooting topics.

**Table 5 — Troubleshooting**

| SYMPTOM | CAUSE | SOLUTION |
|---|---|---|
| **Compressor and Outdoor Fan Will Not Start** | Power failure. | Call power company. |
| | Fuse blown or circuit breaker tripped. | Replace fuse or reset circuit breaker. Determine root cause. |
| | Defective thermostat, contactor, transformer, control relay, or capacitor. | Replacement component. |
| | Insufficient line voltage. | Determine cause and correct. |
| | Incorrect or faulty wiring. | Check wiring diagram and rewire correctly. |
| | Thermostat setting too high. | Lower thermostat setting below room temperature. |
| | High pressure switch tripped. | See problem “Excessive head pressure.” |
| **Compressor Will Not Start but Outdoor Fan Runs** | Faulty wiring or loose connections in compressor circuit. | Check wiring and repair or replace. |
| | Compressor motor burned out, seized, or internal overload open. | Determine cause. Replace compressor or allow enough time for internal overload to cool and reset. |
| | Defective run/start capacitor, overload, or start relay. | Determine cause. Replace compressor or allow enough time for internal overload to cool and reset. |
| | One leg of 3-phase power dead. | Replace fuse or reset circuit breaker. Determine cause. |
| **Compressor Cycles (Other Than Normally Satisfying Thermostat)** | Refrigerant overcharge or undercharge. | Recover refrigerant, evacuate system, and recharge to nameplate. |
| | Defective compressor. | Replace and determine cause. |
| | Insufficient line voltage. | Determine cause and correct. |
| | Blocked outdoor coil or dirty air filter. | Determine cause and correct. |
| | Defective Run/Start capacitor, overload, or start relay. | Determine cause and correct. |
| | Defective thermostat. | Replace thermostat. |
| | Faulty outdoor-fan (cooling) or indoor-fan (heating) motor or capacitor. | Replace faulty part. |
| | Restriction in refrigerant system. | Locate restriction and remove. |
| | Defective loader plug. | Determine cause and replace. |
| **Compressor Operates Continuously** | Dirty air filter. | Replaced filter. |
| | Unit undersized for load. | Decrease load or increase unit size. |
| | Thermostat set too low (cooling). | Reset thermostat. |
| | Low refrigerant charge. | Locate leak; repair and recharge. |
| | Air in system. | Recover refrigerant, evacuate system, and recharge. |
| | Outdoor coil dirty or restricted. | Clean coil or remove restriction. |
| **Compressor Makes Excessive Noise** | Compressor rotating in the wrong direction. | Reverse the 3-phase power leads as described in Start-Up. |
| **Excessive Head Pressure** | Dirty outside. | Replace filter. |
| | Dirty outdoor coil (cooling). | Clean coil. |
| | Refrigerant overcharged. | Recover excess refrigerant. |
| | Air in system. | Recover refrigerant, evacuate system, and recharge. |
| | Condensing air restricted or air short-cycling. | Determine cause and correct. |
| **Head Pressure Too Low** | Low refrigerant charge. | Check for leaks; repair and recharge |
| | Compressor scroll plates defective. | Replace compressor |
| | Restriction in liquid tube. | Remove restriction. |
| **Excessive Suction Pressure** | High heat load. | Check for source and eliminate. |
| | Compressor scroll plates defective. | Replace compressor. |
| | Refrigerant overcharge. | Recover excess refrigerant. |
| **Suction Pressure Too Low** | Dirty air filter (cooling). | Replace filter. |
| | Dirt or heavily iced outdoor coil (heating). | Clean outdoor coil. Check defrost cycle operation. |
| | Low refrigerant charge. | Check for leaks; repair and recharge. |
| | Metering device or low side restricted. | Remove source of restriction. |
| | Insufficient indoor airflow (cooling mode). | Increase air quantity. Check filter and replace if necessary. |
| | Temperature too low in conditioned area. | Reset thermostat. |
| | Field-installed filter drier restricted. | Replace. |
| | Outdoor ambient temperature below 40°F (cooling). | Install low-ambient kit. |
| | Outdoor fan motor(s) not operating (heating). | Check fan motor operation. |

## 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.

### Convenience Outlets

Two types of convenience outlets are offered on 48QE models: non-powered and unit-powered. Both types provide a 125 vac ground-fault circuit-interrupt (GFCI) duplex receptacle rated at 15A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 28.

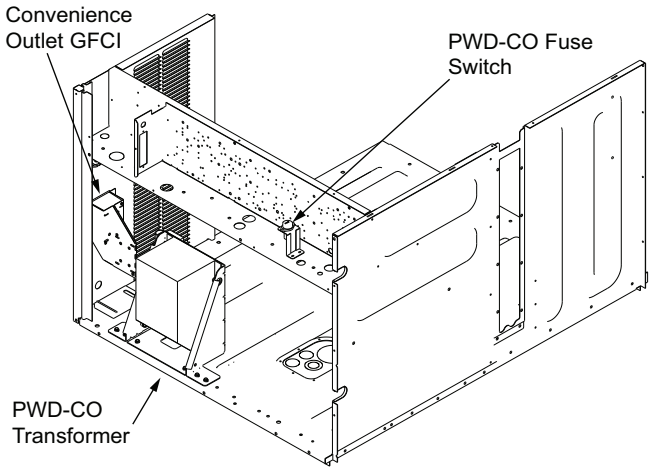



**Fig. 28 — Convenience Outlet Location**

### Installing Weatherproof Cover

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

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

NOTE: DISCONNECT ALL POWER TO UNIT AND CONVENIENCE OUTLET. Use approved lockout/tag-out procedures.

1. Remove the blank cover plate at the convenience outlet; discard the blank cover.
2. Loosen the 2 screws at the GFCI duplex outlet, until approximately 1/2 in. (13 mm) under screw heads is exposed.
3. 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 2 screws until snug (do not over-tighten).
4. Mount the weatherproof cover to the backing plate as shown in Fig. 29.
5. Remove 2 slot fillers in the bottom of the cover to permit service tool cords to exit the cover.
6. Check cover installation for full closing and latching.

### Non-Powered Type

This 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.

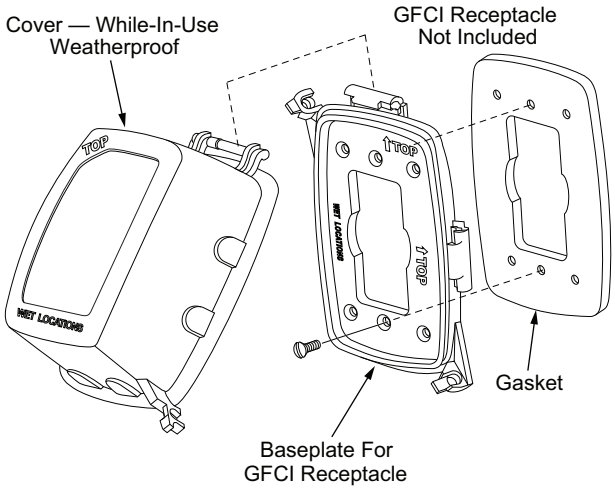
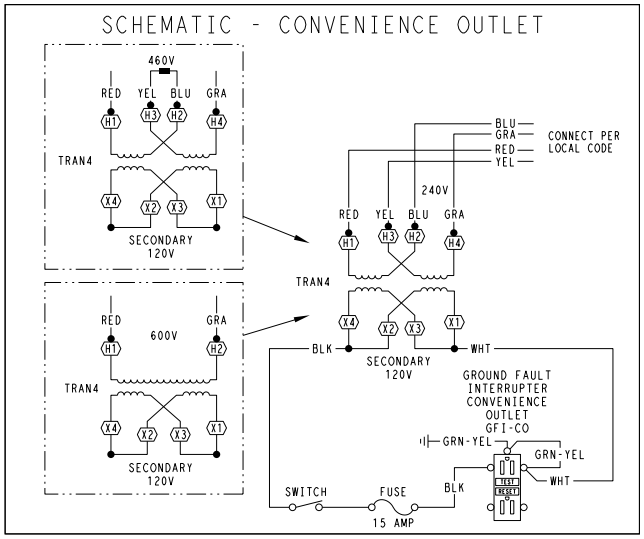



**Fig. 29 — Weatherproof Cover Installation**

### 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. 28.

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 a unit-mounted non-fused disconnect or Heating, Air Conditioning and Refrigeration (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. 30.




| UNIT VOLTAGE | CONNECT AS | PRIMARY CONNECTIONS | TRANSFORMER TERMINALS |
|---|---|---|---|
| **208, 230** | 240 | L1: RED +YEL<br>L2: BLU + GRA | 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. 30 — Powered Convenience Outlet Wiring**

## Duty Cycle

The unit-powered convenience outlet has a duty cycle limitation. The transformer is intended to provide power on an intermittent basis for service tools, lamps, etc; it is not intended to provide 15A loading for continuous duty loads. Observe a 50% limit on circuit loading above 8A (i.e., limit loads exceeding 8A to 30 minutes of operation every hour).

## Maintenance

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

## Fuse on Powered Type

The factory fuse is a Bussmann™[1] Fusetron™[1] T-15, non-renewable screw-in (Edison base) type plug fuse.

USING UNIT-MOUNTED CONVENIENCE OUTLETS

Units with unit-mounted convenience outlet circuits will often require that 2 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.

# GAS HEATING SYSTEM

## General

The heat exchanger system consists of a gas valve feeding multiple in-shot burners off a manifold. The burners fire into matching primary tubes. The primary tubes discharge into combustion plenum where gas flow converges into secondary tubes. The secondary tubes exit into the induced draft fan wheel inlet. The induced fan wheel discharges into a flue passage and flue gases exit out a flue hood on the side of the unit. The induced draft fan motor includes a flue gas pressure switch circuit that confirms adequate wheel speed through the Integrated Gas Control (IGC) board. Safety switches include a Rollout Switch (at the top of the burner compartment; see Fig. 31) and a limit switch (mounted through the heat exchanger cover panel, over the tubes). (See Fig. 32.)

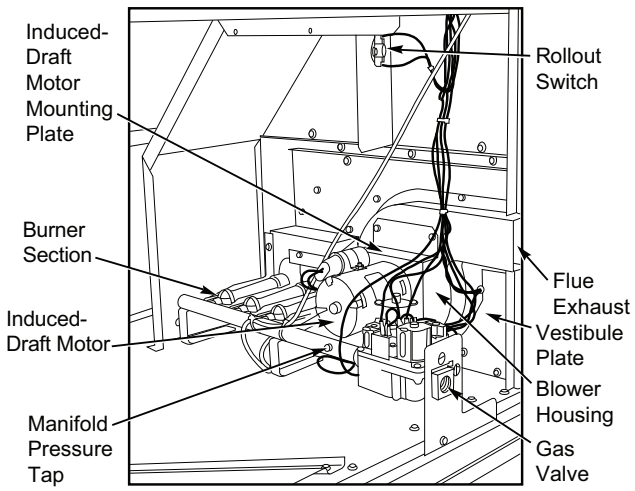



**Fig. 31 — Burner Section Details**

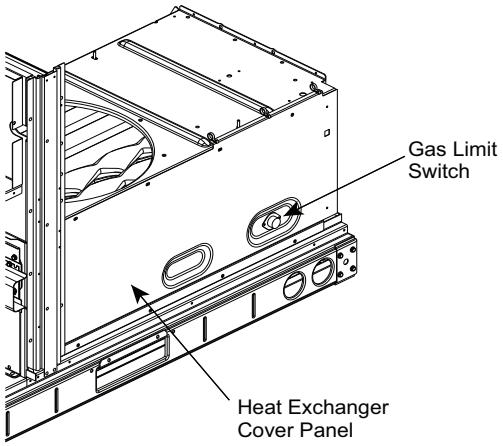



**Fig. 32 — Gas Limit Switch Location**

## Fuel Types and Pressures

NATURAL GAS

The 48QE unit is factory-equipped for use with natural gas (NG) fuel at elevation under 2000 ft (610 m). See section "Orifice Replacement" for information in modifying this unit for installation at elevations above 2000 ft (610 m).

Gas line pressure entering the unit's main gas valve must be within specified ranges (see Table 6). Adjust unit gas regulator valve as required or consult local gas utility.

**Table 6 — Natural Gas Supply Line Pressure Ranges**

| UNIT MODEL | UNIT SIZE | MINIMUM | MAXIMUM |
|---|---|---|---|
| **48QE(L/S/R)** | 04, 05, 06 | 4.0 in. wg (996 Pa) | 13.0 in. wg (3240 Pa) |
| **48QET (High Heat Units Only)** | 05, 06 | 4.0 in. wg (996 Pa) | 13.0 in. wg (3240 Pa) |

Manifold pressure is factory-adjusted for NG fuel use. Adjust as required to obtain best flame characteristic (see Table 7).

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

**Table 7 — Natural Gas Manifold Pressure Ranges**

| UNIT MODEL | UNIT SIZE | HIGH FIRE | LOW FIRE |
|---|---|---|---|
| **48QE(L/S/R)** | 04, 05, 06 | 3.5 in. wg (872 Pa) | 1.7 in. wg (423 Pa) |
| **48QET (High Heat Units Only)** | 05, 06 | 3.5 in. wg (872 Pa) | 1.7 in. wg (423 Pa) |

LIQUID PROPANE

Accessory packages are available for field-installation that will convert the 48QE unit (except Low NOx model) to operate with liquid propane (LP) fuels. These kits include new orifice spuds, new springs for gas valves and a supply line low pressure switch. See High Altitude Gas Conversion Kit Gas Heating/Electric Cooling 3 to 15 Ton Small Rooftop Units Accessory LP (Liquid Propane) Installation Instructions for details on orifice size selections.

IMPORTANT: Low NOx models include specially-sized orifices and use of different flue flow limits and tube baffles. Because of these extra features, conversion of these models to LP is not recommended.

Fuel line pressure entering unit gas valve must remain within specified range (see Table 8).

**Table 8 — Liquid Propane Supply Line Pressure Ranges**

| UNIT MODEL | UNIT SIZE | MINIMUM | MAXIMUM |
|---|---|---|---|
| **48QE(L/S/R)** | 04, 05, 06 | 11.0 in. wg (2740 Pa) | 13.0 in. wg (3240 Pa) |
| **48QET (High Heat Units Only)** | 05, 06 | 11.0 in. wg (2740 Pa) | 13.0 in. wg (3240 Pa) |

Manifold pressure for LP fuel use must be adjusted to specified range (see Table 9). Follow instructions in the accessory kit to make initial readjustment.

**Table 9 — Liquid Propane Manifold Pressure Ranges**

| UNIT MODEL | UNIT SIZE | HIGH FIRE | LOW FIRE |
|---|---|---|---|
| **48QE(L/S/R)** | 04, 05, 06 | 10 in. wg (2490 Pa) | 5 in. wg (1245 Pa) |
| **48QET (High Heat Units Only)** | 05, 06 | 10 in. wg (2490 Pa) | 5 in. wg (1245 Pa) |

SUPPLY PRESSURE SWITCH

The LP conversion kit includes a supply low pressure switch. The switch contacts (from terminal C to terminal NO) will open the gas valve power whenever the supply line pressure drops below the set point. See Fig. 33 and 34. If the low pressure remains open for 15 minutes during a call for heat, the IGC circuit will initiate a Ignition Fault (5 flashes) lockout. Reset of the low pressure switch is automatic on rise in supply line pressure. Reset of the IGC requires a recycle of unit power after the low pressure switch has closed.

This switch also prevents operation when the propane tank level is low, which can result in gas with a high concentration of impurities, additives, and residues that have settled to the bottom of the tank. Operation under these conditions can cause harm to the heat exchanger system. Contact your fuel supplier if this condition is suspected.

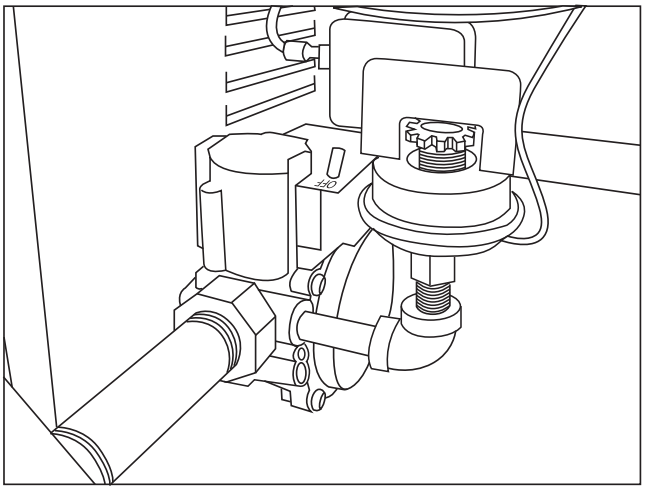


**Fig. 33 — LP Low Pressure Switch (Installed)**

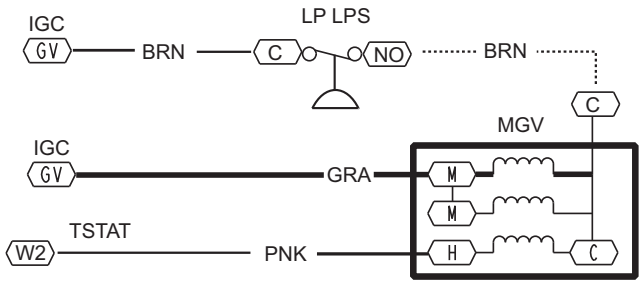



**Fig. 34 — LP Supply Line Low Pressure Switch Wiring**

## Flue Gas Passageways

To inspect the flue collector box and upper areas of the heat exchanger:

1. Remove the combustion blower wheel and motor assembly according to directions in Combustion-Air Blower section. See Fig. 35.
2. Remove the vestibule plate to inspect the heat exchanger.
3. Clean all surfaces as required using a wire brush.

## Combustion-Air Blower

Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel every 2 months to determine proper cleaning frequency.

To access burner section, slide the burner partition panel out of the unit.

To inspect blower wheel, shine a flashlight into draft hood opening. If cleaning is required, remove motor and wheel as follows:

1. Remove the screw at the base of the burner partition panel (see Fig. 36) and slide out the panel.
2. Remove the 7 screws attaching the induced-draft motor housing to the vestibule plate. (See Fig. 35.)
3. The blower wheel can be cleaned at this point. If additional cleaning is required, continue with Steps 4 and 5.
4. Remove the blower from the motor shaft by removing 2 setscrews.
5. Removing motor: remove the 4 screws holding the motor to the mounting plate. Remove the motor cooling fan by removing one setscrew. Remove nuts that hold the motor to the mounting plate.
6. Reverse the procedure outlined above to reinstall the motor.

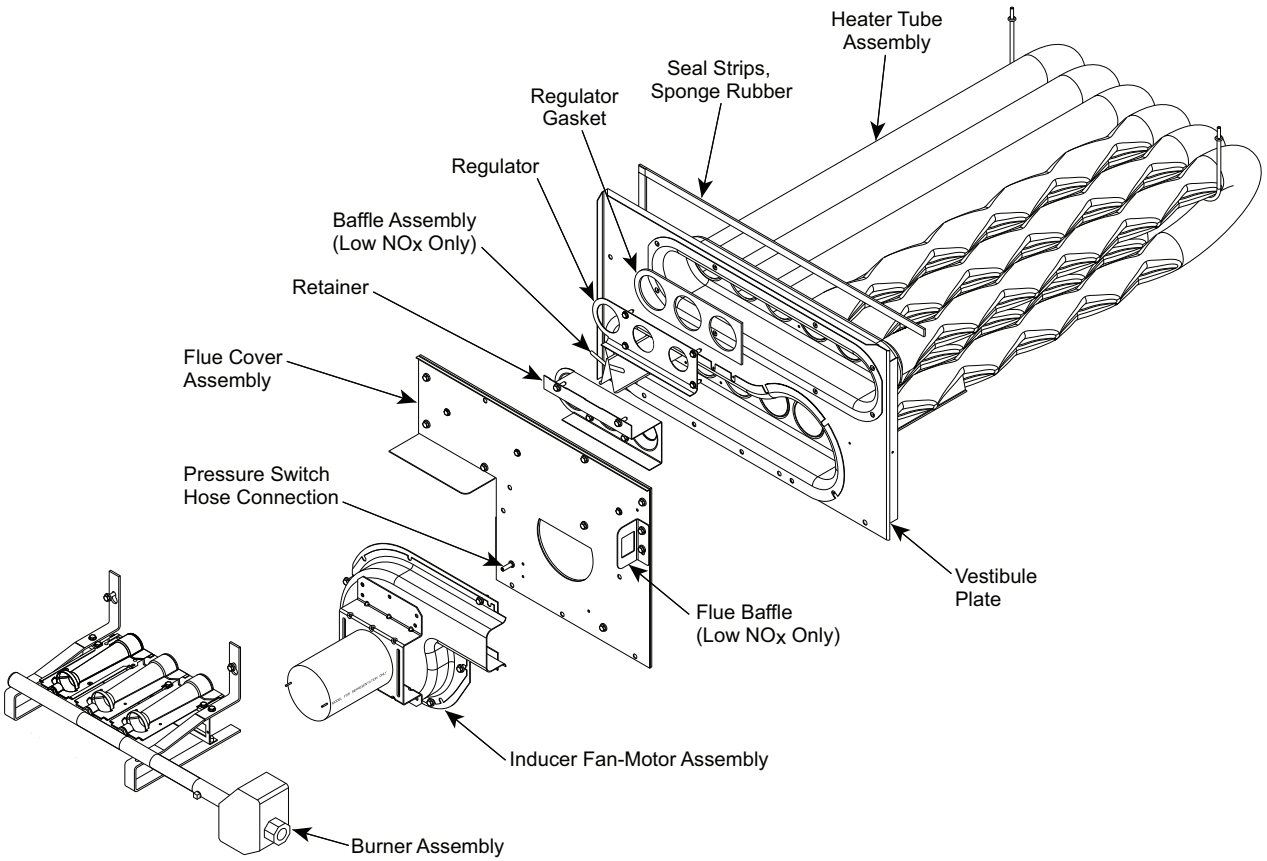



**Fig. 35 — Heat Exchanger Assembly**

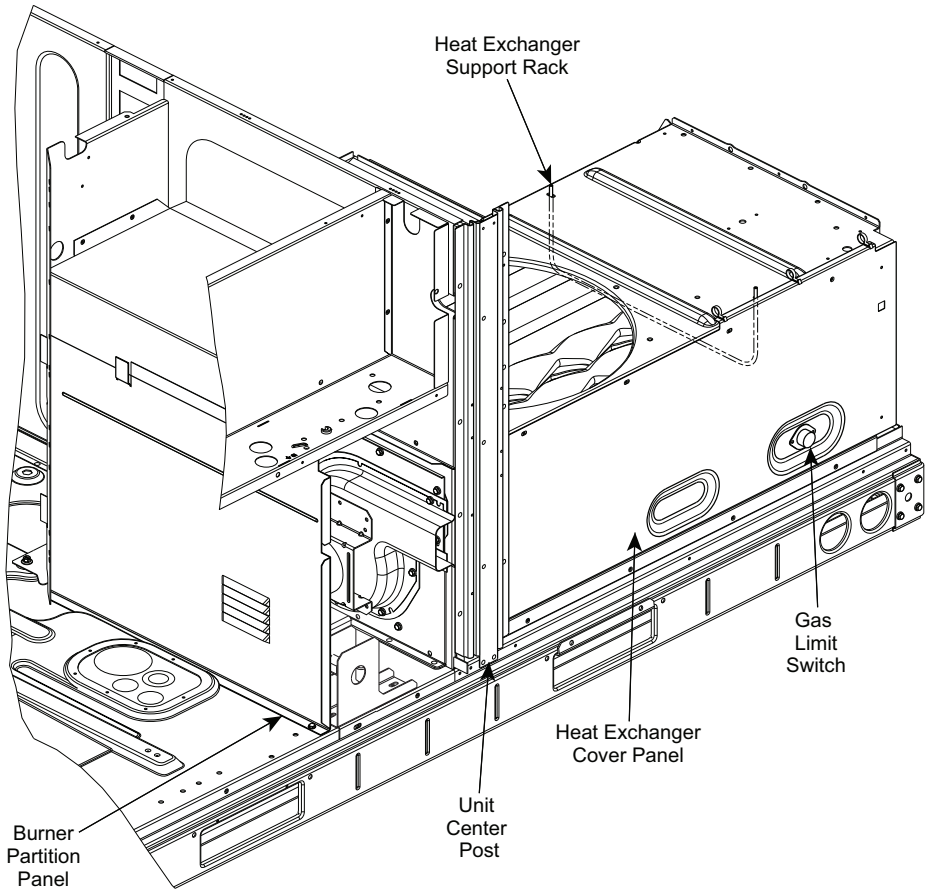



**Fig. 36 — Heat Exchanger Access — Internal Panels, Center Post and HX Rack Locations**

## Burners and Igniters

**⚠ CAUTION**

EQUIPMENT DAMAGE HAZARD

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

When working on gas train, do not hit or plug orifice spuds.

MAIN BURNERS

To access burners, remove the control box access panel and slide out burner partition panel. At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames and adjust, if necessary.

***Orifice Projection***

See Fig. 37 for maximum projection dimension for orifice face to manifold tube.

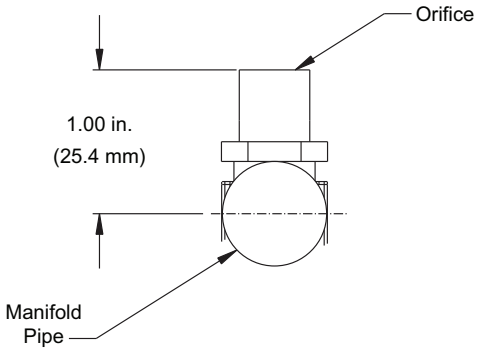



**Fig. 37 — Orifice Projection**

REMOVAL AND REPLACEMENT OF GAS TRAIN

See Fig. 31, 35, 36, 38, and 39.

1. Shut off manual gas valve.
2. Shut off power to unit.
3. Remove the control box access panel.
4. Remove the control box high voltage cover.
5. Remove the screw at the base of the burner partition panel (see Fig. 36) and slide out the panel.
6. Disconnect gas piping at unit gas valve.
7. Remove wires connected to gas valve. Mark each wire.
8. Remove igniter wires and sensor wires at the Integrated Gas Unit Controller (IGC). (See Fig. 39.)
9. Remove the 2 screws attaching the burner rack to the vestibule plate (see Fig. 35).
10. Slide the burner tray out of the unit (see Fig. 38).
11. Reverse the procedures outlined above to reinstall the burner rack.

CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described in "Removal and Replacement of Gas Train" section above.
2. Inspect burners; if dirty, remove burners from rack. (Mark each burner to identify its position before removing from the rack.)
3. Use a soft brush to clean burners and cross-over port as required.
4. Adjust spark gap. (See Fig. 40.)
5. If factory orifice has been removed, check that each orifice is tight at its threads into the manifold pipe and that orifice projection does not exceed maximum value. See Fig. 37.
6. Reinstall burners on rack in the same locations as factory-installed. (The outside crossover flame regions of the outermost burners are pinched off to prevent excessive gas flow from the side of the burner assembly. If the pinched crossovers are installed between 2 burners, the flame will not ignite properly.)
7. Reinstall burner rack as described in "Removal and Replacement of Gas Train" section.

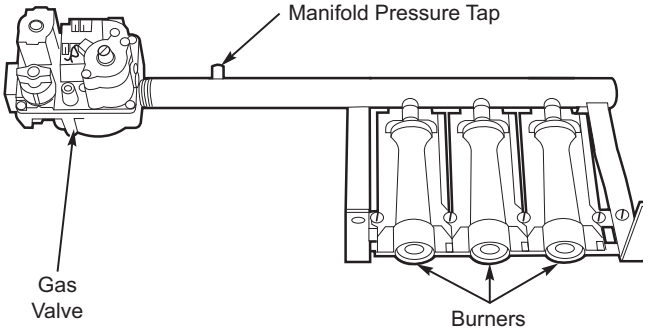



**Fig. 38 — Burner Tray Details**

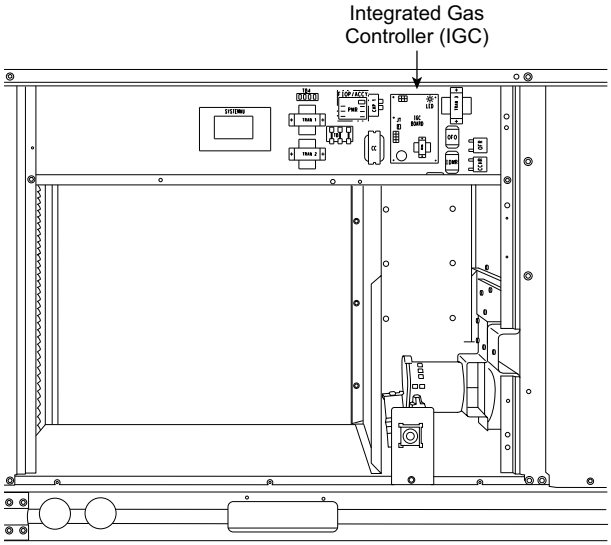


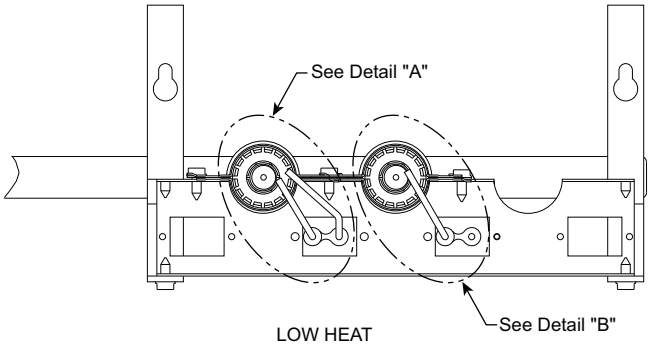

**Fig. 39 — Unit Control Box/IGC Location**

REMOVING THE HEAT EXCHANGER

The following procedure details the steps to remove the heat exchanger from the unit.

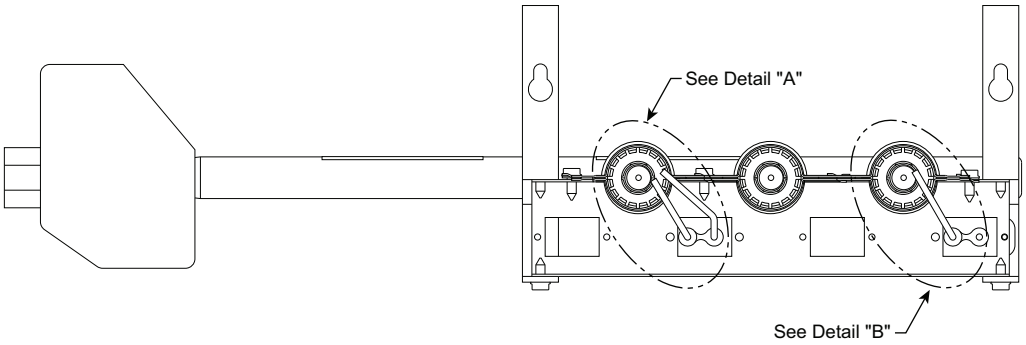
1. Turn off electric power to the unit and shut off the unit's gas supply.
2. Remove the 2 exterior panels: control box access panel and indoor blower access panel.
3. Remove the unit center post (refer to Fig. 36).
4. Disconnect the 2 wires from the gas limit switch.
5. Remove the 3 interior panels: control box high voltage panel, burner partition panel, and heat exchanger cover panel.
6. Disconnect the wires connected to the gas valve. Mark each wire.
7. Disconnect the igniter wires and sensor wires at the integrated gas controller (IGC).
8. Disconnect a gas pipe union and remove the gas manifold with the gas valve.
9. Remove the 2 screws attaching the burner rack to the vestibule plate (refer to Fig. 35).

10. Remove the pressure switch hose from the connection on the flue cover assembly (see Fig. 35).
11. Remove the screws around the vestibule plate.
12. Remove the nuts holding the heat exchanger support rack to the fan deck.
13. Remove the heat exchanger from the unit.
14. Separate the following from the heat exchanger: inducer fan-motor assembly, flue cover assembly, retainer, regulator, regulator gasket, and if a Low NOx unit, also remove the baffle assembly. See Fig. 35.




| LOW HEAT | |
|---|---|
| 3 PHASE | 67,000 BTUH |
| 1 PHASE | 65,000 BTUH |
| LOW NOx* | 60,000 BTUH |

*Only available for Low Heat Units




| MEDIUM HEAT | |
|---|---|
| 3 PHASE | 110,000 BTUH |
| 1 PHASE | 90,000 BTUH |

| HIGH HEAT | |
|---|---|
| 3 PHASE | 150,000 BTUH |
| 1 PHASE | 130,000 BTUH |

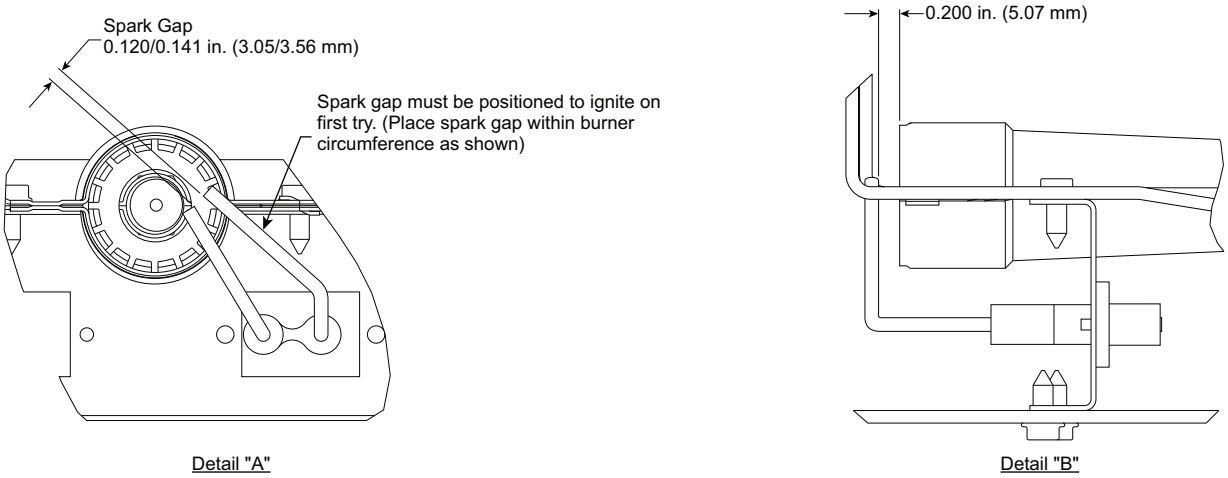



**Fig. 40 — Spark Adjustment (Size 04-07)**

GAS VALVE

All 3-phase models (except Low NOx) are equipped with 2-stage gas valves. Single-phase models and all Low NOx models are equipped with single-stage gas valves. See Fig. 41 for locations of adjustment screws and features on the gas valves.

To adjust gas valve pressure settings:

IMPORTANT: Leak check all gas connections including the main service connection, gas valve, gas spuds, and manifold pipe plug. All leaks must be repaired before firing unit.

*Check unit operation and make necessary adjustments.*

NOTE: Gas supply pressure at gas valve inlet must be within specified ranges for fuel type and unit size. For natural gas see Tables 6 and 7. For liquid propane see Tables 8 and 9.

1. Slide out the burner partition panel.
2. Remove manifold pressure tap plug from manifold and connect pressure gauge or manometer. (See Fig. 38.)
3. Turn on electrical supply.
4. Turn on unit main gas valve.
5. Set room thermostat to call for heat. If unit has 2-stage gas valve, verify high-stage heat operation before attempting to adjust manifold pressure.
6. When main burners ignite, check all fittings, manifold, and orifices for leaks.
7. Adjust high-stage pressure to specified setting by turning the plastic adjustment screw clockwise to increase pressure, counter-clockwise to decrease pressure.
8. For 2-stage gas valves, set room thermostat to call for low-stage heat. Adjust low-stage pressure to specified setting.
9. Replace regulator cover screw(s) when finished.
10. Observe unit heating operation in both high stage and low stage operation if so equipped. Observe burner flames to see if they are blue in appearance, and that the flames are approximately the same for each burner.
11. Turn off unit, remove pressure manometer and replace the manifold pressure tap plug. (See Fig. 38.)

LIMIT SWITCH

Remove the indoor blower access panel. Limit switch is located on the heat exchanger cover panel. See Fig. 36.

## Burner Ignition

Unit is equipped with a direct spark ignition 100% lockout system. The Integrated Gas Unit Controller (IGC) is located in the control box (see Fig. 39). See Fig. 44 for typical IGC board wiring diagram. The IGC contains a self-diagnostic LED (light-emitting diode). A single LED (see Fig. 42) on the IGC provides a visual display of operational or sequential problems when the power supply is uninterrupted. Figure 43 provides an overview of the IGC Service Analysis Logic. When a break in power occurs, the IGC will be reset (resulting in a loss of fault history) and the indoor (evaporator) fan ON/OFF times will be reset. The LED error code can be observed through the view port. During servicing, refer to the label on the control box cover or Table 11 for an explanation of LED error code descriptions.

If lockout occurs, unit may be reset by interrupting power supply to unit for at least 5 seconds.

IMPORTANT: Refer to Tables 10 and 11 for additional troubleshooting information.

## Orifice Replacement

This unit uses orifice type LH32RFnnn (where "nnn" indicates orifice reference size). When replacing unit orifices, order the necessary parts through RCD. See the High Altitude Gas Conversion Kit Gas Heating/Electric Cooling 3 to 15 Ton Small Rooftop Units Accessory LP (Liquid Propane) Installation Instructions for details.

Ensure each replacement orifice is tight as its threads into the manifold pipe and the orifice projection does not exceed maximum value. See Fig. 37.

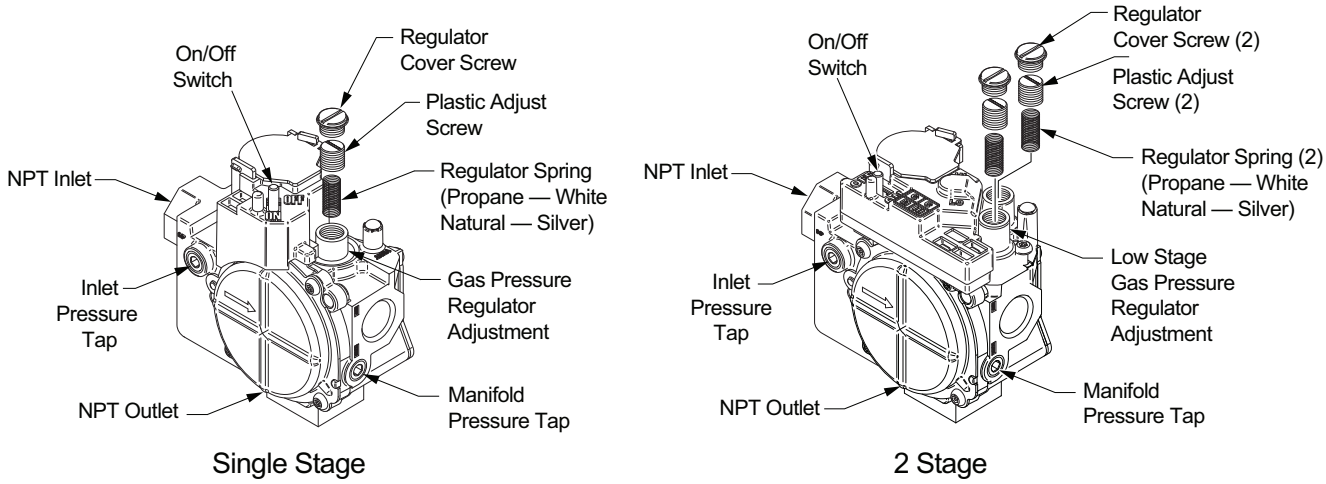



**Fig. 41 — Typical Gas Valves**

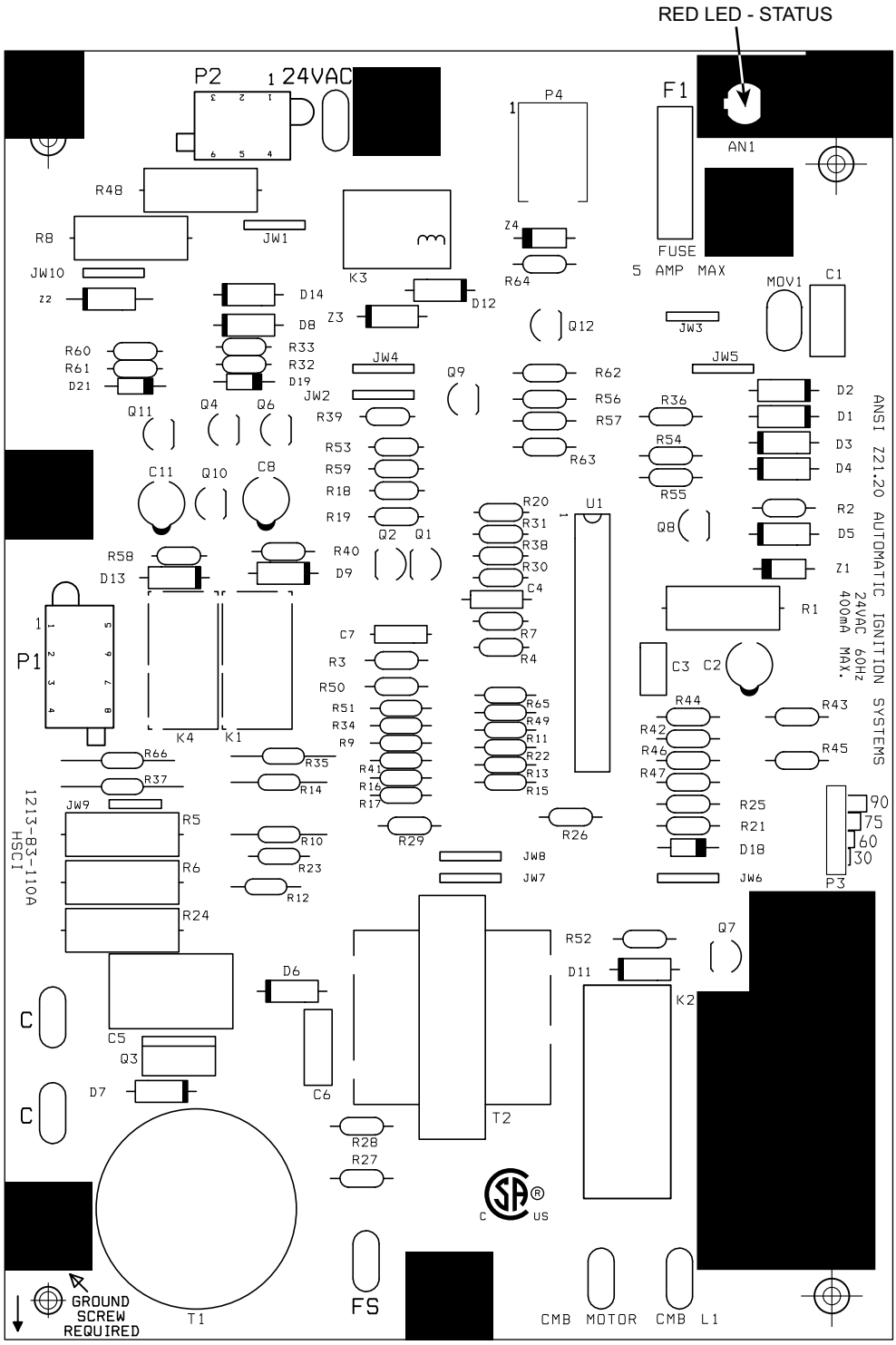


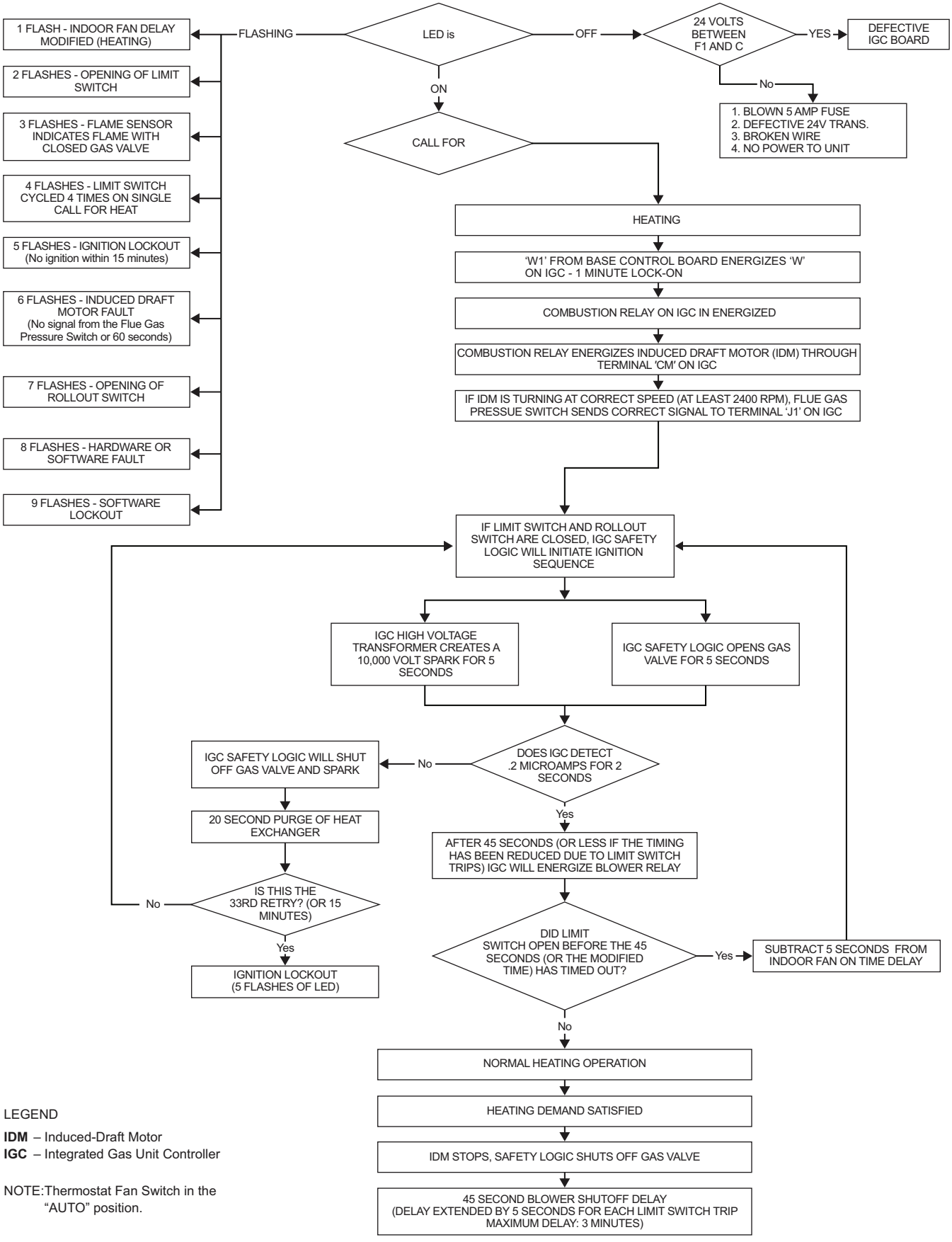

**Fig. 42 — Integrated Gas Control (IGC) Board**

## Troubleshooting Heating System

See Tables 10 and 11 for additional troubleshooting topics.

**Table 10 — Heating Service Troubleshooting**

| PROBLEM | CAUSE | REMEDY |
|---|---|---|
| **Burners Will Not Ignite** | Misaligned spark electrodes. | Check flame ignition and sensor electrode positioning. Adjust as needed. |
| | No gas at main burners. | Check gas line for air, purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to relight unit. |
| | | Check gas valve. |
| | Water in gas line. | Drain water and install drip leg to trap water. |
| | No power to furnace. | Check power supply, fuses, wiring, and circuit breaker. |
| | No 24-v power supply to control circuit. | Check transformer. Transformers with internal overcurrent protection require a cool down period before resetting. |
| | Miswired or loose connections. | Check all wiring and wire nut connections. |
| | Burned-out heat anticipator in thermostat. | Replace thermostat. |
| | Broken thermostat wires. | Run continuity check. Replace wires, if necessary. |
| **Inadequate Heating** | Dirty air filter. | Clean or replace filter as necessary. |
| | Gas input to unit too low. | Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure, or replace with correct orifices. |
| | Unit undersized for application. | Replace with proper unit or add additional unit. |
| | Restricted airflow. | Clean filter, replace filter, or remove any restrictions. |
| | Blower speed too low. | Use high speed tap, increase fan speed, or install optional blower, as suitable for individual units. |
| | Limit switch cycles main burners. | Check thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed. |
| | Too much outdoor air. | Adjust minimum position. |
| | | Check economizer operation. |
| **Poor Flame Characteristics** | Incomplete combustion (lack of combustion air) results in: Aldehyde odors, CO, sooting flame, or floating flame. | Check all screws around flue outlets and burner compartment. Tighten as necessary. |
| | | Cracked heat exchanger. |
| | | Overfired unit — reduce input, change orifices, or adjust gas line or manifold pressure. |
| | | Check vent for restriction. Clean as necessary. |
| | | Check orifice to burner alignment. |
| **Burners Will Not Turn Off** | Unit is locked into Heating mode for a one minute minimum. | Wait until mandatory one minute time period has elapsed or reset power to unit. |




LEGEND

**IDM** – Induced-Draft Motor
**IGC** – Integrated Gas Unit Controller

NOTE: Thermostat Fan Switch in the "AUTO" position.

**Fig. 43 — IGC Service Analysis Logic**

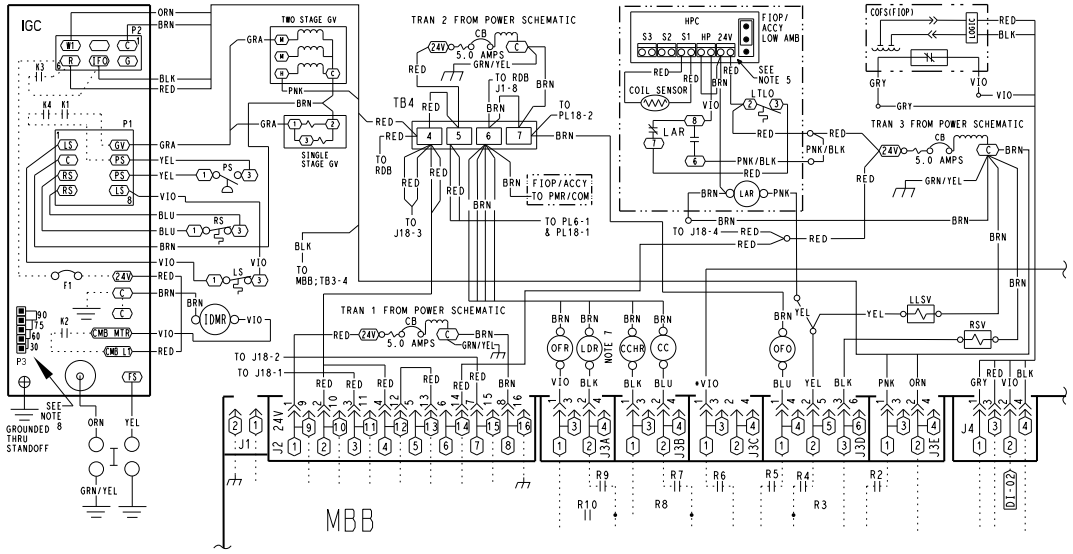



**Fig. 44 — Typical IGC Control Wiring Diagram**

**Table 11 — 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

## 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 with or without economizer, or in combination of supply air and return air. Return air smoke detectors are arranged for vertical return configurations only. All components necessary for operation are factory-provided and mounted. The unit is factory-configured for immediate smoke detector shutdown operation; additional wiring or modifications to unit terminal board may be necessary to complete the unit and smoke detector configuration to meet project requirements.

### System

The smoke detector system consists of a 4-wire controller and one or 2 sensors. Its primary function is to shut down the rooftop unit in order to prevent smoke from circulating throughout the building. It is not to be used as a life saving device.

### Controller

The controller (see Fig. 45) includes a controller housing, a printed circuit board, and a clear plastic cover. The controller can be connected to one or 2 compatible duct smoke sensors. The clear plastic cover is secured to the housing with a single captive screw for easy access to the wiring terminals. The controller has 3 LEDs (for Power, Trouble, and Alarm) and a manual test/reset button (on the cover face).

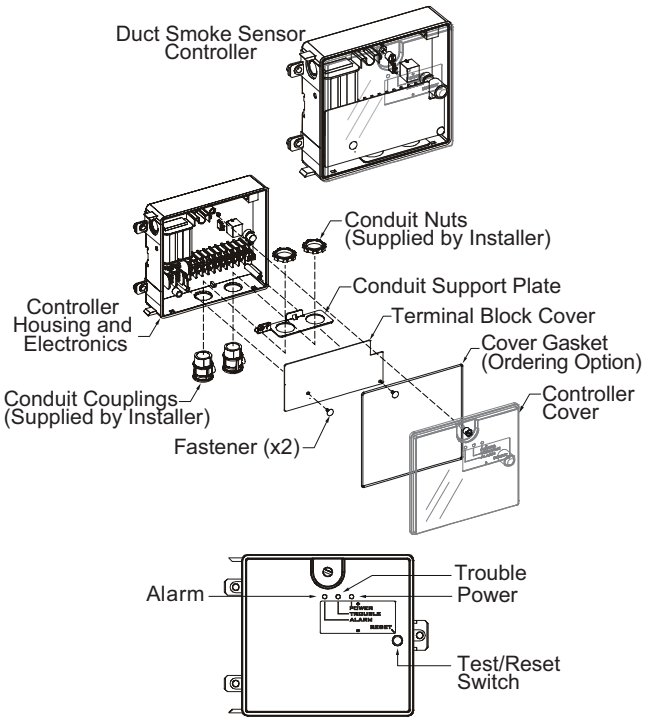



**Fig. 45 — Controller Assembly**

### Smoke Detector Sensor

The smoke detector sensor (see Fig. 46) includes a plastic housing, a printed circuit board, a clear plastic cover, a sampling tube inlet, and an exhaust tube. The sampling tube (when used) and exhaust tube are attached during installation. The sampling tube varies in length depending on the size of the rooftop unit. The clear plastic cover permits visual inspections without having to disassemble the sensor. The cover attaches to the sensor housing using 4 captive screws and forms an airtight chamber around the sensing electronics. Each sensor includes a harness with an RJ45 terminal for connecting to the controller. Each sensor has 4 LEDs (for Power, Trouble, Alarm, and Dirty) and a manual test/reset button (on the left-side of the housing).

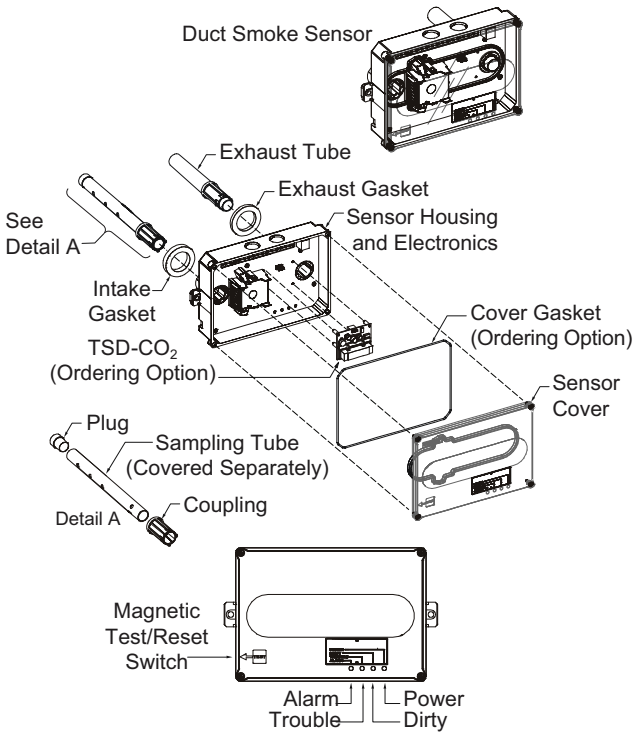



**Fig. 46 — Smoke Detector Sensor**

Air is introduced to the duct smoke detector sensor's sensing chamber through a sampling tube that extends into the HVAC duct and is directed back into the ventilation system through a (shorter) exhaust tube.

The difference in air pressure between the 2 tubes pulls the sampled air through the sensing chamber. When a sufficient amount of smoke is detected in the sensing chamber, the sensor signals an alarm state and the controller automatically takes the appropriate action to shut down fans and blowers, change over air handling systems, notify the fire alarm control panel, etc.

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

The difference in air pressure between the 2 tubes pulls the sampled air through the sensing chamber. When a sufficient amount of smoke is detected in the sensing chamber, the sensor signals an alarm state and the controller automatically takes the appropriate action to shut down fans and blowers, change over air handling systems, notify the fire alarm control panel, etc.

For installations using 2 sensors, the duct smoke detector does not differentiate which sensor signals an alarm or trouble condition.

### Smoke Detector Locations

SUPPLY AIR

The supply air smoke detector sensor is located to the right of the unit's indoor (supply) fan. See Fig. 47. Access is through the fan access panel. The sampling tube inlet extends through the fan deck (into a high pressure area). The controller is located on a bracket to the right of the return filter, accessed through the lift-off filter panel.

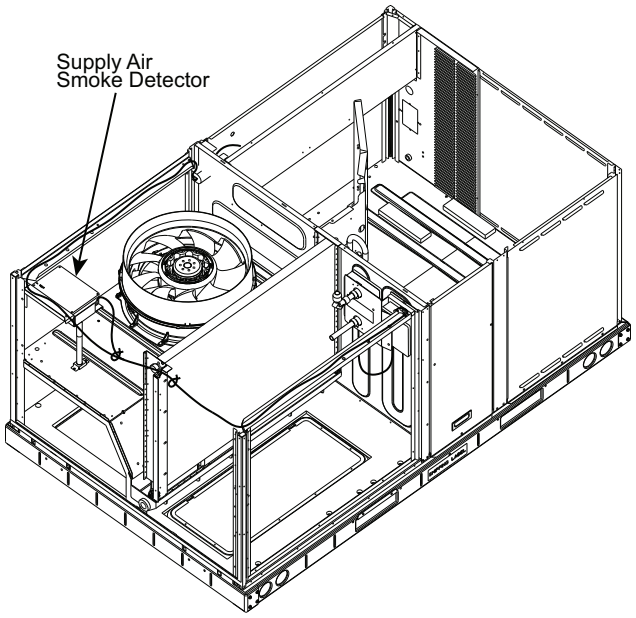



**Fig. 47 — Typical Supply Air Smoke Detector Sensor Location**

RETURN AIR SMOKE DETECTOR SENSOR WITHOUT ECONOMIZER

The sampling tube is located across the return air opening on the unit basepan. See Fig. 48. The holes in the sampling tube face downward, into the return air stream. The sampling tube is connected through tubing to the return air sensor that is mounted on a bracket high on the partition between return filter and controller location.

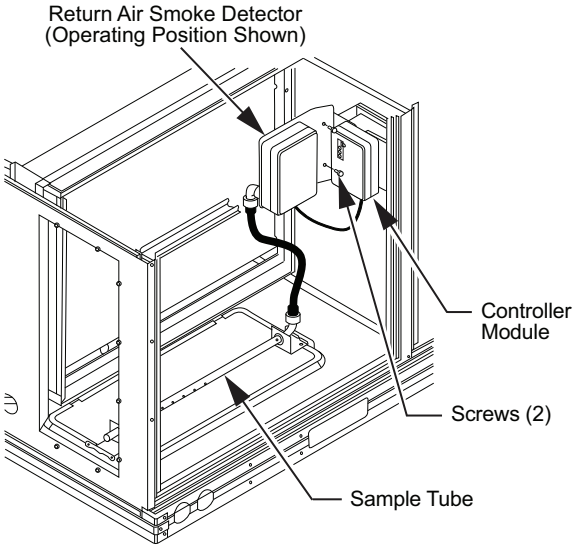



**Fig. 48 — Return Air Smoke Detector Operating Position**

RETURN AIR SMOKE DETECTOR SENSOR WITH ECONOMIZER

The sampling tube is inserted through the side plates of the economizer housing, placing it across the return air opening on the unit basepan. See Fig. 49. The holes in the sampling tube face downward, into the return air stream. The sampling tube is connected using tubing to the return air sensor mounted on a bracket high on the partition between return filter and controller location.

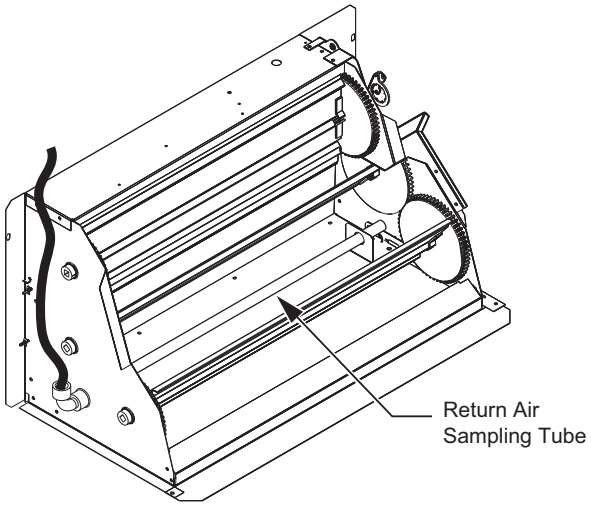



**Fig. 49 — Return Air Sampling Tube Location (View reoriented to show opposite side for clarity.)**

## FIOP Smoke Detector Wiring and Response

ALL UNITS

The FIOP smoke detector is configured to automatically shut down all unit operations when a smoke condition is detected. See Fig. 50, Smoke Detector Wiring.

HIGHLIGHT A

Smoke detector NC contact set will open on smoke alarm condition, de-energizing the ORN conductor.

USING REMOTE LOGIC

Six conductors are provided for field use (see Highlight B) for additional annunciation functions.

ADDITIONAL APPLICATION DATA

Refer to the application data document “Factory-Installed Smoke Detectors for Small and Medium Rooftop Units 2 to 25 Tons” for discussions on additional control features of these smoke detectors including multiple unit coordination.

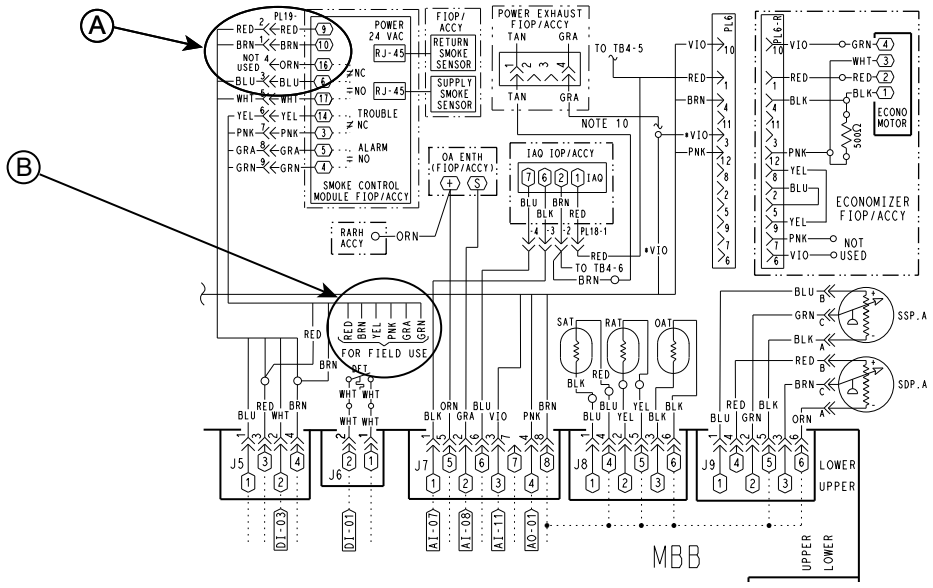



**Fig. 50 — Typical Smoke Detector System Wiring**

## SENSOR AND CONTROLLER TESTS

### Sensor Alarm Test

The sensor alarm test checks a sensor's ability to signal an alarm state. This test requires use of a field provided SD-MAG test magnet.

IMPORTANT: Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

This test places the duct detector into the alarm state. Unless part of the test, disconnect all auxiliary equipment from the controller before performing the test. If the duct detector is connected to a fire alarm system, notify the proper authorities before performing the test.

SENSOR ALARM TEST PROCEDURE

1. Hold the test magnet where indicated on the side of the sensor housing for 7 seconds.
2. Verify that the sensor's Alarm LED turns on.
3. Reset the sensor by holding the test magnet against the sensor housing for 2 seconds.
4. Verify that the sensor's Alarm LED turns off.

### Controller Alarm Test

The controller alarm test checks the controller's ability to initiate and indicate an alarm state.

CONTROLLER ALARM TEST PROCEDURE

1. Press the controller's test/reset switch for 7 seconds.
2. Verify that the controller's Alarm LED turns on.
3. Reset the sensor by pressing the test/reset switch for 2 seconds.
4. Verify that the controller's Alarm LED turns off.

IMPORTANT: Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

This test places the duct detector into the alarm state. Unless part of the test, disconnect all auxiliary equipment from the controller before performing the test. If the duct detector is connected to a fire alarm system, notify the proper authorities before performing the test.

### Dirty Controller Test

The dirty controller test checks the controller's ability to initiate a dirty sensor test and indicate its results.

IMPORTANT: Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

Pressing the controller's test/reset switch for longer than 7 seconds will put the duct detector into the alarm state and activate all automatic alarm responses.

DIRTY CONTROLLER TEST PROCEDURE

1. Press the controller's test/reset switch for 2 seconds.
2. Verify that the controller's Trouble LED flashes.

### Dirty Sensor Test

The dirty sensor test provides an indication of the sensor's ability to compensate for gradual environmental changes. A sensor that can no longer compensate for environmental changes is considered 100% dirty and requires cleaning or replacing. A field provided SD-MAG test magnet must be used to initiate a sensor dirty test. The sensor's Dirty LED indicates the results of the dirty test as shown in Table 12.

IMPORTANT: Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

Holding the test magnet against the sensor housing for more than 7 seconds will put the duct detector into the alarm state and activate all automatic alarm responses.

**Table 12 — Dirty LED Test**

| FLASHES | DESCRIPTION |
|---|---|
| 1 | 0-25% dirty (Typical of a newly installed detector) |
| 2 | 25-50% dirty |
| 3 | 51-75% dirty |
| 4 | 76-99% dirty |

DIRTY SENSOR TEST PROCEDURE

1. Hold the test magnet where indicated on the side of the sensor housing for 2 seconds.
2. Verify that the sensor's Dirty LED flashes.

IMPORTANT: Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

Changing the dirty sensor test operation will put the detector into the alarm state and activate all automatic alarm responses. Before changing dirty sensor test operation, disconnect all auxiliary equipment from the controller and notify the proper authorities if connected to a fire alarm system.

## Changing the Dirty Sensor Test

By default, dirty sensor test results are indicated by:

- The sensor's Dirty LED flashing.
- The controller's Trouble LED flashing.
- The controller's supervision relay contacts toggle.

The operation of a sensor's dirty test can be changed so that the controller's supervision relay is not used to indicate test results. When 2 detectors are connected to a controller, sensor dirty test operation on both sensors must be configured to operate in the same manner.

TO CONFIGURE THE DIRTY SENSOR TEST OPERATION

1. Hold the test magnet where indicated on the side of the sensor housing until the sensor's Alarm LED turns on and its Dirty LED flashes twice (approximately 60 seconds).
2. Reset the sensor by removing the test magnet then holding it against the sensor housing again until the sensor's Alarm LED turns off (approximately 2 seconds).

## Remote Station Test

The remote station alarm test checks a test/reset station's ability to initiate and indicate an alarm state.

IMPORTANT: Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

This test places the duct detector into the alarm state. Unless part of the test, disconnect all auxiliary equipment from the controller before performing the test. If the duct detector is connected to a fire alarm system, notify the proper authorities before performing the test.

## SD-TRM4 Remote Alarm Test Procedure

1. Hold the test magnet to the target area for 7 seconds.
2. Verify that the test/reset station's Alarm LED turns on.
3. Reset the sensor by holding the test magnet to the target area for 2 seconds.
4. Verify that the test/reset station's Alarm LED turns off.

## Remote Test/Reset Station Dirty Sensor Test

The test/reset station dirty sensor test checks the test/reset station's ability to initiate a sensor dirty test and indicate the results. It must be wired to the controller as shown in Fig. 51 and configured to operate the controller's supervision relay. For more information, see "Dirty Sensor Test" on page 40.

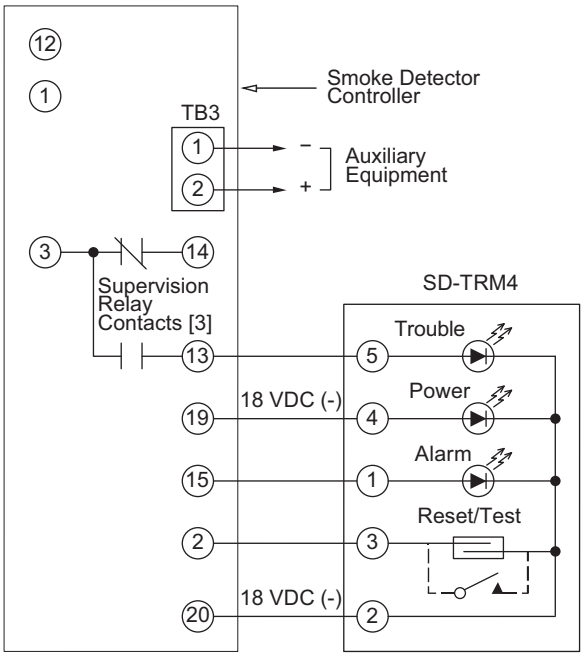



**Fig. 51 — Remote Test/Reset Station Connections**

IMPORTANT: Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

Holding the test magnet to the target area for longer than 7 seconds will put the detector into the alarm state and activate all automatic alarm responses.

## Dirty Sensor Test Using an SD-TRM4

1. Hold the test magnet where indicated on the side of the sensor housing for 2 seconds.
2. Verify that the test/reset station's Trouble LED flashes.

## Detector Cleaning

CLEANING THE SMOKE DETECTOR

Clean the duct smoke sensor when the Dirty LED is flashing continuously or sooner, if conditions warrant.

IMPORTANT: OPERATIONAL TEST ALERT

Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

If the smoke detector is connected to a fire alarm system, first notify the proper authorities that the detector is undergoing maintenance then disable the relevant circuit to avoid generating a false alarm.

1. Disconnect power from the duct detector then remove the sensor's cover. See Fig. 52.

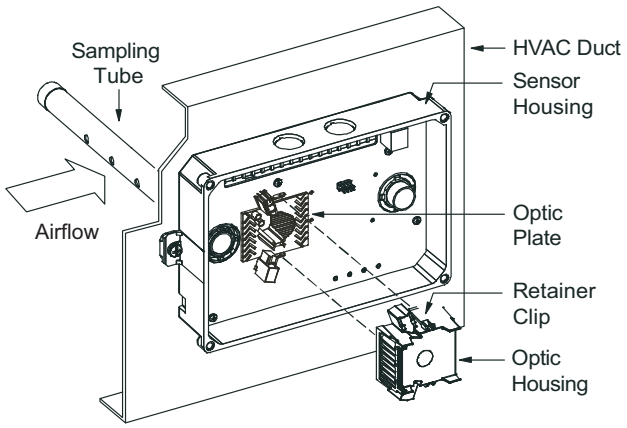



**Fig. 52 — Sensor Cleaning Diagram**

2. Using a vacuum cleaner, clean compressed air, or a soft bristle brush, remove loose dirt and debris from inside the sensor housing and cover. Use isopropyl alcohol and a lint-free cloth to remove dirt and other contaminants from the gasket on the sensor's cover.
3. Squeeze the retainer clips on both sides of the optic housing.
4. Lift the housing away from the printed circuit board.
5. Gently remove dirt and debris from around the optic plate and inside the optic housing.
6. Replace the optic housing and sensor cover.
7. Connect power to the duct detector then perform a sensor alarm test.

## Indicators

NORMAL STATE

The smoke detector operates in the normal state in the absence of any trouble conditions and when its sensing chamber is free of smoke. In the normal state, the Power LED on both the sensor and the controller are on and all other LEDs are off.

ALARM STATE

The smoke detector enters the alarm state when the amount of smoke particulate in the sensor's sensing chamber exceeds the alarm threshold value. (See Table 13.) Upon entering the alarm state:

- The sensor's Alarm LED and the controller's Alarm LED turn on.
- The contacts on the controller's 2 auxiliary relays switch positions.
- The contacts on the controller's alarm initiation relay close.
- The controller's remote alarm LED output is activated (turned on).
- The controller's high impedance multiple fan shutdown control line is pulled to ground.

**Table 13 — Detector Indicators**

| CONTROL OR INDICATOR | DESCRIPTION |
|---|---|
| **Magnetic Test/ Reset Switch** | Resets the sensor when it is in the alarm or trouble state. Activates or tests the sensor when it is in the normal state. |
| **Alarm LED** | Indicates the sensor is in the alarm state. |
| **Trouble LED** | Indicates the sensor is in the trouble state. |
| **Dirty LED** | Indicates the amount of environmental compensation used by the sensor (flashing continuously = 100%). |
| **Power LED** | Indicates the sensor is energized. |

TROUBLE STATE

The SuperDuct™[1] duct smoke detector enters the trouble state under the following conditions:

- A sensor's cover is removed and 20 minutes pass before it is properly secured.
- A sensor's environmental compensation limit is reached (100% dirty).
- A wiring fault between a sensor and the controller is detected.
- An internal sensor fault is detected.

Upon entering the trouble state:

- The contacts on the controller's supervisory relay switch positions. (See Fig. 53.)
- If there is sensor trouble, then the sensor's Trouble LED and the controller's Trouble LED turn on.
- If 100% dirty, then the sensor's Dirty LED turns on and the controller's Trouble LED flashes continuously.
- If there is a wiring fault between a sensor and the controller, then the controller's Trouble LED turns on but not the sensor's.

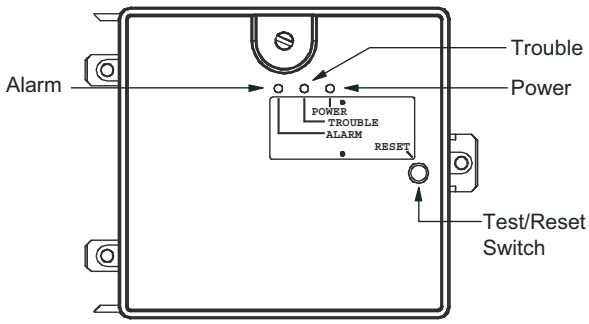



**Fig. 53 — Controller Assembly**

NOTE: All troubles are latched by the duct smoke detector. The trouble condition must be cleared and then the duct smoke detector must be reset in order to restore it to the normal state.

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RESETTING ALARM AND TROUBLE CONDITION TRIPS

Manual reset is required to restore smoke detector systems to Normal operation. For installations using 2 sensors, the duct smoke detector does not differentiate which sensor signals an alarm or trouble condition. Check each sensor for Alarm or Trouble status (indicated by LED). Clear the condition that has generated the trip at this sensor. Then reset the sensor by pressing and holding the reset button (on the side) for 2 seconds. Verify that the sensor's Alarm and Trouble LEDs are now off. At the controller, clear its Alarm or Trouble state by pressing and holding the manual reset button (on the front cover) for 2 seconds. Verify that the controller's Alarm and Trouble LEDs are now off. Replace all panels.

## Troubleshooting

CONTROLLER'S TROUBLE LED IS ON

1. Check the Trouble LED on each sensor connected to the controller. If a sensor's Trouble LED is on, determine the cause and make the necessary repairs.
2. Check the wiring between the sensor and the controller. If wiring is loose or missing, repair or replace as required.

CONTROLLER'S TROUBLE LED IS FLASHING

1. One or both of the sensors is 100% dirty.
2. Determine which Dirty LED is flashing then clean that sensor assembly as described in the detector cleaning section.

SENSOR'S TROUBLE LED IS ON

1. Check the sensor's Dirty LED. If it is flashing, the sensor is dirty and must be cleaned.
2. Check the sensor's cover. If it is loose or missing, secure the cover to the sensor housing.
3. Replace sensor assembly.

SENSOR'S POWER LED IS OFF

1. Check the controller's Power LED. If it is off, determine why the controller does not have power and make the necessary repairs.
2. Check the wiring between the sensor and the controller. If wiring is loose or missing, repair or replace as required.

CONTROLLER'S POWER LED IS OFF

1. Make sure the circuit supplying power to the controller is operational. If not, make sure JP2 and JP3 are set correctly on the controller before applying power.
2. Verify that power is applied to the controller's supply input terminals. If power is not present, replace or repair wiring as required.

REMOTE TEST/RESET STATION'S TROUBLE LED DOES NOT FLASH WHEN PERFORMING A DIRTY TEST, BUT THE CONTROLLER'S TROUBLE LED DOES

1. Verify that the remote test/station is wired as shown in Fig. 51. Repair or replace loose or missing wiring.
2. Configure the sensor dirty test to activate the controller's supervision relay. See "Dirty Sensor Test" on page 40.

SENSOR'S TROUBLE LED IS ON, BUT THE CONTROLLER'S TROUBLE LED IS OFF

Remove JP1 on the controller.

# PROTECTIVE DEVICES

## Compressor Protection

OVERCURRENT

The compressor has internal line-break motor protection.

OVERTEMPERATURE

The compressor has an internal protector to protect it against excessively high discharge gas temperatures.

HIGH PRESSURE SWITCH

The system is provided with a high pressure switch mounted on the discharge line. The switch is stem-mounted and brazed into the discharge tube. Trip setting is 630 ±10 psig (4344 ±69 kPa) when hot. Reset is automatic at 505 psig (3482 kPa).

SUPPLY (INDOOR) FAN MOTOR PROTECTION

Disconnect and lockout power when servicing fan motor.

The standard supply fan motor is equipped with internal overcurrent and over-temperature protection. Protection devices reset automatically.

The high static option supply fan motor is equipped with a pilot-circuit Thermix™[1] combination over-temperature/overcurrent protection device. This device resets automatically. Do not bypass this switch to correct trouble. Determine the cause and correct it.

CONDENSER FAN MOTOR PROTECTION

The condenser fan motor is internally protected against overtemperature.

## Refrigerant Leak Protection

These units are equipped with a factory installed R-454B leak dissipation system to ensure safe operation in the event of a refrigerant leak. See Leak Dissipation System on starting on page 47 for details.

## Relief Device

A soft solder joint at the suction service access port provides pressure relief under abnormal temperature and pressure conditions (i.e., fire in building). Protect this joint during brazing operations near this joint.

## Control Circuit, 24-v

The control circuit is protected against overcurrent conditions by a circuit breaker mounted on control transformer TRAN. Reset is manual.

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## SYSTEMVU CONTROL SYSTEM

The SystemVu™ control is a comprehensive unit-management system. The control system is easy to access, configure, diagnose, and troubleshoot.

The SystemVu control system is fully communicating and cable-ready for connection to the Carrier Comfort Network® (CCN), Carrier i-Vu®, and Third Party BACnet®[1] building management systems. The control provides high-speed communications for remote monitoring via the Internet. Multiple units can be linked together (and to other Direct Digital Control (DDC) equipped units) using a 3-wire communication bus.

The SystemVu control system is easy to access through the use of a integrated display module. A computer is not required for start-up. Access to control menus is simplified by the ability to quickly select from 7 main menu items. An expanded readout provides detailed explanations of control information. Only 6 buttons are required to maneuver through the entire controls menu. The display readout is designed to be visible even in bright sunlight. See Fig. 54.

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### SystemVu Interface

This integrated device is the keypad interface used to access the control information, read sensor values, and test the unit. The interface is located in the main control box.

Through the SystemVu interface, the user can access all of the inputs and outputs to check on their values and status, configure operating parameters, and evaluate the current decision status for operating modes. The control also includes an alarm history which can be accessed from the display. The user can access a built-in test routine that can be used at start-up commissioning and troubleshooting.

### Additional SystemVu Installation and Troubleshooting

Additional installation, wiring and troubleshooting information for the SystemVu Controller can be found in the following manual: "50FEQ 04-28, 50GEQ 04-28, 48QE 04-28 Single Package Rooftop Units with SystemVu™ Controls Version X.X Controls, Start-up, Operation and Troubleshooting."

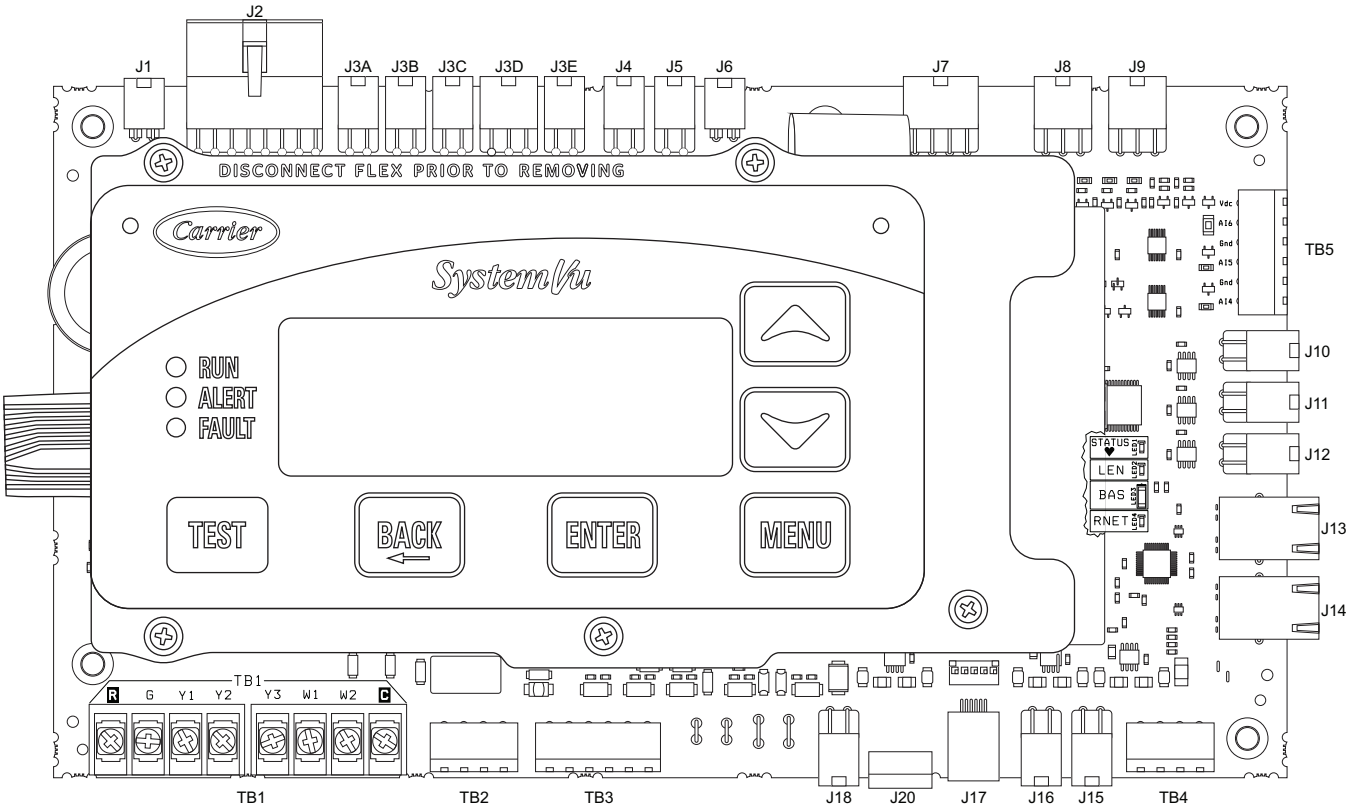


**Fig. 54 — SystemVu Control**

## A2L REFRIGERATION INFORMATION

This equipment contains R-454B, a mildly flammable refrigerant classified as A2L (see Fig. 55). Read all instructions prior to transporting, storing, installing, or servicing this equipment.


**Fig. 55 — A2L Refrigerant Safety Group Warning Label**

**⚠ WARNING**

Only use equipment and components that are designed for use with R-454B refrigerant.

**⚠ ADVERTISSEMENT**

Utilisez uniquement les équipements et les composants conçus pour être utilisés avec le réfrigérant R-454B.

### Servicing

Prior to, and during the work being performed on a unit containing A2L refrigerant, the area must be checked with an appropriate refrigerant detector to ensure that the person or persons performing work are aware of a potentially toxic or flammable atmosphere. The area must also be surveyed to ensure there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

Should any hot work need to be performed on the refrigerant system, or associated parts, appropriate fire extinguishing equipment shall be available nearby. Have a dry powder or $CO_2$ fire extinguisher adjacent to the charging area.

All maintenance staff and others working in the local area shall also be instructed on the nature of work being carried out. Work in confined spaces shall be avoided wherever possible.

### Minimum Conditioned Space Area

The space area served by ducted equipment with A2L refrigerant is restricted by building code based on refrigerant volume that the releasable to the conditioned space served by the duct system.

Determine the conditioned space area by calculating the floor area (room length x room width) of all spaces served by a common duct system and adding them all together to get the total conditioned space area.

Compare the calculated total conditioned space area to the minimum conditioned space area ($TA_{min}$) listed in Table 14, based on the unit size and configuration (with or without Humidi-MiZer).

**Table 14 — Minimum Conditioned Space Area (MCSA or $TA_{min}$)**

| UNIT | ($TA_{MIN}$)[a] | |
|---|---|---|
| | Sq Ft | Sq Meter |
| **48QE*M04** | 353 | 33 |
| **48QE*M05** | 444 | 42 |
| **48QE*M06** | 470 | 44 |
| **48QE*N04** | 470 | 44 |
| **48QE*N05** | 666 | 62 |
| **48QE*N06** | 573 | 53 |

NOTE(S):

a. $TA_{min}$ is based on a minimum ceiling height of 7.2 ft (2.2 m) and the worst-case unit refrigerant charge.

If the space area is above the minimum conditioned space area listed in Table 14 based on unit size and configuration, no action is needed.

If the conditioned space area is below the minimum conditioned space area listed in Table 14 based on unit size and configuration, then additional ventilation may be required. Refer to local code, UL-60335-2-40, or ASHRAE®[1] standard 15.

**⚠ CAUTION**

Do not install an ignition source or potential ignition source in a space where the total conditioned area is below the minimum total conditioned area ($TA_{min}$), unless a flame arresting device has been installed.

**⚠ ADVERTISSEMENT**

N'installez pas de source d'inflammation ou de source d'inflammation potentielle dans un espace où la surface totale conditionnée est inférieure à la surface totale conditionnée minimale ($TA_{min}$), à moins qu'un dispositif pare-flamme n'ait été installé.

### Detection of Flammable Refrigerants

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector utilizing a naked flame) shall not be used.

The following leak detection methods are deemed acceptable for all refrigerant systems.

- Electronic leak detectors may be used to detect refrigerant leaks, but in the case of flammable refrigerants the sensitivity may not be adequate, or may need recalibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% max.) is confirmed.
- Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.
  Examples of leak detection fluids:
  - Bubble method.
  - Fluorescent method agents.

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If a leak is suspected, all naked flames shall be removed/extinguished.

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to the following section.

## Evacuation, Removal, and Recovery

When breaking into the refrigerant circuit to make repairs, or for any other purpose, conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration.

The following procedure shall be adhered to:

- Safely remove refrigerant following local and national regulations
  - Evacuate refrigerant.
  - Purge the circuit with inert gas (optional for A2L refrigerants).
  - Continuously flush or purge with inert gas when using flame to open circuit.
  - Open the circuit.

For appliances containing flammable refrigerants, purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process may need to be repeated several times until the system is free from refrigerant. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant. Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect coupling and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer not arranged.

IMPORTANT: Do not mix refrigerants in recovery units, and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

IMPORTANT: At no point during this process should the outlet for the vacuum pump be close to any potential ignition sources, and ventilation shall be available.

## Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

1. Become familiar with the equipment and its operation.
2. Isolate the system electrically.
3. Before attempting the procedure, ensure that:
   a. Mechanical handling equipment is available, if required for handling refrigerant cylinders.
   b. All personal protective equipment is available and being used correctly.
   c. The recovery process is supervised at all times by a competent person.
   d. Recovery equipment and cylinders conform to the appropriate standards.
4. Pump down refrigerant system, if possible.
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6. Make sure that the cylinder is situated on the scales before recovery takes place.
7. Start the recovery machine and operate in accordance with instructions.
8. Do not overfill cylinders (no more than 80% of volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.
10. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from the site promptly and all isolation valves on the equipment are closed off.
11. Recovered refrigerant shall not be charged into another refrigerating system unless it has been cleaned and checked.

Equipment shall be labeled that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For units containing flammable refrigerants, affix labels on the equipment stating the equipment contains flammable refrigerant.

## 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. 56) and the Refrigerant Dissipation Board (RDB) (see Fig. 57) which are located in the indoor coil section of the unit (see the Control Box Access Panel section of the unit, Fig. 1 on page 5). The A2L sensor is located between the indoor coil and the air filters.

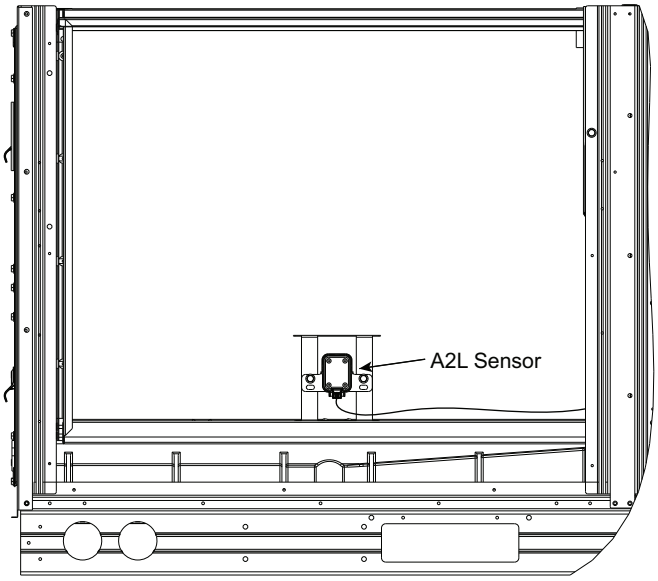


**Fig. 56 — Location of A2L Sensor**

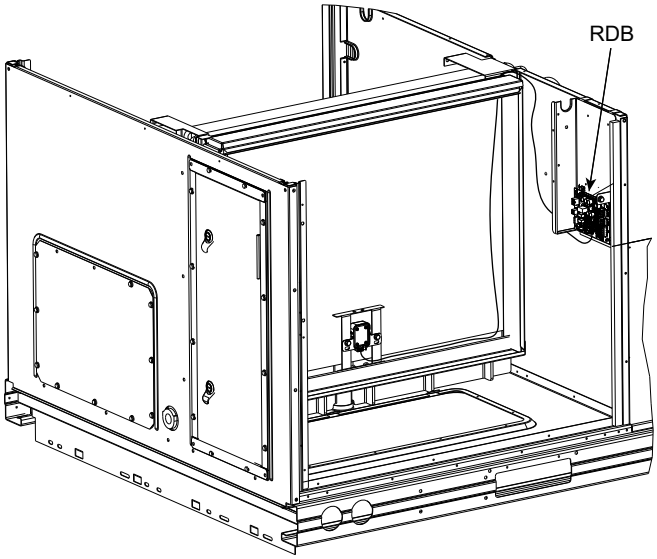


**Fig. 57 — Location of Refrigerant Dissipation Board (RDB) (shown with dust cover removed)**

The A2L detection sensor communicates via a wiring harness to the RDB 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 through the pass-through at the bottom of the control box and connects to the RDB.

NOTE: The drain wire must be properly connected to the ground lug on the RDB 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 R-454B refrigerant dissipation system. If the refrigerant detection sensor sends a signal indicating a refrigerant leak, the RDB 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. 58) indicating the sensor that detected the refrigerant. See Fig. 60 — on page 49 for the full text on the Dissipation Control Status label.

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

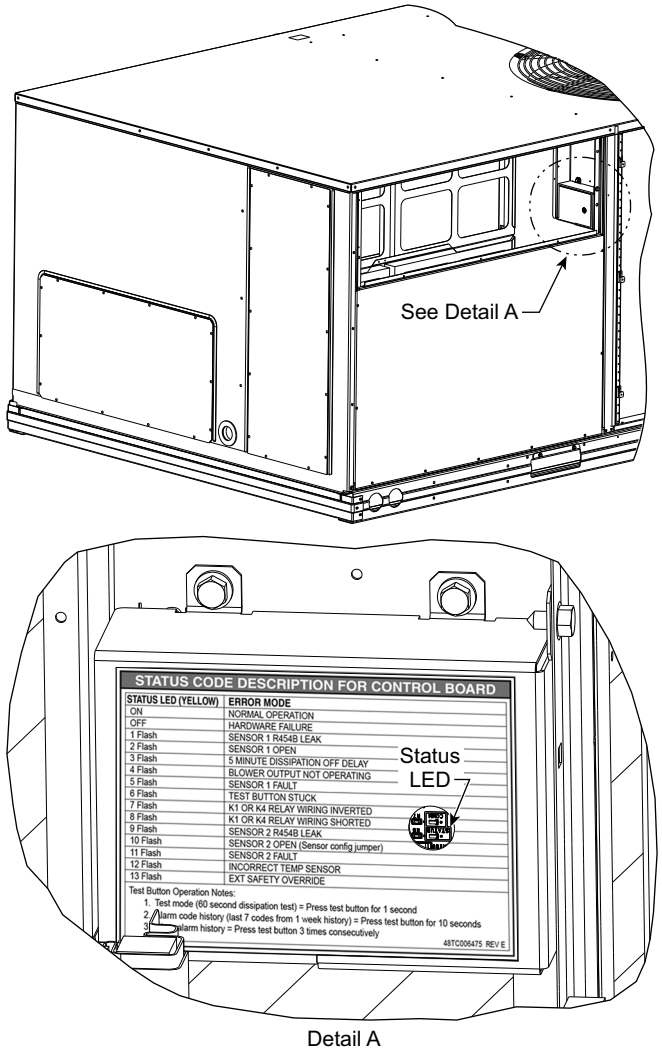


**Fig. 58 — Yellow STATUS LED**

VVT AND VAV ZONING APPLICATIONS

For applications where this unit will be integrated with a zoning system, including VAV (variable air volume) dampers, VVT (variable volume and temperature) dampers, and series or parallel fan powered boxes, the building zone damper(s) must open to allow the system to meet the minimum dissipation circulation rate during A2L dissipation mode. See Table 16 for minimum dissipation circulation rate by unit size and configuration. Electric reheat in zone boxes and duct heaters must be turned off during A2L dissipation mode. For fan powered air terminal boxes, the terminal fan may be used during A2L dissipation mode.

***Carrier Open Airside Linkage***

For applications using only Carrier Open zoning controls configured for Airside Linkage, the Linkage mode is set to Off when A2L dissipation is active. Off mode sets the terminal damper to 70% and disables the terminal fan and heater.

### *Carrier CCN Linkage Controls*

For applications using only Carrier CCN zoning controls configured for Airside Linkage, the Linkage mode is set to Off when A2L dissipation is active. Off mode sets the terminal damper to 70% and disables the terminal fan and heater.

### *All Other Controls*

For applications using all other zoning controls, including Carrier controls not configured for Linkage, the zoning controls must be configured to open the zone dampers to achieve the minimum dissipation airflow and disable electric duct heaters when A2L dissipation mode is active. This unit provides the alarm relay on the RDB (see Fig. 59) and on SystemVu™ units the BACnet®[1] point BV:9095 to indicate when A2L dissipation is active. The alarm relay on J2 of the RDB is a dry contact and can be wired as normally open or normally closed.

LEAK DISSIPATION SYSTEM SELF-TEST

Power on the unit and verify proper functioning of equipment. The yellow Status LED on the RDB should be steady (see Fig. 58). If flash codes are present, see Troubleshooting on page 49.

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

Remove the control box access panel to access the RDB and Test button (see Fig. 59). The Test button is located above the COMM LED.

Press the Test button on the RDB 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 15).

**Table 15 — 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 |

DISSIPATION AIR FLOW

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 16. They are based on the total system refrigerant charge quantity.

**Table 16 — Minimum Dissipation Air Flows**

| MINIMUM DISSIPATION AIR FLOW (cfm) | |
|---|---|
| **UNIT** | **cfm** |
| **48QE*M04** | 320 |
| **48QE*M05** | 410 |
| **48QE*M06** | 430 |
| **48QE*N04** | 430 |
| **48QE*N05** | 610 |
| **48QE*N06** | 530 |

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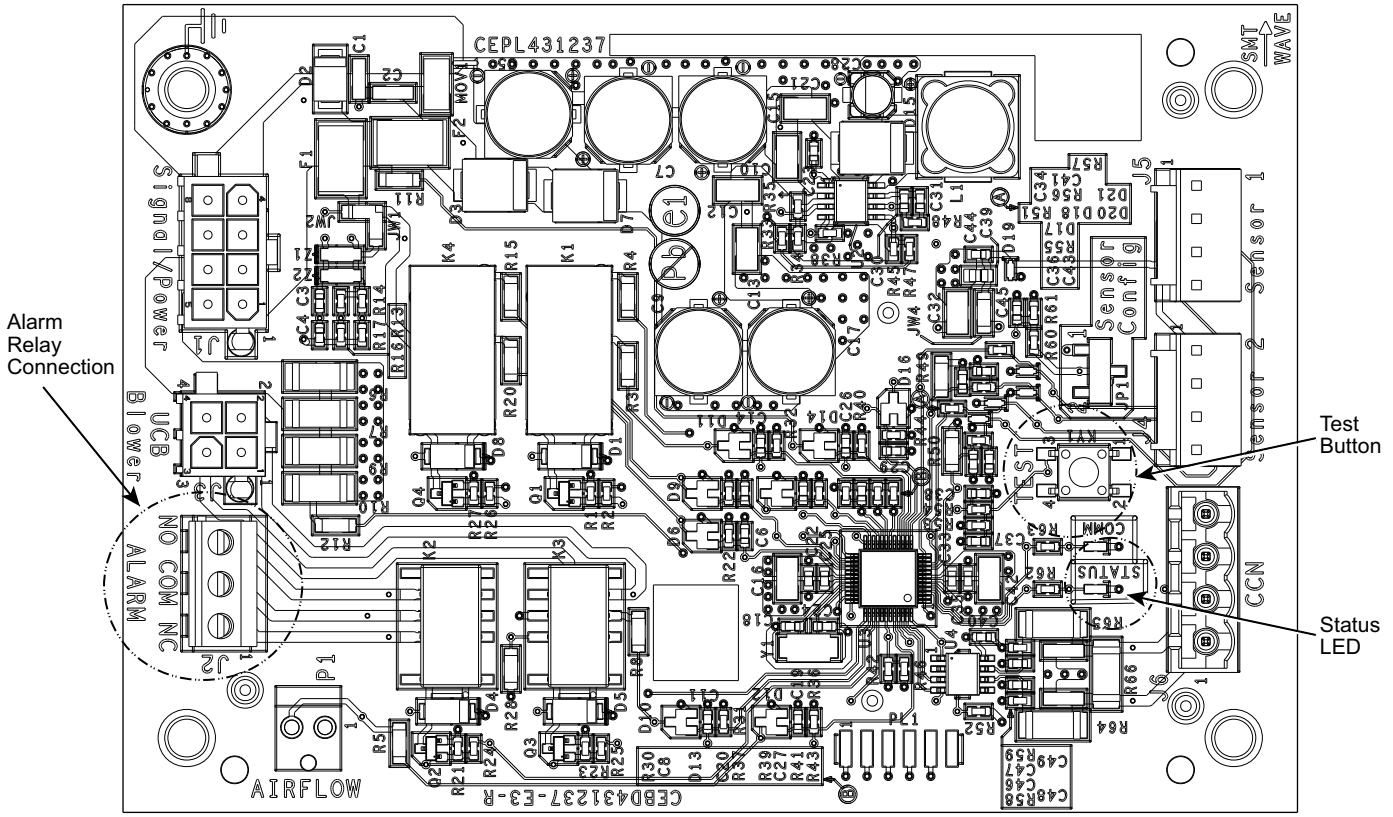



**Fig. 59 — Refrigerant Dissipation Board (RDB) — shown without dust cover**

TROUBLESHOOTING

Table 17 details the required operational checks to ensure proper dissipation system function.

Figure 60 shows the flash codes displayed on the RDB.

NOTE: On SystemVu units a fault F220 will be displayed on the screen anytime there is a dissipation alarm. This indicates that voltage has been interrupted to the HPS1 and HPS2 terminals simultaneously via the K1 and K4 relays on the RDB.

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

**Table 17 — 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 |

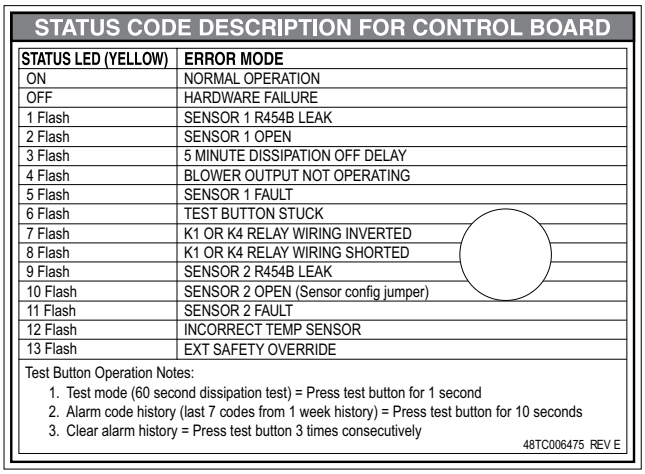



**Fig. 60 — Dissipation Control Status Label**

***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 18 for details on the operating status and troubleshooting of the Dissipation system for the various flash codes.

**Table 18 — Status LED Troubleshooting Table**

| STATUS LED | REASON | CONTROL VERBIAGE | MODE |
|---|---|---|---|
| **1 Flash** | Sensor 1 ≥ 20% LFL. | REFRIG DISSIPATION ACTIVE | Dissipation in Process |
| **2 Flash** | Sensor 1 Open. | REFRIG SENSOR OPEN | Dissipation in Process |
| **3 Flash** | 5 Minute Blower Operating, Sensor < 20% LFL and sensors are not opened (done after fault 1, 2, 9 and 10). | DISSIPATION OFF DELAY ACTIVE | Dissipation in Process |
| **4 Flash** | 0 VAC sensed on Blower output. | BLOWER OUTPUT NOT OPERATING | Dissipation in Process |
| **5 Flash** | Fault with the first A2L digital sensor. | SENSOR 1 FAULT | Dissipation in Process |
| **6 Flash** | If KY1 is stuck pressed for more than 30 seconds. | TEST BUTTON STUCK | To prevent a shorted KY1 to keep the dissipation running continuously. |
| **7 Flash** | Y out switched with Y in or W out switched with W in. | Y (K4) OR W (K1) WIRING INVERTED | Normal mode |
| **8 Flash** | 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 |
| **9 Flash**[a] | Sensor 2 ≥ 20% LFL. | SENSOR 2 DISSIPATION ACTIVE | Dissipation in Process |
| **10 Flash**[a] | Sensor 2 Open. | SENSOR 2 OPEN | Dissipation in Process |
| **11 Flash**[a] | Fault with the second A2L digital sensor. | SENSOR 2 FAULT | Dissipation in Process |
| **12 Flash** | Incorrect sensor connected on sensor 1 or sensor 2 ports. | OVERCURRENT INCORRECT SENSOR | Normal mode |
| **13 Flash** | External Safety 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

## ECONOMIZER SYSTEMS

The unit may be equipped with a factory-installed or accessory (field-installed) economizer system. See Fig. 61 for component locations.

Economizers use direct-drive damper actuators.

IMPORTANT: Any economizer that meets the economizer requirements as laid out in California's Title 24 mandatory section 120.2 (fault detection and diagnostics) and/or prescriptive section 140.4 (life-cycle tests, damper leakage, 5 year warranty, sensor accuracy, etc), will have a label on the economizer. Any economizer without this label does not meet California's Title 24. The 5 year limited parts warranty referred to in section 140.4 only applies to factory-installed economizers. Please refer to your economizer on your unit.

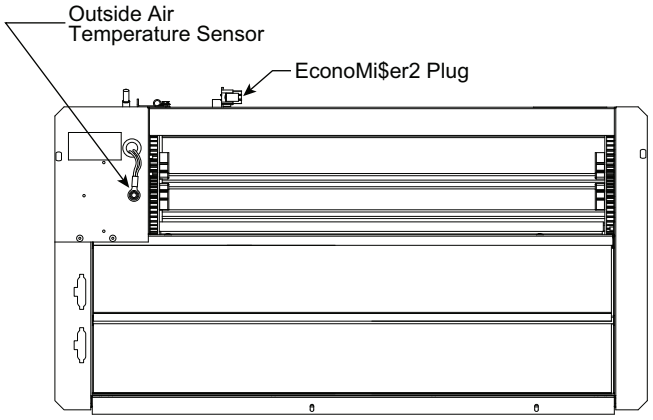



**Fig. 61 — EconoMi$er 2 Component Locations**

IMPORTANT: The optional EconoMi$er 2 does not include a controller. The EconoMi$er 2 is operated by a 4 to 20 mA signal from an existing field-supplied controller. See Fig. 62 for wiring information.

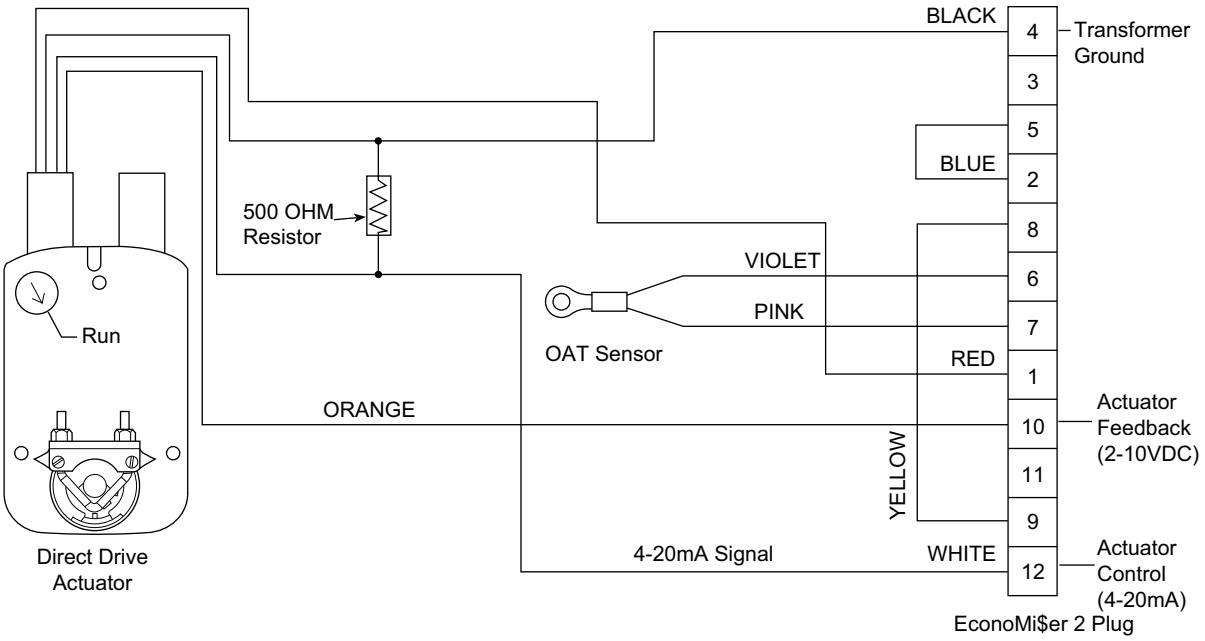



**Fig. 62 — EconoMi$er 2 with 4 to 20 mA Control Wiring**

## PRE-START-UP/START-UP

**⚠ WARNING**

PERSONAL INJURY HAZARD

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

1. Follow recognized safety practices and wear approved Personal Protective Equipment (PPE), including safety glasses and gloves when checking or servicing refrigerant system.
2. Do not use a torch to remove any component. System contains oil and refrigerant under pressure. To remove a component, wear PPE and proceed as follows:
   a. Shut off all electrical power to unit. Apply applicable lockout/tag-out procedures.
   b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
   c. Do not use a torch. Cut component connection tubing with tubing cutter and remove component from unit.
   d. Carefully un-sweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.
3. Do not operate compressor or provide any electric power to unit unless compressor terminal cover is in place and secured.
4. Do not remove compressor terminal cover until all electrical power is disconnected and approved lockout/tag-out procedures are in place.
5. Relieve all pressure from system before touching or disturbing anything inside terminal box whenever refrigerant leak is suspected around compressor terminals.
6. Never attempt to repair a soldered connection while refrigerant system is under pressure.

**⚠ WARNING**

ELECTRICAL OPERATION HAZARD

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

The unit must be electrically grounded in accordance with local codes and NEC ANSI/NFPA 70 (American National Standards Institute/National Fire Protection Association).

Proceed as follows to inspect and prepare the unit for initial start-up:

1. Remove all access panels.
2. Read and follow instructions on all WARNING, CAUTION, and INFORMATION labels attached to, or shipped with, unit.
3. Make the following inspections:
   a. Inspect for shipping and handling damages such as broken lines, loose parts, or disconnected wires, etc.
   b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak-test all refrigerant tubing connections using electronic leak detector, halide torch, or liquid-soap solution.
   c. Inspect all field-wiring and factory-wiring connections. Be sure that connections are completed and tight. Be sure that wires are not in contact with refrigerant tubing or sharp edges.
   d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following conditions:
   a. Make sure that condenser-fan blades are correctly positioned in fan orifice. See Condenser-Fan Adjustment on page 25 for more details.
   b. Make sure that air filter(s) is in place.
   c. Make sure that condensate drain trap is filled with water to ensure proper drainage.
   d. Make sure that all tools and miscellaneous loose parts have been removed.

## START-UP, GENERAL

### Unit Preparation

Make sure that unit has been installed in accordance with installation instructions and applicable codes.

Use the SystemVu Test Mode function to assist in the base unit start-up, this also allows verification of output operation. Controller configuration is also part of start-up. This is especially important when field accessories have been added to the unit. The factory pre-configures options installed at the factory. There may also be additional installation steps or inspection required during the start-up process.

### Additional Installation/Inspection

Inspect the field-installed accessories for proper installation, making note of which ones do or do not require configuration changes. Inspect the alarms displayed on the SystemVu controller for initial insight to any potential issues. Refer to the Controls, Start-up, Operation and Troubleshooting Instructions manual for the SystemVu controller. Inspect the SAT sensor for relocation as intended during installation. Inspect special wiring as directed below.

### Gas Piping

Check gas piping for leaks.

**⚠ WARNING**

FIRE, EXPLOSION HAZARD

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

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

**⚠ WARNING**

RISK OF FIRE OR EXPLOSION

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Leave the building immediately.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

**⚠ 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 pas entreposer ni utiliser d´essence ni autres vapeurs ou liquides inflammables à proximité de cet appareil ou de tout autre appareil.

QUE FAIRE SI UNE ODEUR DE GAZ EST DÉTECTÉE

- Ne mettre en marche aucun appareil.
- Ne toucher aucun interrupteur électrique; ne pas utiliser de téléphone dans le bâtiment.
- Quitter le bâtiment immédiatement.
- Appeler immédiatement le fournisseur de gaz en utilisant le téléphone d´un voisin. Suivre les instructions du fournisseur de gaz.
- Si le fournisseur de gaz n´est pas accessible, appeler le service d´incendie.

L´installation et l´entretien doivent être effectués par un installateur ou une entreprise d´entretien qualifié, ou le fournisseur de gaz.

## Return-Air Filters

Ensure correct filters are installed in unit (see Appendix B — PHYSICAL DATA on page 56). Do not operate unit without return-air filters.

## Outdoor-Air Inlet Screens

Outdoor-air inlet screen must be in place before operating unit.

## Compressor Mounting

Compressors are internally spring mounted. Do not loosen or remove compressor hold down bolts.

## Internal Wiring

Check all electrical connections in unit control boxes. Tighten as required.

## Refrigerant Service Ports

Each unit system has two 1/4 in. SAE flare (with check valves) service ports: one on the suction line, and one on the compressor discharge line. Be sure that caps on the ports are tight.

## 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.

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.

If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

1. Note that the evaporator fan is probably also rotating in the wrong direction.
2. Turn off power to the unit and install lockout tag.
3. Reverse any 2 of the unit power leads.
4. Re-energize to the compressor. Check pressures.

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

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

## Refrigerant Service Ports

Each system has two 1/4 in. SAE flare (with check valves) service ports: one on the suction line, and one on the compressor discharge line. Be sure that caps on the ports are tight.

## Cooling

Set space thermostat to OFF position. To start unit, turn on main power supply. Set system selector switch at COOL position and fan switch at AUTO position. Adjust thermostat to a setting below room temperature. Compressor starts on closure of contactor.

Check unit charge. Refer to Refrigerant Charge section on page 17.

Reset thermostat at a position above room temperature. Compressor will shut off. Evaporator fan will shut off after a 30-second delay.

To shut off unit, set system selector switch at OFF position. Resetting thermostat at a position above room temperature shuts unit off temporarily until space temperature exceeds thermostat setting.

## Main Burner

Main burners are factory set and should require no adjustment.

To check ignition of main burners and heating controls, move thermostat setpoint above room temperature and verify that the burners light and evaporator fan is energized. Check heating effect, then lower the thermostat setting below the room temperature and verify that the burners and evaporator fan turn off.

When replacing unit orifices, order the necessary parts through RCD. See the High Altitude Gas Conversion Kit Gas Heating/Electric Cooling 3 to 15 Ton Small Rooftop Units Accessory LP (Liquid Propane) Installation Instructions for details.

## Heating

1. Purge gas supply line of air by opening union ahead of the gas valve. If gas odor is detected, tighten union and wait 5 minutes before proceeding.
2. Turn on electrical supply and manual gas valve.
3. Set system switch selector at HEAT position and fan switch at AUTO. or ON position. Set heating temperature lever above room temperature.
4. The induced-draft motor will start.
5. After a call for heating, the main burners should light within 5 seconds. If the burner does not light, then there is a 22 second delay before another 5 second try. If the burner still does not light, the time delay is repeated. If the burner does not light within 15 minutes, there is a lockout. To reset the control, break the 24 v power to W1.
6. The evaporator-fan motor will turn on 45 seconds after burner ignition.
7. The evaporator-fan motor will turn off in 45 seconds after the thermostat temperature is satisfied.
8. Adjust airflow to obtain a temperature rise within the range specified on the unit nameplate.

NOTE: The default value for the evaporator-fan motor on/off delay is 45 seconds. The Integrated Gas Unit Controller (IGC) modifies this value when abnormal limit switch cycles occur. Based upon unit operating conditions, the on delay can be reduced to 0 seconds and the off delay can be extended to 180 seconds. When one flash of the LED is observed, the evaporator-fan on/off delay has been modified.

If the limit switch trips at the start of the heating cycle during the evaporator on delay, the time period of the on delay for the next cycle will be 5 seconds less than the time at which the switch tripped. (Example: If the limit switch trips at 30 seconds, the evaporator-fan on delay for the next cycle will occur at 25 seconds.) To prevent short-cycling, a 5 second reduction will only occur if a minimum of 10 minutes has elapsed since the last call for heating.

The evaporator-fan off delay can also be modified. Once the call for heating has ended, there is a 10 minute period during which the modification can occur. If the limit switch trips during this period, the evaporator-fan off delay will increase by 15 seconds. A maximum of 9 trips can occur, extending the evaporator-fan off delay to 180 seconds.

To restore the original default value, reset the power to the unit.

To shut off unit, set system selector switch at OFF position. Resetting heating selector lever below room temperature will temporarily shut unit off until space temperature falls below thermostat setting.

## Ventilation (Continuous Fan)

Set fan and system selector switches at ON and OFF positions, respectively. Evaporator fan operates continuously to provide constant air circulation.

# DECOMMISSIONING

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

1. Become familiar with the equipment and its operation.
2. Isolate the system electrically.
3. Before attempting the procedure, ensure that:
   a. Mechanical handling equipment is available, if required for handling refrigerant cylinders
   b. All personal protective equipment is available and being used correctly
   c. The recovery process is supervised at all times by a competent person
   d. Recovery equipment and cylinders conform to the appropriate standards
4. Pump down refrigerant system, if possible
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6. Make sure that the cylinder is situated on the scales before recovery takes place.
7. Start the recovery machine and operate in accordance with instructions.
8. Do not overfill cylinders (no more than 80% of volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.
10. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from the site promptly and all isolation valves on the equipment are closed off.
11. Recovered refrigerant shall not be charged into another refrigerating system unless it has been cleaned and checked.

Equipment shall be labeled that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For units containing flammable refrigerants, affix labels on the equipment stating the equipment contains flammable refrigerant.

## FASTENER TORQUE VALUES

| | |
|---|---|
| **Heat shield screws** | 30 in.-lb (3.4 Nm) ±2 in.-lb (0.2 Nm) |
| **Stator motor mounting screws** | 23 in.-lb (2.6 Nm) ±2 in.-lb (0.2 Nm) |
| **Fan rotor mounting screws** | 23 in.-lb (2.6 Nm) ±2 in.-lb (0.2 Nm) |
| **Limit switch screws** | 50 in.-lb (5.7 Nm) ±5 in.-lb (0.6 Nm) |
| **Fan Deck bracket screws** | 50 in.-lb (5.7 Nm) ±5 in.-lb (0.6 Nm) |
| **Condenser fan motor mounting screws** | 30 in.-lb (3.4 Nm) ±3 in.-lb (0.3 Nm) |
| **Condenser fan hub set screw** | 60 in.-lb (6.8 Nm) ±5 in.-lb (0.6 Nm) |
| **Compressor mounting bolts** | 65 in.-lb (7.3 Nm) +10 in.-lb (1.2 Nm) |

## START-UP, SYSTEMVU CONTROLS

IMPORTANT: SET-UP INSTRUCTIONS

For installation, wiring, and troubleshooting information for the SystemVu™ Controller, see "50FEQ 04-28, 50GEQ 04-28, 48QE 04-28 Single Package Rooftop Units with SystemVu Controls Version X.X Controls, Start-up, Operation and Troubleshooting." Have a copy of this manual available at unit start-up.

# APPENDIX A — MODEL NUMBER NOMENCLATURE

| 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 | 0 | 5 | 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**
L = Low NOx - Low Gas Heat[a]
S = Low Gas Heat, Stainless Steel (SS) Heat Exchanger
R = Medium Gas Heat, SS Heat Exchanger
T = High Gas Heat, SS Heat Exchanger[b]

**Refrigerant Options**
M = Two-Stage Cooling/Single Circuit
N = Two-Stage Cooling/Single Circuit with Humidi-MiZer® System[b]

**Cooling Tons**
04 = 3.0 tons
05 = 4.0 tons
06 = 5.0 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, Filter Status Switch

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

**Voltage**
1 = 575-3-60
3 = 208/230-1-60
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[d] (High Short Circuit Current Rating)
2 = HSCCR[d] + TTB

**Packaging Compliance**
0 = Standard

NOTE(S):
a Not available for 575V (voltage code -1) units.
b Not available for 3 ton units.
c Not available for 208/230-1-60 voltage units.
d Not available on the following models/options: 575V, Head Pressure Control, Phase Loss Monitor, Non-Fused Disconnect, HACR Breaker, Powered Convenience Outlet.

**Fig. A — Model Number Nomenclature**

# APPENDIX B — PHYSICAL DATA

## 48QE 3 to 5 Ton Physical Data

| 48QE UNIT | 48QE*M04 | 48QE*N04 | 48QE*M05 | 48QE*N05 | 48QE*M06 | 48QE*N06 |
|---|---|---|---|---|---|---|
| NOMINAL TONS | 3 | 3 | 4 | 4 | 5 | 5 |
| BASE UNIT OPERATING WT (lb)[a] | 624 | 624 | 651 | 651 | 653 | 653 |
| REFRIGERATION SYSTEM | | | | | | |
| No. Circuits / No. Compressors / Type | 1 / 1 / 2-Stage Scroll | 1 / 1 / 2-Stage Scroll | 1 / 1 / 2-Stage Scroll | 1 / 1 / 2-Stage Scroll | 1 / 1 / 2-Stage Scroll | 1 / 1 / 2-Stage Scroll |
| Puron Advance™ (R-454B) Charge A/B (lb-oz) | 12-0 | — | 15-1 | — | 16-0 | — |
| Humidi-MiZer® Puron Advance (R-454B) Charge A/B (lb-oz) | — | 16-0 | — | 22-11 | — | 19-8 |
| Metering Device | TXV | TXV | TXV | TXV | TXV | TXV |
| High-Pressure Trip / Reset (psig) | 630 / 505 | 630 / 505 | 630 / 505 | 630 / 505 | 630 / 505 | 630 / 505 |
| Low-Pressure Trip / Reset (psig) | 54 / 117 | 54 / 117 | 54 / 117 | 54 / 117 | 54 / 117 | 54 / 117 |
| EVAPORATOR COIL | | | | | | |
| Material (Tube / Fin) | Cu / Al | Cu / Al | Cu / Al | Cu / Al | Cu / Al | Cu / Al |
| Coil Type | 3/8 in. RTPF | 3/8 in. RTPF | 3/8 in. RTPF | 3/8 in. RTPF | 3/8 in. RTPF | 3/8 in. RTPF |
| Rows / FPI | 3 / 15 | 3 / 15 | 4 / 15 | 4 / 15 | 4 / 15 | 4 / 15 |
| Total Face Area ($ft^2$) | 7.3 | 7.3 | 7.3 | 7.3 | 7.3 | 7.3 |
| Condensate Drain Connection Size | 3/4 in. | 3/4 in. | 3/4 in. | 3/4 in. | 3/4 in. | 3/4 in. |
| CONDENSER COIL | | | | | | |
| Material (Tube / Fin) | Cu / Al | Cu / Al | Cu / Al | Cu / Al | Cu / Al | Cu / Al |
| Coil Type | 5/16 in. RTPF | 5/16 in. RTPF | 5/16 in. RTPF | 5/16 in. RTPF | 5/16 in. RTPF | 5/16 in. RTPF |
| Rows / FPI | 2 / 18 | 2 / 18 | 2 / 18 | 2 / 18 | 2 / 18 | 2 / 18 |
| Total Face Area ($ft^2$) | 18.8 | 18.8 | 20.5 | 20.5 | 20.5 | 20.5 |
| HUMIDI-MIZER COIL | | | | | | |
| Material (Tube / Fin) | — | Cu / Al | — | Cu / Al | — | Cu / Al |
| Coil Type | — | 3/8 in. RTPF | — | 3/8 in. RTPF | — | 3/8 in. RTPF |
| Rows / FPI | — | 1 / 17 | — | 2 / 17 | — | 2 / 17 |
| Total Face Area ($ft^2$) | — | 5.2 | — | 5.2 | — | 5.2 |
| EVAPORATOR FAN AND MOTOR | | | | | | |
| Standard/Medium Static 1 Phase | | | | | | |
| Motor Qty/Drive Type | 1 / Direct | — | 1 / Direct | — | 1 / Direct | — |
| Maximum Cont Bhp | 0.71 | — | 1.06 | — | 1.44 | — |
| Rpm Range | 219-2190 | — | 217-2170 | — | 239-2390 | — |
| Fan Qty/Type | 1 / Vane Axial | — | 1 / Vane Axial | — | 1 / Vane Axial | — |
| Fan Diameter (in.) | 16.6 in. | — | 16.6 in. | — | 16.6 in. | — |
| High Static 1 Phase | | | | | | |
| Motor Qty/Drive Type | 1 / Direct | — | 1 / Direct | — | 1 / Direct | — |
| Maximum Cont Bhp | 1.07 | — | 1.53 | — | 1.96 | — |
| Rpm Range | 249-2490 | — | 246-2460 | — | 266-2660 | — |
| Fan Qty/Type | 1 / Vane Axial | — | 1 / Vane Axial | — | 1 / Vane Axial | — |
| Fan Diameter (in.) | 16.6 in. | — | 16.6 in. | — | 16.6 in. | — |
| Standard/Medium Static 3 Phase | | | | | | |
| Motor Qty/Drive Type | 1 / Direct | 1 / Direct | 1 / Direct | 1 / Direct | 1 / Direct | 1 / Direct |
| Maximum Cont Bhp | 0.71 | 0.71 | 1.06 | 1.06 | 1.44 | 1.44 |
| Rpm Range | 219-2190 | 219-2190 | 217-2170 | 217-2170 | 239-2390 | 239-2390 |
| Fan Qty/Type | 1 / Vane Axial | 1 / Vane Axial | 1 / Vane Axial | 1 / Vane Axial | 1 / Vane Axial | 1 / Vane Axial |
| Fan Diameter (in.) | 16.6 in. | 16.6 in. | 16.6 in. | 16.6 in. | 16.6 in. | 16.6 in. |
| High Static 3 Phase | | | | | | |
| Motor Qty/Drive Type | 1 / Direct | 1 / Direct | 1 / Direct | 1 / Direct | 1 / Direct | 1 / Direct |
| Maximum Cont Bhp | 1.07 | 1.07 | 1.96 | 1.96 | 2.43 | 2.43 |
| Rpm Range | 249-2490 | 249-2490 | 266-2660 | 266-2660 | 284-2836 | 284-2836 |
| Fan Qty/Type | 1 / Vane Axial | 1 / Vane Axial | 1 / Vane Axial | 1 / Vane Axial | 1 / Vane Axial | 1 / Vane Axial |
| Fan Diameter (in.) | 16.6 in. | 16.6 in. | 16.6 in. | 16.6 in. | 16.6 in. | 16.6 in. |

# APPENDIX B — PHYSICAL DATA (cont)

## 48QE 3 to 5 Ton Physical Data (cont)

| 48QE UNIT | 48QE*M04 | 48QE*N04 | 48QE*M05 | 48QE*N05 | 48QE*M06 | 48QE*N06 |
|---|---|---|---|---|---|---|
| **CONDENSER FAN AND MOTOR** | | | | | | |
| **Qty / Motor Drive Type** | 1 / Direct | 1 / Direct | 1 / Direct | 1 / Direct | 1 / Direct | 1 / Direct |
| **Motor HP/Rpm** | 1/3 / 1000/800 | 1/3 / 1000/800 | 1/4 / 1100/900 | 1/4 / 1100/900 | 1/4 / 1100/900 | 1/4 / 1100/900 |
| **Fan Diameter (in.)** | 23 in. | 23 in. | 23 in. | 23 in. | 23 in. | 23 in. |
| **FILTERS** | | | | | | |
| **RA Filter Qty / Size (in.)** | 4 / 16 x 16 x 2 | 4 / 16 x 16 x 2 | 4 / 16 x 16 x 2 | 4 / 16 x 16 x 2 | 4 / 16 x 16 x 2 | 4 / 16 x 16 x 2 |
| **OA Inlet Screen Qty / Size (in.)** | 1 / 20 x 24 x 1 | 1 / 20 x 24 x 1 | 1 / 20 x 24 x 1 | 1 / 20 x 24 x 1 | 1 / 20 x 24 x 1 | 1 / 20 x 24 x 1 |

NOTE(S):

a. Base unit operating weight does not include weight of options.

LEGEND

**Bhp** — Brake Horsepower
**FPI** — Fins Per Inch
**OA** — Outdoor Air
**RA** — Return Air

## APPENDIX B — PHYSICAL DATA (cont)

### 48QE 3 to 5 Ton Gas Heat Data — 1-Phase Units

| 48QE UNIT | 48QE**04 | 48QE**05 | 48QE**06 |
|---|---|---|---|
| GAS CONNECTION | | | |
| No. of Gas Valves | 1 | 1 | 1 |
| Natural Gas Supply Line Pressure (in. wg) / (psig) | 4-13 / 0.14-0.47 | 4-13 / 0.14-0.47 | 4-13 / 0.14-0.47 |
| Liquid Propane Supply Line Pressure (in. wg) / (psig) | 11-13 / 0.40-0.47 | 11-13 / 0.40-0.47 | 11-13 / 0.40-0.47 |
| HEAT ANTICIPATOR SETTING (AMPS) | | | |
| First Stage | 0.14 | 0.14 | 0.14 |
| Second Stage | 0.14 | 0.14 | 0.14 |
| NATURAL GAS HEAT | | | |
| LOW | | | |
| No. of Stages / No. of Burners (total) | 1 / 2 | 1 / 2 | 1 / 2 |
| Connection Size | 1/2 in. NPT | 1/2 in. NPT | 1/2 in. NPT |
| Rollout Switch Opens / Closes (°F) | 195 / 115 | 195 / 115 | 195 / 115 |
| Temperature Rise (°F) | 25-55 | 20-55 | 15-55 |
| MEDIUM | | | |
| No. of Stages / No. of Burners (total) | 1 / 3 | 1 / 3 | 1 / 3 |
| Connection Size | 1/2 in. NPT | 1/2 in. NPT | 1/2 in. NPT |
| Rollout Switch Opens / Closes (°F) | 195 / 115 | 195 / 115 | 195 / 115 |
| Temperature Rise (°F) | 45-85 | 30-65 | 25-65 |
| HIGH | | | |
| No. of Stages / No. of Burners (total) | — | 1 / 3 | 1 / 3 |
| Connection Size | — | 1/2 in. NPT | 1/2 in. NPT |
| Rollout Switch Opens / Closes (°F) | — | 195 / 115 | 195 / 115 |
| Temperature Rise (°F) | — | 45-80 | 35-80 |
| LIQUID PROPANE HEAT | | | |
| LOW | | | |
| No. of Stages / No. of Burners (total) | 1 / 2 | 1 / 2 | 1 / 2 |
| Connection Size | 1/2 in. NPT | 1/2 in. NPT | 1/2 in. NPT |
| Rollout Switch Opens / Closes (°F) | 195 / 115 | 195 / 115 | 195 / 115 |
| Temperature Rise (°F) | 25-55 | 20-55 | 15-55 |
| MEDIUM | | | |
| No. of Stages / No. of Burners (total) | 1 / 3 | 1 / 3 | 1 / 3 |
| Connection Size | 1/2 in. NPT | 1/2 in. NPT | 1/2 in. NPT |
| Rollout Switch Opens / Closes (°F) | 195 / 115 | 195 / 115 | 195 / 115 |
| Temperature Rise (°F) | 45-85 | 30-65 | 25-65 |
| HIGH | | | |
| No. of Stages / No. of Burners (total) | — | 1 / 3 | 1 / 3 |
| Connection Size | — | 1/2 in. NPT | 1/2 in. NPT |
| Rollout Switch Opens / Closes (°F) | — | 195 / 115 | 195 / 115 |
| Temperature Rise (°F) | — | 45-80 | 35-80 |

## APPENDIX B — PHYSICAL DATA (cont)

### 48QE 3 to 5 Ton Gas Heat Data — 3-Phase Units

| 48QE UNIT | 48QE**04 | 48QE**05 | 48QE**06 |
|---|---|---|---|
| **GAS CONNECTION** | | | |
| **No. of Gas Valves** | 1 | 1 | 1 |
| **Natural Gas Supply Line Pressure (in. wg) / (psig)** | 4-13 / 0.14-0.47 | 4-13 / 0.14-0.47 | 4-13 / 0.14-0.47 |
| **Liquid Propane Supply Line Pressure (in. wg) / (psig)** | 11-13 / 0.40-0.47 | 11-13 / 0.40-0.47 | 11-13 / 0.40-0.47 |
| **HEAT ANTICIPATOR SETTING (AMPS)** | | | |
| **First Stage** | 0.14 | 0.14 | 0.14 |
| **Second Stage** | 0.14 | 0.14 | 0.14 |
| **NATURAL GAS HEAT** | | | |
| **LOW** | | | |
| **No. of Stages / No. of Burners (total)** | 2 / 2 | 2 / 2 | 2 / 2 |
| **Connection Size** | 1/2 in. NPT | 1/2 in. NPT | 1/2 in. NPT |
| **Rollout Switch Opens / Closes (°F)** | 195 / 115 | 195 / 115 | 195 / 115 |
| **Temperature Rise (°F)** | 25-55 | 25-55 | 20-55 |
| **MEDIUM** | | | |
| **No. of Stages / No. of Burners (total)** | 2 / 3 | 2 / 3 | 2 / 3 |
| **Connection Size** | 1/2 in. NPT | 1/2 in. NPT | 1/2 in. NPT |
| **Rollout Switch Opens / Closes (°F)** | 195 / 115 | 195 / 115 | 195 / 115 |
| **Temperature Rise (°F)** | 50-85 | 35-65 | 30-65 |
| **HIGH** | | | |
| **No. of Stages / No. of Burners (total)** | — | 2 / 3 | 2 / 3 |
| **Connection Size** | — | 1/2 in. NPT | 1/2 in. NPT |
| **Rollout Switch Opens / Closes (°F)** | — | 195 / 115 | 195 / 115 |
| **Temperature Rise (°F)** | — | 50-80 | 40-80 |
| **LIQUID PROPANE HEAT** | | | |
| **LOW** | | | |
| **No. of Stages / No. of Burners (total)** | 2 / 2 | 2 / 2 | 2 / 2 |
| **Connection Size** | 1/2 in. NPT | 1/2 in. NPT | 1/2 in. NPT |
| **Rollout Switch Opens / Closes (°F)** | 195 / 115 | 195 / 115 | 195 / 115 |
| **Temperature Rise (°F)** | 25-55 | 25-55 | 20-55 |
| **MEDIUM** | | | |
| **No. of Stages / No. of Burners (total)** | 2 / 3 | 2 / 3 | 2 / 3 |
| **Connection Size** | 1/2 in. NPT | 1/2 in. NPT | 1/2 in. NPT |
| **Rollout Switch Opens / Closes (°F)** | 195 / 115 | 195 / 115 | 195 / 115 |
| **Temperature Rise (°F)** | 50-85 | 35-65 | 30-65 |
| **HIGH** | | | |
| **No. of Stages / No. of Burners (total)** | — | 2 / 3 | 2 / 3 |
| **Connection Size** | — | 1/2 in. NPT | 1/2 in. NPT |
| **Rollout Switch Opens / Closes (°F)** | — | 195 / 115 | 195 / 115 |
| **Temperature Rise (°F)** | — | 50-80 | 40-80 |

# APPENDIX C — FAN PERFORMANCE

## General Fan Performance Notes

1. Interpolation is permissible. Do not extrapolate.
2. External static pressure is the static pressure difference between the return duct and the supply duct plus the static pressure caused by any FIOPs or accessories.
3. Tabular data accounts for pressure loss due to clean filters, unit casing, wet coils, and highest gas heat exchanger (when gas heat unit).
4. Factory options and accessories may effect static pressure losses. Gas heat unit fan tables assume highest gas heat models; for fan selections with low or medium heat models, the user must deduct low and medium heat static pressures. Selection software is available, through your salesperson, to help you select the best motor/drive combination for your application.
5. The fan performance tables offer motor/drive recommendations. In cases when 2 motor/drive combinations would work, Carrier recommends the lower horsepower option.
6. For information on the electrical properties of Carrier motors, please see the Electrical information section of the product data book for this model and size.
7. For more information on the performance limits of Carrier motors, see the application data section of the product data book for this model and size.
8. The EPACT (Energy Policy Act of 1992) regulates energy requirements for specific types of indoor fan motors. Motors regulated by EPACT include any general purpose, T-frame (3-digit, 143 and larger), single-speed, foot mounted, polyphase, squirrel cage induction motors of NEMA (National Electrical Manufacturers Association) design A and B, manufactured for use in the United States. Ranging from 1 to 200 Hp, these continuous-duty motors operate on 230 and 460 volt, 60 Hz power. If a motor does not fit into these specifications, the motor does not have to be replaced by an EPACT compliant energy-efficient motor. Variable-speed motors are exempt from EPACT compliance requirements.

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M04 Single Phase — 3 Ton Vertical Supply (rpm - bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 900 | 1092 | 0.09 | 1317 | 0.16 | 1503 | 0.24 | 1666 | 0.32 | 1812 | 0.41 |
| 975 | 1140 | 0.10 | 1361 | 0.18 | 1543 | 0.26 | 1703 | 0.34 | 1847 | 0.44 |
| 1050 | 1190 | 0.12 | 1405 | 0.19 | 1584 | 0.28 | 1741 | 0.37 | 1884 | 0.47 |
| 1125 | 1241 | 0.13 | 1450 | 0.21 | 1626 | 0.30 | 1781 | 0.39 | 1922 | 0.49 |
| 1200 | 1294 | 0.15 | 1497 | 0.23 | 1670 | 0.32 | 1822 | 0.42 | 1961 | 0.53 |
| 1275 | 1348 | 0.17 | 1544 | 0.26 | 1714 | 0.35 | 1864 | 0.45 | 2001 | 0.56 |
| 1350 | 1404 | 0.19 | 1593 | 0.28 | 1759 | 0.38 | 1907 | 0.48 | 2042 | 0.59 |
| 1425 | 1460 | 0.22 | 1642 | 0.31 | 1805 | 0.41 | 1951 | 0.52 | 2084 | 0.63 |
| 1500 | 1517 | 0.24 | 1693 | 0.34 | 1852 | 0.44 | 1996 | 0.55 | 2127 | 0.67 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 900 | 1947 | 0.51 | 2072 | 0.62 | 2190 | 0.73 | 2301 | 0.85 | 2406 | 0.97 |
| 975 | 1980 | 0.54 | 2104 | 0.65 | 2221 | 0.76 | 2331 | 0.88 | 2436 | 1.01 |
| 1050 | 2015 | 0.57 | 2138 | 0.68 | 2253 | 0.80 | 2362 | 0.92 | 2466 | 1.04 |
| 1125 | 2051 | 0.60 | 2172 | 0.71 | 2286 | 0.83 | 2395 | 0.96 | — | — |
| 1200 | 2088 | 0.63 | 2208 | 0.75 | 2321 | 0.87 | 2428 | 1.00 | — | — |
| 1275 | 2127 | 0.67 | 2245 | 0.79 | 2357 | 0.91 | 2463 | 1.04 | — | — |
| 1350 | 2167 | 0.71 | 2283 | 0.83 | 2394 | 0.96 | — | — | — | — |
| 1425 | 2207 | 0.75 | 2323 | 0.87 | 2432 | 1.00 | — | — | — | — |
| 1500 | 2249 | 0.79 | 2363 | 0.92 | 2471 | 1.05 | — | — | — | — |

Standard/Medium Static 1092-2190 rpm, 0.71 max bhp

High Static 1092-2490 rpm, 1.07 max bhp

### 48QE*M04 Single Phase — Standard/Medium Static — 3 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1092 | 5.0 | 1317 | 6.0 | 1503 | 6.9 | 1666 | 7.6 | 1812 | 8.3 |
| 975 | 1140 | 5.2 | 1361 | 6.2 | 1543 | 7.0 | 1703 | 7.8 | 1847 | 8.4 |
| 1050 | 1190 | 5.4 | 1405 | 6.4 | 1584 | 7.2 | 1741 | 7.9 | 1884 | 8.6 |
| 1125 | 1241 | 5.7 | 1450 | 6.6 | 1626 | 7.4 | 1781 | 8.1 | 1922 | 8.8 |
| 1200 | 1294 | 5.9 | 1497 | 6.8 | 1670 | 7.6 | 1822 | 8.3 | 1961 | 9.0 |
| 1275 | 1348 | 6.2 | 1544 | 7.1 | 1714 | 7.8 | 1864 | 8.5 | 2001 | 9.1 |
| 1350 | 1404 | 6.4 | 1593 | 7.3 | 1759 | 8.0 | 1907 | 8.7 | 2042 | 9.3 |
| 1425 | 1460 | 6.7 | 1642 | 7.5 | 1805 | 8.2 | 1951 | 8.9 | 2084 | 9.5 |
| 1500 | 1517 | 6.9 | 1693 | 7.7 | 1852 | 8.5 | 1996 | 9.1 | 2127 | 9.7 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1947 | 8.9 | 2072 | 9.5 | 2190 | 10.0 | — | — | — | — |
| 975 | 1980 | 9.0 | 2104 | 9.6 | — | — | — | — | — | — |
| 1050 | 2015 | 9.2 | 2138 | 9.8 | — | — | — | — | — | — |
| 1125 | 2051 | 9.4 | 2172 | 9.9 | — | — | — | — | — | — |
| 1200 | 2088 | 9.5 | — | — | — | — | — | — | — | — |
| 1275 | 2127 | 9.7 | — | — | — | — | — | — | — | — |
| 1350 | 2167 | 9.9 | — | — | — | — | — | — | — | — |
| 1425 | — | — | — | — | — | — | — | — | — | — |
| 1500 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1092-2190 rpm

# APPENDIX C — FAN PERFORMANCE (cont)

## 48QE*M04 Single Phase — High Static — 3 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1092 | 4.4 | 1317 | 5.3 | 1503 | 6.0 | 1666 | 6.7 | 1812 | 7.3 |
| 975 | 1140 | 4.6 | 1361 | 5.5 | 1543 | 6.2 | 1703 | 6.8 | 1847 | 7.4 |
| 1050 | 1190 | 4.8 | 1405 | 5.6 | 1584 | 6.4 | 1741 | 7.0 | 1884 | 7.6 |
| 1125 | 1241 | 5.0 | 1450 | 5.8 | 1626 | 6.5 | 1781 | 7.2 | 1922 | 7.7 |
| 1200 | 1294 | 5.2 | 1497 | 6.0 | 1670 | 6.7 | 1822 | 7.3 | 1961 | 7.9 |
| 1275 | 1348 | 5.4 | 1544 | 6.2 | 1714 | 6.9 | 1864 | 7.5 | 2001 | 8.0 |
| 1350 | 1404 | 5.6 | 1593 | 6.4 | 1759 | 7.1 | 1907 | 7.7 | 2042 | 8.2 |
| 1425 | 1460 | 5.9 | 1642 | 6.6 | 1805 | 7.2 | 1951 | 7.8 | 2084 | 8.4 |
| 1500 | 1517 | 6.1 | 1693 | 6.8 | 1852 | 7.4 | 1996 | 8.0 | 2127 | 8.5 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1947 | 7.8 | 2072 | 8.3 | 2190 | 8.8 | 2301 | 9.2 | 2406 | 9.7 |
| 975 | 1980 | 8.0 | 2104 | 8.4 | 2221 | 8.9 | 2331 | 9.4 | 2436 | 9.8 |
| 1050 | 2015 | 8.1 | 2138 | 8.6 | 2253 | 9.0 | 2362 | 9.5 | 2466 | 9.9 |
| 1125 | 2051 | 8.2 | 2172 | 8.7 | 2286 | 9.2 | 2395 | 9.6 | — | — |
| 1200 | 2088 | 8.4 | 2208 | 8.9 | 2321 | 9.3 | 2428 | 9.8 | — | — |
| 1275 | 2127 | 8.5 | 2245 | 9.0 | 2357 | 9.5 | 2463 | 9.9 | — | — |
| 1350 | 2167 | 8.7 | 2283 | 9.2 | 2394 | 9.6 | — | — | — | — |
| 1425 | 2207 | 8.9 | 2323 | 9.3 | 2432 | 9.8 | — | — | — | — |
| 1500 | 2249 | 9.0 | 2363 | 9.5 | 2471 | 9.9 | — | — | — | — |

High Static 1092-2490 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M04 Three Phase — 3 Ton Vertical Supply (rpm - bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 900 | 1092 | 0.09 | 1317 | 0.16 | 1503 | 0.24 | 1666 | 0.32 | 1812 | 0.41 |
| 975 | 1140 | 0.10 | 1361 | 0.18 | 1543 | 0.26 | 1703 | 0.34 | 1847 | 0.44 |
| 1050 | 1190 | 0.12 | 1405 | 0.19 | 1584 | 0.28 | 1741 | 0.37 | 1884 | 0.47 |
| 1125 | 1241 | 0.13 | 1450 | 0.21 | 1626 | 0.30 | 1781 | 0.39 | 1922 | 0.49 |
| 1200 | 1294 | 0.15 | 1497 | 0.23 | 1670 | 0.32 | 1822 | 0.42 | 1961 | 0.53 |
| 1275 | 1348 | 0.17 | 1544 | 0.26 | 1714 | 0.35 | 1864 | 0.45 | 2001 | 0.56 |
| 1350 | 1404 | 0.19 | 1593 | 0.28 | 1759 | 0.38 | 1907 | 0.48 | 2042 | 0.59 |
| 1425 | 1460 | 0.22 | 1642 | 0.31 | 1805 | 0.41 | 1951 | 0.52 | 2084 | 0.63 |
| 1500 | 1517 | 0.24 | 1693 | 0.34 | 1852 | 0.44 | 1996 | 0.55 | 2127 | 0.67 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 900 | 1947 | 0.51 | 2072 | 0.62 | 2190 | 0.73 | 2301 | 0.85 | 2406 | 0.97 |
| 975 | 1980 | 0.54 | 2104 | 0.65 | 2221 | 0.76 | 2331 | 0.88 | 2436 | 1.01 |
| 1050 | 2015 | 0.57 | 2138 | 0.68 | 2253 | 0.80 | 2362 | 0.92 | 2466 | 1.04 |
| 1125 | 2051 | 0.60 | 2172 | 0.71 | 2286 | 0.83 | 2395 | 0.96 | — | — |
| 1200 | 2088 | 0.63 | 2208 | 0.75 | 2321 | 0.87 | 2428 | 1.00 | — | — |
| 1275 | 2127 | 0.67 | 2245 | 0.79 | 2357 | 0.91 | 2463 | 1.04 | — | — |
| 1350 | 2167 | 0.71 | 2283 | 0.83 | 2394 | 0.96 | — | — | — | — |
| 1425 | 2207 | 0.75 | 2323 | 0.87 | 2432 | 1.00 | — | — | — | — |
| 1500 | 2249 | 0.79 | 2363 | 0.92 | 2471 | 1.05 | — | — | — | — |

Standard/Medium Static 1092-2190 rpm, 0.71 max bhp

High Static 1092-2490 rpm, 1.07 max bhp

### 48QE*M04 Three Phase — Standard/Medium Static — 3 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1092 | 5.0 | 1317 | 6.0 | 1503 | 6.9 | 1666 | 7.6 | 1812 | 8.3 |
| 975 | 1140 | 5.2 | 1361 | 6.2 | 1543 | 7.0 | 1703 | 7.8 | 1847 | 8.4 |
| 1050 | 1190 | 5.4 | 1405 | 6.4 | 1584 | 7.2 | 1741 | 7.9 | 1884 | 8.6 |
| 1125 | 1241 | 5.7 | 1450 | 6.6 | 1626 | 7.4 | 1781 | 8.1 | 1922 | 8.8 |
| 1200 | 1294 | 5.9 | 1497 | 6.8 | 1670 | 7.6 | 1822 | 8.3 | 1961 | 9.0 |
| 1275 | 1348 | 6.2 | 1544 | 7.1 | 1714 | 7.8 | 1864 | 8.5 | 2001 | 9.1 |
| 1350 | 1404 | 6.4 | 1593 | 7.3 | 1759 | 8.0 | 1907 | 8.7 | 2042 | 9.3 |
| 1425 | 1460 | 6.7 | 1642 | 7.5 | 1805 | 8.2 | 1951 | 8.9 | 2084 | 9.5 |
| 1500 | 1517 | 6.9 | 1693 | 7.7 | 1852 | 8.5 | 1996 | 9.1 | 2127 | 9.7 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1947 | 8.9 | 2072 | 9.5 | 2190 | 10.0 | — | — | — | — |
| 975 | 1980 | 9.0 | 2104 | 9.6 | — | — | — | — | — | — |
| 1050 | 2015 | 9.2 | 2138 | 9.8 | — | — | — | — | — | — |
| 1125 | 2051 | 9.4 | 2172 | 9.9 | — | — | — | — | — | — |
| 1200 | 2088 | 9.5 | — | — | — | — | — | — | — | — |
| 1275 | 2127 | 9.7 | — | — | — | — | — | — | — | — |
| 1350 | 2167 | 9.9 | — | — | — | — | — | — | — | — |
| 1425 | — | — | — | — | — | — | — | — | — | — |
| 1500 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1092-2190 rpm

# APPENDIX C — FAN PERFORMANCE (cont)

## 48QE*M04 Three Phase — High Static — 3 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1092 | 4.4 | 1317 | 5.3 | 1503 | 6.0 | 1666 | 6.7 | 1812 | 7.3 |
| 975 | 1140 | 4.6 | 1361 | 5.5 | 1543 | 6.2 | 1703 | 6.8 | 1847 | 7.4 |
| 1050 | 1190 | 4.8 | 1405 | 5.6 | 1584 | 6.4 | 1741 | 7.0 | 1884 | 7.6 |
| 1125 | 1241 | 5.0 | 1450 | 5.8 | 1626 | 6.5 | 1781 | 7.2 | 1922 | 7.7 |
| 1200 | 1294 | 5.2 | 1497 | 6.0 | 1670 | 6.7 | 1822 | 7.3 | 1961 | 7.9 |
| 1275 | 1348 | 5.4 | 1544 | 6.2 | 1714 | 6.9 | 1864 | 7.5 | 2001 | 8.0 |
| 1350 | 1404 | 5.6 | 1593 | 6.4 | 1759 | 7.1 | 1907 | 7.7 | 2042 | 8.2 |
| 1425 | 1460 | 5.9 | 1642 | 6.6 | 1805 | 7.2 | 1951 | 7.8 | 2084 | 8.4 |
| 1500 | 1517 | 6.1 | 1693 | 6.8 | 1852 | 7.4 | 1996 | 8.0 | 2127 | 8.5 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1947 | 7.8 | 2072 | 8.3 | 2190 | 8.8 | 2301 | 9.2 | 2406 | 9.7 |
| 975 | 1980 | 8.0 | 2104 | 8.4 | 2221 | 8.9 | 2331 | 9.4 | 2436 | 9.8 |
| 1050 | 2015 | 8.1 | 2138 | 8.6 | 2253 | 9.0 | 2362 | 9.5 | 2466 | 9.9 |
| 1125 | 2051 | 8.2 | 2172 | 8.7 | 2286 | 9.2 | 2395 | 9.6 | — | — |
| 1200 | 2088 | 8.4 | 2208 | 8.9 | 2321 | 9.3 | 2428 | 9.8 | — | — |
| 1275 | 2127 | 8.5 | 2245 | 9.0 | 2357 | 9.5 | 2463 | 9.9 | — | — |
| 1350 | 2167 | 8.7 | 2283 | 9.2 | 2394 | 9.6 | — | — | — | — |
| 1425 | 2207 | 8.9 | 2323 | 9.3 | 2432 | 9.8 | — | — | — | — |
| 1500 | 2249 | 9.0 | 2363 | 9.5 | 2471 | 9.9 | — | — | — | — |

High Static 1092-2490 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M05 Single Phase — 4 Ton Vertical Supply (rpm - bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1200 | 1191 | 0.18 | 1384 | 0.28 | 1544 | 0.39 | 1685 | 0.51 | 1814 | 0.63 |
| 1300 | 1255 | 0.21 | 1442 | 0.32 | 1599 | 0.43 | 1737 | 0.55 | 1863 | 0.68 |
| 1400 | 1321 | 0.24 | 1500 | 0.36 | 1655 | 0.48 | 1791 | 0.61 | 1914 | 0.74 |
| 1500 | 1388 | 0.28 | 1561 | 0.40 | 1711 | 0.53 | 1845 | 0.66 | 1967 | 0.80 |
| 1600 | 1456 | 0.33 | 1622 | 0.45 | 1770 | 0.59 | 1901 | 0.73 | 2021 | 0.87 |
| 1700 | 1525 | 0.37 | 1685 | 0.51 | 1829 | 0.65 | 1958 | 0.79 | 2075 | 0.94 |
| 1800 | 1596 | 0.43 | 1749 | 0.56 | 1889 | 0.71 | 2016 | 0.87 | 2131 | 1.02 |
| 1900 | 1668 | 0.49 | 1814 | 0.63 | 1950 | 0.78 | 2074 | 0.94 | 2188 | 1.11 |
| 2000 | 1740 | 0.56 | 1881 | 0.70 | 2012 | 0.86 | 2134 | 1.03 | 2246 | 1.20 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1200 | 1933 | 0.77 | 2045 | 0.91 | 2151 | 1.06 | 2253 | 1.21 | 2351 | 1.38 |
| 1300 | 1980 | 0.82 | 2089 | 0.96 | 2194 | 1.12 | 2293 | 1.28 | 2389 | 1.44 |
| 1400 | 2029 | 0.88 | 2136 | 1.03 | 2238 | 1.19 | 2336 | 1.35 | 2430 | 1.52 |
| 1500 | 2079 | 0.95 | 2185 | 1.10 | 2285 | 1.26 | 2381 | 1.43 | — | — |
| 1600 | 2132 | 1.02 | 2236 | 1.18 | 2334 | 1.34 | 2428 | 1.51 | — | — |
| 1700 | 2185 | 1.10 | 2288 | 1.26 | 2385 | 1.43 | — | — | — | — |
| 1800 | 2239 | 1.19 | 2340 | 1.35 | 2436 | 1.53 | — | — | — | — |
| 1900 | 2295 | 1.28 | 2394 | 1.45 | — | — | — | — | — | — |
| 2000 | 2351 | 1.37 | 2449 | 1.55 | — | — | — | — | — | — |

Standard/Medium Static 1191-2170 rpm, 1.06 max bhp

High Static 1191-2460 rpm, 1.53 max bhp

### 48QE*M05 Single Phase — Standard/Medium Static — 4 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1190 | 5.5 | 1383 | 6.4 | 1544 | 7.1 | 1685 | 7.8 | 1814 | 8.4 |
| 1300 | 1255 | 5.8 | 1441 | 6.6 | 1599 | 7.4 | 1737 | 8.0 | 1863 | 8.6 |
| 1400 | 1320 | 6.1 | 1500 | 6.9 | 1654 | 7.6 | 1791 | 8.3 | 1914 | 8.8 |
| 1500 | 1388 | 6.4 | 1561 | 7.2 | 1711 | 7.9 | 1845 | 8.5 | 1967 | 9.1 |
| 1600 | 1456 | 6.7 | 1623 | 7.5 | 1770 | 8.2 | 1901 | 8.8 | 2020 | 9.3 |
| 1700 | 1526 | 7.0 | 1685 | 7.8 | 1829 | 8.4 | 1958 | 9.0 | 2075 | 9.6 |
| 1800 | 1596 | 7.4 | 1749 | 8.1 | 1889 | 8.7 | 2016 | 9.3 | 2131 | 9.8 |
| 1900 | 1668 | 7.7 | 1814 | 8.4 | 1950 | 9.0 | 2074 | 9.6 | — | — |
| 2000 | 1741 | 8.0 | 1881 | 8.7 | 2012 | 9.3 | 2134 | 9.8 | — | — |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1933 | 8.9 | 2045 | 9.4 | 2151 | 9.9 | — | — | — | — |
| 1300 | 1980 | 9.1 | 2089 | 9.6 | — | — | — | — | — | — |
| 1400 | 2029 | 9.4 | 2136 | 9.8 | — | — | — | — | — | — |
| 1500 | 2080 | 9.6 | — | — | — | — | — | — | — | — |
| 1600 | 2131 | 9.8 | — | — | — | — | — | — | — | — |
| 1700 | — | — | — | — | — | — | — | — | — | — |
| 1800 | — | — | — | — | — | — | — | — | — | — |
| 1900 | — | — | — | — | — | — | — | — | — | — |
| 2000 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1191-2170 rpm

# APPENDIX C — FAN PERFORMANCE (cont)

## 48QE*M05 Single Phase — High Static — 4 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1191 | 4.5 | 1384 | 5.2 | 1544 | 5.8 | 1685 | 6.3 | 1814 | 6.8 |
| 1300 | 1255 | 4.7 | 1442 | 5.4 | 1599 | 6.0 | 1737 | 6.5 | 1863 | 7.0 |
| 1400 | 1321 | 5.0 | 1500 | 5.6 | 1655 | 6.2 | 1791 | 6.7 | 1914 | 7.2 |
| 1500 | 1388 | 5.2 | 1561 | 5.9 | 1711 | 6.4 | 1845 | 6.9 | 1967 | 7.4 |
| 1600 | 1456 | 5.5 | 1622 | 6.1 | 1770 | 6.7 | 1901 | 7.1 | 2021 | 7.6 |
| 1700 | 1525 | 5.7 | 1685 | 6.3 | 1829 | 6.9 | 1958 | 7.4 | 2075 | 7.8 |
| 1800 | 1596 | 6.0 | 1749 | 6.6 | 1889 | 7.1 | 2016 | 7.6 | 2131 | 8.0 |
| 1900 | 1668 | 6.3 | 1814 | 6.8 | 1950 | 7.3 | 2074 | 7.8 | 2188 | 8.2 |
| 2000 | 1740 | 6.5 | 1881 | 7.1 | 2012 | 7.6 | 2134 | 8.0 | 2246 | 8.4 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1933 | 7.3 | 2045 | 7.7 | 2151 | 8.1 | 2253 | 8.5 | 2351 | 8.8 |
| 1300 | 1980 | 7.4 | 2089 | 7.9 | 2194 | 8.2 | 2293 | 8.6 | 2389 | 9.0 |
| 1400 | 2029 | 7.6 | 2136 | 8.0 | 2238 | 8.4 | 2336 | 8.8 | 2430 | 9.1 |
| 1500 | 2079 | 7.8 | 2185 | 8.2 | 2285 | 8.6 | 2381 | 9.0 | — | — |
| 1600 | 2132 | 8.0 | 2236 | 8.4 | 2334 | 8.8 | 2428 | 9.1 | — | — |
| 1700 | 2185 | 8.2 | 2288 | 8.6 | 2385 | 9.0 | — | — | — | — |
| 1800 | 2239 | 8.4 | 2340 | 8.8 | 2436 | 9.2 | — | — | — | — |
| 1900 | 2295 | 8.6 | 2394 | 9.0 | — | — | — | — | — | — |
| 2000 | 2351 | 8.8 | 2449 | 9.2 | — | — | — | — | — | — |

High Static 1191-2460 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M05 Three Phase — 4 Ton Vertical Supply (rpm - bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1200 | 1191 | 0.18 | 1384 | 0.28 | 1544 | 0.39 | 1685 | 0.51 | 1814 | 0.63 |
| 1300 | 1255 | 0.21 | 1442 | 0.32 | 1599 | 0.43 | 1737 | 0.55 | 1863 | 0.68 |
| 1400 | 1321 | 0.24 | 1500 | 0.36 | 1655 | 0.48 | 1791 | 0.61 | 1914 | 0.74 |
| 1500 | 1388 | 0.28 | 1561 | 0.40 | 1711 | 0.53 | 1845 | 0.66 | 1967 | 0.80 |
| 1600 | 1456 | 0.33 | 1622 | 0.45 | 1770 | 0.59 | 1901 | 0.73 | 2021 | 0.87 |
| 1700 | 1525 | 0.37 | 1685 | 0.51 | 1829 | 0.65 | 1958 | 0.79 | 2075 | 0.94 |
| 1800 | 1596 | 0.43 | 1749 | 0.56 | 1889 | 0.71 | 2016 | 0.87 | 2131 | 1.02 |
| 1900 | 1668 | 0.49 | 1814 | 0.63 | 1950 | 0.78 | 2074 | 0.94 | 2188 | 1.11 |
| 2000 | 1740 | 0.56 | 1881 | 0.70 | 2012 | 0.86 | 2134 | 1.03 | 2246 | 1.20 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1200 | 1933 | 0.77 | 2045 | 0.91 | 2151 | 1.06 | 2253 | 1.21 | 2351 | 1.38 |
| 1300 | 1980 | 0.82 | 2089 | 0.96 | 2194 | 1.12 | 2293 | 1.28 | 2389 | 1.44 |
| 1400 | 2029 | 0.88 | 2136 | 1.03 | 2238 | 1.19 | 2336 | 1.35 | 2430 | 1.52 |
| 1500 | 2079 | 0.95 | 2185 | 1.10 | 2285 | 1.26 | 2381 | 1.43 | 2473 | 1.60 |
| 1600 | 2132 | 1.02 | 2236 | 1.18 | 2334 | 1.34 | 2428 | 1.51 | 2519 | 1.69 |
| 1700 | 2185 | 1.10 | 2288 | 1.26 | 2385 | 1.43 | 2477 | 1.60 | 2566 | 1.78 |
| 1800 | 2239 | 1.19 | 2340 | 1.35 | 2436 | 1.53 | 2528 | 1.71 | 2615 | 1.89 |
| 1900 | 2295 | 1.28 | 2394 | 1.45 | 2489 | 1.63 | 2579 | 1.81 | — | — |
| 2000 | 2351 | 1.37 | 2449 | 1.55 | 2543 | 1.74 | 2632 | 1.93 | — | — |

Standard/Medium Static 1191-2170 rpm, 1.06 max bhp

High Static 1191-2660 rpm, 1.96 max bhp

### 48QE*M05 Three Phase — Standard/Medium Static — 4 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1190 | 5.5 | 1383 | 6.4 | 1544 | 7.1 | 1685 | 7.8 | 1814 | 8.4 |
| 1300 | 1255 | 5.8 | 1441 | 6.6 | 1599 | 7.4 | 1737 | 8.0 | 1863 | 8.6 |
| 1400 | 1320 | 6.1 | 1500 | 6.9 | 1654 | 7.6 | 1791 | 8.3 | 1914 | 8.8 |
| 1500 | 1388 | 6.4 | 1561 | 7.2 | 1711 | 7.9 | 1845 | 8.5 | 1967 | 9.1 |
| 1600 | 1456 | 6.7 | 1623 | 7.5 | 1770 | 8.2 | 1901 | 8.8 | 2020 | 9.3 |
| 1700 | 1526 | 7.0 | 1685 | 7.8 | 1829 | 8.4 | 1958 | 9.0 | 2075 | 9.6 |
| 1800 | 1596 | 7.4 | 1749 | 8.1 | 1889 | 8.7 | 2016 | 9.3 | 2131 | 9.8 |
| 1900 | 1668 | 7.7 | 1814 | 8.4 | 1950 | 9.0 | 2074 | 9.6 | — | — |
| 2000 | 1741 | 8.0 | 1881 | 8.7 | 2012 | 9.3 | 2134 | 9.8 | — | — |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1933 | 8.9 | 2045 | 9.4 | 2151 | 9.9 | — | — | — | — |
| 1300 | 1980 | 9.1 | 2089 | 9.6 | — | — | — | — | — | — |
| 1400 | 2029 | 9.4 | 2136 | 9.8 | — | — | — | — | — | — |
| 1500 | 2080 | 9.6 | — | — | — | — | — | — | — | — |
| 1600 | 2131 | 9.8 | — | — | — | — | — | — | — | — |
| 1700 | — | — | — | — | — | — | — | — | — | — |
| 1800 | — | — | — | — | — | — | — | — | — | — |
| 1900 | — | — | — | — | — | — | — | — | — | — |
| 2000 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1191-2170 rpm

# APPENDIX C — FAN PERFORMANCE (cont)

## 48QE*M05 Three Phase — High Static — 4 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1191 | 4.5 | 1384 | 5.2 | 1544 | 5.8 | 1685 | 6.3 | 1814 | 6.8 |
| 1300 | 1255 | 4.7 | 1442 | 5.4 | 1599 | 6.0 | 1737 | 6.5 | 1863 | 7.0 |
| 1400 | 1321 | 5.0 | 1500 | 5.6 | 1655 | 6.2 | 1791 | 6.7 | 1914 | 7.2 |
| 1500 | 1388 | 5.2 | 1561 | 5.9 | 1711 | 6.4 | 1845 | 6.9 | 1967 | 7.4 |
| 1600 | 1456 | 5.5 | 1622 | 6.1 | 1770 | 6.7 | 1901 | 7.1 | 2021 | 7.6 |
| 1700 | 1525 | 5.7 | 1685 | 6.3 | 1829 | 6.9 | 1958 | 7.4 | 2075 | 7.8 |
| 1800 | 1596 | 6.0 | 1749 | 6.6 | 1889 | 7.1 | 2016 | 7.6 | 2131 | 8.0 |
| 1900 | 1668 | 6.3 | 1814 | 6.8 | 1950 | 7.3 | 2074 | 7.8 | 2188 | 8.2 |
| 2000 | 1740 | 6.5 | 1881 | 7.1 | 2012 | 7.6 | 2134 | 8.0 | 2246 | 8.4 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1933 | 7.3 | 2045 | 7.7 | 2151 | 8.1 | 2253 | 8.5 | 2351 | 8.8 |
| 1300 | 1980 | 7.4 | 2089 | 7.9 | 2194 | 8.2 | 2293 | 8.6 | 2389 | 9.0 |
| 1400 | 2029 | 7.6 | 2136 | 8.0 | 2238 | 8.4 | 2336 | 8.8 | 2430 | 9.1 |
| 1500 | 2079 | 7.8 | 2185 | 8.2 | 2285 | 8.6 | 2381 | 9.0 | 2473 | 9.3 |
| 1600 | 2132 | 8.0 | 2236 | 8.4 | 2334 | 8.8 | 2428 | 9.1 | 2519 | 9.5 |
| 1700 | 2185 | 8.2 | 2288 | 8.6 | 2385 | 9.0 | 2477 | 9.3 | 2566 | 9.6 |
| 1800 | 2239 | 8.4 | 2340 | 8.8 | 2436 | 9.2 | 2528 | 9.5 | 2615 | 9.8 |
| 1900 | 2295 | 8.6 | 2394 | 9.0 | 2489 | 9.4 | 2579 | 9.7 | — | — |
| 2000 | 2351 | 8.8 | 2449 | 9.2 | 2543 | 9.6 | 2632 | 9.9 | — | — |

High Static 1191-2660 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M06 Single Phase — 5 Ton Vertical Supply (rpm - bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1500 | 1387 | 0.28 | 1561 | 0.40 | 1711 | 0.53 | 1845 | 0.66 | 1967 | 0.80 |
| 1625 | 1473 | 0.34 | 1638 | 0.46 | 1784 | 0.60 | 1914 | 0.74 | 2034 | 0.89 |
| 1750 | 1561 | 0.40 | 1718 | 0.54 | 1859 | 0.68 | 1987 | 0.83 | 2103 | 0.98 |
| 1875 | 1650 | 0.47 | 1798 | 0.61 | 1935 | 0.77 | 2060 | 0.92 | 2174 | 1.08 |
| 2000 | 1741 | 0.56 | 1880 | 0.70 | 2012 | 0.86 | 2134 | 1.03 | 2246 | 1.20 |
| 2125 | 1832 | 0.65 | 1965 | 0.80 | 2092 | 0.97 | 2210 | 1.14 | 2320 | 1.32 |
| 2250 | 1925 | 0.75 | 2050 | 0.91 | 2172 | 1.08 | 2287 | 1.26 | 2394 | 1.45 |
| 2375 | 2018 | 0.87 | 2137 | 1.03 | 2254 | 1.21 | 2365 | 1.40 | 2470 | 1.59 |
| 2500 | 2113 | 1.00 | 2225 | 1.16 | 2337 | 1.35 | 2444 | 1.54 | 2547 | 1.75 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1500 | 2079 | 0.95 | 2185 | 1.10 | 2285 | 1.26 | 2381 | 1.43 | 2473 | 1.60 |
| 1625 | 2145 | 1.04 | 2249 | 1.20 | 2347 | 1.37 | 2440 | 1.53 | 2530 | 1.71 |
| 1750 | 2212 | 1.14 | 2314 | 1.31 | 2410 | 1.48 | 2502 | 1.65 | 2590 | 1.84 |
| 1875 | 2280 | 1.25 | 2381 | 1.43 | 2476 | 1.60 | 2566 | 1.78 | 2653 | 1.97 |
| 2000 | 2351 | 1.37 | 2449 | 1.55 | 2543 | 1.74 | 2632 | 1.93 | — | — |
| 2125 | 2422 | 1.50 | 2519 | 1.69 | 2611 | 1.88 | — | — | — | — |
| 2250 | 2495 | 1.64 | 2591 | 1.84 | — | — | — | — | — | — |
| 2375 | 2569 | 1.79 | — | — | — | — | — | — | — | — |
| 2500 | 2644 | 1.95 | — | — | — | — | — | — | — | — |

Standard/Medium Static 1387-2390 rpm, 1.44 max bhp

High Static 1387-2660 rpm, 1.96 max bhp

### 48QE*M06 Single Phase — Standard/Medium Static — 5 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 1387 | 5.8 | 1561 | 6.5 | 1711 | 7.2 | 1845 | 7.7 | 1967 | 8.2 |
| 1625 | 1473 | 6.2 | 1638 | 6.9 | 1784 | 7.5 | 1914 | 8.0 | 2034 | 8.5 |
| 1750 | 1561 | 6.5 | 1718 | 7.2 | 1859 | 7.8 | 1987 | 8.3 | 2103 | 8.8 |
| 1875 | 1650 | 6.9 | 1798 | 7.5 | 1935 | 8.1 | 2060 | 8.6 | 2174 | 9.1 |
| 2000 | 1741 | 7.3 | 1880 | 7.9 | 2012 | 8.4 | 2134 | 8.9 | 2246 | 9.4 |
| 2125 | 1832 | 7.7 | 1965 | 8.2 | 2092 | 8.8 | 2210 | 9.2 | 2320 | 9.7 |
| 2250 | 1925 | 8.1 | 2050 | 8.6 | 2172 | 9.1 | 2287 | 9.6 | — | — |
| 2375 | 2018 | 8.4 | 2137 | 8.9 | 2254 | 9.4 | 2365 | 9.9 | — | — |
| 2500 | 2113 | 8.8 | 2225 | 9.3 | 2337 | 9.8 | — | — | — | — |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 2079 | 8.7 | 2185 | 9.1 | 2285 | 9.6 | 2381 | 10.0 | — | — |
| 1625 | 2145 | 9.0 | 2249 | 9.4 | 2347 | 9.8 | — | — | — | — |
| 1750 | 2212 | 9.3 | 2314 | 9.7 | — | — | — | — | — | — |
| 1875 | 2280 | 9.5 | 2381 | 10.0 | — | — | — | — | — | — |
| 2000 | 2351 | 9.8 | — | — | — | — | — | — | — | — |
| 2125 | — | — | — | — | — | — | — | — | — | — |
| 2250 | — | — | — | — | — | — | — | — | — | — |
| 2375 | — | — | — | — | — | — | — | — | — | — |
| 2500 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1387-2390 rpm

# APPENDIX C — FAN PERFORMANCE (cont)

## 48QE*M06 Single Phase — High Static — 5 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 1387 | 4.9 | 1561 | 5.5 | 1711 | 6.0 | 1845 | 6.5 | 1967 | 6.9 |
| 1625 | 1473 | 5.2 | 1638 | 5.8 | 1784 | 6.3 | 1914 | 6.7 | 2034 | 7.2 |
| 1750 | 1561 | 5.5 | 1718 | 6.1 | 1859 | 6.6 | 1987 | 7.0 | 2103 | 7.4 |
| 1875 | 1650 | 5.8 | 1798 | 6.3 | 1935 | 6.8 | 2060 | 7.3 | 2174 | 7.7 |
| 2000 | 1741 | 6.1 | 1880 | 6.6 | 2012 | 7.1 | 2134 | 7.5 | 2246 | 7.9 |
| 2125 | 1832 | 6.5 | 1965 | 6.9 | 2092 | 7.4 | 2210 | 7.8 | 2320 | 8.2 |
| 2250 | 1925 | 6.8 | 2050 | 7.2 | 2172 | 7.7 | 2287 | 8.1 | 2394 | 8.4 |
| 2375 | 2018 | 7.1 | 2137 | 7.5 | 2254 | 7.9 | 2365 | 8.3 | 2470 | 8.7 |
| 2500 | 2113 | 7.5 | 2225 | 7.8 | 2337 | 8.2 | 2444 | 8.6 | 2547 | 9.0 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 2079 | 7.3 | 2185 | 7.7 | 2285 | 8.1 | 2381 | 8.4 | 2473 | 8.7 |
| 1625 | 2145 | 7.6 | 2249 | 7.9 | 2347 | 8.3 | 2440 | 8.6 | 2530 | 8.9 |
| 1750 | 2212 | 7.8 | 2314 | 8.2 | 2410 | 8.5 | 2502 | 8.8 | 2590 | 9.1 |
| 1875 | 2280 | 8.0 | 2381 | 8.4 | 2476 | 8.7 | 2566 | 9.0 | 2653 | 9.4 |
| 2000 | 2351 | 8.3 | 2449 | 8.6 | 2543 | 9.0 | 2632 | 9.3 | — | — |
| 2125 | 2422 | 8.5 | 2519 | 8.9 | 2611 | 9.2 | — | — | — | — |
| 2250 | 2495 | 8.8 | 2591 | 9.1 | — | — | — | — | — | — |
| 2375 | 2569 | 9.1 | — | — | — | — | — | — | — | — |
| 2500 | 2644 | 9.3 | — | — | — | — | — | — | — | — |

High Static 1387-2660 rpm

# APPENDIX C — FAN PERFORMANCE (cont)

## 48QE*M06 Three Phase — 5 Ton Vertical Supply (rpm - bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1500 | 1387 | 0.28 | 1561 | 0.40 | 1711 | 0.53 | 1845 | 0.66 | 1967 | 0.80 |
| 1625 | 1473 | 0.34 | 1638 | 0.46 | 1784 | 0.60 | 1914 | 0.74 | 2034 | 0.89 |
| 1750 | 1561 | 0.40 | 1718 | 0.54 | 1859 | 0.68 | 1987 | 0.83 | 2103 | 0.98 |
| 1875 | 1650 | 0.47 | 1798 | 0.61 | 1935 | 0.77 | 2060 | 0.92 | 2174 | 1.08 |
| 2000 | 1741 | 0.56 | 1880 | 0.70 | 2012 | 0.86 | 2134 | 1.03 | 2246 | 1.20 |
| 2125 | 1832 | 0.65 | 1965 | 0.80 | 2092 | 0.97 | 2210 | 1.14 | 2320 | 1.32 |
| 2250 | 1925 | 0.75 | 2050 | 0.91 | 2172 | 1.08 | 2287 | 1.26 | 2394 | 1.45 |
| 2375 | 2018 | 0.87 | 2137 | 1.03 | 2254 | 1.21 | 2365 | 1.40 | 2470 | 1.59 |
| 2500 | 2113 | 1.00 | 2225 | 1.16 | 2337 | 1.35 | 2444 | 1.54 | 2547 | 1.75 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1500 | 2079 | 0.95 | 2185 | 1.10 | 2285 | 1.26 | 2381 | 1.43 | 2473 | 1.60 |
| 1625 | 2145 | 1.04 | 2249 | 1.20 | 2347 | 1.37 | 2440 | 1.53 | 2530 | 1.71 |
| 1750 | 2212 | 1.14 | 2314 | 1.31 | 2410 | 1.48 | 2502 | 1.65 | 2590 | 1.84 |
| 1875 | 2280 | 1.25 | 2381 | 1.43 | 2476 | 1.60 | 2566 | 1.78 | 2653 | 1.97 |
| 2000 | 2351 | 1.37 | 2449 | 1.55 | 2543 | 1.74 | 2632 | 1.93 | 2717 | 2.12 |
| 2125 | 2422 | 1.50 | 2519 | 1.69 | 2611 | 1.88 | 2699 | 2.08 | 2783 | 2.28 |
| 2250 | 2495 | 1.64 | 2591 | 1.84 | 2681 | 2.04 | 2767 | 2.24 | — | — |
| 2375 | 2569 | 1.79 | 2663 | 2.00 | 2752 | 2.20 | — | — | — | — |
| 2500 | 2644 | 1.95 | 2736 | 2.17 | 2824 | 2.38 | — | — | — | — |

Standard/Medium Static 1387-2390 rpm, 1.44 max bhp

High Static 1387-2836 rpm, 2.43 max bhp

## 48QE*M06 Three Phase — Standard/Medium Static — 5 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 1387 | 5.8 | 1561 | 6.5 | 1711 | 7.2 | 1845 | 7.7 | 1967 | 8.2 |
| 1625 | 1473 | 6.2 | 1638 | 6.9 | 1784 | 7.5 | 1914 | 8.0 | 2034 | 8.5 |
| 1750 | 1561 | 6.5 | 1718 | 7.2 | 1859 | 7.8 | 1987 | 8.3 | 2103 | 8.8 |
| 1875 | 1650 | 6.9 | 1798 | 7.5 | 1935 | 8.1 | 2060 | 8.6 | 2174 | 9.1 |
| 2000 | 1741 | 7.3 | 1880 | 7.9 | 2012 | 8.4 | 2134 | 8.9 | 2246 | 9.4 |
| 2125 | 1832 | 7.7 | 1965 | 8.2 | 2092 | 8.8 | 2210 | 9.2 | 2320 | 9.7 |
| 2250 | 1925 | 8.1 | 2050 | 8.6 | 2172 | 9.1 | 2287 | 9.6 | — | — |
| 2375 | 2018 | 8.4 | 2137 | 8.9 | 2254 | 9.4 | 2365 | 9.9 | — | — |
| 2500 | 2113 | 8.8 | 2225 | 9.3 | 2337 | 9.8 | — | — | — | — |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 2079 | 8.7 | 2185 | 9.1 | 2285 | 9.6 | 2381 | 10.0 | — | — |
| 1625 | 2145 | 9.0 | 2249 | 9.4 | 2347 | 9.8 | — | — | — | — |
| 1750 | 2212 | 9.3 | 2314 | 9.7 | — | — | — | — | — | — |
| 1875 | 2280 | 9.5 | 2381 | 10.0 | — | — | — | — | — | — |
| 2000 | 2351 | 9.8 | — | — | — | — | — | — | — | — |
| 2125 | — | — | — | — | — | — | — | — | — | — |
| 2250 | — | — | — | — | — | — | — | — | — | — |
| 2375 | — | — | — | — | — | — | — | — | — | — |
| 2500 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1387-2390 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M06 Three Phase — High Static — 5 Ton Vertical Supply (rpm - vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 1387 | 4.9 | 1561 | 5.5 | 1711 | 6.0 | 1845 | 6.5 | 1967 | 6.9 |
| 1625 | 1473 | 5.2 | 1638 | 5.8 | 1784 | 6.3 | 1914 | 6.7 | 2034 | 7.2 |
| 1750 | 1561 | 5.5 | 1718 | 6.1 | 1859 | 6.6 | 1987 | 7.0 | 2103 | 7.4 |
| 1875 | 1650 | 5.8 | 1798 | 6.3 | 1935 | 6.8 | 2060 | 7.3 | 2174 | 7.7 |
| 2000 | 1741 | 6.1 | 1880 | 6.6 | 2012 | 7.1 | 2134 | 7.5 | 2246 | 7.9 |
| 2125 | 1832 | 6.5 | 1965 | 6.9 | 2092 | 7.4 | 2210 | 7.8 | 2320 | 8.2 |
| 2250 | 1925 | 6.8 | 2050 | 7.2 | 2172 | 7.7 | 2287 | 8.1 | 2394 | 8.4 |
| 2375 | 2018 | 7.1 | 2137 | 7.5 | 2254 | 7.9 | 2365 | 8.3 | 2470 | 8.7 |
| 2500 | 2113 | 7.5 | 2225 | 7.8 | 2337 | 8.2 | 2444 | 8.6 | 2547 | 9.0 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 2079 | 7.3 | 2185 | 7.7 | 2285 | 8.1 | 2381 | 8.4 | 2473 | 8.7 |
| 1625 | 2145 | 7.6 | 2249 | 7.9 | 2347 | 8.3 | 2440 | 8.6 | 2530 | 8.9 |
| 1750 | 2212 | 7.8 | 2314 | 8.2 | 2410 | 8.5 | 2502 | 8.8 | 2590 | 9.1 |
| 1875 | 2280 | 8.0 | 2381 | 8.4 | 2476 | 8.7 | 2566 | 9.0 | 2653 | 9.4 |
| 2000 | 2351 | 8.3 | 2449 | 8.6 | 2543 | 9.0 | 2632 | 9.3 | 2717 | 9.6 |
| 2125 | 2422 | 8.5 | 2519 | 8.9 | 2611 | 9.2 | 2699 | 9.5 | 2783 | 9.8 |
| 2250 | 2495 | 8.8 | 2591 | 9.1 | 2681 | 9.5 | 2767 | 9.8 | — | — |
| 2375 | 2569 | 9.1 | 2663 | 9.4 | 2752 | 9.7 | — | — | — | — |
| 2500 | 2644 | 9.3 | 2736 | 9.6 | 2824 | 10.0 | — | — | — | — |

High Static 1387-2836 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M04 Single Phase — 3 Ton Horizontal Supply (rpm — bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 900 | 1060 | 0.08 | 1292 | 0.15 | 1483 | 0.23 | 1650 | 0.31 | 1798 | 0.40 |
| 975 | 1106 | 0.09 | 1331 | 0.16 | 1519 | 0.24 | 1683 | 0.33 | 1831 | 0.43 |
| 1050 | 1154 | 0.11 | 1371 | 0.18 | 1556 | 0.26 | 1718 | 0.35 | 1864 | 0.45 |
| 1125 | 1204 | 0.12 | 1413 | 0.20 | 1594 | 0.28 | 1753 | 0.38 | 1898 | 0.48 |
| 1200 | 1255 | 0.14 | 1456 | 0.21 | 1633 | 0.30 | 1790 | 0.40 | 1933 | 0.50 |
| 1275 | 1308 | 0.16 | 1500 | 0.24 | 1673 | 0.33 | 1828 | 0.43 | 1969 | 0.53 |
| 1350 | 1361 | 0.18 | 1546 | 0.26 | 1715 | 0.35 | 1867 | 0.45 | 2006 | 0.56 |
| 1425 | 1416 | 0.20 | 1594 | 0.28 | 1757 | 0.38 | 1907 | 0.48 | 2043 | 0.59 |
| 1500 | 1472 | 0.22 | 1642 | 0.31 | 1801 | 0.41 | 1947 | 0.51 | 2082 | 0.63 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 900 | 1933 | 0.50 | 2058 | 0.61 | 2175 | 0.72 | 2285 | 0.83 | 2390 | 0.95 |
| 975 | 1965 | 0.53 | 2089 | 0.63 | 2206 | 0.75 | 2315 | 0.86 | 2419 | 0.99 |
| 1050 | 1998 | 0.56 | 2121 | 0.66 | 2237 | 0.78 | 2346 | 0.90 | 2450 | 1.02 |
| 1125 | 2030 | 0.58 | 2154 | 0.70 | 2269 | 0.81 | 2377 | 0.94 | 2480 | 1.06 |
| 1200 | 2064 | 0.61 | 2186 | 0.73 | 2301 | 0.85 | 2409 | 0.97 | — | — |
| 1275 | 2099 | 0.64 | 2220 | 0.76 | 2333 | 0.88 | 2441 | 1.01 | — | — |
| 1350 | 2134 | 0.68 | 2254 | 0.80 | 2367 | 0.92 | 2474 | 1.05 | — | — |
| 1425 | 2170 | 0.71 | 2289 | 0.84 | 2401 | 0.96 | — | — | — | — |
| 1500 | 2208 | 0.75 | 2325 | 0.88 | 2436 | 1.01 | — | — | — | — |

Standard/Medium Static 1060-2190 rpm, 0.71 max bhp

High Static 1060-2490 rpm, 1.07 max bhp

### 48QE*M04 Single Phase — Standard/Medium Static — 3 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1060 | 4.8 | 1292 | 5.9 | 1483 | 6.8 | 1650 | 7.5 | 1798 | 8.2 |
| 975 | 1106 | 5.1 | 1331 | 6.1 | 1519 | 6.9 | 1683 | 7.7 | 1831 | 8.4 |
| 1050 | 1154 | 5.3 | 1371 | 6.3 | 1556 | 7.1 | 1718 | 7.8 | 1864 | 8.5 |
| 1125 | 1204 | 5.5 | 1413 | 6.5 | 1594 | 7.3 | 1753 | 8.0 | 1898 | 8.7 |
| 1200 | 1255 | 5.7 | 1456 | 6.6 | 1633 | 7.5 | 1790 | 8.2 | 1933 | 8.8 |
| 1275 | 1308 | 6.0 | 1500 | 6.8 | 1673 | 7.6 | 1828 | 8.3 | 1969 | 9.0 |
| 1350 | 1361 | 6.2 | 1546 | 7.1 | 1715 | 7.8 | 1867 | 8.5 | 2006 | 9.2 |
| 1425 | 1416 | 6.5 | 1594 | 7.3 | 1757 | 8.0 | 1907 | 8.7 | 2043 | 9.3 |
| 1500 | 1472 | 6.7 | 1642 | 7.5 | 1801 | 8.2 | 1947 | 8.9 | 2082 | 9.5 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1933 | 8.8 | 2058 | 9.4 | 2175 | 9.9 | — | — | — | — |
| 975 | 1965 | 9.0 | 2089 | 9.5 | — | — | — | — | — | — |
| 1050 | 1998 | 9.1 | 2121 | 9.7 | — | — | — | — | — | — |
| 1125 | 2030 | 9.3 | 2154 | 9.8 | — | — | — | — | — | — |
| 1200 | 2064 | 9.4 | 2186 | 10.0 | — | — | — | — | — | — |
| 1275 | 2099 | 9.6 | — | — | — | — | — | — | — | — |
| 1350 | 2134 | 9.7 | — | — | — | — | — | — | — | — |
| 1425 | 2170 | 9.9 | — | — | — | — | — | — | — | — |
| 1500 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1060-2190 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M04 Single Phase — High Static — 3 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1060 | 4.3 | 1292 | 5.2 | 1483 | 6.0 | 1650 | 6.6 | 1798 | 7.2 |
| 975 | 1106 | 4.4 | 1331 | 5.3 | 1519 | 6.1 | 1683 | 6.8 | 1831 | 7.4 |
| 1050 | 1154 | 4.6 | 1371 | 5.5 | 1556 | 6.2 | 1718 | 6.9 | 1864 | 7.5 |
| 1125 | 1204 | 4.8 | 1413 | 5.7 | 1594 | 6.4 | 1753 | 7.0 | 1898 | 7.6 |
| 1200 | 1255 | 5.0 | 1456 | 5.8 | 1633 | 6.6 | 1790 | 7.2 | 1933 | 7.8 |
| 1275 | 1308 | 5.3 | 1500 | 6.0 | 1673 | 6.7 | 1828 | 7.3 | 1969 | 7.9 |
| 1350 | 1361 | 5.5 | 1546 | 6.2 | 1715 | 6.9 | 1867 | 7.5 | 2006 | 8.1 |
| 1425 | 1416 | 5.7 | 1594 | 6.4 | 1757 | 7.1 | 1907 | 7.7 | 2043 | 8.2 |
| 1500 | 1472 | 5.9 | 1642 | 6.6 | 1801 | 7.2 | 1947 | 7.8 | 2082 | 8.4 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1933 | 7.8 | 2058 | 8.3 | 2175 | 8.7 | 2285 | 9.2 | 2390 | 9.6 |
| 975 | 1965 | 7.9 | 2089 | 8.4 | 2206 | 8.9 | 2315 | 9.3 | 2419 | 9.7 |
| 1050 | 1998 | 8.0 | 2121 | 8.5 | 2237 | 9.0 | 2346 | 9.4 | 2450 | 9.8 |
| 1125 | 2030 | 8.2 | 2154 | 8.7 | 2269 | 9.1 | 2377 | 9.5 | 2480 | 10.0 |
| 1200 | 2064 | 8.3 | 2186 | 8.8 | 2301 | 9.2 | 2409 | 9.7 | — | — |
| 1275 | 2099 | 8.4 | 2220 | 8.9 | 2333 | 9.4 | 2441 | 9.8 | — | — |
| 1350 | 2134 | 8.6 | 2254 | 9.1 | 2367 | 9.5 | 2474 | 9.9 | — | — |
| 1425 | 2170 | 8.7 | 2289 | 9.2 | 2401 | 9.6 | — | — | — | — |
| 1500 | 2208 | 8.9 | 2325 | 9.3 | 2436 | 9.8 | — | — | — | — |

High Static 1060-2490 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M04 Three Phase — 3 Ton Horizontal Supply (rpm — bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 900 | 1060 | 0.08 | 1292 | 0.15 | 1483 | 0.23 | 1650 | 0.31 | 1798 | 0.40 |
| 975 | 1106 | 0.09 | 1331 | 0.16 | 1519 | 0.24 | 1683 | 0.33 | 1831 | 0.43 |
| 1050 | 1154 | 0.11 | 1371 | 0.18 | 1556 | 0.26 | 1718 | 0.35 | 1864 | 0.45 |
| 1125 | 1204 | 0.12 | 1413 | 0.20 | 1594 | 0.28 | 1753 | 0.38 | 1898 | 0.48 |
| 1200 | 1255 | 0.14 | 1456 | 0.21 | 1633 | 0.30 | 1790 | 0.40 | 1933 | 0.50 |
| 1275 | 1308 | 0.16 | 1500 | 0.24 | 1673 | 0.33 | 1828 | 0.43 | 1969 | 0.53 |
| 1350 | 1361 | 0.18 | 1546 | 0.26 | 1715 | 0.35 | 1867 | 0.45 | 2006 | 0.56 |
| 1425 | 1416 | 0.20 | 1594 | 0.28 | 1757 | 0.38 | 1907 | 0.48 | 2043 | 0.59 |
| 1500 | 1472 | 0.22 | 1642 | 0.31 | 1801 | 0.41 | 1947 | 0.51 | 2082 | 0.63 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 900 | 1933 | 0.50 | 2058 | 0.61 | 2175 | 0.72 | 2285 | 0.83 | 2390 | 0.95 |
| 975 | 1965 | 0.53 | 2089 | 0.63 | 2206 | 0.75 | 2315 | 0.86 | 2419 | 0.99 |
| 1050 | 1998 | 0.56 | 2121 | 0.66 | 2237 | 0.78 | 2346 | 0.90 | 2450 | 1.02 |
| 1125 | 2030 | 0.58 | 2154 | 0.70 | 2269 | 0.81 | 2377 | 0.94 | 2480 | 1.06 |
| 1200 | 2064 | 0.61 | 2186 | 0.73 | 2301 | 0.85 | 2409 | 0.97 | — | — |
| 1275 | 2099 | 0.64 | 2220 | 0.76 | 2333 | 0.88 | 2441 | 1.01 | — | — |
| 1350 | 2134 | 0.68 | 2254 | 0.80 | 2367 | 0.92 | 2474 | 1.05 | — | — |
| 1425 | 2170 | 0.71 | 2289 | 0.84 | 2401 | 0.96 | — | — | — | — |
| 1500 | 2208 | 0.75 | 2325 | 0.88 | 2436 | 1.01 | — | — | — | — |

Standard/Medium Static 1060-2190 rpm, 0.71 max bhp

High Static 1060-2490 rpm, 1.07 max bhp

### 48QE*M04 Three Phase — Standard/Medium Static — 3 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1060 | 4.8 | 1292 | 5.9 | 1483 | 6.8 | 1650 | 7.5 | 1798 | 8.2 |
| 975 | 1106 | 5.1 | 1331 | 6.1 | 1519 | 6.9 | 1683 | 7.7 | 1831 | 8.4 |
| 1050 | 1154 | 5.3 | 1371 | 6.3 | 1556 | 7.1 | 1718 | 7.8 | 1864 | 8.5 |
| 1125 | 1204 | 5.5 | 1413 | 6.5 | 1594 | 7.3 | 1753 | 8.0 | 1898 | 8.7 |
| 1200 | 1255 | 5.7 | 1456 | 6.6 | 1633 | 7.5 | 1790 | 8.2 | 1933 | 8.8 |
| 1275 | 1308 | 6.0 | 1500 | 6.8 | 1673 | 7.6 | 1828 | 8.3 | 1969 | 9.0 |
| 1350 | 1361 | 6.2 | 1546 | 7.1 | 1715 | 7.8 | 1867 | 8.5 | 2006 | 9.2 |
| 1425 | 1416 | 6.5 | 1594 | 7.3 | 1757 | 8.0 | 1907 | 8.7 | 2043 | 9.3 |
| 1500 | 1472 | 6.7 | 1642 | 7.5 | 1801 | 8.2 | 1947 | 8.9 | 2082 | 9.5 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1933 | 8.8 | 2058 | 9.4 | 2175 | 9.9 | — | — | — | — |
| 975 | 1965 | 9.0 | 2089 | 9.5 | — | — | — | — | — | — |
| 1050 | 1998 | 9.1 | 2121 | 9.7 | — | — | — | — | — | — |
| 1125 | 2030 | 9.3 | 2154 | 9.8 | — | — | — | — | — | — |
| 1200 | 2064 | 9.4 | 2186 | 10.0 | — | — | — | — | — | — |
| 1275 | 2099 | 9.6 | — | — | — | — | — | — | — | — |
| 1350 | 2134 | 9.7 | — | — | — | — | — | — | — | — |
| 1425 | 2170 | 9.9 | — | — | — | — | — | — | — | — |
| 1500 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1060-2190 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M04 Three Phase — High Static — 3 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1060 | 4.3 | 1292 | 5.2 | 1483 | 6.0 | 1650 | 6.6 | 1798 | 7.2 |
| 975 | 1106 | 4.4 | 1331 | 5.3 | 1519 | 6.1 | 1683 | 6.8 | 1831 | 7.4 |
| 1050 | 1154 | 4.6 | 1371 | 5.5 | 1556 | 6.2 | 1718 | 6.9 | 1864 | 7.5 |
| 1125 | 1204 | 4.8 | 1413 | 5.7 | 1594 | 6.4 | 1753 | 7.0 | 1898 | 7.6 |
| 1200 | 1255 | 5.0 | 1456 | 5.8 | 1633 | 6.6 | 1790 | 7.2 | 1933 | 7.8 |
| 1275 | 1308 | 5.3 | 1500 | 6.0 | 1673 | 6.7 | 1828 | 7.3 | 1969 | 7.9 |
| 1350 | 1361 | 5.5 | 1546 | 6.2 | 1715 | 6.9 | 1867 | 7.5 | 2006 | 8.1 |
| 1425 | 1416 | 5.7 | 1594 | 6.4 | 1757 | 7.1 | 1907 | 7.7 | 2043 | 8.2 |
| 1500 | 1472 | 5.9 | 1642 | 6.6 | 1801 | 7.2 | 1947 | 7.8 | 2082 | 8.4 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1933 | 7.8 | 2058 | 8.3 | 2175 | 8.7 | 2285 | 9.2 | 2390 | 9.6 |
| 975 | 1965 | 7.9 | 2089 | 8.4 | 2206 | 8.9 | 2315 | 9.3 | 2419 | 9.7 |
| 1050 | 1998 | 8.0 | 2121 | 8.5 | 2237 | 9.0 | 2346 | 9.4 | 2450 | 9.8 |
| 1125 | 2030 | 8.2 | 2154 | 8.7 | 2269 | 9.1 | 2377 | 9.5 | 2480 | 10.0 |
| 1200 | 2064 | 8.3 | 2186 | 8.8 | 2301 | 9.2 | 2409 | 9.7 | — | — |
| 1275 | 2099 | 8.4 | 2220 | 8.9 | 2333 | 9.4 | 2441 | 9.8 | — | — |
| 1350 | 2134 | 8.6 | 2254 | 9.1 | 2367 | 9.5 | 2474 | 9.9 | — | — |
| 1425 | 2170 | 8.7 | 2289 | 9.2 | 2401 | 9.6 | — | — | — | — |
| 1500 | 2208 | 8.9 | 2325 | 9.3 | 2436 | 9.8 | — | — | — | — |

High Static 1060-2490 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M05 Single Phase — 4 Ton Horizontal Supply (rpm — bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1200 | 1148 | 0.16 | 1343 | 0.26 | 1507 | 0.37 | 1651 | 0.48 | 1781 | 0.60 |
| 1300 | 1209 | 0.19 | 1397 | 0.29 | 1557 | 0.40 | 1698 | 0.52 | 1826 | 0.65 |
| 1400 | 1271 | 0.22 | 1452 | 0.33 | 1608 | 0.44 | 1747 | 0.57 | 1873 | 0.70 |
| 1500 | 1335 | 0.25 | 1508 | 0.36 | 1661 | 0.49 | 1797 | 0.62 | 1921 | 0.75 |
| 1600 | 1401 | 0.29 | 1565 | 0.41 | 1714 | 0.53 | 1848 | 0.67 | 1971 | 0.81 |
| 1700 | 1468 | 0.33 | 1624 | 0.45 | 1769 | 0.59 | 1900 | 0.73 | 2020 | 0.87 |
| 1800 | 1537 | 0.38 | 1685 | 0.51 | 1825 | 0.64 | 1953 | 0.79 | 2072 | 0.94 |
| 1900 | 1606 | 0.44 | 1747 | 0.56 | 1882 | 0.70 | 2008 | 0.85 | 2124 | 1.01 |
| 2000 | 1676 | 0.50 | 1810 | 0.63 | 1940 | 0.77 | 2063 | 0.93 | 2177 | 1.09 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1200 | 1902 | 0.73 | 2015 | 0.87 | 2122 | 1.02 | 2223 | 1.17 | 2320 | 1.33 |
| 1300 | 1945 | 0.78 | 2056 | 0.93 | 2161 | 1.07 | 2261 | 1.23 | 2356 | 1.39 |
| 1400 | 1990 | 0.84 | 2099 | 0.98 | 2202 | 1.13 | 2300 | 1.29 | 2395 | 1.46 |
| 1500 | 2036 | 0.89 | 2143 | 1.04 | 2245 | 1.20 | 2342 | 1.36 | 2435 | 1.53 |
| 1600 | 2084 | 0.96 | 2190 | 1.11 | 2290 | 1.27 | 2385 | 1.44 | — | — |
| 1700 | 2132 | 1.02 | 2237 | 1.18 | 2336 | 1.35 | 2430 | 1.52 | — | — |
| 1800 | 2182 | 1.10 | 2285 | 1.26 | 2383 | 1.43 | — | — | — | — |
| 1900 | 2232 | 1.17 | 2334 | 1.34 | 2431 | 1.52 | — | — | — | — |
| 2000 | 2284 | 1.26 | 2385 | 1.43 | — | — | — | — | — | — |

Standard/Medium Static 1148-2170 rpm, 1.06 max bhp

High Static 1148-2460 rpm, 1.53 max bhp

### 48QE*M05 Single Phase — Standard/Medium Static — 4 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1148 | 5.3 | 1343 | 6.2 | 1507 | 6.9 | 1651 | 7.6 | 1781 | 8.2 |
| 1300 | 1209 | 5.6 | 1397 | 6.4 | 1557 | 7.2 | 1698 | 7.8 | 1826 | 8.4 |
| 1400 | 1271 | 5.9 | 1452 | 6.7 | 1608 | 7.4 | 1747 | 8.1 | 1873 | 8.6 |
| 1500 | 1335 | 6.2 | 1508 | 6.9 | 1661 | 7.7 | 1797 | 8.3 | 1921 | 8.9 |
| 1600 | 1401 | 6.5 | 1565 | 7.2 | 1714 | 7.9 | 1848 | 8.5 | 1971 | 9.1 |
| 1700 | 1468 | 6.8 | 1624 | 7.5 | 1769 | 8.2 | 1900 | 8.8 | 2020 | 9.3 |
| 1800 | 1537 | 7.1 | 1685 | 7.8 | 1825 | 8.4 | 1953 | 9.0 | 2072 | 9.5 |
| 1900 | 1606 | 7.4 | 1747 | 8.1 | 1882 | 8.7 | 2008 | 9.3 | 2124 | 9.8 |
| 2000 | 1676 | 7.7 | 1810 | 8.3 | 1940 | 8.9 | 2063 | 9.5 | — | — |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 900 | 1902 | 8.8 | 2015 | 9.3 | 2122 | 9.8 | — | — | — | — |
| 975 | 1945 | 9.0 | 2056 | 9.5 | 2161 | 10.0 | — | — | — | — |
| 1050 | 1990 | 9.2 | 2099 | 9.7 | — | — | — | — | — | — |
| 1125 | 2036 | 9.4 | 2143 | 9.9 | — | — | — | — | — | — |
| 1200 | 2084 | 9.6 | — | — | — | — | — | — | — | — |
| 1275 | 2132 | 9.8 | — | — | — | — | — | — | — | — |
| 1350 | — | — | — | — | — | — | — | — | — | — |
| 1425 | — | — | — | — | — | — | — | — | — | — |
| 1500 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1148-2170 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M05 Single Phase — High Static — 4 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1148 | 4.3 | 1343 | 5.0 | 1507 | 5.7 | 1651 | 6.2 | 1781 | 6.7 |
| 1300 | 1209 | 4.5 | 1397 | 5.3 | 1557 | 5.9 | 1698 | 6.4 | 1826 | 6.9 |
| 1400 | 1271 | 4.8 | 1452 | 5.5 | 1608 | 6.0 | 1747 | 6.6 | 1873 | 7.0 |
| 1500 | 1335 | 5.0 | 1508 | 5.7 | 1661 | 6.2 | 1797 | 6.8 | 1921 | 7.2 |
| 1600 | 1401 | 5.3 | 1565 | 5.9 | 1714 | 6.4 | 1848 | 6.9 | 1971 | 7.4 |
| 1700 | 1468 | 5.5 | 1624 | 6.1 | 1769 | 6.7 | 1900 | 7.1 | 2020 | 7.6 |
| 1800 | 1537 | 5.8 | 1685 | 6.3 | 1825 | 6.9 | 1953 | 7.3 | 2072 | 7.8 |
| 1900 | 1606 | 6.0 | 1747 | 6.6 | 1882 | 7.1 | 2008 | 7.5 | 2124 | 8.0 |
| 2000 | 1676 | 6.3 | 1810 | 6.8 | 1940 | 7.3 | 2063 | 7.8 | 2177 | 8.2 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1902 | 7.2 | 2015 | 7.6 | 2122 | 8.0 | 2223 | 8.4 | 2320 | 8.7 |
| 1300 | 1945 | 7.3 | 2056 | 7.7 | 2161 | 8.1 | 2261 | 8.5 | 2356 | 8.9 |
| 1400 | 1990 | 7.5 | 2099 | 7.9 | 2202 | 8.3 | 2300 | 8.6 | 2395 | 9.0 |
| 1500 | 2036 | 7.7 | 2143 | 8.1 | 2245 | 8.4 | 2342 | 8.8 | 2435 | 9.2 |
| 1600 | 2084 | 7.8 | 2190 | 8.2 | 2290 | 8.6 | 2385 | 9.0 | — | — |
| 1700 | 2132 | 8.0 | 2237 | 8.4 | 2336 | 8.8 | 2430 | 9.1 | — | — |
| 1800 | 2182 | 8.2 | 2285 | 8.6 | 2383 | 9.0 | — | — | — | — |
| 1900 | 2232 | 8.4 | 2334 | 8.8 | 2431 | 9.1 | — | — | — | — |
| 2000 | 2284 | 8.6 | 2385 | 9.0 | — | — | — | — | — | — |

High Static 1148-2460 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M05 Three Phase — 4 Ton Horizontal Supply (rpm — bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1200 | 1148 | 0.16 | 1343 | 0.26 | 1507 | 0.37 | 1651 | 0.48 | 1781 | 0.60 |
| 1300 | 1209 | 0.19 | 1397 | 0.29 | 1557 | 0.40 | 1698 | 0.52 | 1826 | 0.65 |
| 1400 | 1271 | 0.22 | 1452 | 0.33 | 1608 | 0.44 | 1747 | 0.57 | 1873 | 0.70 |
| 1500 | 1335 | 0.25 | 1508 | 0.36 | 1661 | 0.49 | 1797 | 0.62 | 1921 | 0.75 |
| 1600 | 1401 | 0.29 | 1565 | 0.41 | 1714 | 0.53 | 1848 | 0.67 | 1971 | 0.81 |
| 1700 | 1468 | 0.33 | 1624 | 0.45 | 1769 | 0.59 | 1900 | 0.73 | 2020 | 0.87 |
| 1800 | 1537 | 0.38 | 1685 | 0.51 | 1825 | 0.64 | 1953 | 0.79 | 2072 | 0.94 |
| 1900 | 1606 | 0.44 | 1747 | 0.56 | 1882 | 0.70 | 2008 | 0.85 | 2124 | 1.01 |
| 2000 | 1676 | 0.50 | 1810 | 0.63 | 1940 | 0.77 | 2063 | 0.93 | 2177 | 1.09 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1200 | 1902 | 0.73 | 2015 | 0.87 | 2122 | 1.02 | 2223 | 1.17 | 2320 | 1.33 |
| 1300 | 1945 | 0.78 | 2056 | 0.93 | 2161 | 1.07 | 2261 | 1.23 | 2356 | 1.39 |
| 1400 | 1990 | 0.84 | 2099 | 0.98 | 2202 | 1.13 | 2300 | 1.29 | 2395 | 1.46 |
| 1500 | 2036 | 0.89 | 2143 | 1.04 | 2245 | 1.20 | 2342 | 1.36 | 2435 | 1.53 |
| 1600 | 2084 | 0.96 | 2190 | 1.11 | 2290 | 1.27 | 2385 | 1.44 | 2477 | 1.61 |
| 1700 | 2132 | 1.02 | 2237 | 1.18 | 2336 | 1.35 | 2430 | 1.52 | 2520 | 1.69 |
| 1800 | 2182 | 1.10 | 2285 | 1.26 | 2383 | 1.43 | 2476 | 1.60 | 2565 | 1.78 |
| 1900 | 2232 | 1.17 | 2334 | 1.34 | 2431 | 1.52 | 2523 | 1.70 | 2611 | 1.88 |
| 2000 | 2284 | 1.26 | 2385 | 1.43 | 2480 | 1.61 | 2571 | 1.79 | 2658 | 1.98 |

Standard/Medium Static 1148-2170 rpm, 1.06 max bhp

High Static 1148-2660 rpm, 1.96 max bhp

### 48QE*M05 Three Phase — Standard/Medium Static — 4 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1148 | 5.3 | 1343 | 6.2 | 1507 | 6.9 | 1651 | 7.6 | 1781 | 8.2 |
| 1300 | 1209 | 5.6 | 1397 | 6.4 | 1557 | 7.2 | 1698 | 7.8 | 1826 | 8.4 |
| 1400 | 1271 | 5.9 | 1452 | 6.7 | 1608 | 7.4 | 1747 | 8.1 | 1873 | 8.6 |
| 1500 | 1335 | 6.2 | 1508 | 6.9 | 1661 | 7.7 | 1797 | 8.3 | 1921 | 8.9 |
| 1600 | 1401 | 6.5 | 1565 | 7.2 | 1714 | 7.9 | 1848 | 8.5 | 1971 | 9.1 |
| 1700 | 1468 | 6.8 | 1624 | 7.5 | 1769 | 8.2 | 1900 | 8.8 | 2020 | 9.3 |
| 1800 | 1537 | 7.1 | 1685 | 7.8 | 1825 | 8.4 | 1953 | 9.0 | 2072 | 9.5 |
| 1900 | 1606 | 7.4 | 1747 | 8.1 | 1882 | 8.7 | 2008 | 9.3 | 2124 | 9.8 |
| 2000 | 1676 | 7.7 | 1810 | 8.3 | 1940 | 8.9 | 2063 | 9.5 | — | — |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1902 | 8.8 | 2015 | 9.3 | 2122 | 9.8 | — | — | — | — |
| 1300 | 1945 | 9.0 | 2056 | 9.5 | 2161 | 10.0 | — | — | — | — |
| 1400 | 1990 | 9.2 | 2099 | 9.7 | — | — | — | — | — | — |
| 1500 | 2036 | 9.4 | 2143 | 9.9 | — | — | — | — | — | — |
| 1600 | 2084 | 9.6 | — | — | — | — | — | — | — | — |
| 1700 | 2132 | 9.8 | — | — | — | — | — | — | — | — |
| 1800 | — | — | — | — | — | — | — | — | — | — |
| 1900 | — | — | — | — | — | — | — | — | — | — |
| 2000 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1148-2170 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M05 Three Phase — High Static — 4 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1148 | 4.3 | 1343 | 5.0 | 1507 | 5.7 | 1651 | 6.2 | 1781 | 6.7 |
| 1300 | 1209 | 4.5 | 1397 | 5.3 | 1557 | 5.9 | 1698 | 6.4 | 1826 | 6.9 |
| 1400 | 1271 | 4.8 | 1452 | 5.5 | 1608 | 6.0 | 1747 | 6.6 | 1873 | 7.0 |
| 1500 | 1335 | 5.0 | 1508 | 5.7 | 1661 | 6.2 | 1797 | 6.8 | 1921 | 7.2 |
| 1600 | 1401 | 5.3 | 1565 | 5.9 | 1714 | 6.4 | 1848 | 6.9 | 1971 | 7.4 |
| 1700 | 1468 | 5.5 | 1624 | 6.1 | 1769 | 6.7 | 1900 | 7.1 | 2020 | 7.6 |
| 1800 | 1537 | 5.8 | 1685 | 6.3 | 1825 | 6.9 | 1953 | 7.3 | 2072 | 7.8 |
| 1900 | 1606 | 6.0 | 1747 | 6.6 | 1882 | 7.1 | 2008 | 7.5 | 2124 | 8.0 |
| 2000 | 1676 | 6.3 | 1810 | 6.8 | 1940 | 7.3 | 2063 | 7.8 | 2177 | 8.2 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1200 | 1902 | 7.2 | 2015 | 7.6 | 2122 | 8.0 | 2223 | 8.4 | 2320 | 8.7 |
| 1300 | 1945 | 7.3 | 2056 | 7.7 | 2161 | 8.1 | 2261 | 8.5 | 2356 | 8.9 |
| 1400 | 1990 | 7.5 | 2099 | 7.9 | 2202 | 8.3 | 2300 | 8.6 | 2395 | 9.0 |
| 1500 | 2036 | 7.7 | 2143 | 8.1 | 2245 | 8.4 | 2342 | 8.8 | 2435 | 9.2 |
| 1600 | 2084 | 7.8 | 2190 | 8.2 | 2290 | 8.6 | 2385 | 9.0 | 2477 | 9.3 |
| 1700 | 2132 | 8.0 | 2237 | 8.4 | 2336 | 8.8 | 2430 | 9.1 | 2520 | 9.5 |
| 1800 | 2182 | 8.2 | 2285 | 8.6 | 2383 | 9.0 | 2476 | 9.3 | 2565 | 9.6 |
| 1900 | 2232 | 8.4 | 2334 | 8.8 | 2431 | 9.1 | 2523 | 9.5 | 2611 | 9.8 |
| 2000 | 2284 | 8.6 | 2385 | 9.0 | 2480 | 9.3 | 2571 | 9.7 | 2658 | 10.0 |

High Static 1148-2660 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M06 Single Phase — 5 Ton Horizontal Supply (rpm — bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1500 | 1335 | 0.25 | 1507 | 0.36 | 1660 | 0.49 | 1797 | 0.62 | 1921 | 0.75 |
| 1625 | 1418 | 0.30 | 1580 | 0.42 | 1727 | 0.55 | 1861 | 0.68 | 1983 | 0.83 |
| 1750 | 1502 | 0.36 | 1655 | 0.48 | 1796 | 0.61 | 1926 | 0.76 | 2046 | 0.91 |
| 1875 | 1589 | 0.42 | 1731 | 0.55 | 1867 | 0.69 | 1994 | 0.84 | 2111 | 0.99 |
| 2000 | 1677 | 0.50 | 1810 | 0.63 | 1941 | 0.77 | 2063 | 0.93 | 2177 | 1.09 |
| 2125 | 1766 | 0.58 | 1891 | 0.71 | 2015 | 0.86 | 2133 | 1.02 | 2245 | 1.19 |
| 2250 | 1855 | 0.67 | 1973 | 0.81 | 2091 | 0.96 | 2206 | 1.13 | 2314 | 1.31 |
| 2375 | 1946 | 0.78 | 2057 | 0.92 | 2169 | 1.07 | 2280 | 1.25 | 2385 | 1.43 |
| 2500 | 2037 | 0.89 | 2142 | 1.03 | 2249 | 1.20 | 2355 | 1.37 | 2457 | 1.56 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1500 | 2036 | 0.89 | 2143 | 1.04 | 2245 | 1.20 | 2342 | 1.36 | 2435 | 1.53 |
| 1625 | 2096 | 0.97 | 2201 | 1.13 | 2301 | 1.29 | 2396 | 1.46 | 2488 | 1.63 |
| 1750 | 2157 | 1.06 | 2261 | 1.22 | 2359 | 1.39 | 2453 | 1.56 | 2542 | 1.74 |
| 1875 | 2220 | 1.16 | 2322 | 1.32 | 2419 | 1.49 | 2511 | 1.67 | 2599 | 1.85 |
| 2000 | 2284 | 1.26 | 2385 | 1.43 | 2480 | 1.61 | 2571 | 1.79 | 2658 | 1.98 |
| 2125 | 2350 | 1.37 | 2449 | 1.55 | 2543 | 1.73 | 2633 | 1.92 | — | — |
| 2250 | 2417 | 1.49 | 2514 | 1.67 | 2607 | 1.87 | — | — | — | — |
| 2375 | 2485 | 1.62 | 2581 | 1.81 | — | — | — | — | — | — |
| 2500 | 2555 | 1.76 | 2649 | 1.96 | — | — | — | — | — | — |

Standard/Medium Static 1335-2390 rpm, 1.44 max bhp

High Static 1335-2660 rpm, 1.96 max bhp

### 48QE*M06 Single Phase — Standard/Medium Static — 5 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 1335 | 5.6 | 1507 | 6.3 | 1660 | 6.9 | 1797 | 7.5 | 1921 | 8.0 |
| 1625 | 1418 | 5.9 | 1580 | 6.6 | 1727 | 7.2 | 1861 | 7.8 | 1983 | 8.3 |
| 1750 | 1502 | 6.3 | 1655 | 6.9 | 1796 | 7.5 | 1926 | 8.1 | 2046 | 8.6 |
| 1875 | 1589 | 6.6 | 1731 | 7.2 | 1867 | 7.8 | 1994 | 8.3 | 2111 | 8.8 |
| 2000 | 1677 | 7.0 | 1810 | 7.6 | 1941 | 8.1 | 2063 | 8.6 | 2177 | 9.1 |
| 2125 | 1766 | 7.4 | 1891 | 7.9 | 2015 | 8.4 | 2133 | 8.9 | 2245 | 9.4 |
| 2250 | 1855 | 7.8 | 1973 | 8.3 | 2091 | 8.7 | 2206 | 9.2 | 2314 | 9.7 |
| 2375 | 1946 | 8.1 | 2057 | 8.6 | 2169 | 9.1 | 2280 | 9.5 | 2385 | 10.0 |
| 2500 | 2037 | 8.5 | 2142 | 9.0 | 2249 | 9.4 | 2355 | 9.9 | — | — |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 2036 | 8.5 | 2143 | 9.0 | 2245 | 9.4 | 2342 | 9.8 | — | — |
| 1625 | 2096 | 8.8 | 2201 | 9.2 | 2301 | 9.6 | — | — | — | — |
| 1750 | 2157 | 9.0 | 2261 | 9.5 | 2359 | 9.9 | — | — | — | — |
| 1875 | 2220 | 9.3 | 2322 | 9.7 | — | — | — | — | — | — |
| 2000 | 2284 | 9.6 | 2385 | 10.0 | — | — | — | — | — | — |
| 2125 | 2350 | 9.8 | — | — | — | — | — | — | — | — |
| 2250 | — | — | — | — | — | — | — | — | — | — |
| 2375 | — | — | — | — | — | — | — | — | — | — |
| 2500 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1335-2390 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M06 Single Phase — High Static — 5 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 1335 | 4.7 | 1507 | 5.3 | 1660 | 5.9 | 1797 | 6.3 | 1921 | 6.8 |
| 1625 | 1418 | 5.0 | 1580 | 5.6 | 1727 | 6.1 | 1861 | 6.6 | 1983 | 7.0 |
| 1750 | 1502 | 5.3 | 1655 | 5.8 | 1796 | 6.3 | 1926 | 6.8 | 2046 | 7.2 |
| 1875 | 1589 | 5.6 | 1731 | 6.1 | 1867 | 6.6 | 1994 | 7.0 | 2111 | 7.4 |
| 2000 | 1677 | 5.9 | 1810 | 6.4 | 1941 | 6.8 | 2063 | 7.3 | 2177 | 7.7 |
| 2125 | 1766 | 6.2 | 1891 | 6.7 | 2015 | 7.1 | 2133 | 7.5 | 2245 | 7.9 |
| 2250 | 1855 | 6.5 | 1973 | 7.0 | 2091 | 7.4 | 2206 | 7.8 | 2314 | 8.2 |
| 2375 | 1946 | 6.9 | 2057 | 7.3 | 2169 | 7.6 | 2280 | 8.0 | 2385 | 8.4 |
| 2500 | 2037 | 7.2 | 2142 | 7.6 | 2249 | 7.9 | 2355 | 8.3 | 2457 | 8.7 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 2036 | 7.2 | 2143 | 7.6 | 2245 | 7.9 | 2342 | 8.3 | 2435 | 8.6 |
| 1625 | 2096 | 7.4 | 2201 | 7.8 | 2301 | 8.1 | 2396 | 8.4 | 2488 | 8.8 |
| 1750 | 2157 | 7.6 | 2261 | 8.0 | 2359 | 8.3 | 2453 | 8.6 | 2542 | 9.0 |
| 1875 | 2220 | 7.8 | 2322 | 8.2 | 2419 | 8.5 | 2511 | 8.9 | 2599 | 9.2 |
| 2000 | 2284 | 8.1 | 2385 | 8.4 | 2480 | 8.7 | 2571 | 9.1 | 2658 | 9.4 |
| 2125 | 2350 | 8.3 | 2449 | 8.6 | 2543 | 9.0 | 2633 | 9.3 | — | — |
| 2250 | 2417 | 8.5 | 2514 | 8.9 | 2607 | 9.2 | — | — | — | — |
| 2375 | 2485 | 8.8 | 2581 | 9.1 | — | — | — | — | — | — |
| 2500 | 2555 | 9.0 | 2649 | 9.3 | — | — | — | — | — | — |

High Static 1335-2660 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M06 Three Phase — 5 Ton Horizontal Supply (rpm — bhp)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1500 | 1335 | 0.25 | 1507 | 0.36 | 1660 | 0.49 | 1797 | 0.62 | 1921 | 0.75 |
| 1625 | 1418 | 0.30 | 1580 | 0.42 | 1727 | 0.55 | 1861 | 0.68 | 1983 | 0.83 |
| 1750 | 1502 | 0.36 | 1655 | 0.48 | 1796 | 0.61 | 1926 | 0.76 | 2046 | 0.91 |
| 1875 | 1589 | 0.42 | 1731 | 0.55 | 1867 | 0.69 | 1994 | 0.84 | 2111 | 0.99 |
| 2000 | 1677 | 0.50 | 1810 | 0.63 | 1941 | 0.77 | 2063 | 0.93 | 2177 | 1.09 |
| 2125 | 1766 | 0.58 | 1891 | 0.71 | 2015 | 0.86 | 2133 | 1.02 | 2245 | 1.19 |
| 2250 | 1855 | 0.67 | 1973 | 0.81 | 2091 | 0.96 | 2206 | 1.13 | 2314 | 1.31 |
| 2375 | 1946 | 0.78 | 2057 | 0.92 | 2169 | 1.07 | 2280 | 1.25 | 2385 | 1.43 |
| 2500 | 2037 | 0.89 | 2142 | 1.03 | 2249 | 1.20 | 2355 | 1.37 | 2457 | 1.56 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp | rpm | bhp |
| 1500 | 2036 | 0.89 | 2143 | 1.04 | 2245 | 1.20 | 2342 | 1.36 | 2435 | 1.53 |
| 1625 | 2096 | 0.97 | 2201 | 1.13 | 2301 | 1.29 | 2396 | 1.46 | 2488 | 1.63 |
| 1750 | 2157 | 1.06 | 2261 | 1.22 | 2359 | 1.39 | 2453 | 1.56 | 2542 | 1.74 |
| 1875 | 2220 | 1.16 | 2322 | 1.32 | 2419 | 1.49 | 2511 | 1.67 | 2599 | 1.85 |
| 2000 | 2284 | 1.26 | 2385 | 1.43 | 2480 | 1.61 | 2571 | 1.79 | 2658 | 1.98 |
| 2125 | 2350 | 1.37 | 2449 | 1.55 | 2543 | 1.73 | 2633 | 1.92 | 2719 | 2.12 |
| 2250 | 2417 | 1.49 | 2514 | 1.67 | 2607 | 1.87 | 2695 | 2.06 | 2780 | 2.26 |
| 2375 | 2485 | 1.62 | 2581 | 1.81 | 2672 | 2.01 | 2759 | 2.21 | — | — |
| 2500 | 2555 | 1.76 | 2649 | 1.96 | 2738 | 2.16 | 2824 | 2.37 | — | — |

Standard/Medium Static 1335-2390 rpm, 1.44 max bhp

High Static 1335-2836 rpm, 2.43 max bhp

### 48QE*M06 Three Phase — Standard/Medium Static — 5 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 1335 | 5.6 | 1507 | 6.3 | 1660 | 6.9 | 1797 | 7.5 | 1921 | 8.0 |
| 1625 | 1418 | 5.9 | 1580 | 6.6 | 1727 | 7.2 | 1861 | 7.8 | 1983 | 8.3 |
| 1750 | 1502 | 6.3 | 1655 | 6.9 | 1796 | 7.5 | 1926 | 8.1 | 2046 | 8.6 |
| 1875 | 1589 | 6.6 | 1731 | 7.2 | 1867 | 7.8 | 1994 | 8.3 | 2111 | 8.8 |
| 2000 | 1677 | 7.0 | 1810 | 7.6 | 1941 | 8.1 | 2063 | 8.6 | 2177 | 9.1 |
| 2125 | 1766 | 7.4 | 1891 | 7.9 | 2015 | 8.4 | 2133 | 8.9 | 2245 | 9.4 |
| 2250 | 1855 | 7.8 | 1973 | 8.3 | 2091 | 8.7 | 2206 | 9.2 | 2314 | 9.7 |
| 2375 | 1946 | 8.1 | 2057 | 8.6 | 2169 | 9.1 | 2280 | 9.5 | 2385 | 10.0 |
| 2500 | 2037 | 8.5 | 2142 | 9.0 | 2249 | 9.4 | 2355 | 9.9 | — | — |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 2036 | 8.5 | 2143 | 9.0 | 2245 | 9.4 | 2342 | 9.8 | — | — |
| 1625 | 2096 | 8.8 | 2201 | 9.2 | 2301 | 9.6 | — | — | — | — |
| 1750 | 2157 | 9.0 | 2261 | 9.5 | 2359 | 9.9 | — | — | — | — |
| 1875 | 2220 | 9.3 | 2322 | 9.7 | — | — | — | — | — | — |
| 2000 | 2284 | 9.6 | 2385 | 10.0 | — | — | — | — | — | — |
| 2125 | 2350 | 9.8 | — | — | — | — | — | — | — | — |
| 2250 | — | — | — | — | — | — | — | — | — | — |
| 2375 | — | — | — | — | — | — | — | — | — | — |
| 2500 | — | — | — | — | — | — | — | — | — | — |

Standard/Medium Static 1335-2390 rpm

## APPENDIX C — FAN PERFORMANCE (cont)

### 48QE*M06 Three Phase — High Static — 5 Ton Horizontal Supply (rpm — vdc)

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 1335 | 4.7 | 1507 | 5.3 | 1660 | 5.9 | 1797 | 6.3 | 1921 | 6.8 |
| 1625 | 1418 | 5.0 | 1580 | 5.6 | 1727 | 6.1 | 1861 | 6.6 | 1983 | 7.0 |
| 1750 | 1502 | 5.3 | 1655 | 5.8 | 1796 | 6.3 | 1926 | 6.8 | 2046 | 7.2 |
| 1875 | 1589 | 5.6 | 1731 | 6.1 | 1867 | 6.6 | 1994 | 7.0 | 2111 | 7.4 |
| 2000 | 1677 | 5.9 | 1810 | 6.4 | 1941 | 6.8 | 2063 | 7.3 | 2177 | 7.7 |
| 2125 | 1766 | 6.2 | 1891 | 6.7 | 2015 | 7.1 | 2133 | 7.5 | 2245 | 7.9 |
| 2250 | 1855 | 6.5 | 1973 | 7.0 | 2091 | 7.4 | 2206 | 7.8 | 2314 | 8.2 |
| 2375 | 1946 | 6.9 | 2057 | 7.3 | 2169 | 7.6 | 2280 | 8.0 | 2385 | 8.4 |
| 2500 | 2037 | 7.2 | 2142 | 7.6 | 2249 | 7.9 | 2355 | 8.3 | 2457 | 8.7 |

| CFM | AVAILABLE EXTERNAL STATIC PRESSURE (in. wg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc | rpm | vdc |
| 1500 | 2036 | 7.2 | 2143 | 7.6 | 2245 | 7.9 | 2342 | 8.3 | 2435 | 8.6 |
| 1625 | 2096 | 7.4 | 2201 | 7.8 | 2301 | 8.1 | 2396 | 8.4 | 2488 | 8.8 |
| 1750 | 2157 | 7.6 | 2261 | 8.0 | 2359 | 8.3 | 2453 | 8.6 | 2542 | 9.0 |
| 1875 | 2220 | 7.8 | 2322 | 8.2 | 2419 | 8.5 | 2511 | 8.9 | 2599 | 9.2 |
| 2000 | 2284 | 8.1 | 2385 | 8.4 | 2480 | 8.7 | 2571 | 9.1 | 2658 | 9.4 |
| 2125 | 2350 | 8.3 | 2449 | 8.6 | 2543 | 9.0 | 2633 | 9.3 | 2719 | 9.6 |
| 2250 | 2417 | 8.5 | 2514 | 8.9 | 2607 | 9.2 | 2695 | 9.5 | 2780 | 9.8 |
| 2375 | 2485 | 8.8 | 2581 | 9.1 | 2672 | 9.4 | 2759 | 9.7 | — | — |
| 2500 | 2555 | 9.0 | 2649 | 9.3 | 2738 | 9.7 | 2824 | 10.0 | — | — |

High Static 1335-2836 rpm

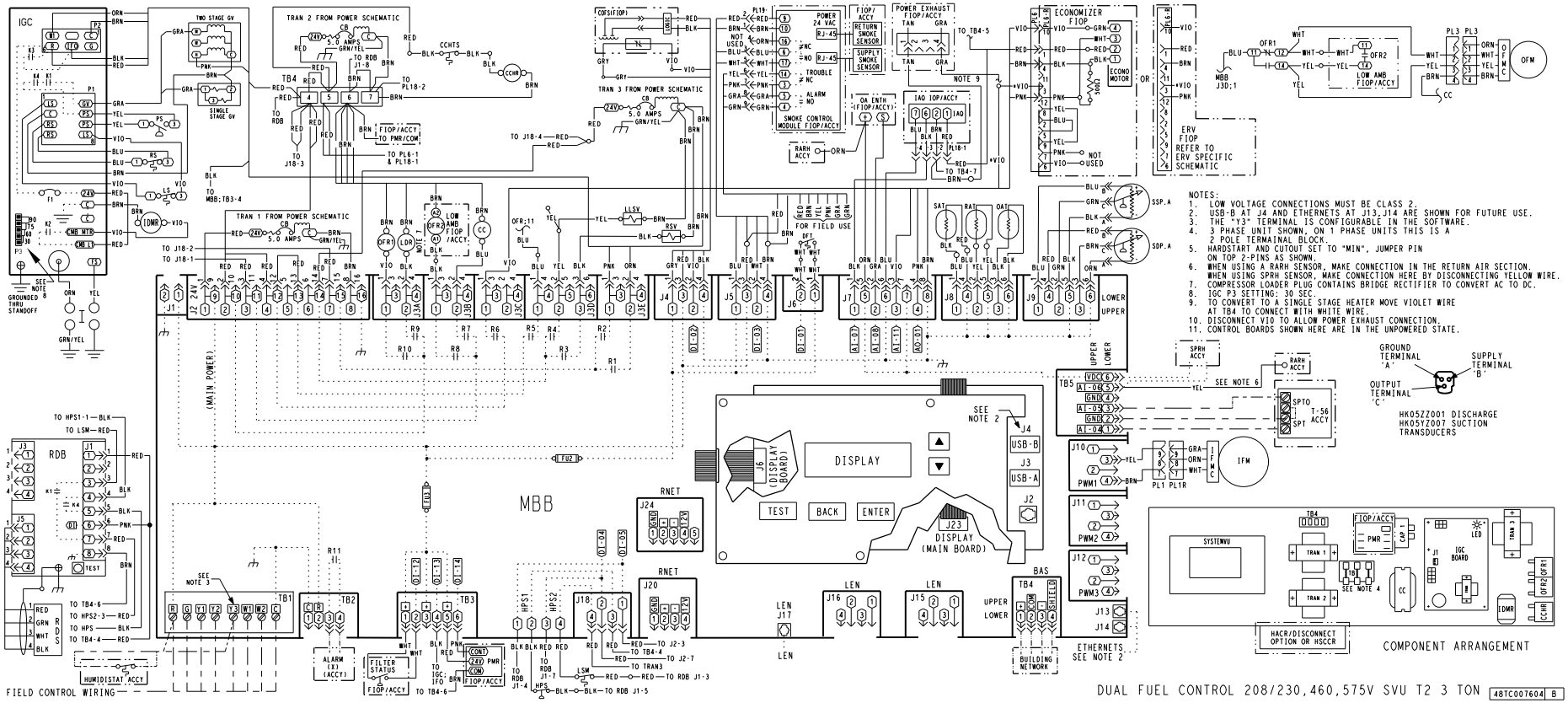
# APPENDIX D — WIRING DIAGRAMS

## 48QE**04-06 — Wiring Diagrams — Standard SCCR

| UNIT | VOLTAGE | CONTROL | PAGE | POWER | PAGE |
|---|---|---|---|---|---|
| **48QE**04 with SystemVu™ Controls** | 208/230-1-60 | 48TC007604 | 86 | 48TC007606 | 90 |
| | 208/230-3-60 | | | 48TC007607 | 91 |
| | 460-3-60 | | | 48TC007605 | 92 |
| | 575-3-60 | | | | |
| **48QE**05-06 with SystemVu™ Controls** | 208/230-1-60 | 48TC007556 | 87 | 48TC007558 | 93 |
| | 208/230-3-60 | | | 48TC007559 | 94 |
| | 460-3-60 | | | 48TC007557 | 95 |
| | 575-3-60 | | | | |
| **48QE**04 with SystemVu™ Controls (Humidi-MiZer System)** | 208/230-3-60 | 48TC007829 | 88 | 48TC007837 | 96 |
| | 460-3-60 | | | 48TC007836 | 97 |
| | 575-3-60 | | | | |
| **48QE**05-06 with SystemVu™ Controls (Humidi-MiZer System)** | 208/230-3-60 | 48TC007827 | 89 | 48TC007833 | 98 |
| | 460-3-60 | | | 48TC007832 | 99 |
| | 575-3-60 | | | | |

## 48QE**04-06 — Wiring Diagrams — High SCCR

| UNIT | VOLTAGE | CONTROL | PAGE | POWER | PAGE |
|---|---|---|---|---|---|
| **48QE**04 with SystemVu™ Controls** | 208/230-1-60 | 48TC007604 | 86 | 48TC007608 | 100 |
| | 208/230-3-60 | | | 48TC007609 | 101 |
| | 460-3-60 | | | 48TC007610 | 102 |
| **48QE**05-06 with SystemVu™ Controls** | 208/230-1-60 | 48TC007556 | 87 | 48TC007560 | 103 |
| | 208/230-3-60 | | | 48TC007561 | 104 |
| | 460-3-60 | | | 48TC007562 | 105 |




DUAL FUEL CONTROL 208/230,460,575V SVU T2 3 TON 48TC007604 B



**Fig. B — Typical 48QE**04 Control Wiring Diagram — All Voltages**

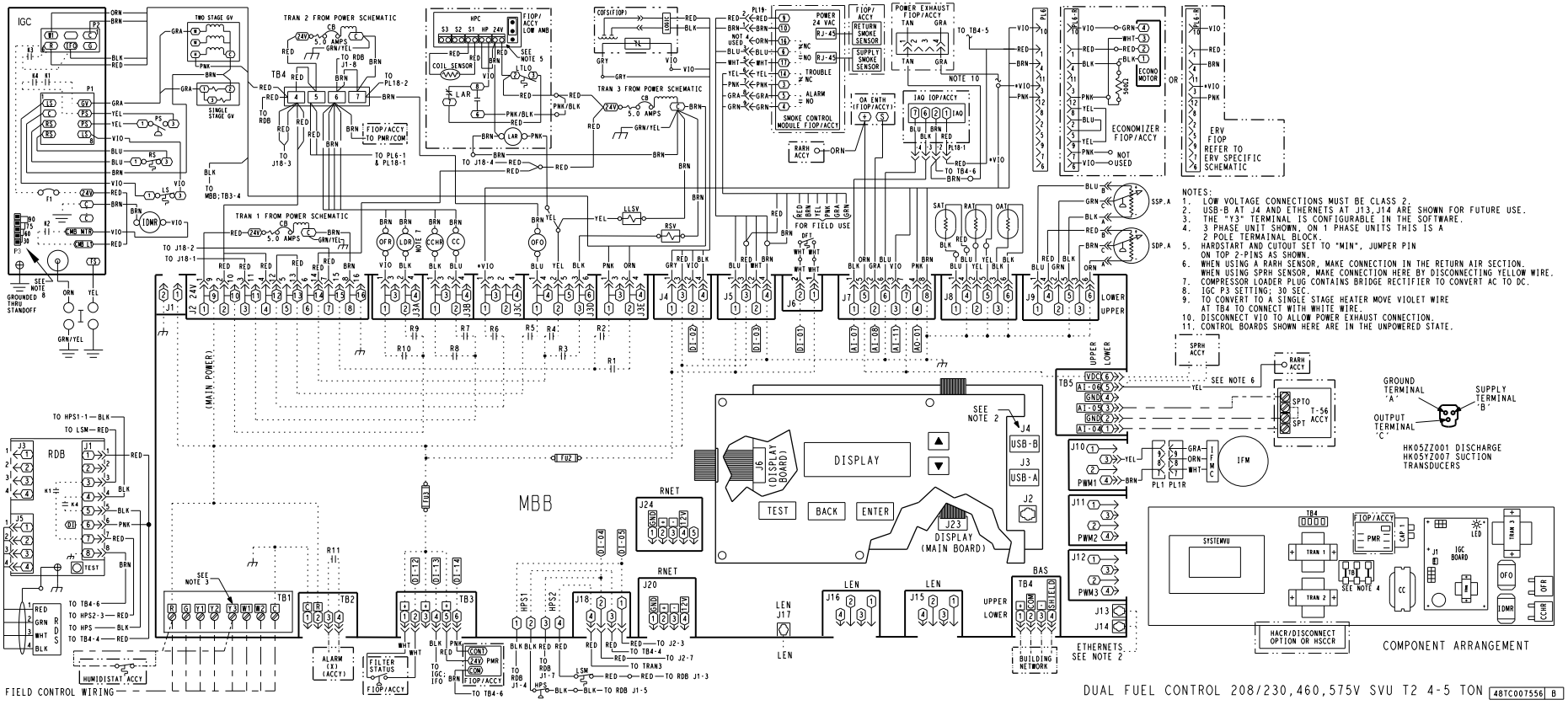



Fig. C — Typical 48QE**05-06 Control Wiring Diagram — All Voltages

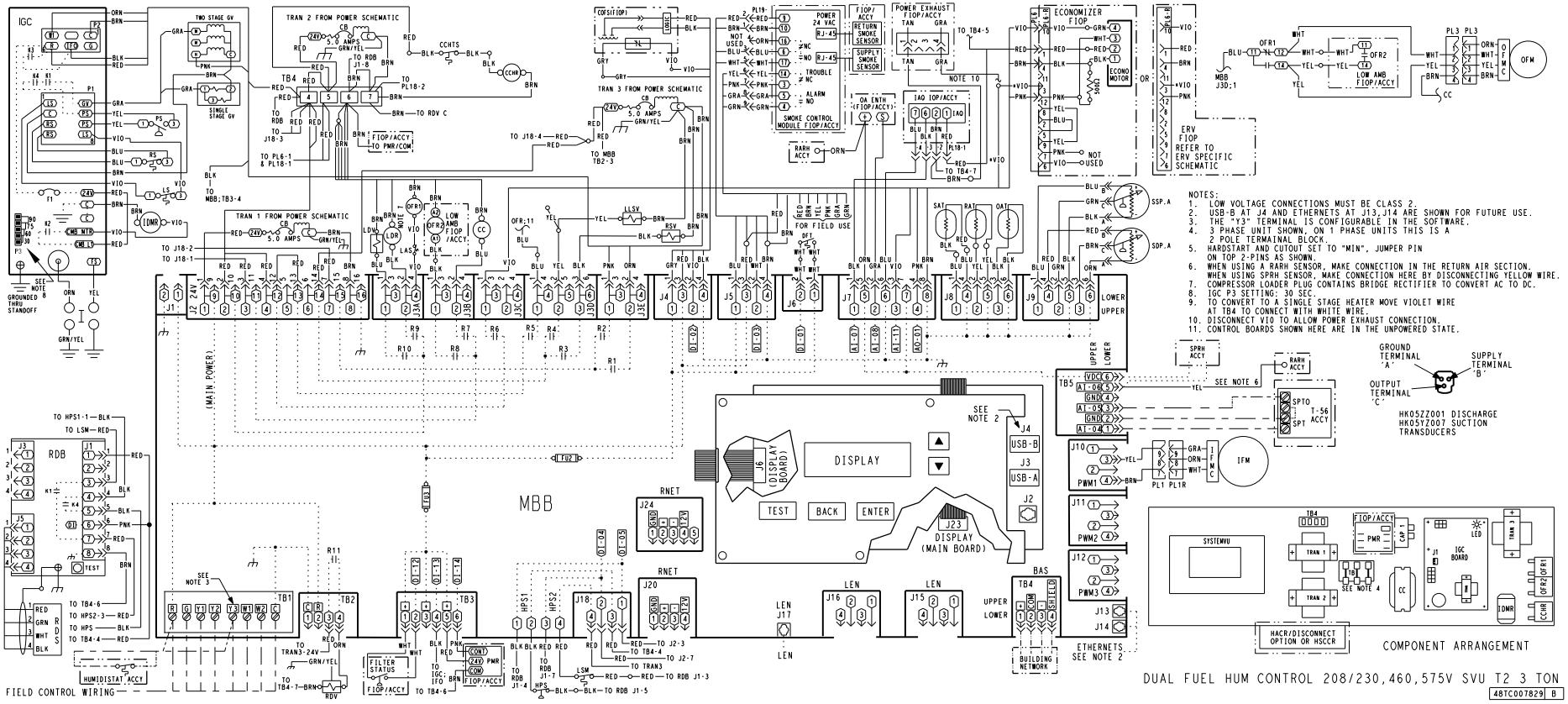



**Fig. D — Typical 48QE**04 Control Wiring Diagram with Humidi-MiZer System — All Voltages**

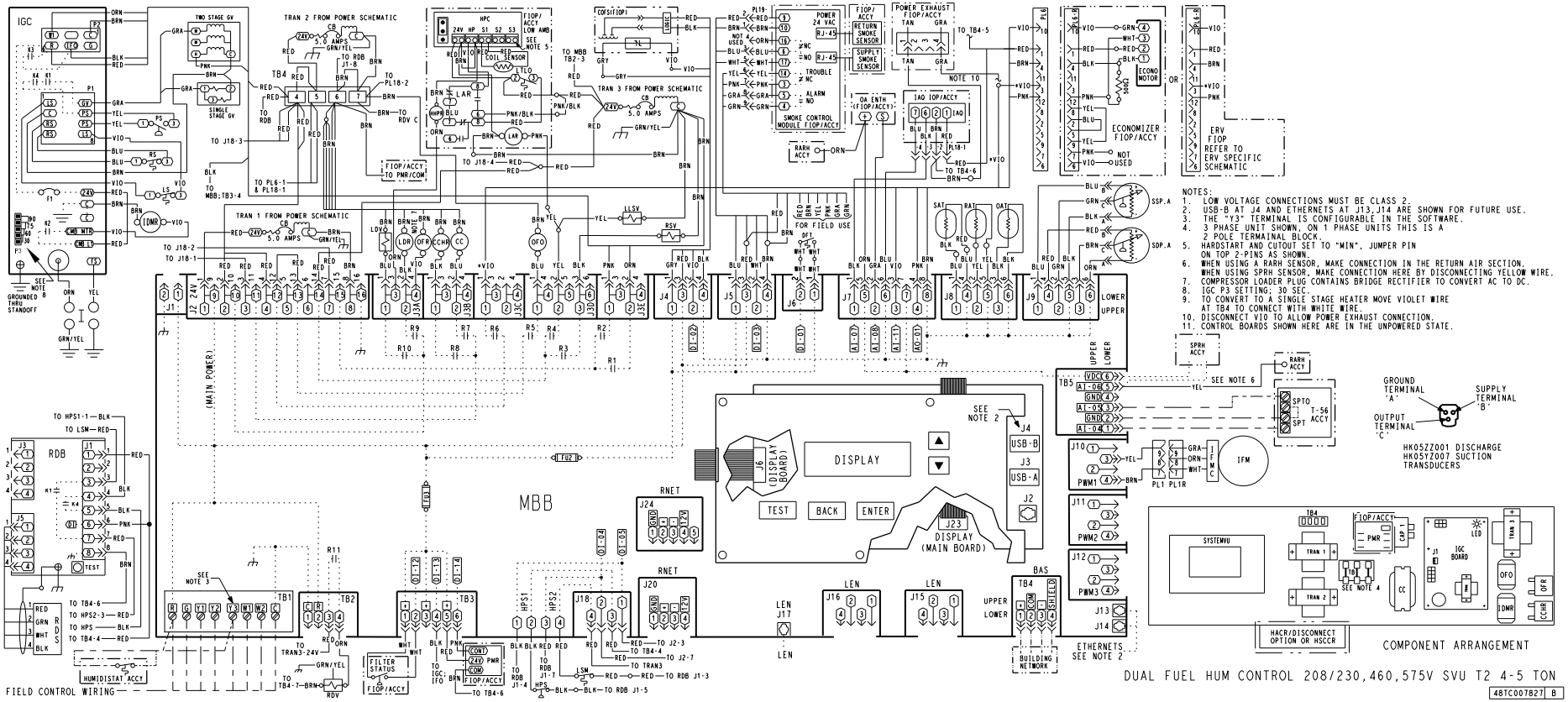
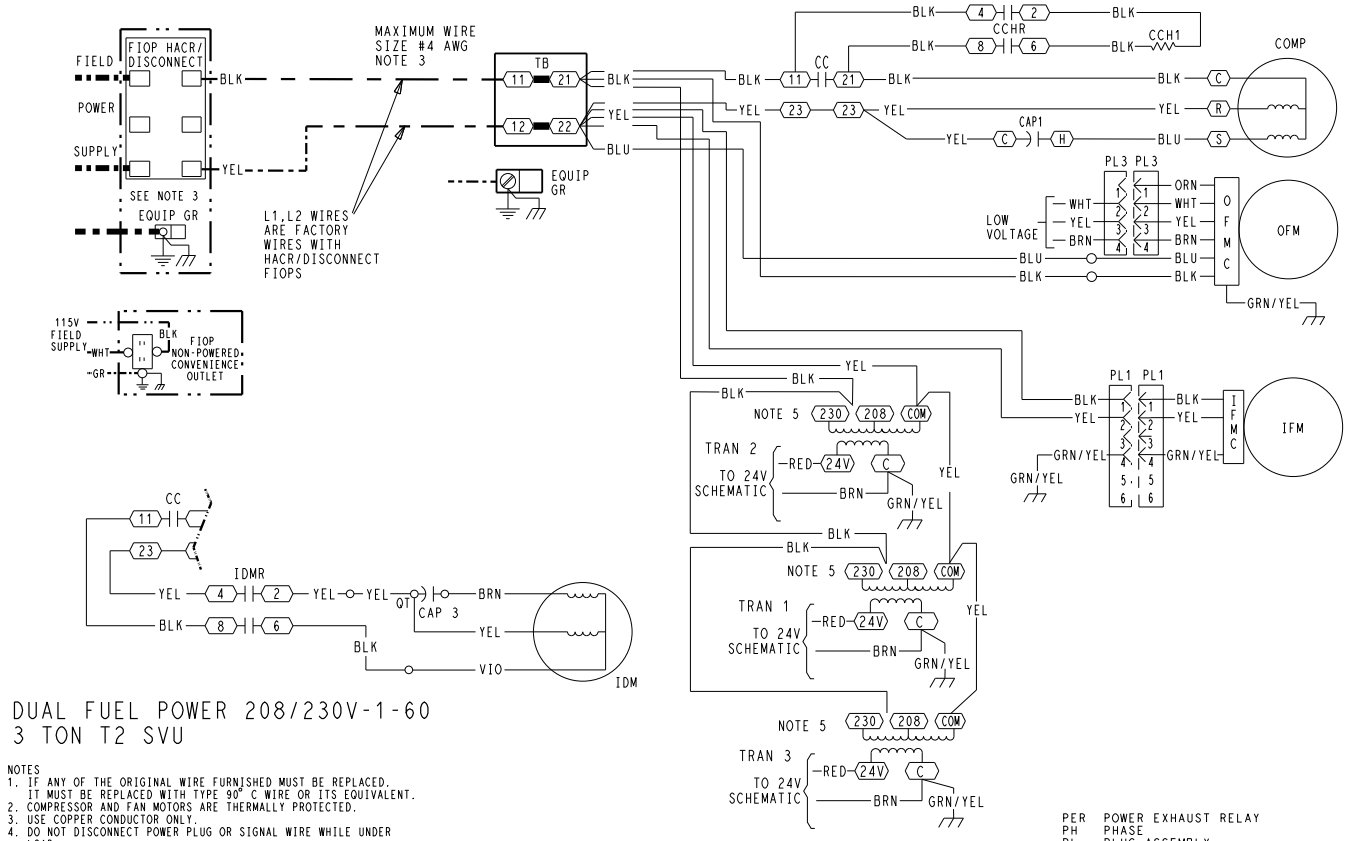



Fig. E — Typical 48QE**05-06 Control Wiring Diagram with Humidi-MiZer System — All Voltages




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.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.

LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |

| | |
|---|---|
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFO | OUTDOOR FAN ON RELAY |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |

| | |
|---|---|
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

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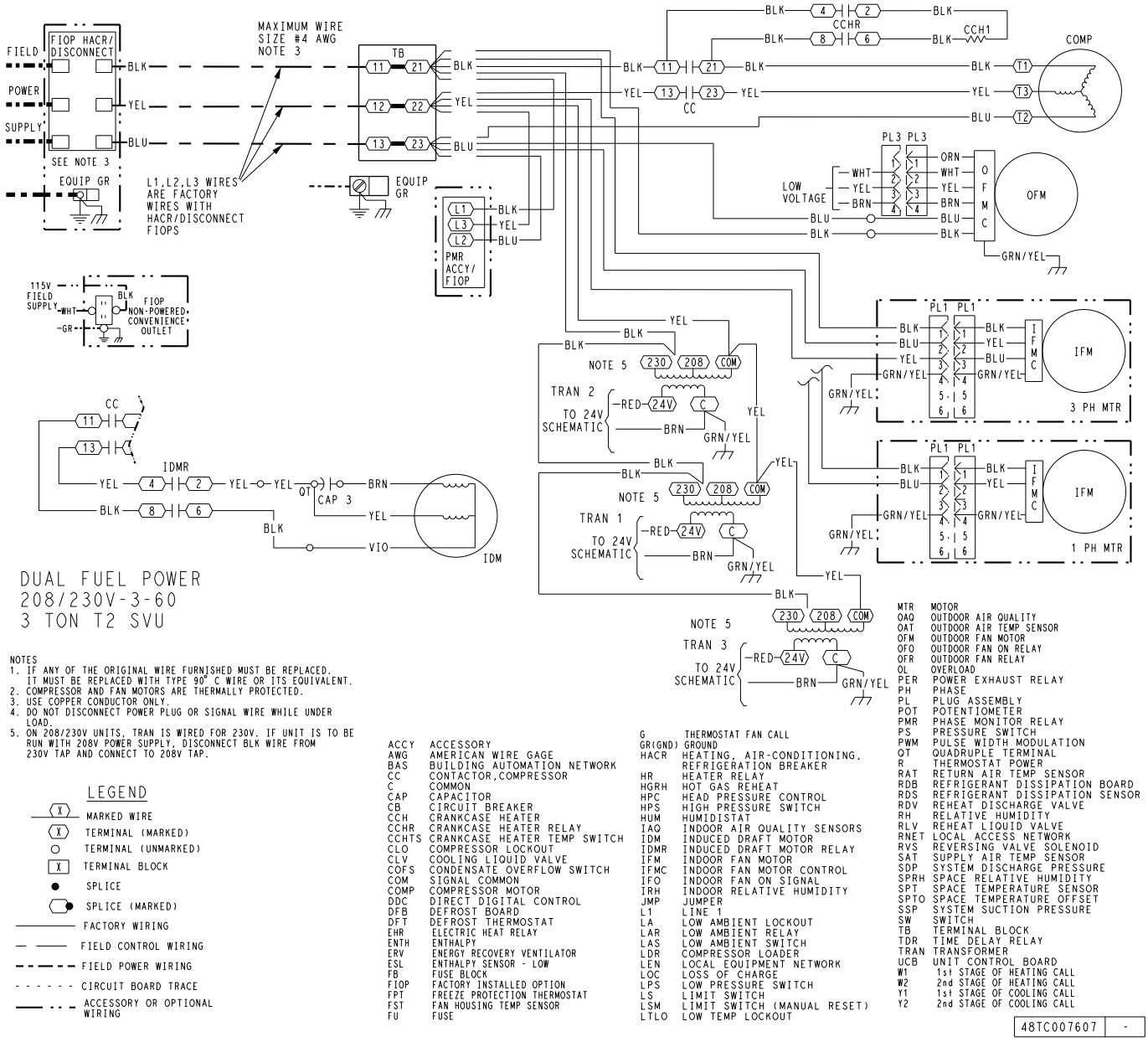
**Fig. F — Typical 48QE**04 Power Wiring Diagram — 208/230-1-60**




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.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.

LEGEND

| | |
|---|---|
| (X) | MARKED WIRE |
| (X) | TERMINAL (MARKED) |
| ○ | TERMINAL (UNMARKED) |
| [X] | TERMINAL BLOCK |
| ● | SPLICE |
| | SPLICE (MARKED) |
| ——— | FACTORY WIRING |
| — ——— | FIELD CONTROL WIRING |
| - - - - | FIELD POWER WIRING |
| - - - - - - | CIRCUIT BOARD TRACE |
| ——— - - - | ACCESSORY OR OPTIONAL WIRING |

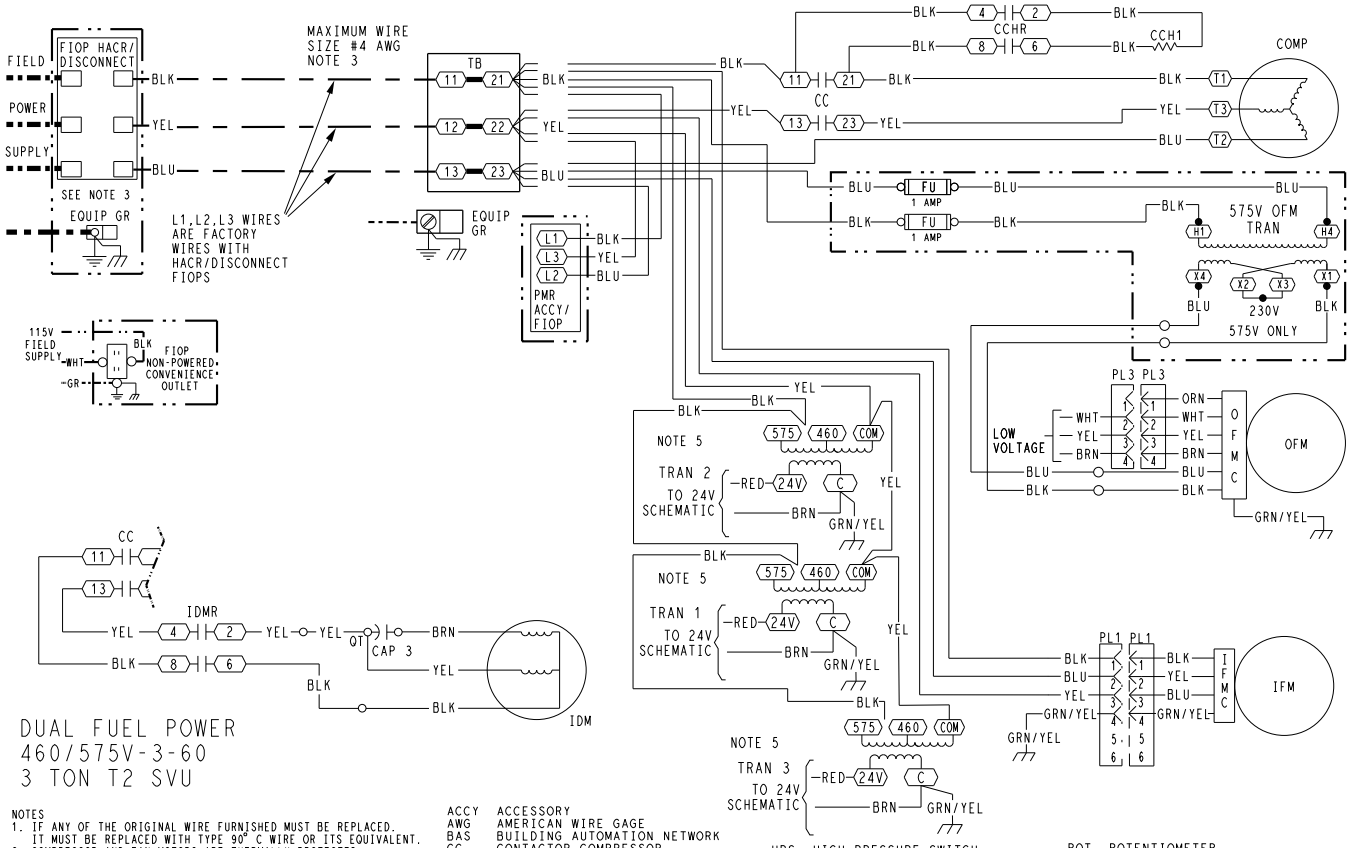
| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |

| | |
|---|---|
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |

| | |
|---|---|
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP SENSOR |
| OFM | OUTDOOR FAN MOTOR |
| OFO | OUTDOOR FAN ON RELAY |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

48TC007607 | -

**Fig. G — Typical 48QE**04 Power Wiring Diagram — 208/230-3-60**




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.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC.

LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFR | OUTDOOR FAN RELAY |
| OFO | OUTDOOR FAN ON RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

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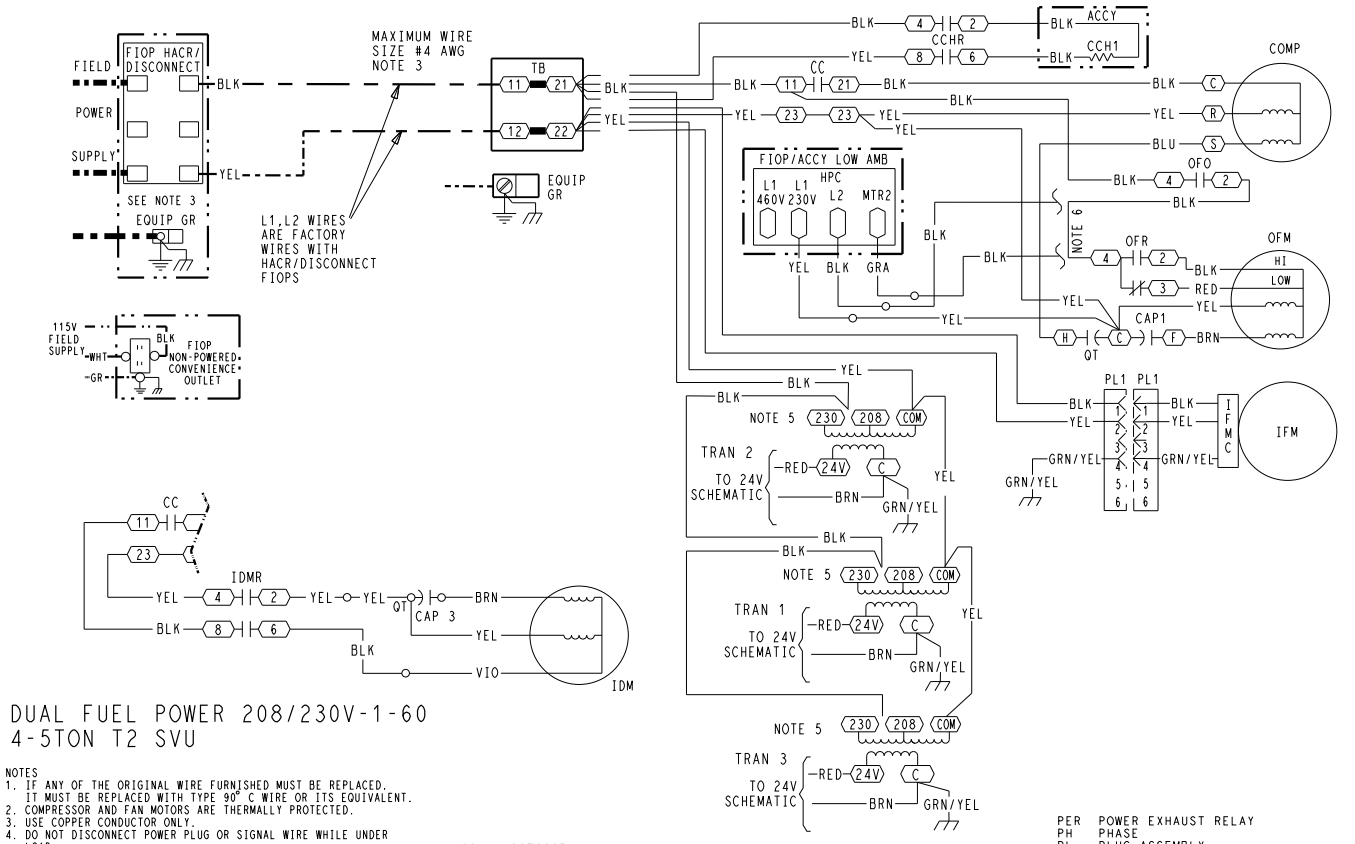
**Fig. H — Typical 48QE**04 Power Wiring Diagram — 460/575-3-60**




DUAL FUEL POWER 208/230V-1-60
4-5TON T2 SVU

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.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.
6. THIS WIRE NOT USED WITH LOW AMBIENT FIOP/ACCY.

LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFO | OUTDOOR FAN ON RELAY |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

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**Fig. I — Typical 48QE**05-06 Power Wiring Diagram — 208/230-1-60**

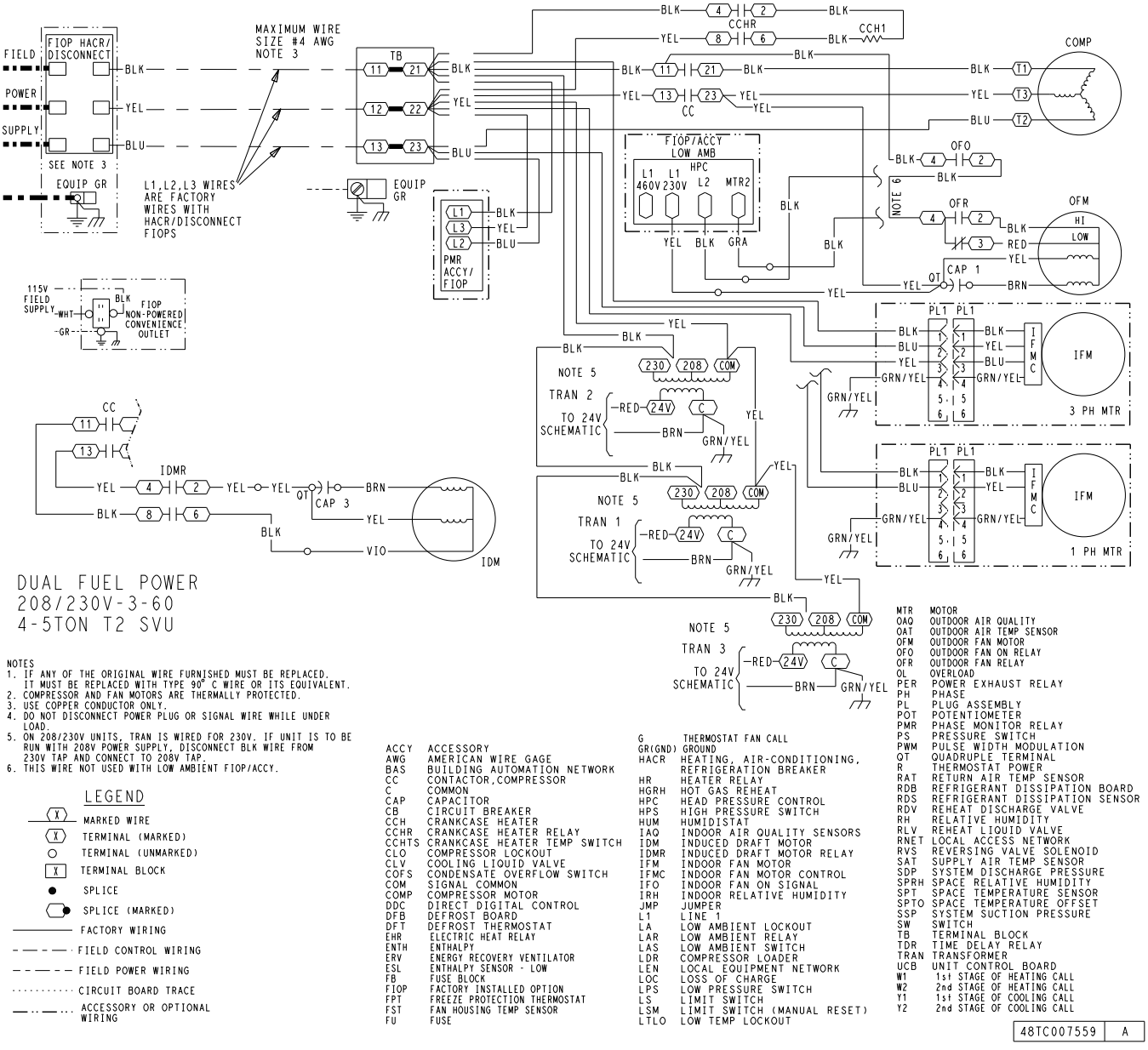
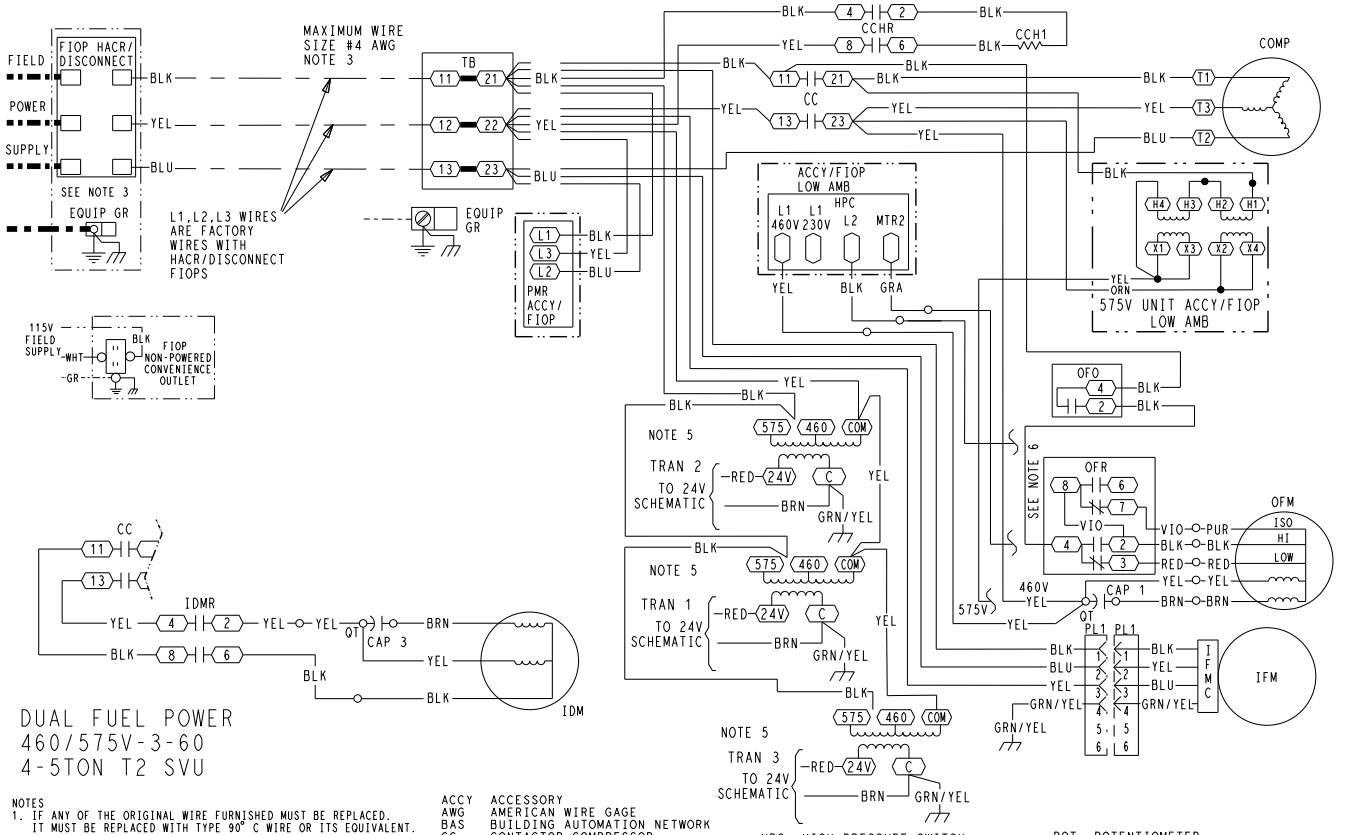



**Fig. J — Typical 48QE**05-06 Power Wiring Diagram — 208/230-3-60**




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.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC.
6. THIS WIRE NOT USED WITH LOW AMBIENT FIOP/ACCY.

LEGEND

- (X) MARKED WIRE
- (X) TERMINAL (MARKED)
- ○ TERMINAL (UNMARKED)
- [X] TERMINAL BLOCK
- ● SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFR | OUTDOOR FAN RELAY |
| OFO | OUTDOOR FAN ON RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

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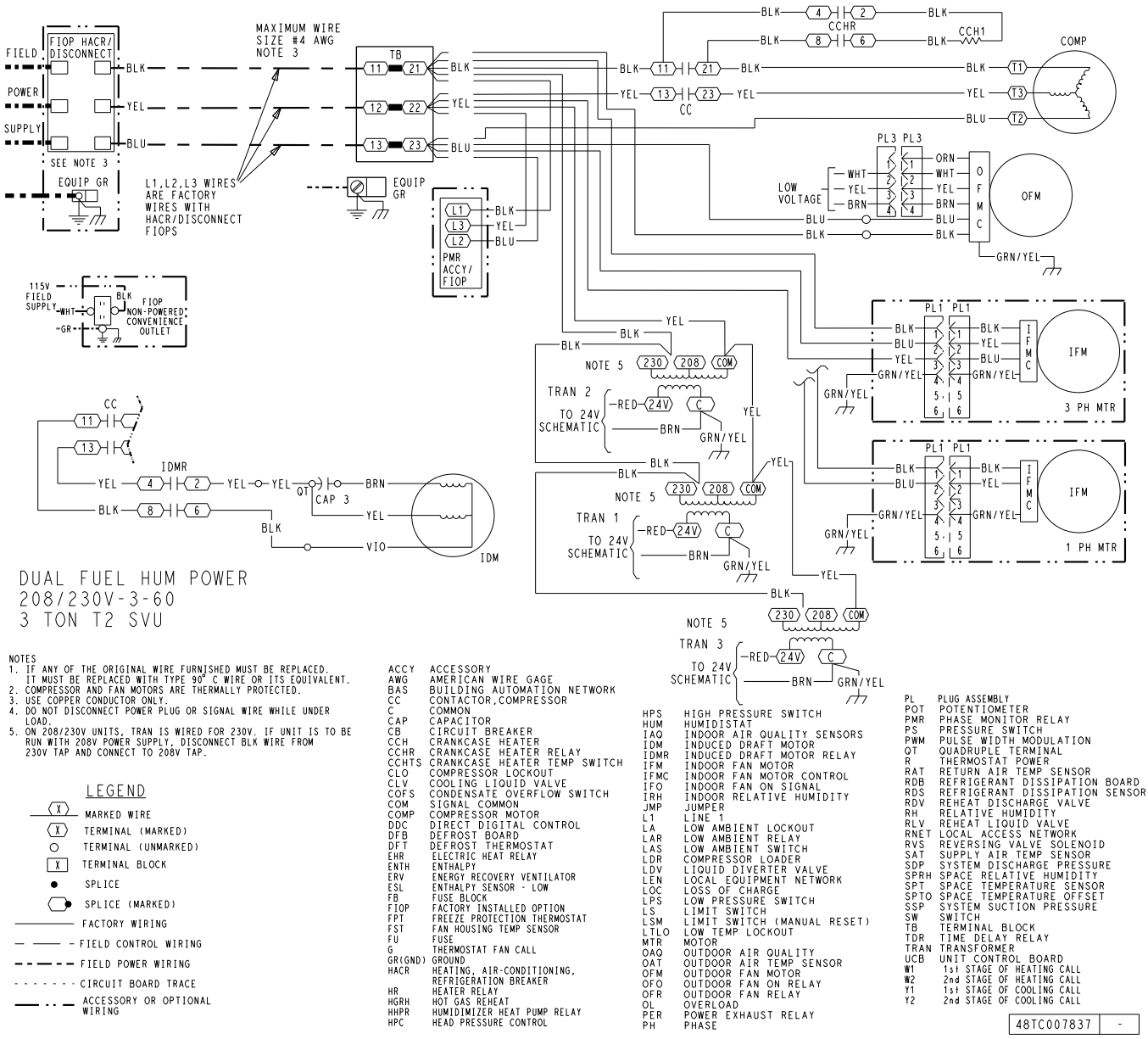
**Fig. K — Typical 48QE**05-06 Power Wiring Diagram — 460/575-3-60**




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.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.

LEGEND

| | |
|---|---|
| (X) | MARKED WIRE |
| (X) | TERMINAL (MARKED) |
| ○ | TERMINAL (UNMARKED) |
| [X] | TERMINAL BLOCK |
| ● | SPLICE |
| ⬡● | SPLICE (MARKED) |
| ——— | FACTORY WIRING |
| — ——— — | FIELD CONTROL WIRING |
| - - - - - | FIELD POWER WIRING |
| - - - - - - - | CIRCUIT BOARD TRACE |
| ——— · — | ACCESSORY OR OPTIONAL WIRING |

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HHPR | HUMIDIMIZER HEAT PUMP RELAY |
| HPC | HEAD PRESSURE CONTROL |

| | |
|---|---|
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LDV | LIQUID DIVERTER VALVE |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP SENSOR |
| OFM | OUTDOOR FAN MOTOR |
| OFO | OUTDOOR FAN ON RELAY |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |

| | |
|---|---|
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

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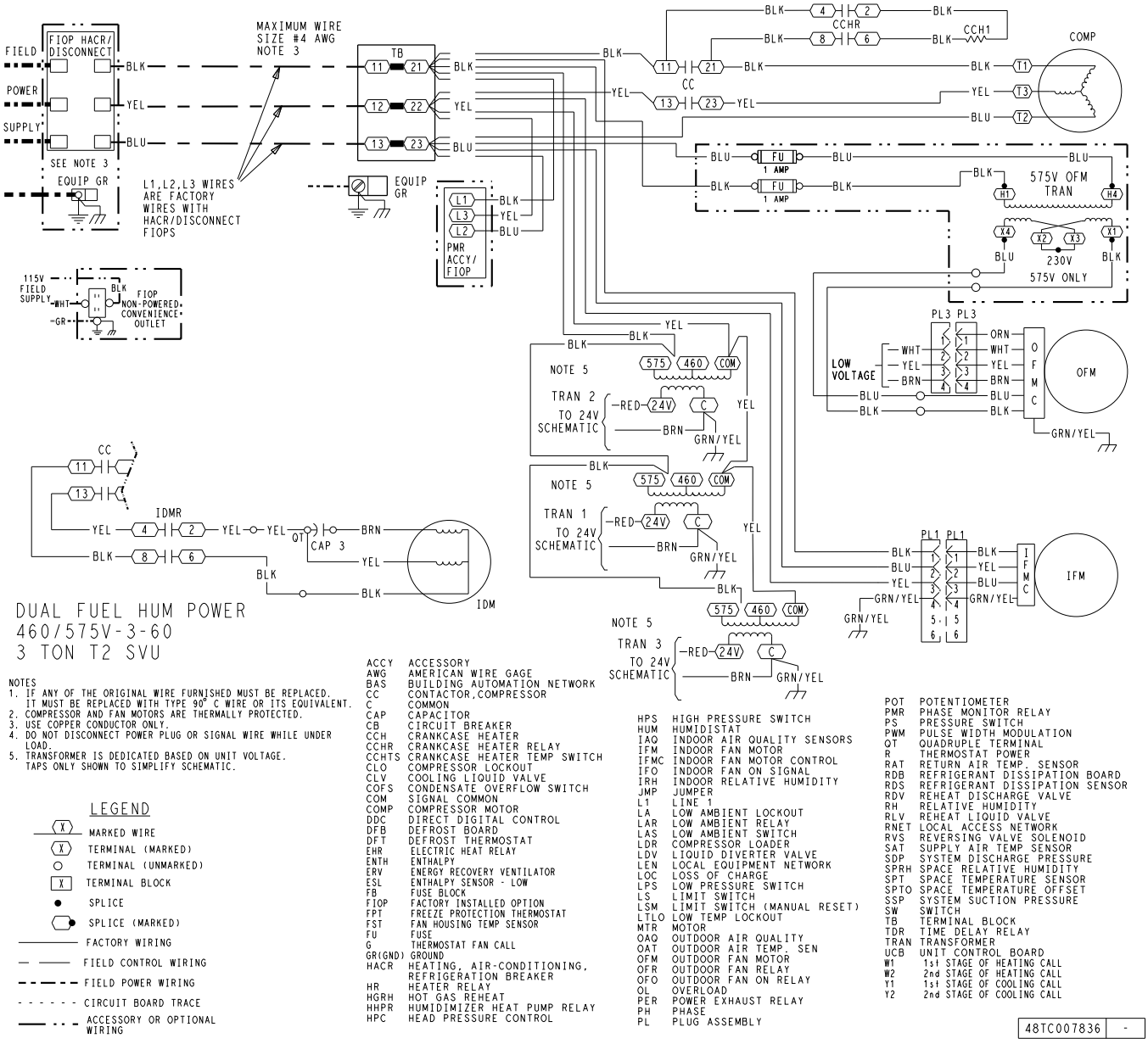
**Fig. L — Typical 48QE**04 Power Wiring Diagram with Humidi-MiZer System — 208/230-3-60**




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.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC.

LEGEND

| | |
|---|---|
| (X) | MARKED WIRE |
| (X) | TERMINAL (MARKED) |
| ○ | TERMINAL (UNMARKED) |
| X | TERMINAL BLOCK |
| ● | SPLICE |
| (●) | SPLICE (MARKED) |
| ——— | FACTORY WIRING |
| — ——— | FIELD CONTROL WIRING |
| - - - - | FIELD POWER WIRING |
| - - - - - - | CIRCUIT BOARD TRACE |
| ——— - - - | ACCESSORY OR OPTIONAL WIRING |

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HHPR | HUMIDIMIZER HEAT PUMP RELAY |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LDV | LIQUID DIVERTER VALVE |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFR | OUTDOOR FAN RELAY |
| OFO | OUTDOOR FAN ON RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
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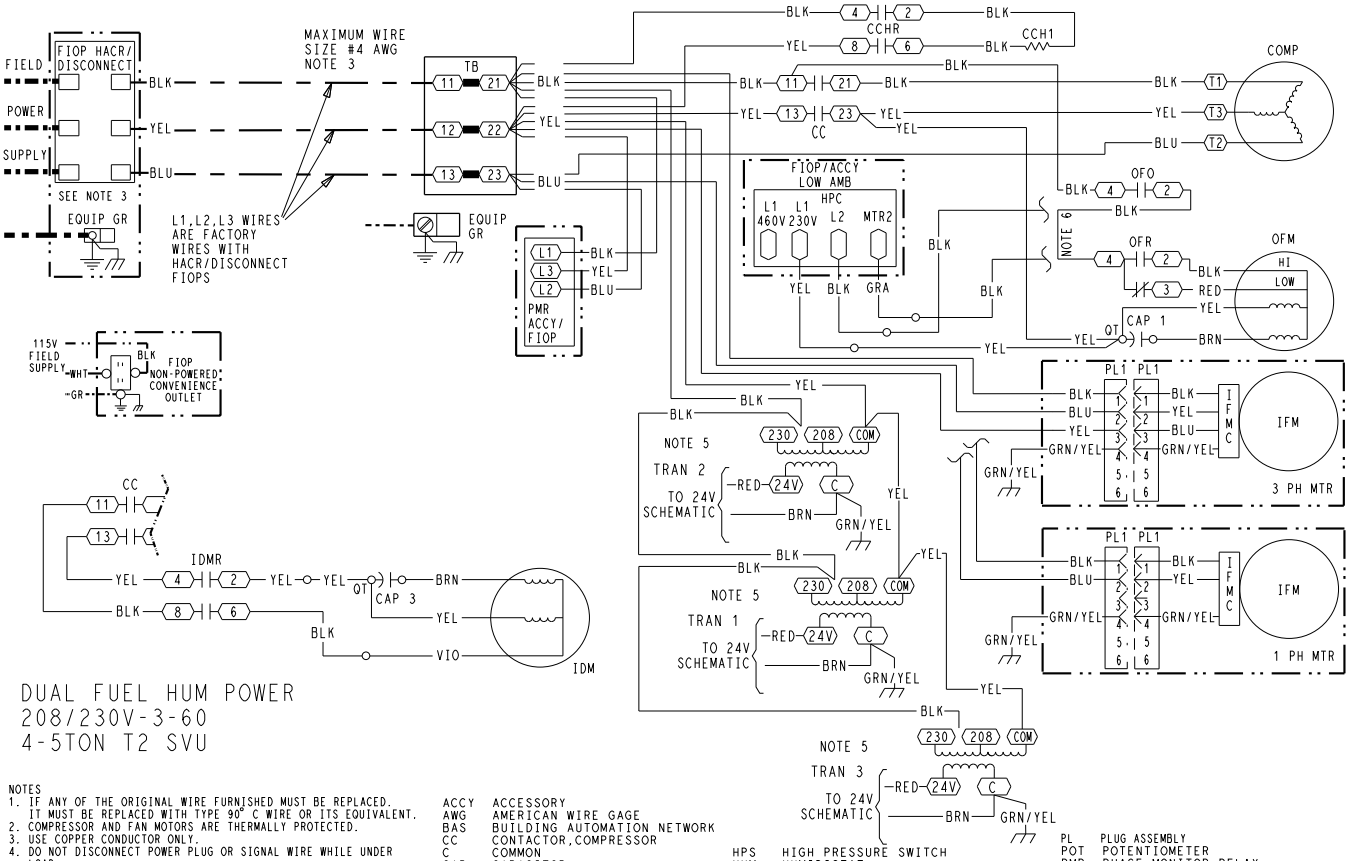
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

48TC007836 -

**Fig. M — Typical 48QE**04 Power Wiring Diagram with Humidi-MiZer System — 460/575-3-60**




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.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.
6. THIS WIRE NOT USED WITH LOW AMBIENT FIOP/ACCY.

LEGEND

| | |
|---|---|
| (X) | MARKED WIRE |
| (X) | TERMINAL (MARKED) |
| ○ | TERMINAL (UNMARKED) |
| [X] | TERMINAL BLOCK |
| ● | SPLICE |
| ⬡● | SPLICE (MARKED) |
| ——— | FACTORY WIRING |
| — ——— | FIELD CONTROL WIRING |
| - - - - - | FIELD POWER WIRING |
| - - - - - - - | CIRCUIT BOARD TRACE |
| ——— · · ——— | ACCESSORY OR OPTIONAL WIRING |

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HHPR | HUMIDIMIZER HEAT PUMP RELAY |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LDV | LIQUID DIVERTER VALVE |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP SENSOR |
| OFM | OUTDOOR FAN MOTOR |
| OFO | OUTDOOR FAN ON RELAY |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

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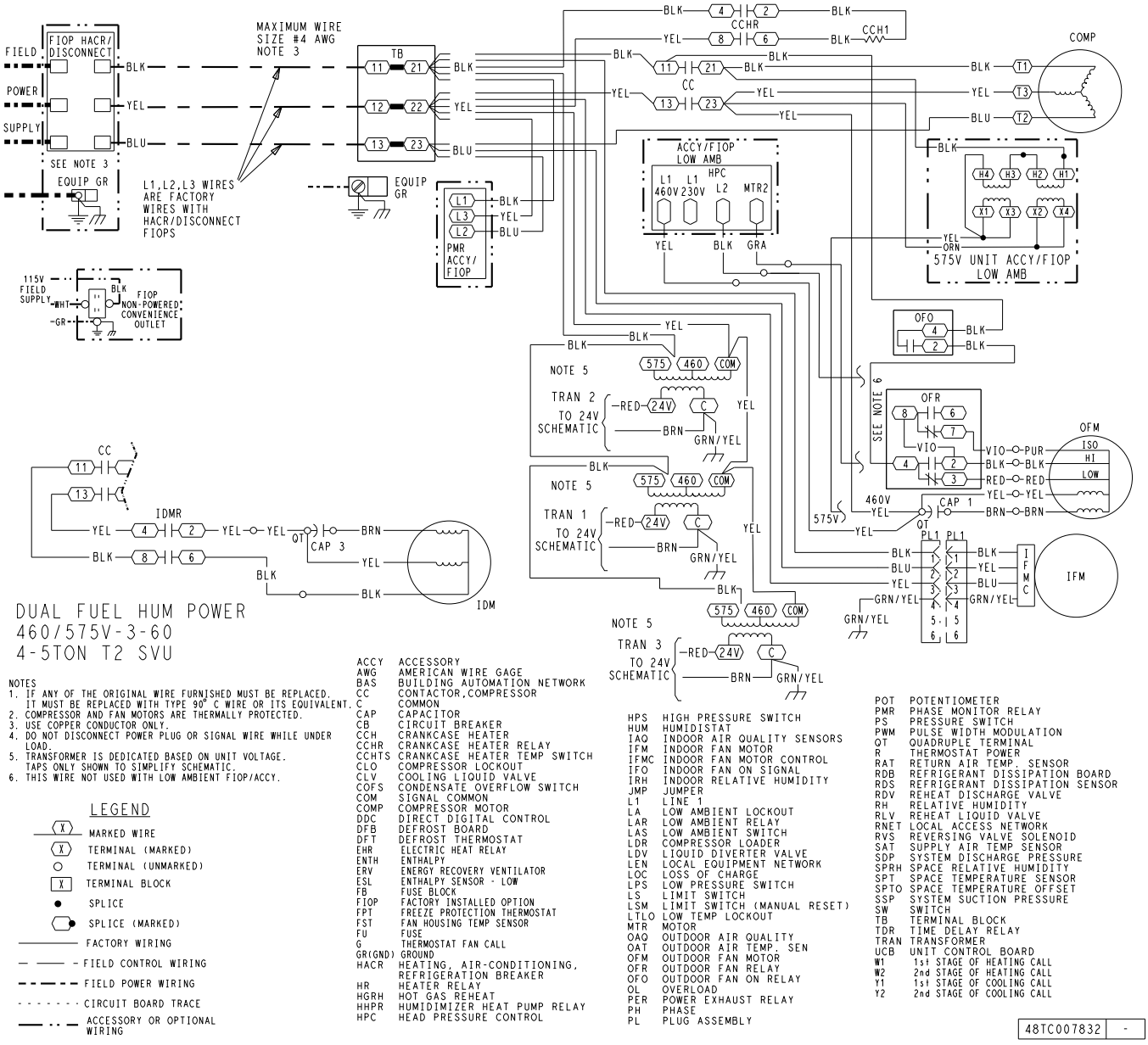
**Fig. N — Typical 48QE**05-06 Power Wiring Diagram with Humidi-MiZer System — 208/230-3-60**




NOTES
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2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC.
6. THIS WIRE NOT USED WITH LOW AMBIENT FIOP/ACCY.

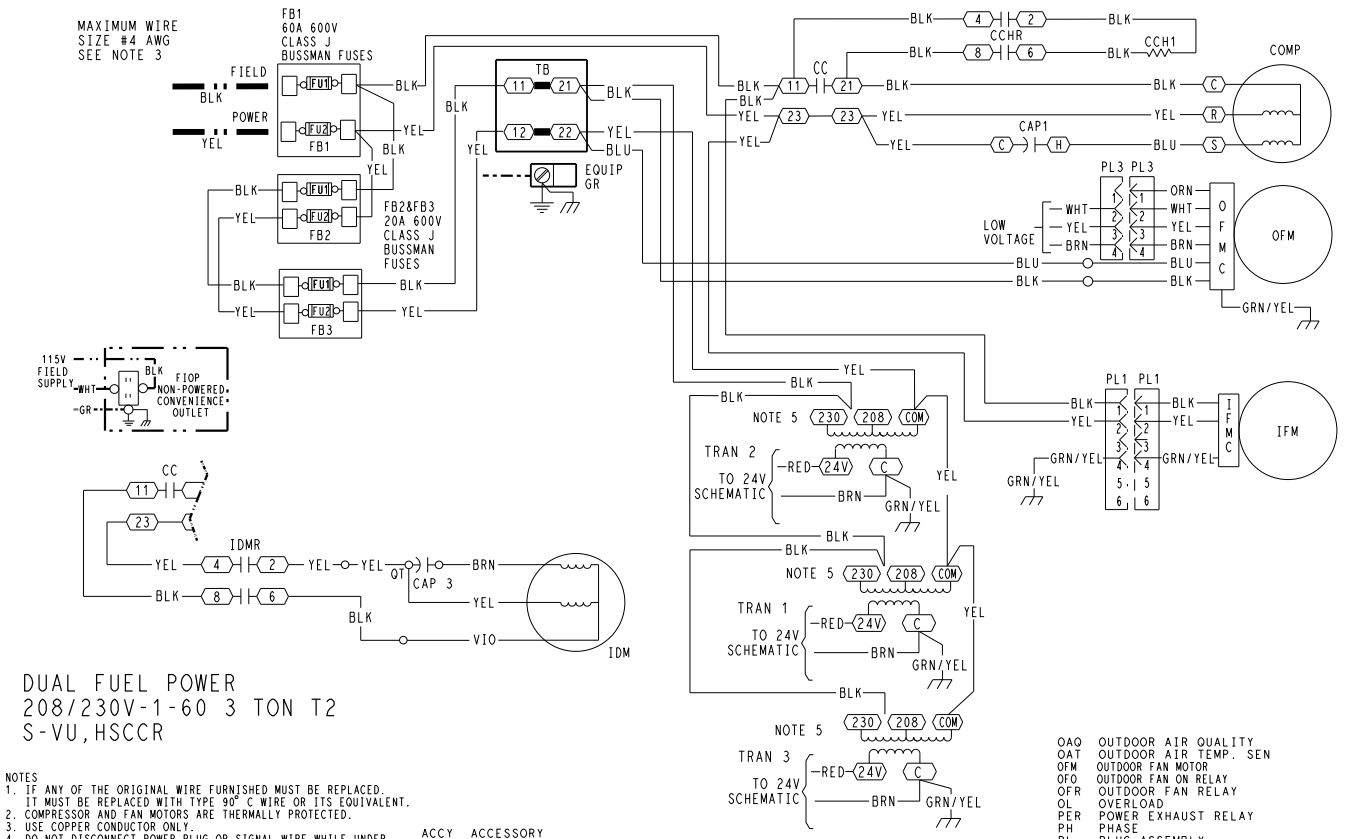
LEGEND

| | |
|---|---|
| (X) | MARKED WIRE |
| (X) | TERMINAL (MARKED) |
| ○ | TERMINAL (UNMARKED) |
| [X] | TERMINAL BLOCK |
| ● | SPLICE |
| ⬡● | SPLICE (MARKED) |
| ——— | FACTORY WIRING |
| — ——— — | FIELD CONTROL WIRING |
| - - - - - | FIELD POWER WIRING |
| - - - - - - - | CIRCUIT BOARD TRACE |
| ——— · · — | ACCESSORY OR OPTIONAL WIRING |

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HHPR | HUMIDIMIZER HEAT PUMP RELAY |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LDV | LIQUID DIVERTER VALVE |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFR | OUTDOOR FAN RELAY |
| OFO | OUTDOOR FAN ON RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

48TC007832 -

**Fig. O — Typical 48QE**05-06 Power Wiring Diagram with Humidi-MiZer System — 460/575-3-60**




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.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.

LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

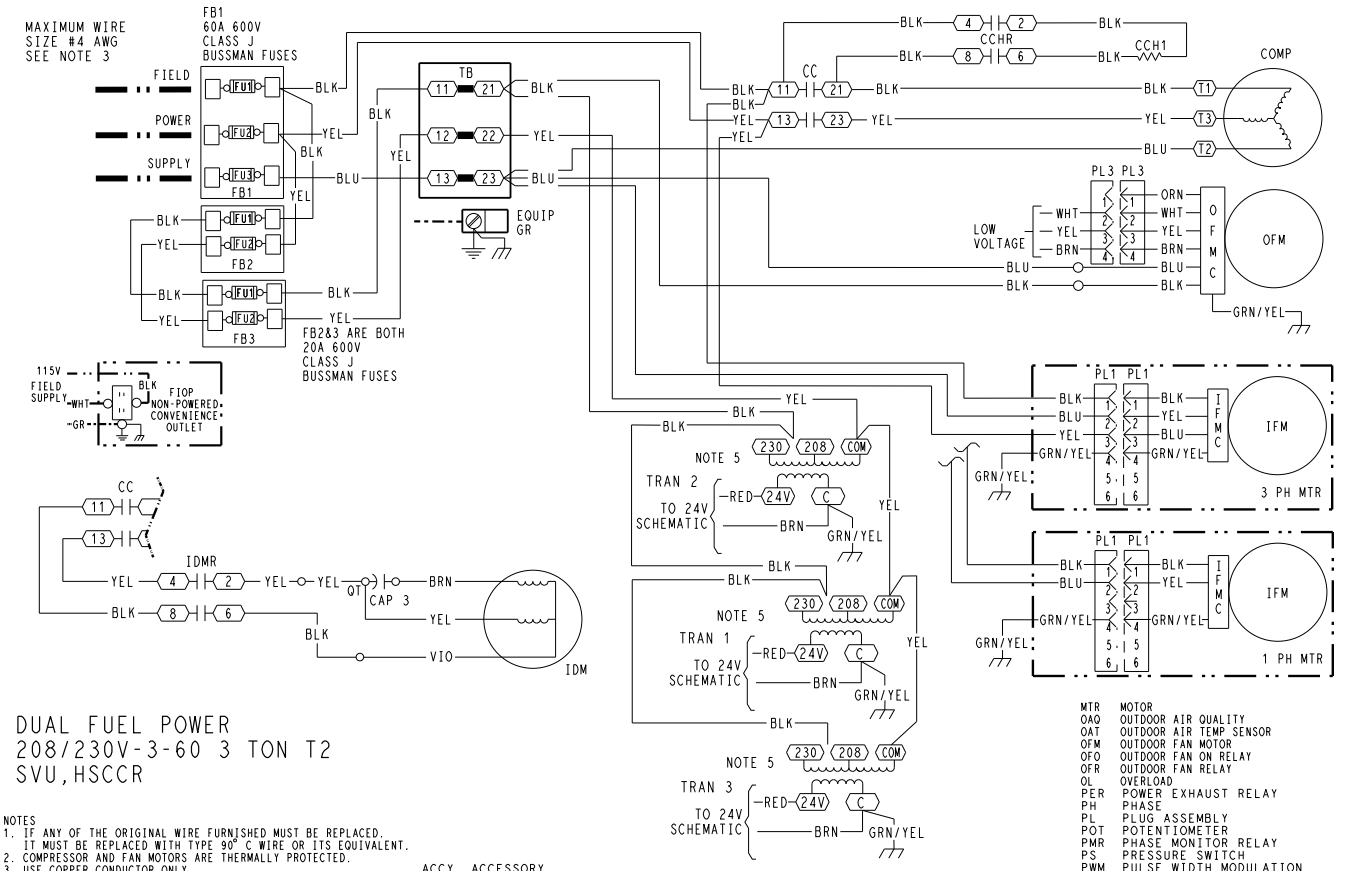
| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |

| | |
|---|---|
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| HSCCR | HIGH SHORT-CIRCUIT CURRENT RATINGS |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| LLSV | LIQUID LINE SOLENOID VALVE |
| LLSVR | LIQUID LINE SOLENOID VALVE RELAY |
| MTR | MOTOR |

| | |
|---|---|
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFO | OUTDOOR FAN ON RELAY |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

48TC007608 -

**Fig. P — Typical 48QE**04 Power Wiring Diagram — 208/230-1-60 — HSCCR**




NOTES
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2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.

LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |

| | |
|---|---|
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
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| IAQ | INDOOR AIR QUALITY SENSORS |
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| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |

| | |
|---|---|
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP SENSOR |
| OFM | OUTDOOR FAN MOTOR |
| OFO | OUTDOOR FAN ON RELAY |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
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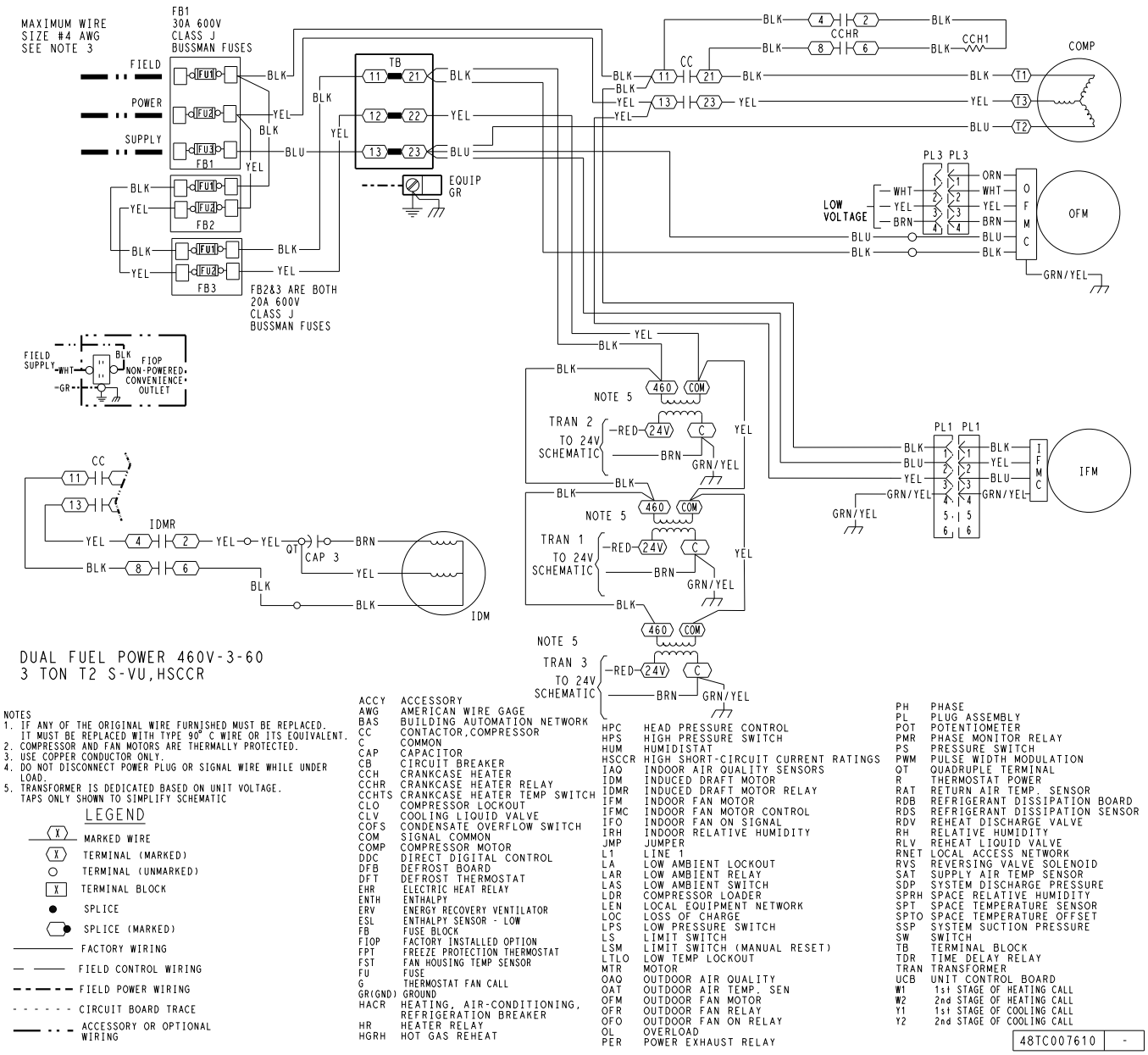
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

48TC007609 -

**Fig. Q — Typical 48QE**04 Power Wiring Diagram — 208/230-3-60 — HSCCR**

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5. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC

LEGEND

| | |
|---|---|
| (X) | MARKED WIRE |
| (X) | TERMINAL (MARKED) |
| ○ | TERMINAL (UNMARKED) |
| [X] | TERMINAL BLOCK |
| ● | SPLICE |
| ⬡ | SPLICE (MARKED) |
| ——— | FACTORY WIRING |
| — ——— | FIELD CONTROL WIRING |
| - - - - | FIELD POWER WIRING |
| - - - - - - | CIRCUIT BOARD TRACE |
| ——— - - - | ACCESSORY OR OPTIONAL WIRING |

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |

| | |
|---|---|
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| HSCCR | HIGH SHORT-CIRCUIT CURRENT RATINGS |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFR | OUTDOOR FAN RELAY |
| OFO | OUTDOOR FAN ON RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |

| | |
|---|---|
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

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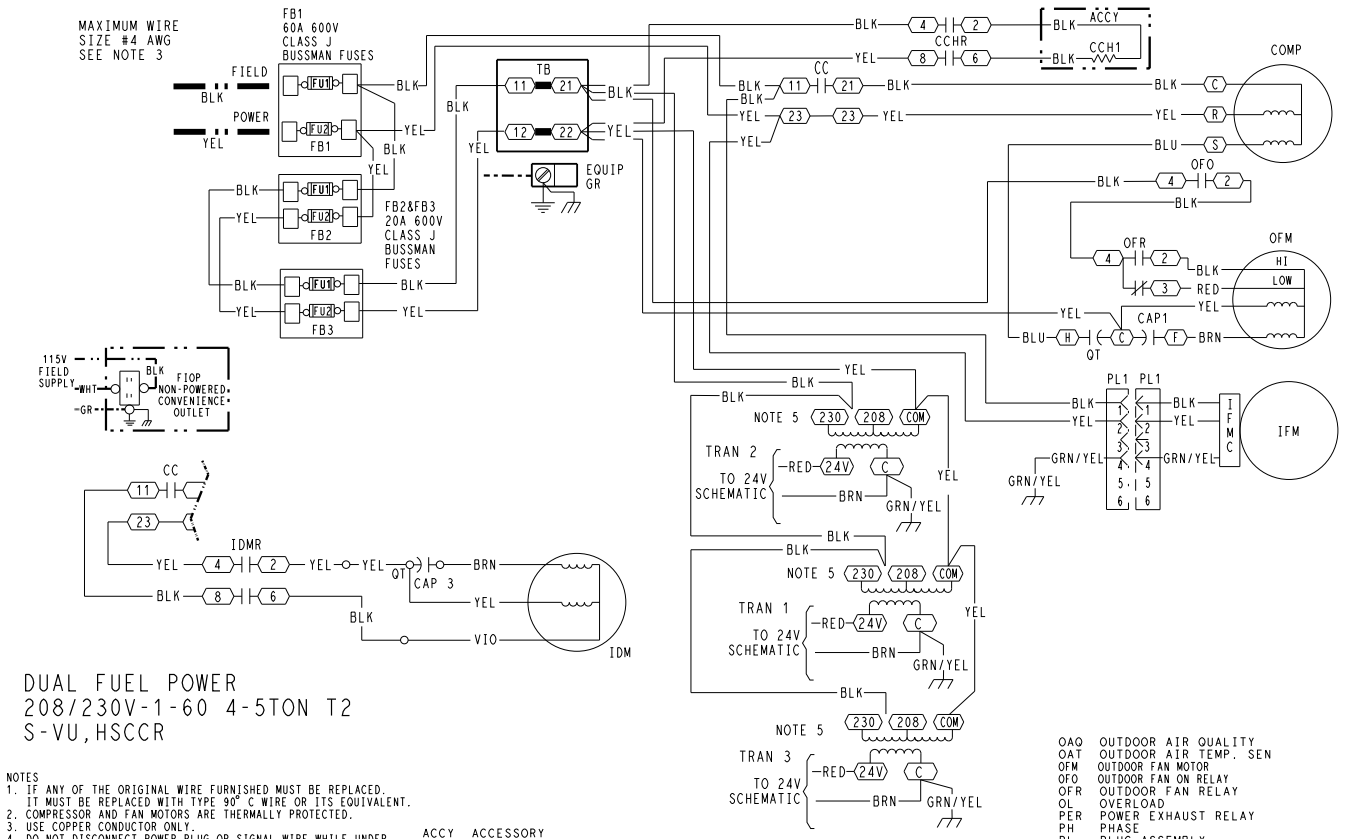
**Fig. R — Typical 48QE**04 Power Wiring Diagram — 460-3-60 — HSCCR**




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.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.

LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| HSCCR | HIGH SHORT-CIRCUIT CURRENT RATINGS |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| LLSV | LIQUID LINE SOLENOID VALVE |
| LLSVR | LIQUID LINE SOLENOID VALVE RELAY |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFO | OUTDOOR FAN ON RELAY |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

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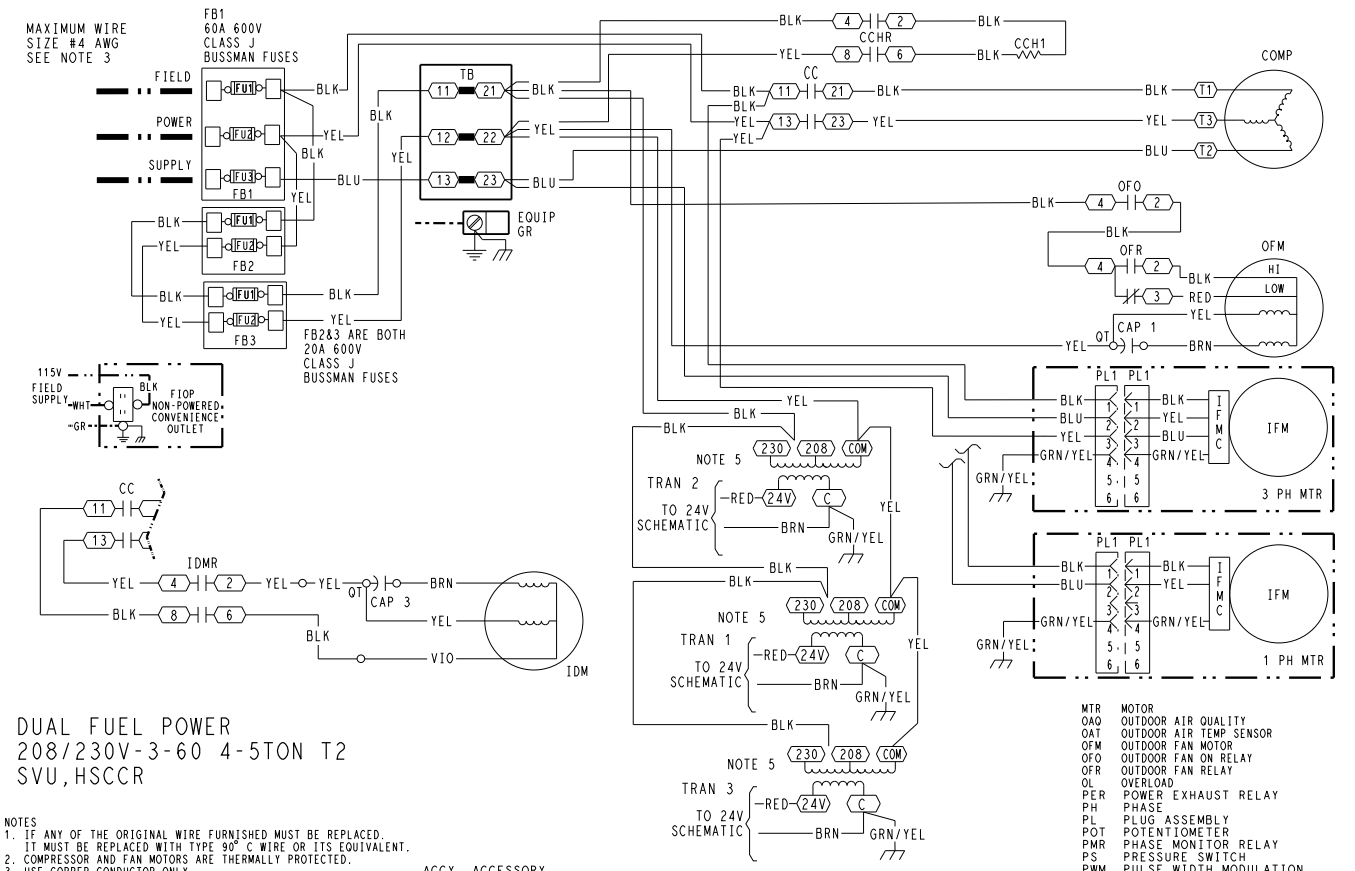
**Fig. S — Typical 48QE**05-06 Power Wiring Diagram — 208/230-1-60 — HSCCR**




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.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 208V TAP.

LEGEND

| | |
|---|---|
| (X) | MARKED WIRE |
| (X) | TERMINAL (MARKED) |
| ○ | TERMINAL (UNMARKED) |
| X | TERMINAL BLOCK |
| ● | SPLICE |
| ⬬ | SPLICE (MARKED) |
| ——— | FACTORY WIRING |
| — ——— | FIELD CONTROL WIRING |
| - - - - | FIELD POWER WIRING |
| - - - - - - | CIRCUIT BOARD TRACE |
| ——— - - - | ACCESSORY OR OPTIONAL WIRING |

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
| HGRH | HOT GAS REHEAT |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| HUM | HUMIDISTAT |
| HSCCR | HIGH SHORT-CIRCUIT CURRENT RATINGS |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IDM | INDUCED DRAFT MOTOR |
| IDMR | INDUCED DRAFT MOTOR RELAY |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROL |
| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP SENSOR |
| OFM | OUTDOOR FAN MOTOR |
| OFO | OUTDOOR FAN ON RELAY |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

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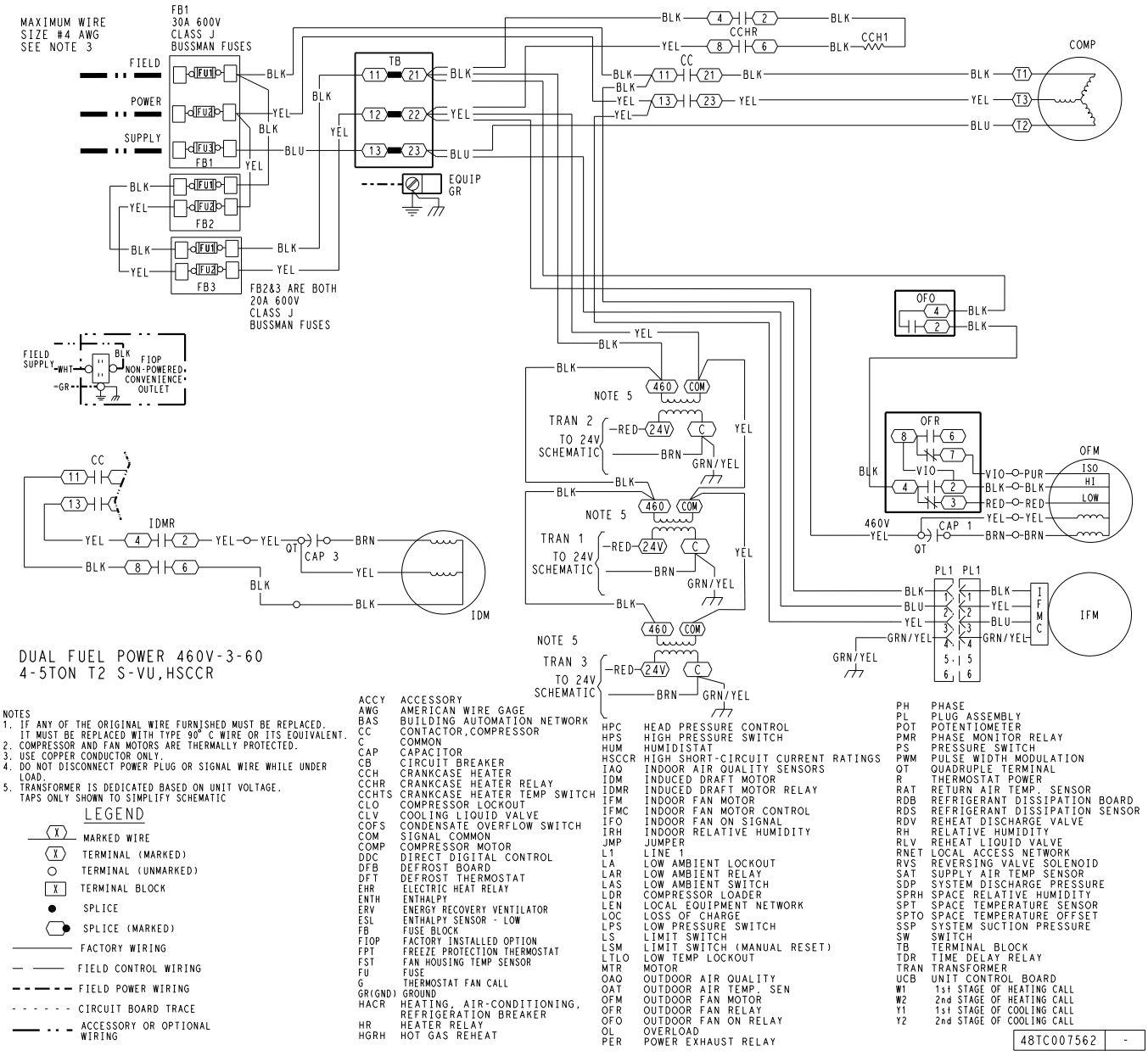
**Fig. T — Typical 48QE**04 Power Wiring Diagram — 208/230-3-60 — HSCCR**




NOTES
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2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED.
3. USE COPPER CONDUCTOR ONLY.
4. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
5. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC

LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING

| | |
|---|---|
| ACCY | ACCESSORY |
| AWG | AMERICAN WIRE GAGE |
| BAS | BUILDING AUTOMATION NETWORK |
| CC | CONTACTOR,COMPRESSOR |
| C | COMMON |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| CCHTS | CRANKCASE HEATER TEMP SWITCH |
| CLO | COMPRESSOR LOCKOUT |
| CLV | COOLING LIQUID VALVE |
| COFS | CONDENSATE OVERFLOW SWITCH |
| COM | SIGNAL COMMON |
| COMP | COMPRESSOR MOTOR |
| DDC | DIRECT DIGITAL CONTROL |
| DFB | DEFROST BOARD |
| DFT | DEFROST THERMOSTAT |
| EHR | ELECTRIC HEAT RELAY |
| ENTH | ENTHALPY |
| ERV | ENERGY RECOVERY VENTILATOR |
| ESL | ENTHALPY SENSOR - LOW |
| FB | FUSE BLOCK |
| FIOP | FACTORY INSTALLED OPTION |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FST | FAN HOUSING TEMP SENSOR |
| FU | FUSE |
| G | THERMOSTAT FAN CALL |
| GR(GND) | GROUND |
| HACR | HEATING, AIR-CONDITIONING, REFRIGERATION BREAKER |
| HR | HEATER RELAY |
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| IFM | INDOOR FAN MOTOR |
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| IFO | INDOOR FAN ON SIGNAL |
| IRH | INDOOR RELATIVE HUMIDITY |
| JMP | JUMPER |
| L1 | LINE 1 |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LAS | LOW AMBIENT SWITCH |
| LDR | COMPRESSOR LOADER |
| LEN | LOCAL EQUIPMENT NETWORK |
| LOC | LOSS OF CHARGE |
| LPS | LOW PRESSURE SWITCH |
| LS | LIMIT SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMP LOCKOUT |
| MTR | MOTOR |
| OAQ | OUTDOOR AIR QUALITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFR | OUTDOOR FAN RELAY |
| OFO | OUTDOOR FAN ON RELAY |
| OL | OVERLOAD |
| PER | POWER EXHAUST RELAY |
| PH | PHASE |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| PS | PRESSURE SWITCH |
| PWM | PULSE WIDTH MODULATION |
| QT | QUADRUPLE TERMINAL |
| R | THERMOSTAT POWER |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| RH | RELATIVE HUMIDITY |
| RLV | REHEAT LIQUID VALVE |
| RNET | LOCAL ACCESS NETWORK |
| RVS | REVERSING VALVE SOLENOID |
| SAT | SUPPLY AIR TEMP SENSOR |
| SDP | SYSTEM DISCHARGE PRESSURE |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| SSP | SYSTEM SUCTION PRESSURE |
| SW | SWITCH |
| TB | TERMINAL BLOCK |
| TDR | TIME DELAY RELAY |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |
| W1 | 1st STAGE OF HEATING CALL |
| W2 | 2nd STAGE OF HEATING CALL |
| Y1 | 1st STAGE OF COOLING CALL |
| Y2 | 2nd STAGE OF COOLING CALL |

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**Fig. U — Typical 48QE**05-06 Power Wiring Diagram — 460-3-60 — HSCCR**

## APPENDIX E — LOW AMBIENT CONTROL SENSOR LOCATION

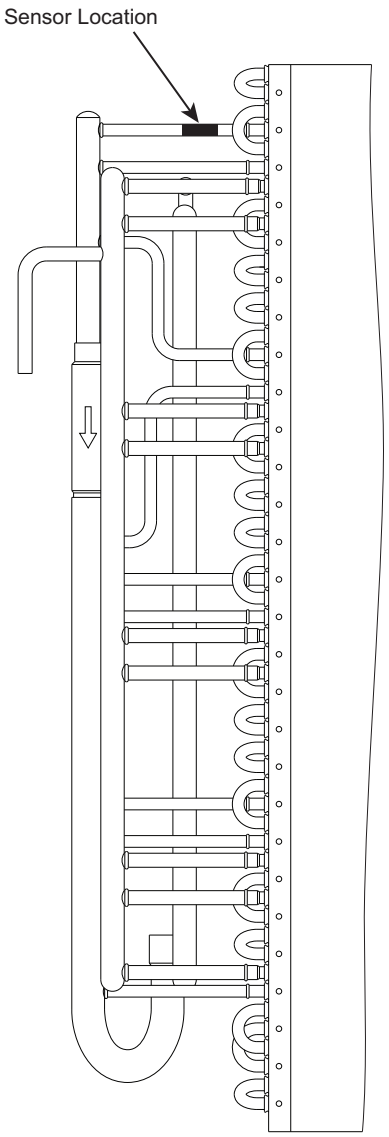


**Fig. V — 48QE**04 Outdoor Circuiting**

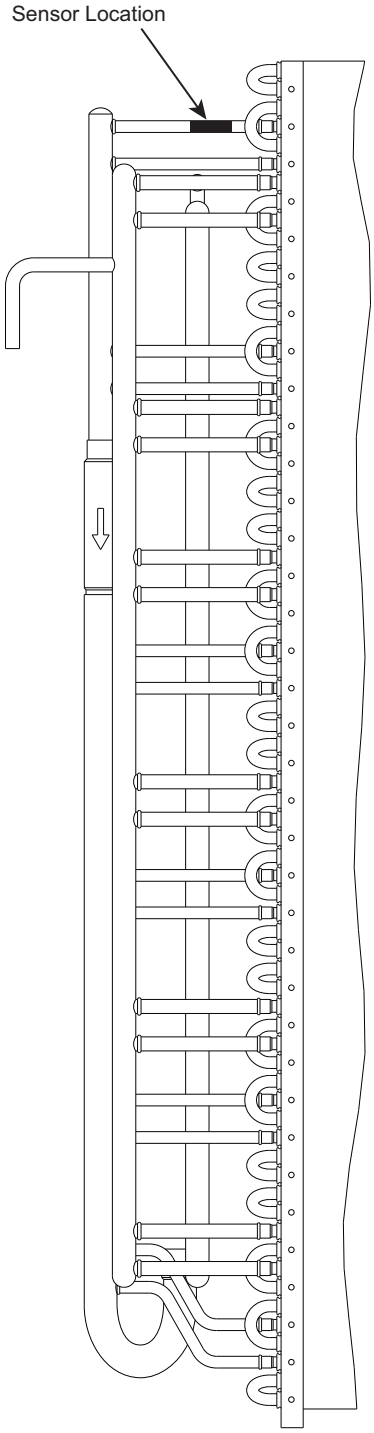


**Fig. W — 48QE**05 Outdoor Circuiting**

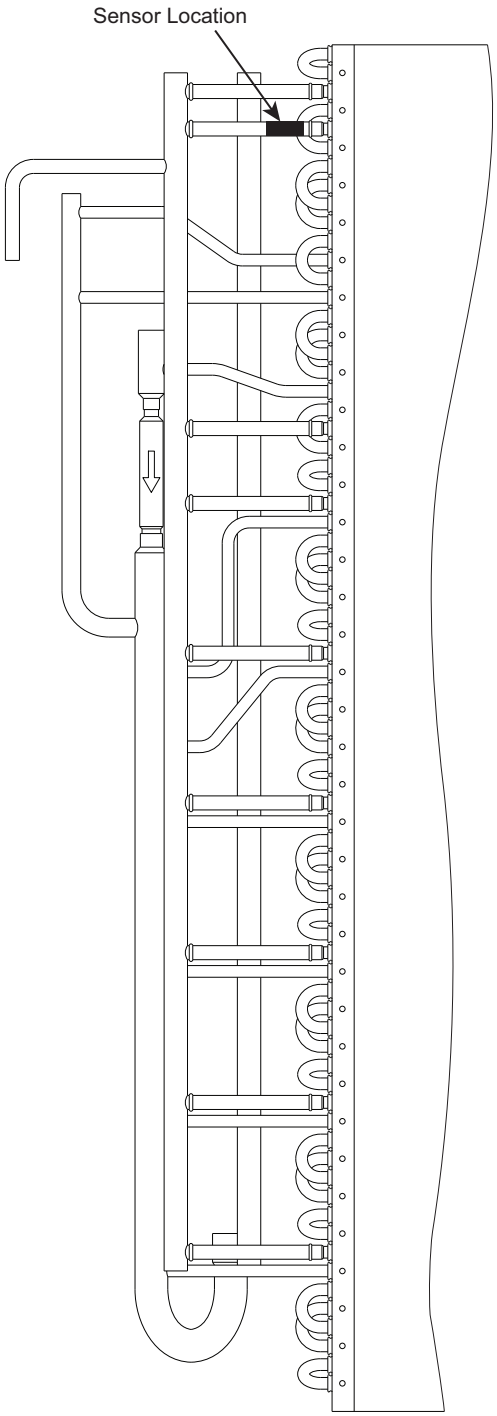


**Fig. X — 48QE**06 Outdoor Circuiting**

**Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.**

Catalog No. 04-53480681-01 Printed in U.S.A. Form No. 48QE-4-6-02SM Pg 108 6-26 Replaces: 48QE-4-6-01SM

## START-UP CHECKLIST

### 48QE**04-06 Single Package Rooftop 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 service and maintenance 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 that all electrical connections and terminals are tight. | (Y/N) _____ |
| Verify ground integrity with a continuity test. | (Y/N) _____ |
| Verify gas pressure to unit gas valve is within specified range. | (Y/N) _____ |
| Check gas piping for leaks. | (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) _____ |
| Check fan propellers for location in housing/orifice and verify setscrew is tight. | (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) _____ |
| Verify that crankcase heaters have been energized for at least 24 hours. | (Y/N) _____ |

## III. START-UP

## ELECTRICAL

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

## TEMPERATURES

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

## PRESSURES

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

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

## IV. HUMIDI-MIZER® SYSTEM START-UP

## STEPS

1. Use Service Test mode to turn on cooling. Turn on COOL TEST CMP SPD to 4500 rpm under Cool Test menu. (Y/N) _____

### OBSERVE AND RECORD

| | | | |
|---|---|---|---|
| a. | Suction pressure | _____ psig | _____ psig |
| b. | Discharge pressure | _____ psig | _____ psig |
| c. | Entering air temperature | _____ °F | _____ °F |
| d. | Liquid temperature at outlet or reheat coil | _____ °F | _____ °F |

e. Confirm correct rotation for compressor. (Y/N) _____

f. Check for correct ramp-up of outdoor fan motor as condenser coil warms. (Y/N) _____

2. Check unit charge per charging chart. (Y/N) _____

3. Switch unit to HIGH-LATENT mode (SUBCOOL) by turning Humidi-MiZer test to SUBCOOL under the COOL TEST menu. (Y/N) _____

### OBSERVE

a. Reduction in suction pressure (5 to 7 psi expected). (Y/N) _____

b. Discharge pressure unchanged. (Y/N) _____

c. Liquid temperature drops to 50 to 55°F range. (Y/N) _____

d. CLV solenoid energized (valve closes for no flow). (Y/N) _____

4. Switch unit to DEHUMID (REHEAT) by turning Humidi-MiZer test to REHEAT under the COOL TEST menu. (Y/N) _____

### OBSERVE

a. Suction pressure increases to normal cooling level. (Y/N) _____

b. Discharge pressure decreases 30 to 50 psi. (Y/N) _____

c. Liquid temperature returns to normal cooling level. (Y/N) _____

d. CLV solenoid energized, valve closes for no flow. (Y/N) _____

e. RDV solenoid energized, valve opens for flow. (Y/N) _____

5. Switch unit to OFF by turning Humidi-MiZer test to OFF under the COOL TEST menu, and Compressor and outdoor fan stop, CLV and RDV solenoids de-energized. (Y/N) _____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

## V. 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) _____

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**Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.**

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