# WeatherMaster® 50GEQ*07-09 Single Package Rooftop Heat Pump 2 and 3 Stage Models with Puron Advance™ Refrigerant and EcoBlue™ Fan Technology

# Installation Instructions

## CONTENTS



## SAFETY CONSIDERATIONS

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

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



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

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

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

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**

Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation and service. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

**⚠ DANGER**

ELECTRICAL SHOCK HAZARD

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

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

**⚠ WARNING**

UNIT OPERATION AND SAFETY HAZARD

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

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

**⚠ AVERTISSEMENT**

FONCTIONNEMENT DE L'APPAREIL ET DANGERS POUR LA SÉCURITÉ

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

Le R-454B est un fluide frigorigène A2L. Tous les équipements et composants d'entretien doivent être compatibles avec le R-454B. N'utilisez pas d'équipements ou de composants non compatibles avec le R-454B.

**⚠ WARNING**

PERSONAL INJURY AND ENVIRONMENTAL HAZARD

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

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

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

**⚠ WARNING**

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

**⚠ AVERTISSEMENT**

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

**⚠ 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.

## MODEL NUMBER NOMENCLATURE AND DIMENSIONS

See Fig. 1 for 50GEQ*07-09 model number nomenclature. See Fig. 2 and 3 (pages 5 - 10) for unit dimensional drawings.

### Rated Indoor Airflow

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

**Table 1 — Rated Indoor Airflow**

| MODEL NUMBER | RATED COOLING AIRFLOW (cfm) | RATED HEATING AIRFLOW (cfm) |
|---|---|---|
| **50GEQ*07** | 2600 | 2600 |
| **50GEQ*08** | 3000 | 3000 |
| **50GEQM/N/P09** | 3200 | 3200 |
| **50GEQT/U09** | 3200 | 3400 |

## A2L REFRIGERATION INFORMATION

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


### Transportation

Follow all local, state, or federal regulations when transporting equipment containing A2L refrigerant. Carrier applied RTUs are designed to be transported on a flatbed trailer or flatbed rail car. Ensure the proper safety equipment, driver training, and any required trailer markings are in place prior to transporting equipment containing an A2L refrigerant. Units with an A2L refrigerant charge are not approved for air or cargo vessel transportation.

### 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 2, based on the unit size and configuration.

**Table 2 — Minimum Conditioned Space Area (MCSA or $TA_{min}$)**

| UNIT | $(TA_{MIN})^a$ | |
|---|---|---|
| | Sq Ft | Sq Meter |
| **50GEQM/P/T07** | 441 | 41 |
| **50GEQM//P/T08** | 491 | 46 |
| **50GEQM/P09** | 558 | 52 |
| **50GEQN/U07** | 466 | 44 |
| **50GEQN/U08** | 699 | 65 |
| **50GEQN/U09** | 822 | 77 |
| **50GEQT09** | 617 | 58 |

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 2 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 2 based on unit size and configuration, then additional ventilation may be required. Refer to local code, UL-60335-2-40, or ASHRAE 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.

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

**Unit Type**
50 – Cooling Packaged Rooftop

**Model Series**
GE – Mid Tier Puron Advance™

**Heat Size**
Q = Heat Pump
(Field-Installed Electric Heat)

**Refrigerant Systems Options**
M = Two Stage Cooling, Single Circuit
N = Two Stage Cooling, Single Circuit with Humidi-MiZer® System[a]
P = Two Stage Cooling, Single Circuit with Head Pressure Control[b]
T = Three Stage Cooling, Single Circuit[a]
U = Three Stage Cooling, Single Circuit with Humidi-MiZer® System[a]

**Tonnage**
07 = 6.0 tons
08 = 7.5 tons
09 = 8.5 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

**Fan Options**
2 = Standard/Medium Static – EcoBlue Vane Axial Fan
3 = High Static – EcoBlue Vane Axial Fan
5 = Standard/Medium Static – EcoBlue Vane Axial Fan and Filter Status Switch
6 = High Static – EcoBlue Vane Axial Fan and Filter Status Switch

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

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

**Design Revision**
- = Factory Assigned

**Packaging & Seismic Compliance**
0 = Standard

**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[c] (High Short Circuit Current Rating)
2 = HSCCR[c] + TTB

**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 = Foil Faced Insulation + NPCO
E = Foil Faced Insulation + PCO
F = Foil Faced Insulation + Hinged Panels
G = FF + HP + NPCO
H = FF + HP + PCO
J = Foil Faced Insulation + 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

**Intake / Exhaust Options**
A = None
B = Standard Leak Economizer with Barometric Relief
F = Standard Leak 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

**Base Unit Controls**
0 = Standard Electromechanical Controls (can be used with field installed economizers and dampers)
3 = SystemVu™ Controller
8 = Electro-mechanical Controls with POL224 (includes FDD[d])

NOTE(S):
a. Requires SystemVu™ Controller.
b. Head Pressure Control is included with 8.5 ton units.
c. Not available on the following models/options:
50GEQ*09 (8.5 ton units), 575V, Low Ambient/Head Pressure Control, Phase Loss Monitor, Non-Fused Disconnect, HACR, Powered Convenience Outlet, 2-Stage units with Humidi-MiZer.
d. FDD (Fault Detection and Diagnostic) capability per California Title 24 section 120.2.

**Fig. 1 — 50GEQ 07-09 Model Number Nomenclature (Example)**

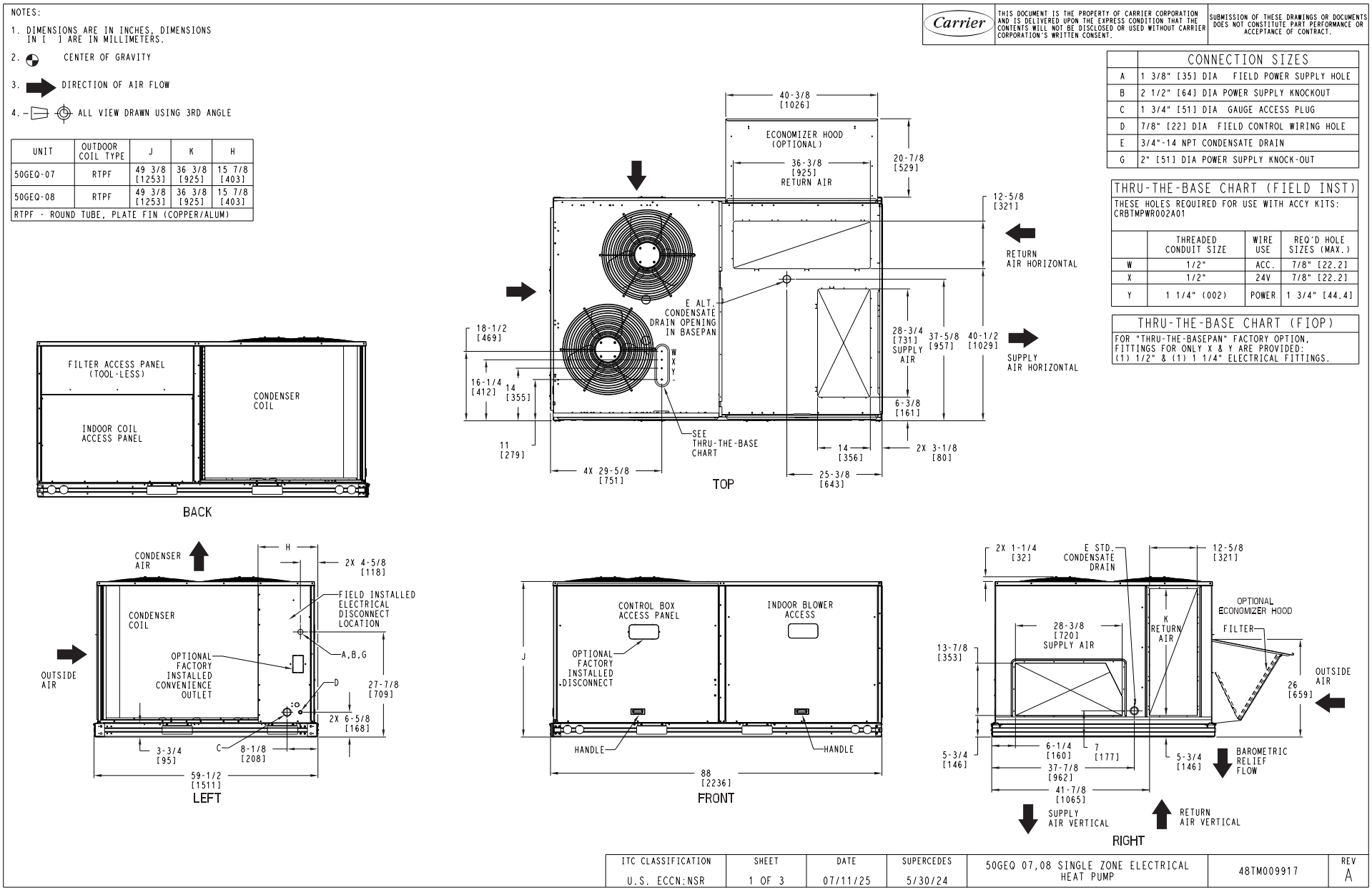
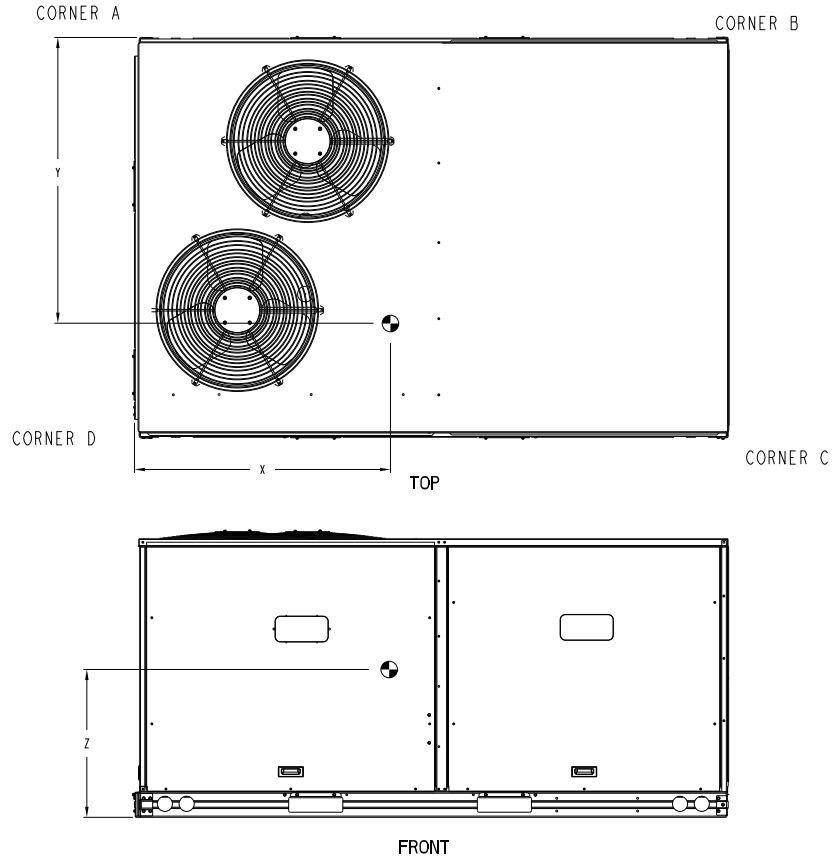
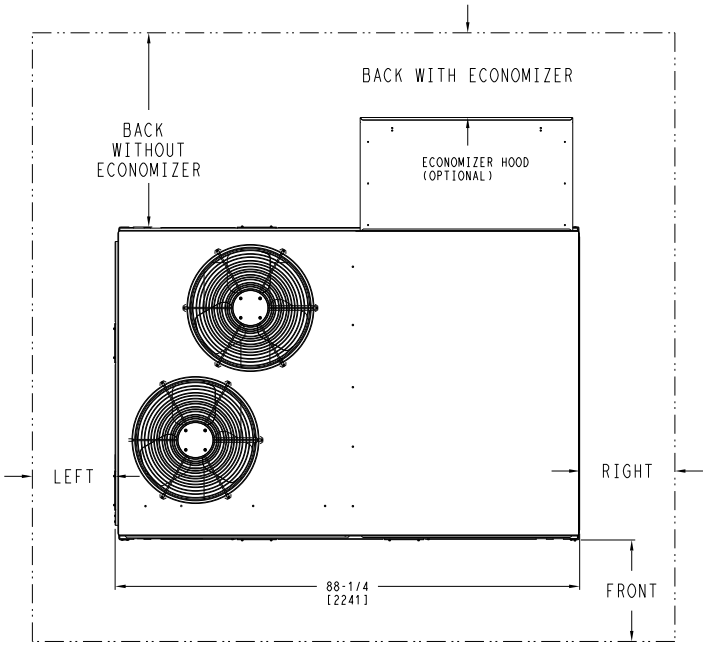



**Fig. 2 — 50GEQ 07-08 Unit Dimensional Drawing**

| UNIT | OUTDOOR COIL TYPE | STD. UNIT WEIGHT *** | | CORNER WEIGHT (A) | | CORNER WEIGHT (B) | | CORNER WEIGHT (C) | | CORNER WEIGHT (D) | | C.G. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LBS. | KG. | LBS. | KG. | LBS. | KG. | LBS. | KG. | LBS. | KG. | X | Y | Z |
| 50GEQ-07 | RTPF | 805 | 365 | 163 | 74 | 209 | 95 | 243 | 110 | 190 | 86 | 38 5/8 [981] | 32 [813] | 19 1/8 [486] |
| 50GEQ-08 | RTPF | 812 | 368 | 164 | 74 | 211 | 96 | 245 | 111 | 191 | 87 | 38 5/8 [981] | 32 [813] | 19 1/8 [486] |
| RTPF - ROUND TUBE, PLATE FIN (COPPER/ALUM) | | | | | | | | | | | | | | |

*** STANDARD UNIT WEIGHT IS WITHOUT ELECTRIC HEAT AND WITHOUT PACKAGING.
FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.




NOTE:

1. FOR ALL MINIMUM CLEARANCES LOCAL CODES OR JURISDICTIONS MAY PREVAIL.

| | CLEARANCE | |
|---|---|---|
| | SERVICE WITH: | SERVICE WITH: |
| SURFACE | CONDUCTIVE BARRIER | NONCONDUCTIVE BARRIER |
| FRONT | 48 [1219mm] | 36 [914mm] |
| LEFT | 48 [1219mm] | 42 [1067mm] |
| BACK W/O ECON | 48 [1219mm] | 42 [1067mm] |
| BACK W/ECON | 36 [914mm] | 36 [914mm] |
| RIGHT | 36 [914mm] | 36 [914mm] |
| TOP | 72 [1829mm] | 72 [1829mm] |

| ITC CLASSIFICATION | SHEET | DATE | SUPERCEDES | | | |
|---|---|---|---|---|---|---|
| U.S. ECCN:NSR | 2 OF 3 | 7/11/25 | 5/30/24 | 50GEQ 07,08 SINGLE ZONE ELECTRICAL HEAT PUMP | 48TM009917 | REV A |





**Fig. 2 — 50GEQ 07-08 Unit Dimensional Drawing (cont)**

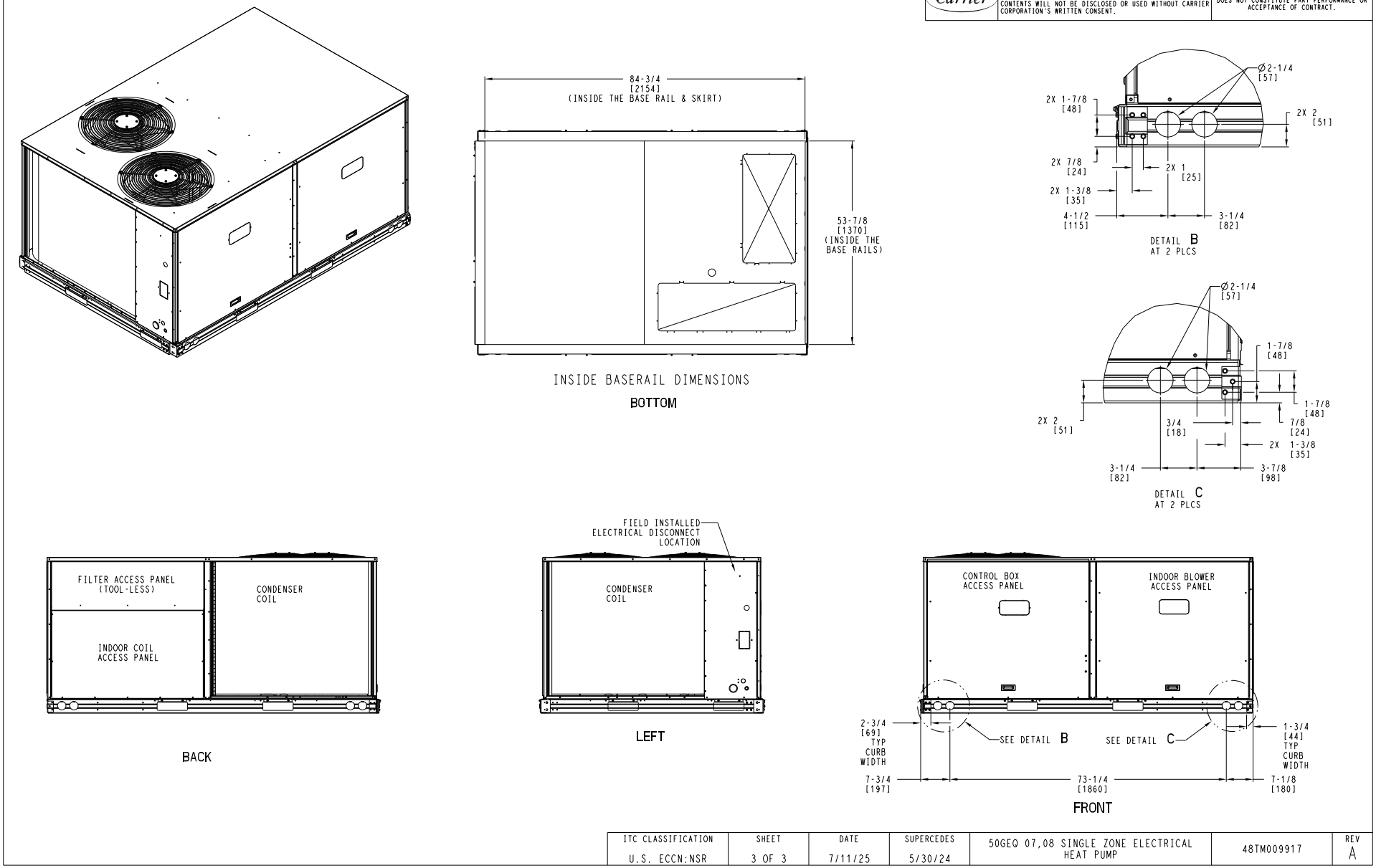



**Fig. 2 — 50GEQ 07-08 Unit Dimensional Drawing (cont)**

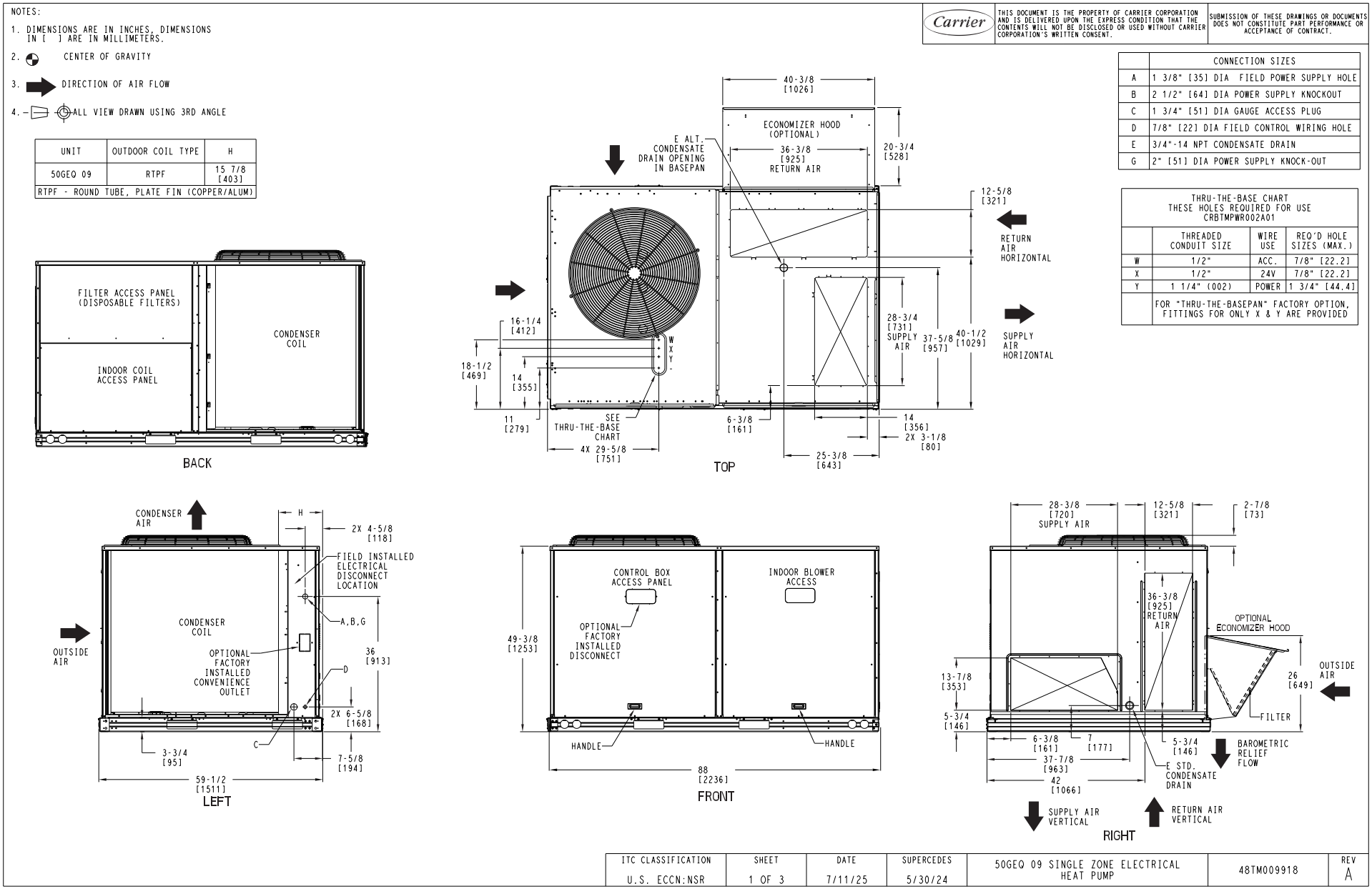
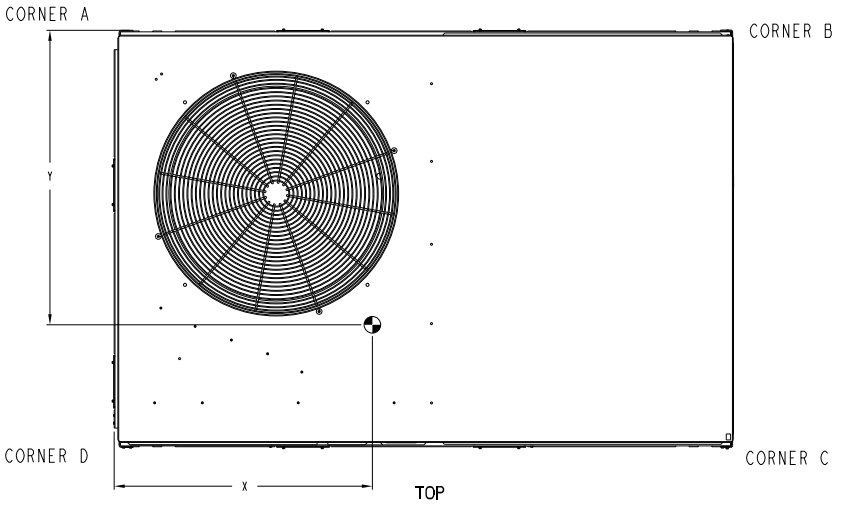
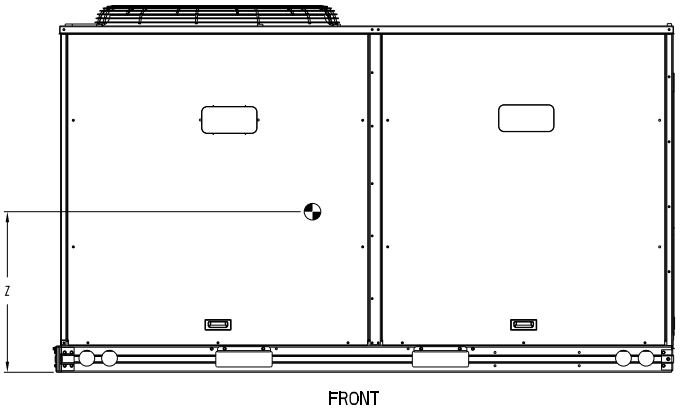


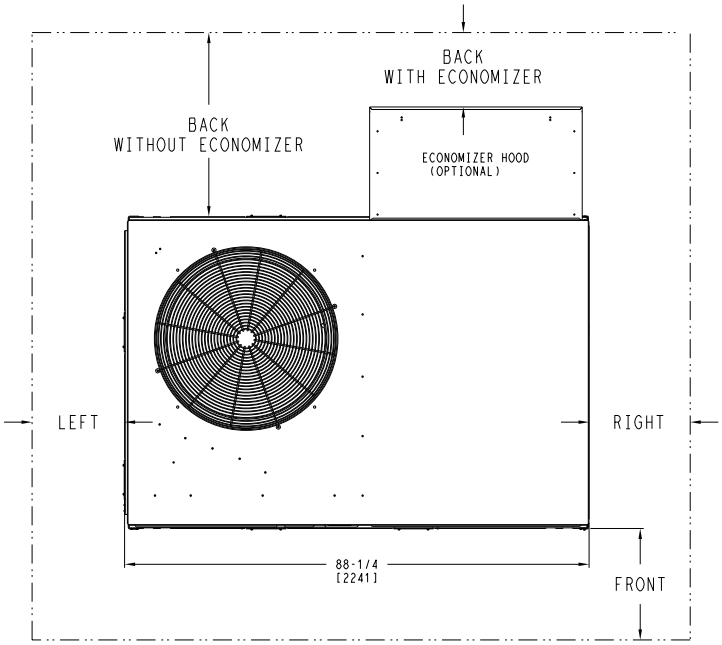

**Fig. 3 — 50GEQ 09 Unit Dimensional Drawing**

| UNIT | OUTDOOR COIL TYPE | STD. UNIT WEIGHT*** | | CORNER WEIGHT (A) | | CORNER WEIGHT (B) | | CORNER WEIGHT (C) | | CORNER WEIGHT (D) | | C.G. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LBS. | KG. | LBS. | KG. | LBS. | KG. | LBS. | KG. | LBS. | KG. | X | Y | Z |
| 50GEQ 09 | RTPF | 955 | 433 | 190 | 86 | 243 | 110 | 293 | 133 | 229 | 104 | 38 5/8 [981] | 32 1/2 [826] | 19 1/8 [486] |
| RTPF - ROUND TUBE, PLATE FIN (COPPER/ALUM) | | | | | | | | | | | | | | |

*** STANDARD UNIT WEIGHT IS WITHOUT ELECTRIC HEAT AND WITHOUT PACKAGING.
FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.




NOTE:

1. FOR ALL MINIMUM CLEARANCES LOCAL CODES OR JURISDICTIONS MAY PREVAIL.

| | CLEARANCE | |
|---|---|---|
| | SERVICE WITH: | SERVICE WITH: |
| SURFACE | CONDUCTIVE BARRIER | NONCONDUCTIVE BARRIER |
| FRONT | 48 [1219mm] | 36 [914mm] |
| LEFT | 48 [1219mm] | 42 [1067mm] |
| BACK W/O ECON | 48 [1219mm] | 42 [1067mm] |
| BACK W/ECON | 36 [914mm] | 36 [914mm] |
| RIGHT | 36 [914mm] | 36 [914mm] |
| TOP | 72 [1829mm] | 72 [1829mm] |



| ITC CLASSIFICATION | SHEET | DATE | SUPERCEDES | | | REV |
|---|---|---|---|---|---|---|
| U.S. ECCN:NSR | 2 OF 3 | 7/11/25 | 5/30/24 | 50GEQ 09 SINGLE ZONE ELECTRICAL HEAT PUMP | 48TM009918 | A |



**Fig. 3 — 50GEQ 09 Unit Dimensional Drawing (cont)**

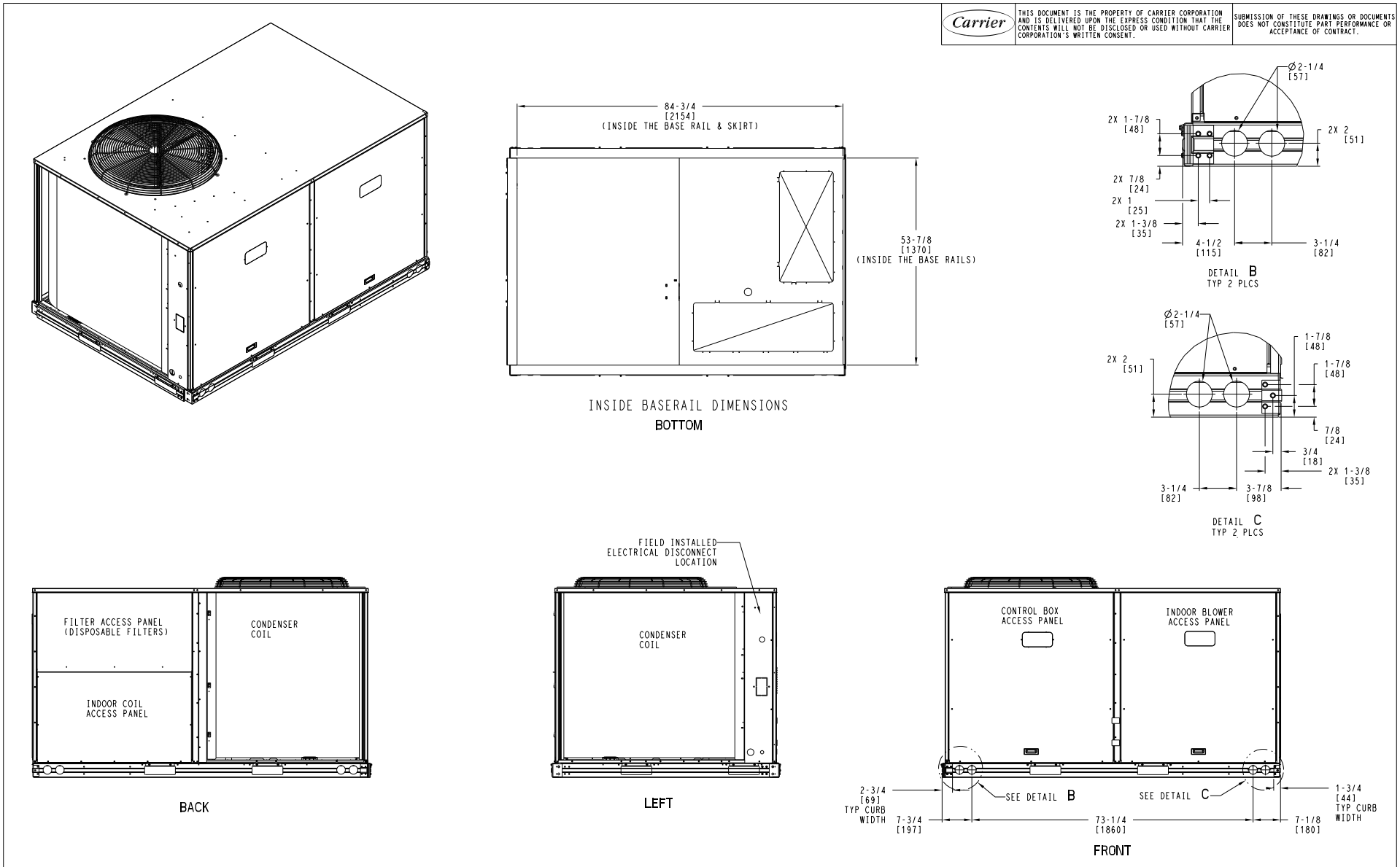



**Fig. 3 — 50GEQ 09 Unit Dimensional Drawing (cont)**

# INSTALLATION

## Jobsite Survey

Complete the following checks before installation.

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

## Step 1 — Plan for Unit Location

Select a location for the unit and its support system (curb or other) that provides for minimum clearances required for safety (including clearance to combustible surfaces), unit performance and service access below, around and above unit as specified in unit drawings. See Fig. 2 on page 6 or Fig. 3 on page 9.

NOTE: Consider also the effect of adjacent units.

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

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

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

Select a unit mounting system that provides adequate height to allow installation of condensate trap per requirements. Refer to Install External Condensate Trap and Line on page 16 for required trap dimensions.

ROOF MOUNT

Check building codes for weight distribution requirements. Unit operating weight is shown in Table 3.

**Table 3 — Operating Weights**

| 50GEQ* | UNIT LB (KG) | | |
|---|---|---|---|
| | 07 | 08 | 09 |
| Base Unit | 805 (365) | 812 (368) | 955 (433) |
| Economizer | | | |
| Vertical | 75 (34) | 75 (34) | 75 (34) |
| Horizontal | 127 (58) | 127 (58) | 127 (58) |
| Humidi-MiZer® Coil | 25 (12) | 34 (16) | 34 (16) |
| Powered Outlet | 35 (16) | 35 (16) | 35 (16) |
| Curb | | | |
| 14 in. (356 mm) | 143 (65) | 143 (65) | 143 (65) |
| 24 in. (610 mm) | 245 (111) | 245 (111) | 245 (111) |

## Step 2 — Plan for Sequence of Unit Installation

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

CURB-MOUNTED INSTALLATION

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

PAD-MOUNTED INSTALLATION

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

FRAME-MOUNTED INSTALLATION

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

## Step 3 — Inspect Unit

Inspect unit for transportation damage. File any claim with transportation agency.

Confirm before installation of unit that voltage, amperage and circuit protection requirements listed on unit data plate agree with power supply provided.

On units with hinged panel option, check to be sure all latches are snug and in closed position.

Locate the carton containing the outside air hood parts. Do not remove carton until unit has been rigged and located in final position.

## Step 4 — Provide Unit Support

ROOF CURB MOUNT

Accessory roof curb details and dimensions are shown in Fig. 4 (on page 12). Assemble and install accessory roof curb in accordance with instructions shipped with the curb.

Curb should be level. This is necessary for unit drain to function properly. Unit leveling tolerances are shown in Fig. 5 (on page 13). Refer to Accessory Roof Curb Installation Instructions for additional information as required.

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

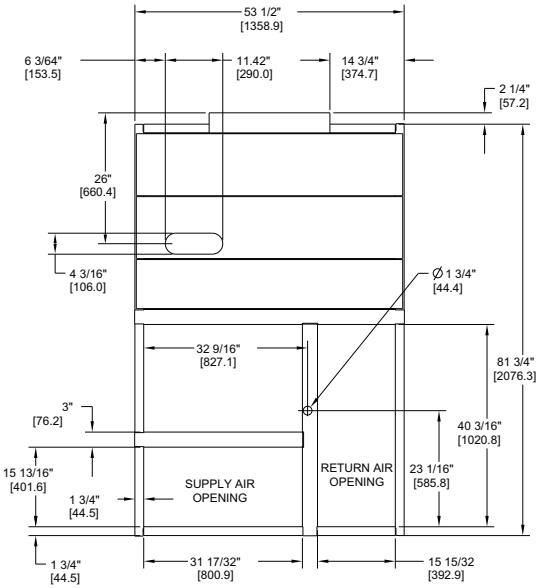
If electric and control wiring is to be routed through the basepan, attach the accessory thru-the-base service connections to the basepan in accordance with the accessory installation instructions.

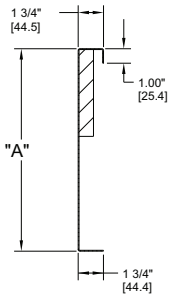
NOTE: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 4. Improperly applied gasket can also result in air leaks and poor unit performance.

| ROOF CURB ACCESSORY # | A |
|---|---|
| CRRFCURB003A01 | 14" [356] |
| CRRFCURB004A01 | 24" [610] |

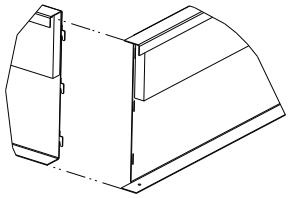
NOTES:
1. ROOFCURB ACCESSORY IS SHIPPED DISASSEMBLED.
2. INSULATED PANELS: 25.4 [1"] THK. POLYURETHANE FOAM, 44.5 [1-3/4] # DENSITY.
3. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
4. ROOFCURB: 18 GAGE STEEL.
5. ATTACH DUCTWORK TO CURB. (FLANGES OF DUCT REST ON CURB).
6. SERVICE CLEARANCE 4 FEET ON EACH SIDE.
7. ▨ DIRECTION OF AIR FLOW.
8. CONNECTOR PACKAGE CRBTMPWR002A01 IS FOR THRU-THE-CURB GAS TYPE PACKAGE CRBTMPWR004A01 IS FOR THRU-THE-BOTTOM TYPE GAS CONNECTIONS.

| CONNECTOR PKG. ACC. | GAS CONNECTION TYPE | GAS FITTING | POWER WIRING FITTING | CONTROL WIRING FITTING | ACCESSORY CONVENIENCE OUTLET WIRING CONNECTOR |
|---|---|---|---|---|---|
| CRBTMPWR002A01 | THRU THE CURB | 3/4" [19] NPT | 1 1/4" [31.7] NPT | 1/2" [12.7] NPT | 1/2" [12.7] NPT |
| CRBTMPWR004A01 | THRU THE BOTTOM | | | | |

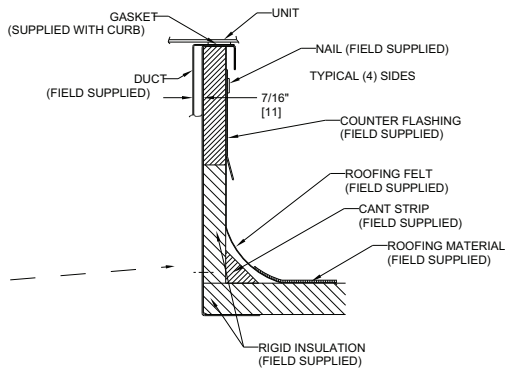


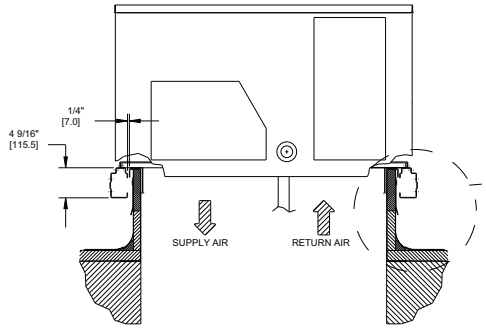



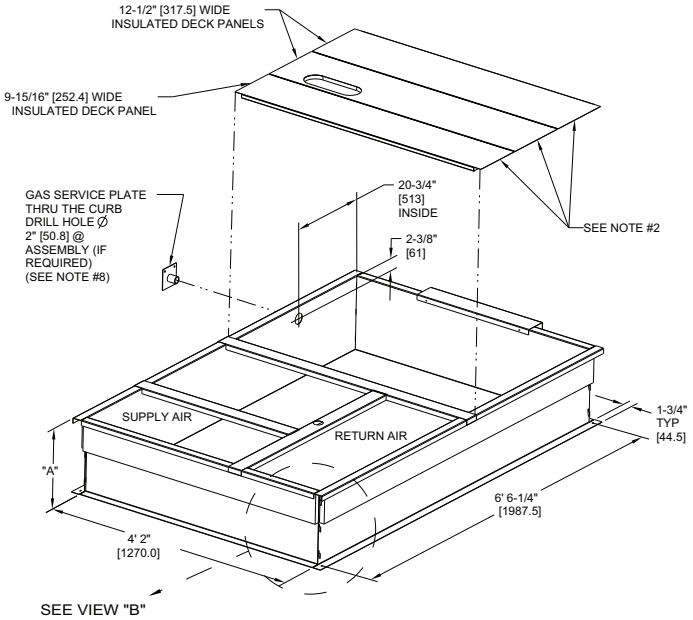

SECTION THRU SIDE



VIEW "B"
CORNER DETAIL



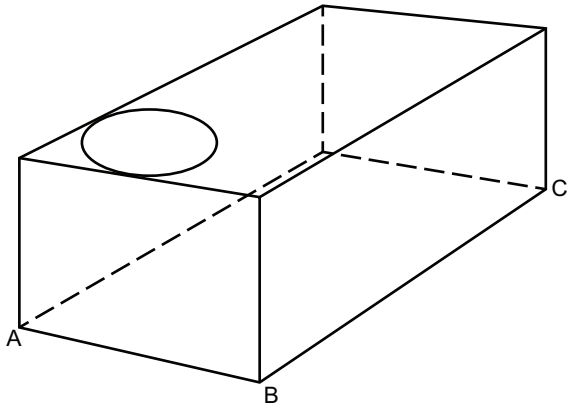






TITLE
CURB ASY, ROOF

| DRAWING NUMBER | REV |
|---|---|
| 50HJ405012 | C |

**Fig. 4 — Roof Curb Details**




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

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

**Fig. 5 — Unit Leveling Tolerances**

SLAB MOUNT (HORIZONTAL UNITS ONLY)

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

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

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

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

## Step 5 — Field Fabricate Ductwork

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

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

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

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

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

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

**⚠ CAUTION**

PROPERTY DAMAGE HAZARD

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

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

FOR UNITS WITH ACCESSORY ELECTRIC HEATERS

All installations require a minimum clearance to combustible surfaces of 1 in. (25 mm) from duct for first 12 in. (305 mm) away from unit.

Outlet grilles must not lie directly below unit discharge.

**⚠ WARNING**

PERSONAL INJURY HAZARD

Failure to follow this warning could cause personal injury.

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

## Step 6 — Rig and Place Unit

Keep unit upright and do not drop. Spreader bars are required. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 3 on page 11 and Fig. 6 on page 14 for additional information.

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

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

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

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

**⚠ CAUTION**

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

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

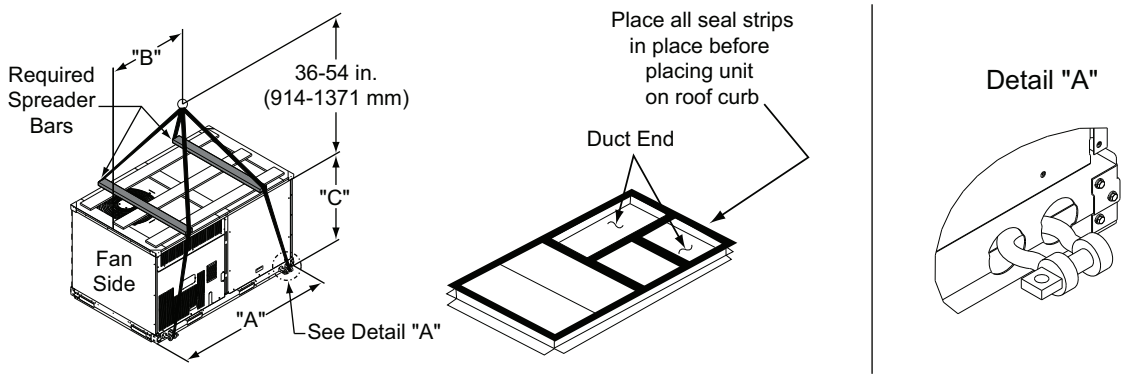
If using top crate as spreader bar, once unit is set, carefully lower wooden crate off building roof top to ground. Ensure that no people or obstructions are below prior to lowering the crate.

POSITIONING ON CURB

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

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

After unit is in position, remove rigging skids and shipping materials.




NOTE(S):
1. SPREADER BARS ARE REQUIRED. Top damage will occur if spreader bars are not used.
2. Hook rigging shackles through holes in base rail, as shown in Detail A. Holes in base rails are centered around the unit center of gravity. Use wooden top to prevent rigging straps from damaging unit.

| UNIT | MAX WEIGHT | | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | A | | B | | C | |
| | lb | kg | in. | mm | in. | mm | in. | mm |
| **50GEQ*07** | 1310 | 594 | 88.0 | 2235 | 38.5 | 980 | 49.5 | 1255 |
| **50GEQ*08** | 1375 | 624 | 88.0 | 2235 | 38.5 | 980 | 49.5 | 1255 |
| **50GEQ*09** | 1560 | 708 | 88.0 | 2235 | 38.5 | 980 | 49.5 | 1255 |

**Fig. 6 — Rigging Details**

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

Unit is shipped in the vertical duct configuration. Unit without factory-installed economizer or return-air smoke detector option may be field-converted to horizontal ducted configuration. To convert to horizontal configuration, remove screws from side duct opening covers (see Fig. 7) and remove covers. Use the screws to install the covers on vertical duct openings with the insulation-side down. The panels must be inserted into the notches on the basepan to properly seal. The notches are covered by the tape used to secure the insulation to the basepan and are not easily seen. See Fig. 8 for position of the notches in the basepan. Seals around duct openings must be tight. Secure with screws as shown in Fig. 9. Cover seams with foil duct tape.

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

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

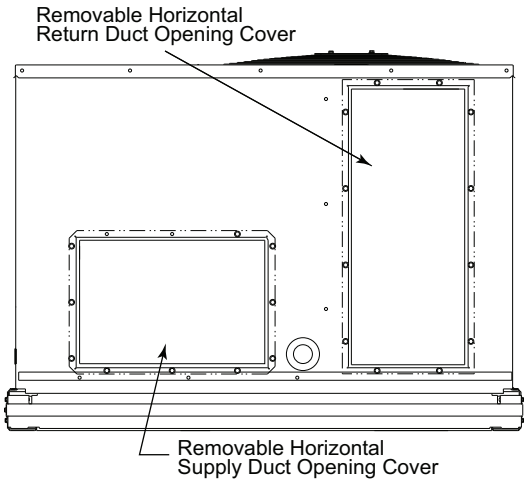



**Fig. 7 — Horizontal Conversion Panels**

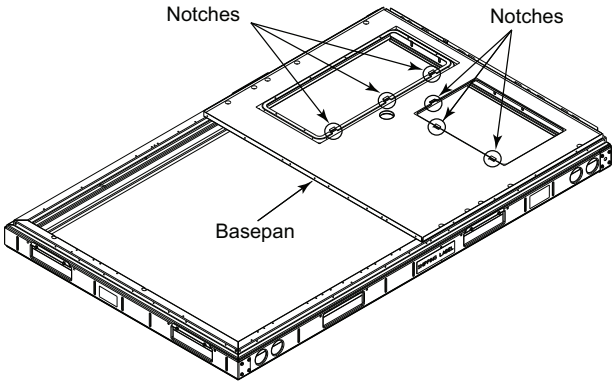



**Fig. 8 — Location of Notches**

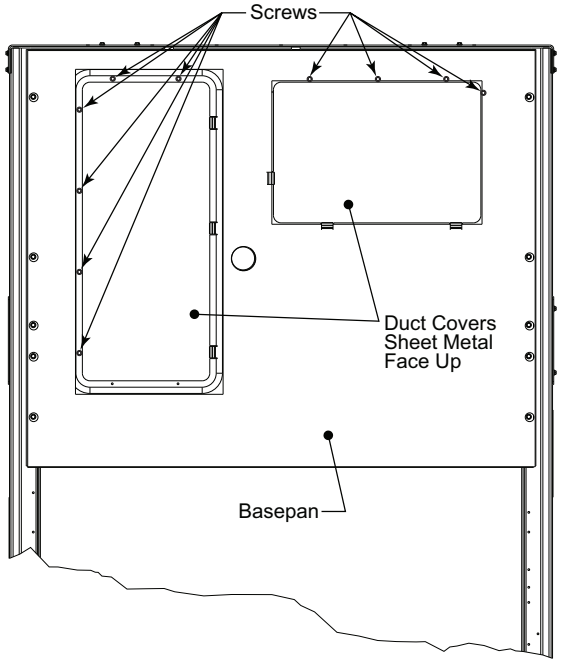



**Fig. 9 — Horizontal Duct Panels In Place**

## Step 8 — Install Outside Air Hood

ECONOMIZER HOOD PACKAGE REMOVAL (FACTORY OPTION)

1. The hood is shipped in knock-down form and must be field assembled. The indoor coil access panel is used as the hood top while the hood sides, divider and filter are packaged together, attached to a metal support tray using plastic stretch wrap, and shipped in the return air compartment behind the indoor coil access panel. The hood assembly's metal tray is attached to the basepan and also attached to the damper using two plastic tie-wraps.
2. To gain access to the hood, remove the filter access panel. (See Fig. 10.)

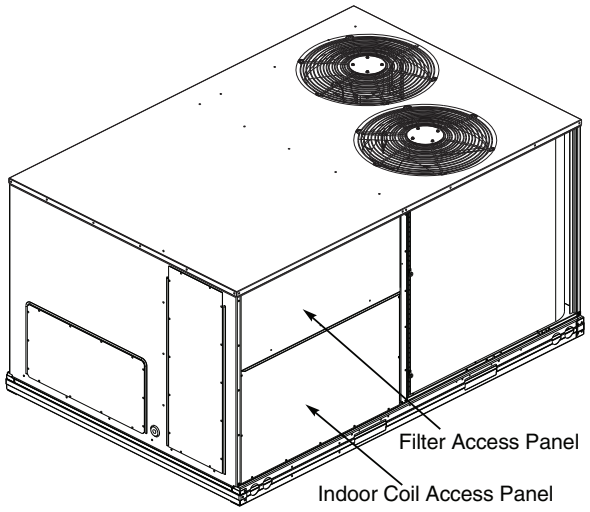



**Fig. 10 — Typical Access Panel Locations**

3. Locate the (2) screws holding the metal tray to the basepan and remove. Locate and cut the (2) plastic tie-wraps securing the assembly to the damper. (See Fig. 11.) Be careful to not damage any wiring or cut tie-wraps securing any wiring.

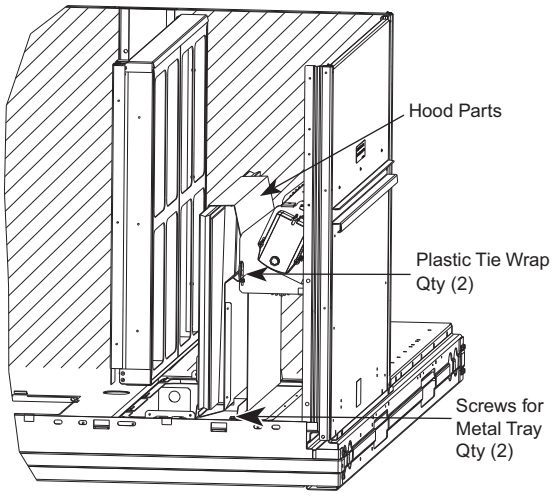



**Fig. 11 — Economizer Hood Parts Location**

4. Carefully lift the hood assembly (with metal tray) through the filter access opening and assemble per the steps outlined in Economizer Hood Setup in the following section.

ECONOMIZER HOOD SETUP

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

1. The indoor coil access panel will be used as the top of the hood. Remove the screws along the sides and bottom of the indoor coil access panel. See Fig. 12.

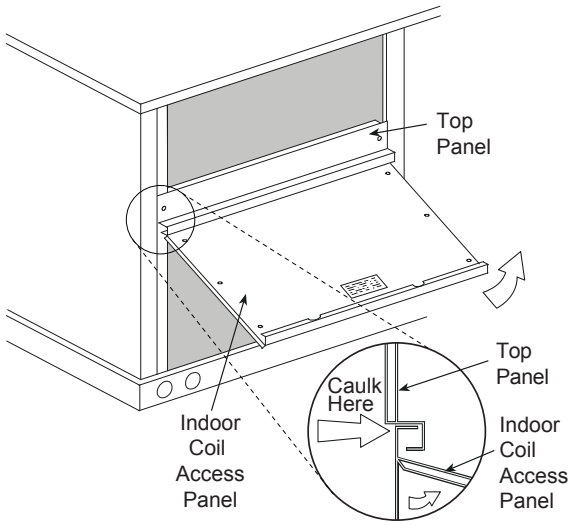



**Fig. 12 — Indoor Coil Access Panel Relocation**

2. Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 13.

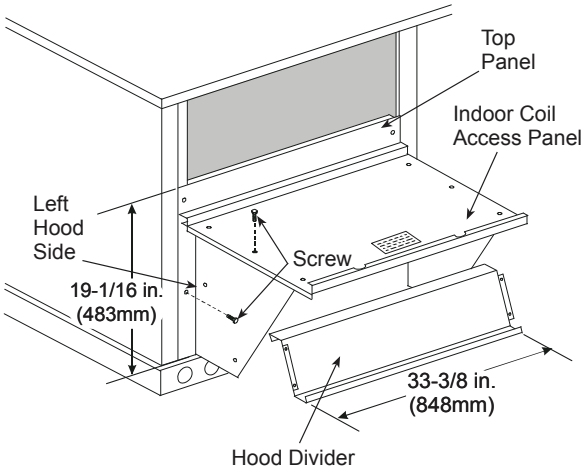



**Fig. 13 — Economizer Hood Construction**

3. Remove the shipping tape holding the economizer barometric relief damper in place (economizer only).
4. Insert the hood divider between the hood sides. See Fig. 13 and 14. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.
5. Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 14.
6. Caulk the ends of the joint between the unit top panel and the hood top.
7. Replace the filter access panel.

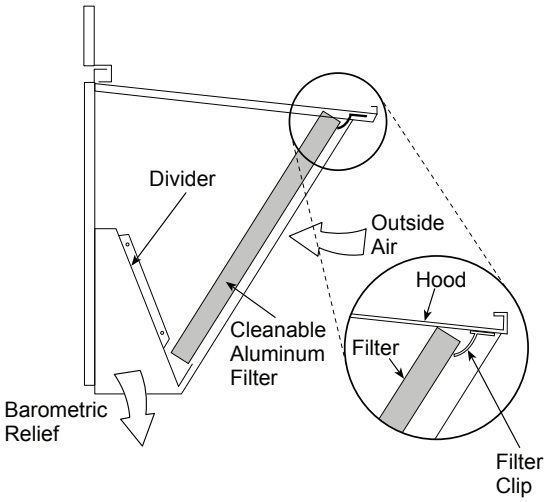



**Fig. 14 — Economizer Filter Installation**

## Step 9 — Install External Condensate Trap and Line

The unit has one 3/4 in. condensate drain connection on the end of the condensate pan and an alternate connection on the bottom. See Fig. 15. Unit airflow configuration does not determine which drain connection to use. Either drain connection can be used with vertical or horizontal applications.

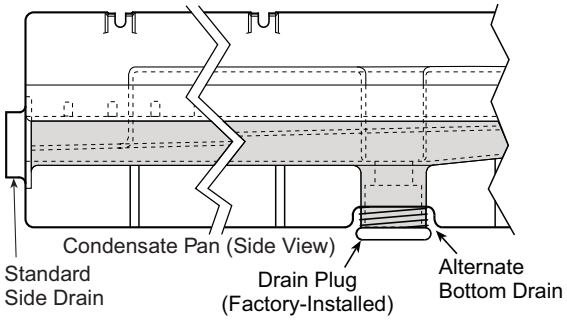
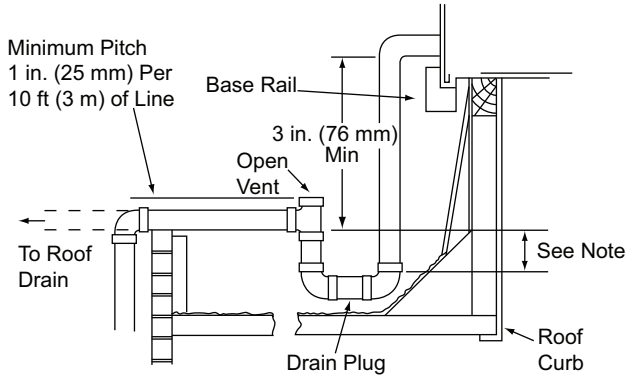



**Fig. 15 — Condensate Drain Pan (Side View)**

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

The piping for the condensate drain and external trap can be completed after the unit is in place. See Fig. 16.

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




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

**Fig. 16 — Condensate Drain Piping Details**

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

## Step 10 — Make Electrical Connections

**⚠ WARNING**

ELECTRIC SHOCK HAZARD

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

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

NOTE: Field-supplied wiring shall conform with the limitations of minimum 63°F (33°C) rise.

FIELD POWER SUPPLY

If equipped with optional powered convenience outlet: The power source leads to the convenience outlet's transformer primary are not factory connected. Installer must connect these leads according to required operation of the convenience outlet. If an always-energized convenience outlet operation is desired, connect the source leads to the line side of the unit-mounted disconnect. (Check with local codes to ensure this method is acceptable in your area.) If a de-energize via unit disconnect switch operation of the convenience outlet is desired, connect the source leads to the load side of the unit disconnect. On a unit without a unit-mounted disconnect, connect the source leads to compressor contactor C and indoor fan contactor IFC pressure lugs with unit field power leads (see Fig. 17).

Field power wires will be connected at the line-side pressure lugs on the power terminal block or at factory-installed option non-fused disconnect or HACR.

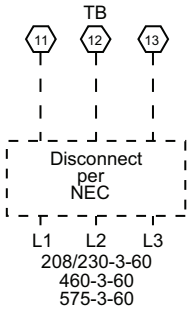
FIELD POWER WIRING CONNECTIONS

Field power wires are connected to the unit at line-side pressure lugs on compressor contactor C and indoor fan contactor IFC (see wiring diagram label for control box component arrangement), or at factory-installed option non-fused disconnect switch or HACR or electric heat single point box. Max wire size is no. 4ga AWG (copper only) per pole on contactors, no. 4ga AWG (copper only) or 1/0 AWG (copper only) per pole on optional disconnect (max wire size depends on the disconnect size supplied with unit), 1/0 AWG (copper only) on optional HACR and 4/0 AWG (copper only) per pole on terminal or fuse block on units with single point box. See Fig. 17 and unit label diagram for field power wiring connections.

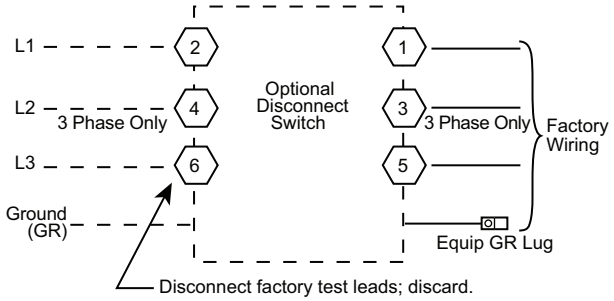
Refer to Table 4 for maximum wire sizes at connection lugs Use copper wire only. See Fig. 17 and 18.

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

Units Without Single Point Box, Disconnect or HACR Option




Units With Disconnect or HACR Option




Units With Electric Heat Option with Single Point Box and Without Disconnect or HACR Option

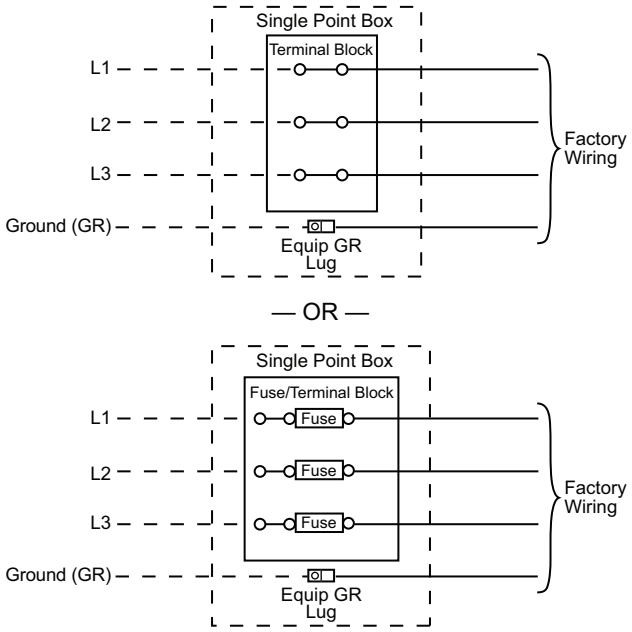



**Fig. 17 — Power Wiring Connections**

**⚠ WARNING**

FIRE HAZARD

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

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

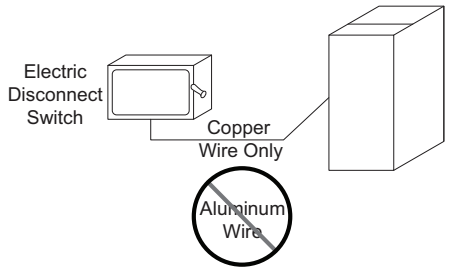



**Fig. 18 — Disconnect Switch and Unit**

**Table 4 — Connection Lug Min/Max Wire Sizes**

| CONNECTION | MINIMUM | MAXIMUM |
|---|---|---|
| **TB1 In Unit Control Box** | #14 | #1 |
| **80A Disconnect Option** | #14 | #4 |
| **100A Disconnect Option** | #8 | 1/0 |

UNITS WITH FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR

The factory-installed option non-fused disconnect (NFD) (see Fig. 19) or HACR (see Fig. 20) switch is located in a weatherproof enclosure located under the main control box. The manual switch handle and shaft are shipped in the disconnect or HACR enclosure. Assemble the shaft and handle to the switch at this point. Discard the factory test leads (see Fig. 17). Connect field power supply conductors to LINE side terminals when the switch enclosure cover is removed to attach the handle.

Connect field power supply conductors to LINE side terminals when the switch enclosure cover is removed to attach the handle.

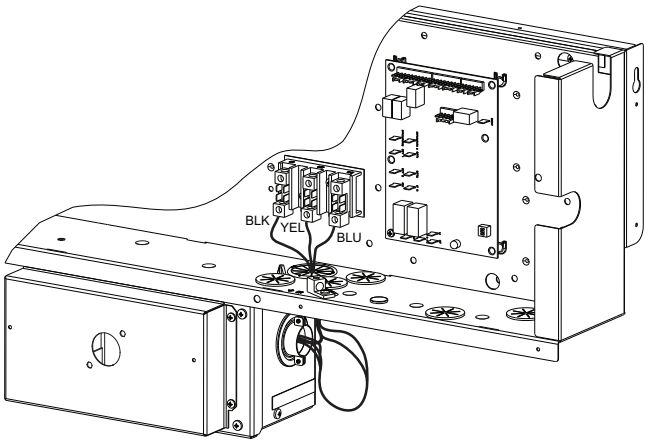



**Fig. 19 — Location of Non-Fused Disconnect Enclosure**

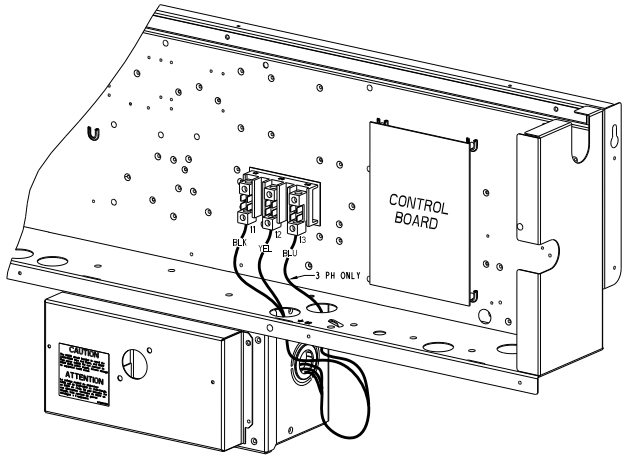



**Fig. 20 — Location of HACR Circuit Breaker Enclosure**

***To field install the NFD shaft and handle (see Fig. 21):***

1. Remove the unit front panel (see Fig. 2 and 3).
2. Remove (3) hex screws on the NFD enclosure - (2) on the face of the cover and (1) on the left side cover.
3. Remove the front cover of the NFD enclosure.
4. Make sure the NFD shipped from the factory is at OFF position (the arrow on the black handle knob is at OFF).
5. Insert the shaft with the cross pin on the top of the shaft in the horizontal position.
6. Measure from the tip of the shaft to the top surface of the black pointer; the measurement should be 3.75 in. to 3.88 in. (95 mm to 99 mm).
7. Tighten the locking screw to secure the shaft to the NFD.
8. Turn the handle to the OFF position with red arrow pointing to OFF.
9. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
10. Secure the handle to the painted cover with (2) screws and lock washers supplied.
11. Engaging the shaft into the handle socket, re-install (3) hex screws on the NFD enclosure.
12. Re-install the unit front panel.

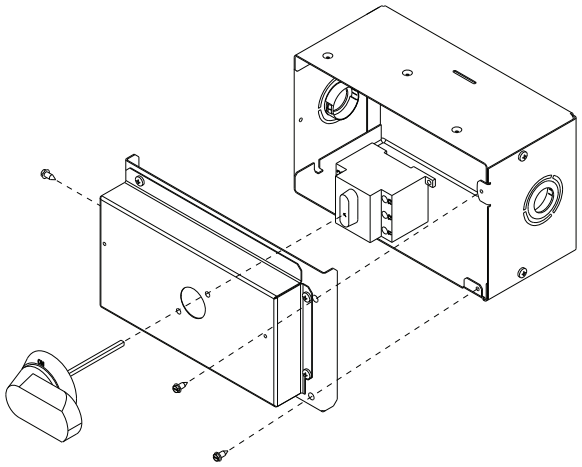


**Fig. 21 — Handle and Shaft Assembly for NFD**

***To field install the HACR circuit breaker shaft and handle (see Fig. 22):***

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

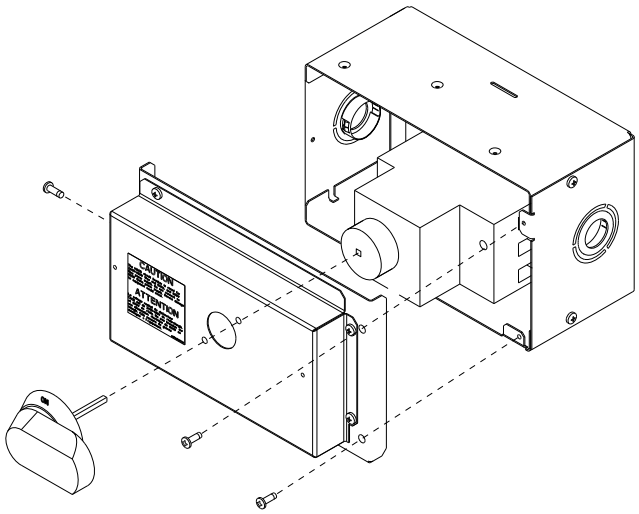


**Fig. 22 — Handle and Shaft Assembly for HACR Circuit Breaker**

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

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

FIELD WIRING COMPLIANCE

All field wiring must comply with NEC and all local code requirements. Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 17 and unit label diagram for power wiring connections to the unit and equipment ground. Maximum wire size is no. 4 ga AWG (copper only) per pole on contactors and no. 2 ga AWG (copper only) per pole on optional non-fused disconnect or HACR.

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

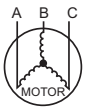
NOTE: Units ordered with factory-installed HACR do not need an additional ground-fault and short-circuit over-current protective device unless required by local codes.

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

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate. On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the following formula to determine the percent of voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

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

Example: Supply voltage is 230-3-60




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

$$\text{Average Voltage} = \frac{(224 + 231 + 226)}{3} = \frac{681}{3} = 227$$

Determine maximum deviation from average voltage.

(AB) 227-224 = 3-v

(BC) 231-227 = 4-v

(AC) 227-226 = 1-v

Maximum deviation is 4-v.

Determine percent of voltage imbalance.

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

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

## CONVENIENCE OUTLETS

**⚠ WARNING**

ELECTRICAL OPERATION HAZARD

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

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

Two types of convenience outlets are offered on 50GEQ models: non-powered and unit-powered. Both types provide a 125-v GFCI (ground-fault circuit-interrupter) duplex receptacle rated at 15-A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 23.

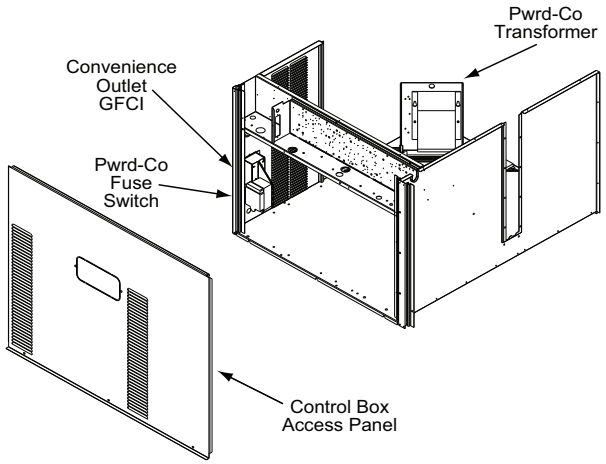



**Fig. 23 — Convenience Outlet Location**

### *Installing Weatherproof Cover*

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

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

On units with a factory installed direct digital controller (SystemVu™ controls) the weatherproof cover kit is secured to the basepan underneath the control box. See Fig. 24.

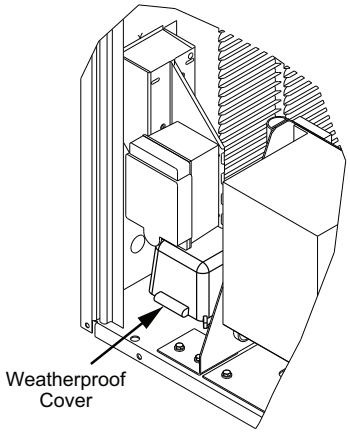



**Fig. 24 — Weatherproof Cover - Shipping Location on Units with Factory-Installed DDC**

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

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

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

Mount the weatherproof cover to the backing plate as shown in Fig. 25. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover. Check for full closing and latching.

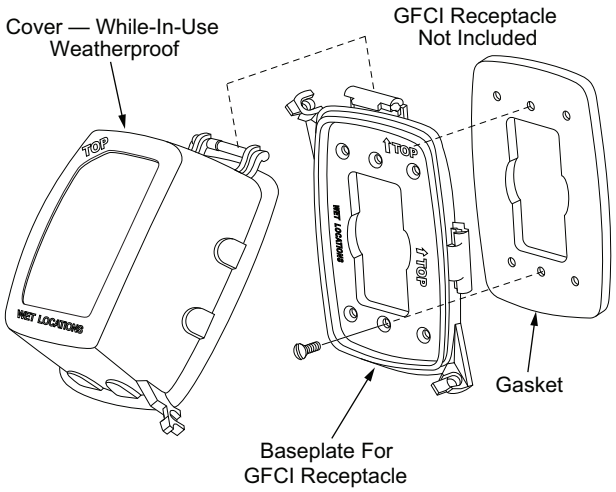



**Fig. 25 — Weatherproof Cover Installation**

### *Non-powered type*

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

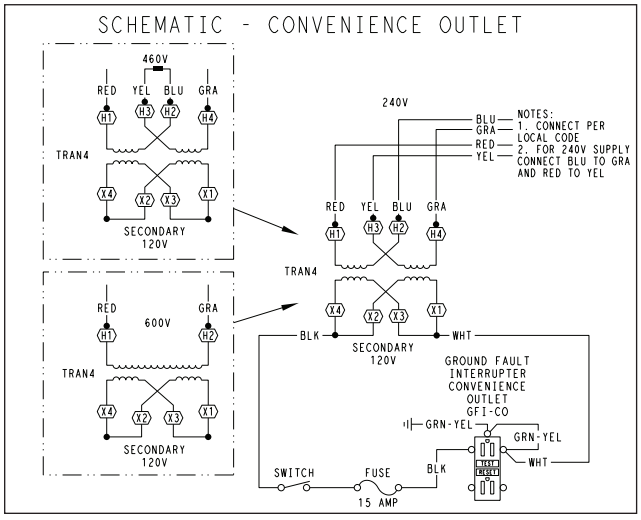
***Unit-powered type***

A unit-mounted transformer is factory-installed to step-down the main power supply voltage to the unit to 115-v at the duplex receptacle. This option also includes a manual switch with fuse, located in a utility box and mounted on a bracket behind the convenience outlet; access is through the unit's control box access panel. See Fig. 23.

The primary leads to the convenience outlet transformer are not factory-connected. Selection of primary power source is a customer option. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect; this will provide service power to the unit when the unit disconnect witch is open. Other connection methods will result in the convenience outlet circuit being de-energized when the unit disconnect switch is open. See Fig 26. On a unit without a unit-mounted disconnect, connect the source leads to the main terminal block (TB1).

ALL UNITS

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




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

**Fig. 26 — Powered Convenience Outlet Wiring**

***Unit-mounted convenience outlets***

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

***Fuse on power type***

The factory fuse is a Bussmann™[1] "Fusetron" T-15, non-renewable screw-in (Edison base) type plug fuse. See Fig. 27 for maximum continuous use amp limitations.

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

HACR AMP RATING

The amp rating of the HACR factory-installed option is based on the size, voltage, indoor motor and other electrical options of the unit as shipped from the factory. If field-installed accessories are added or changed in the field (for example, power exhaust, ERV), the HACR may no longer be of the proper amp rating and therefore will need to be removed from the unit. See unit nameplate and label on factory-installed HACR for the amp rating of the HACR that was shipped with the unit from the factory (Fig. 28). See unit nameplates for the proper fuse, HACR or maximum over-current protection device required on the unit with field installed accessories.

**NOTICE**

**Convenience Outlet Utilization**

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

50HJ542739 C

**Fig. 27 — Convenience Outlet Utilization Notice Label**

**⚠ CAUTION**

**The HACR circuit breaker is rated for 240V/480V Wye and Delta, and 600V Wye power supply. Do not connect to 600V Delta power supply. Severe damage to equipment would occur.**

**⚠ ATTENTION**

**Le voltage nominal du disjoncteur CACR est de 240V/480V en étoile-triangle, et 600V en étoile. Ne pas brancher sur une alimentation électrique de 600V en triangle. Cela causera de graves dommages à l'équipment.**

48TM503700 -

**Fig. 28 — HACR Caution Label**

FACTORY-OPTION THRU-BASE CONNECTIONS

This service connection kit consists of a a 1/2 in. electrical bulkhead connector and a 3/4 in. electrical bulkhead connector, factory-installed in the embossed (raised) section of the unit basepan in the condenser section. The 3/4 in. bulkhead connector enables the low-voltage control wires to pass through the basepan. The 1/2 in. electrical bulkhead connector allows the high-voltage power wires to pass through the basepan. See Fig. 29.

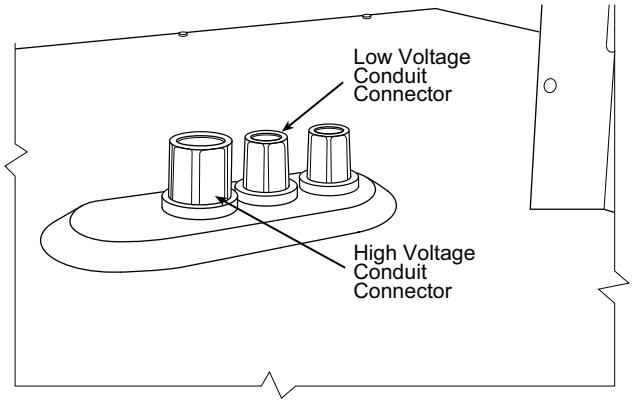



**Fig. 29 — Thru-Base Connection Fittings**

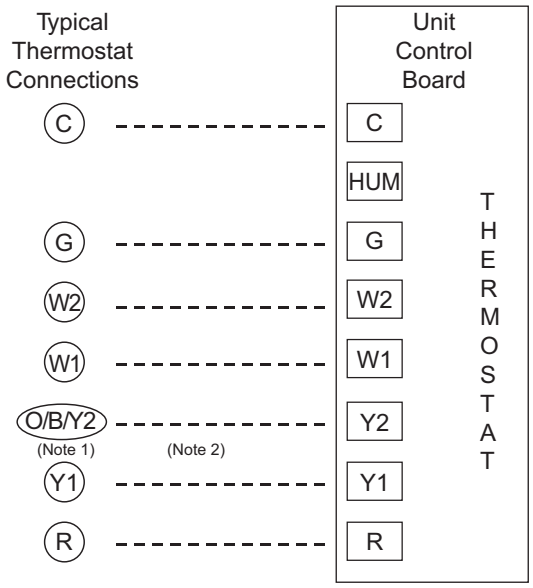
Check tightness of connector lock nuts before connecting electrical conduits.

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

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

1. Install power wiring conduit through side panel openings. Install conduit between disconnect and control box.
2. Install power lines to terminal connections as shown in Fig. 30 for 2-stage units and Fig 31 for 3-stage units.

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate. On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula on page 18 to determine the percent of voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

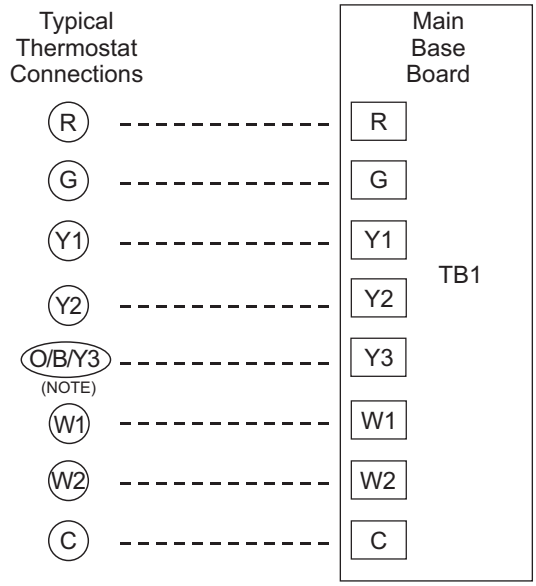



Note 1: Typical multi-function marking. Follow manufacturer's configuration Instructions to select Y2.

Note 2: Y2 to Y2 connection required on single-stage cooling units when integrated economizer function is desired.

- - - Field Wiring

**Fig. 30 — Typical Low-Voltage Connections 2-Stage Electromechanical Units**




NOTE: Typical multi-function marking. Follow manufacturer's configuration Instructions to select Y3.

- - - Field Wiring

**Fig. 31 — Typical Low-Voltage Control Connections 2-Stage and 3-Stage SystemVu Units**

***Field Control Wiring***

The 50GEQ unit requires an external temperature control device. This device can be a thermostat (field-supplied) or a SystemVu™ controller (available as factory-installed option, for use on a Carrier Comfort Network® or as a stand-alone control). All field added wire must comply with UL and local NEC standards. Use raceway shown in Fig. 32 to help with compliance as needed.

All low voltage wiring should be routed through the provided raceway (see Fig. 32) built into the corner post of the unit or secured to the unit control box with electrical conduit in order to provide UL-required clearance between high-voltage and low-voltage wiring.

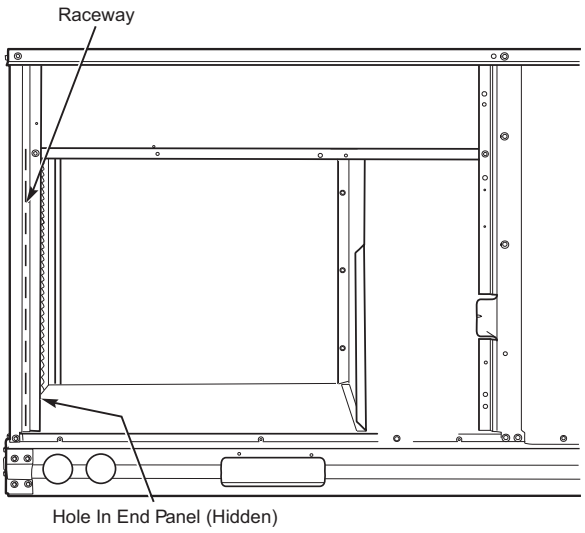



**Fig. 32 — Field Control Wiring Raceway**

### *Thermostat*

Install a Carrier-approved accessory 2-stage or 3-stage thermostat according to installation instructions included with the accessory. For complete economizer function and 2-stage or 3-stage compressor operation, select a two-stage or three-stage cooling thermostat. If a 2-stage or 3-stage cooling thermostat is not available, use a single stage cooling thermostat instead, but note that this will limit cooling to just 1 stage. Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions. If the thermostat contains a logic circuit requiring 24-v power, use a thermostat cable or equivalent single leads of different colors with minimum of seven leads for 2 stage units and eight leads for 3 stage unit (see Fig. 30 and 31). If the thermostat does not require a 24-v source (no "C" connection required), use a thermostat cable or equivalent with minimum of six leads for 2 stage units and seven leads for 3 stage units. Check the thermostat installation instructions for additional features which might require additional conductors in the cable. For wire runs up to 50 ft (15 m), use no. 18 AWG (American Wire Gauge) insulated wire [35°C (95°F) minimum]. For 50 to 75 ft (15 to 23 m), use no. 16 AWG insulated wire [35°C (95°F) minimum]. For over 75 ft (23 m), use no. 14 AWG insulated wire [35°C (95°F) minimum]. All wire sizes larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and splice at the thermostat.

### *Unit Without Thru-Base Connection Kit*

Pass the thermostat control wires through the hole provided in the corner post; then feed the wires through the raceway built into the corner post to the control box. Pull the wires over to the terminal strip on the upper left corner of the Unit Control Board or on the bottom left corner of the Main Base Board (MBB) on units with SystemVu controller. See Fig. 32.

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

COMMERCIAL DEFROST CONTROL

On 50GEQ units equipped with electromechanical controls the Defrost Control Board (DFB) coordinates thermostat demands for supply fan control, 1 or 2 stage cooling, 2 stage heating, emergency heating and defrost control with unit operating sequences. The DFB also provides an indoor fan off delay feature (user selectable). See Fig. 33 for board arrangement.

The DFB is located in the main control box of the 50GEQ unit (see Fig. 34). All connections are factory-made through harnesses to the UCB (unit control board) to the ECM (direct-drive motor), reversing valve solenoids and to defrost thermostats. Refer to Table 5 for details of DFB Inputs and Outputs.

NOTE: The Defrost Control Board is not used on units equipped with the factory-installed SystemVu™ controller option.

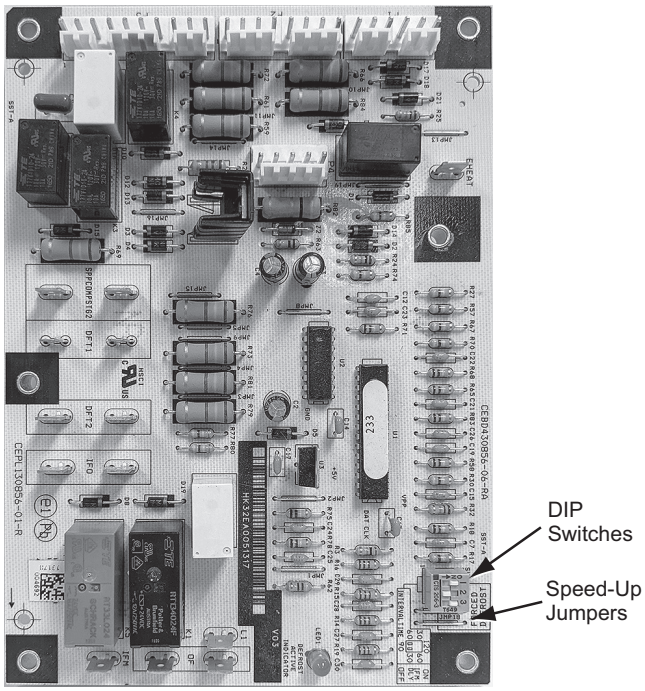



**Fig. 33 — Defrost Control Board Arrangement**

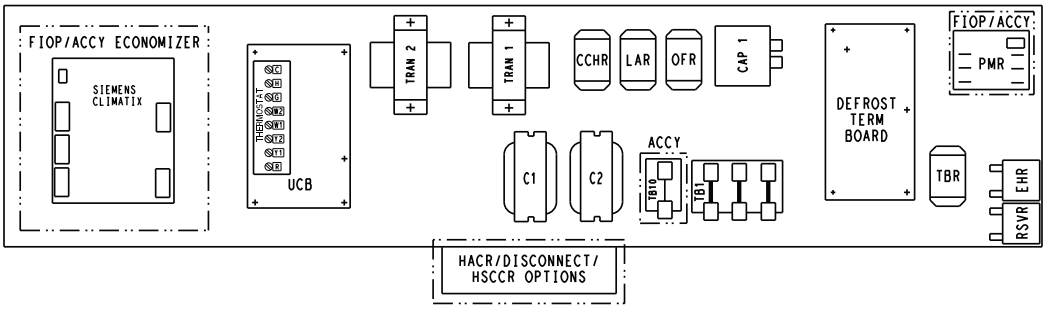



**Fig. 34 — Defrost Control Board Location - 50GEQ 07-08 Electromechanical Units Shown**

**Table 5 — 50GEQ Defrost Board I/O and Jumper Configurations[a,b]**

| POINT NAME | TYPE OF I/O | CONNECTION PIN NUMBER | UNIT CONNECTION | NOTE |
|---|---|---|---|---|
| **INPUTS** | | | | |
| **G Fan** | DI, 24 vac | P2-3 | CTB-G | |
| **Y1 Cool 1** | DI, 24 vac | P2-5 | CTB-Y1 | |
| **Y2 Cool 2** | DI, 24 vac | P2-4 | CTB-Y2 | |
| **W1 Heat 1** | DI, 24 vac | P2-7 | CTB-W1 | |
| **W2 Heat 2** | DI, 24 vac | P2-6 | CTB-W2 | |
| **R Power** | 24 vac | P3-1 | CONTL BRD-8 | |
| **C Common** | 24 vac | P3-2 | CONTL BRD-4 | |
| **DFT 1** | DI, 24 vac | DFT-1 to DFT-1 | — | |
| **DFT 2** | DI, 24 vac | DFT-2 to DFT-2 | — | |
| **OUTPUTS** | | | | |
| **IFO Fan On** | DO, 24 vac | P3-9 | REHEAT/HP-2 | |
| **OF OD Fan On** | DO, 24 vac | OF | OFR | |
| **RVS1** | DO, 24 vac | P3-7 to P3-5 | — | Energize in COOL |
| **RVS2** | DO, 24 vac | P3-6 to P3-4 | — | Energize in COOL |
| **COMP 1** | DO, 24 vac | P3-10 | FPT1-REHEAT/HP-6 | |
| **COMP2** | DO, 24 vac | P3-8 | FPT2-REHEAT/HP-8 | |
| **HEAT 2** | DO, 24 vac | E-HEAT | TB4-1 | |
| **COM** | 24 vac | P3-3 | TB4-3 | |
| **CONFIGURATION** | | | | |
| **Select Jumper** | 24 vac | P1-1 | — | |
| **SPEED-UP CONFIGURATION** | | | | |
| **Speed-Up Jumper** | — | JMP17 | — | |
| **Speed-Up Jumper** | — | JMP18 | — | |

NOTE(S):

a. Jumper for 1-3 seconds: Factory Test — The defrost interval timing is reduced by a factor of 0.1 seconds/minute based on the positions of DIP switches SW1 and SW2 (i.e., 90 minutes will be reduced to 9 seconds).
b. Jumper for 5-20 seconds: Forced Defrost — Defrost runs for 30 seconds if DFT2 is open.

### *Reversing Valve Control*

The DFB has two outputs for unit reversing valve control. Operation of the reversing valves is based on internal logic; this application does not use an "O" or "B" signal to determine reversing valve position. Reversing valves are energized during the cooling stages and the defrost cycle and de-energized during heating cycles. Once energized at the start of a cooling stage, the reversing valve will remain energized until the next heating cycle demand is received. Once de-energized at the start of a Heating cycle, the reversing valves will remain de-energized until the next cooling stage is initiated.

### *Compressor Control*

The DFB receives inputs indicating Stage 1 Cooling, Stage 2 Cooling and Stage 1 Heating from the space thermostat; it generates commands to start compressors with or without reversing valve operation to produce Stage 1 Cooling (one compressor runs), Stage 2 Cooling (both compressors run) or Stage 1 Heating (both compressors run).

### *Auxiliary (Electric) Heat Control*

The 50GEQ unit can be equipped with one or two auxiliary electric heaters, to provide a second stage of heating. The DFB will energize this Heating System for a Stage 2 Heating Command (heaters operate concurrently with compressor(s) in the Stage 1 Heating cycle), for an Emergency Heating sequence (compressors are off and only the electric heaters are energized) and also during the Defrost cycle (to eliminate a "cold blow" condition in the space).

### *Defrost*

The defrost control mode is a time/temperature sequence. There are two time components: The continuous run period and the test/defrost cycle period. The temperature component is provided by Defrost Thermostat mounted on the outdoor coil.

The continuous run period is a fixed time period between the end of the last defrost cycle (or start of the current Heating cycle) during which no defrost will be permitted. This period can be set at 30, 60, 90 or 120 minutes by changing the positions of DIP switches SW1 and SW2 (see Fig. 35 and Table 6). The default run period is 30 minutes.

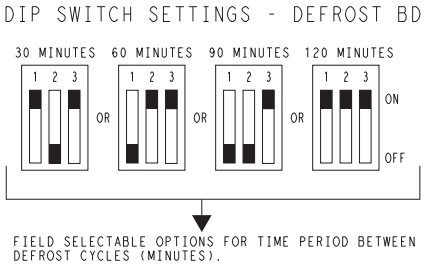



**Fig. 35 — DIP Switch Settings - Defrost Board**

**Table 6 — DIP Switch Positions**

| | 1 | 2 | | 1 | 2 | | 1 | 2 | | 1 | 2 | | 3 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | • | | 1 | | • | 1 | | | 1 | • | • | 1 | • | On |
| 0 | | • | 0 | • | | 0 | • | • | 0 | | | 0 | | Off |
| | 30 minutes (factory default) | | | 60 minutes | | | 90 minutes | | | 120 minutes | | | Fan Delay | |

Shorting the jumpers for a period of 5 to 20 seconds bypasses the remaining continuous run period and places the unit in a Forced Defrost mode. If the controlling DFT is closed when this mode is initiated, the unit will complete a normal defrost period that will terminate when the controlling DFT opens or the 10 minute defrost cycle limit is reached. If the controlling DFT is open when this mode is initiated, the Defrost cycle will run for 30 seconds. Both modes end at the end of the Defrost cycle.

HEAT ANTICIPATOR SETTINGS

Set heat anticipator settings at 0.14 amp for the first stage and 0.14 amp for second-stage heating, when available.

ELECTRIC HEATERS

The 50GEQ units may be equipped with field-installed accessory electric heaters. The heaters are modular in design, with heater frames holding open coil resistance wires strung through ceramic insulators, line-break limit switches and a control contactor.

Heater modules are installed in the compartment below the indoor (supply) fan outlet. Access is through the indoor access panel. See Fig. 36-38.

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

Refer to the *Small Roof Top Units Accessory Electric Heater and Single Point Box* installation instructions for further details.

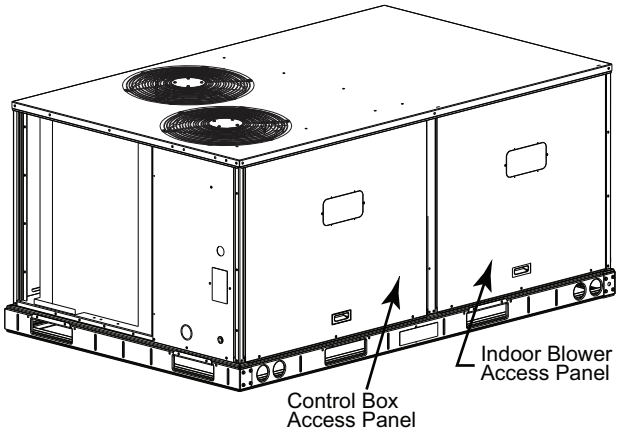



**Fig. 36 — Typical Access Panel Location**

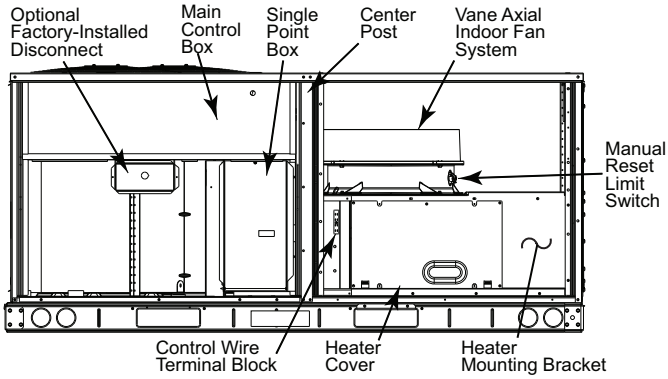



**Fig. 37 — Typical Component Location**

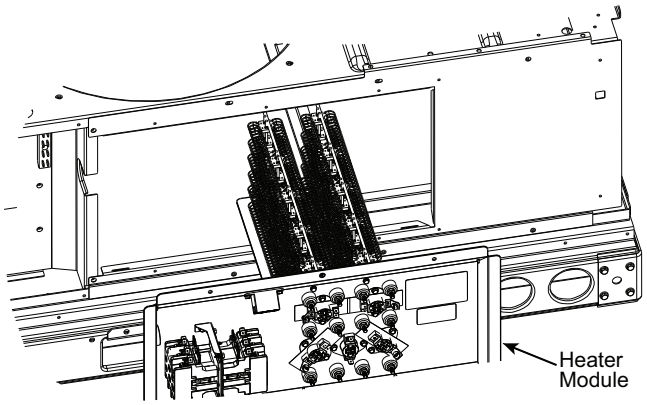



**Fig. 38 — Typical Heater Module Installation**

SINGLE POINT BOXES AND SUPPLEMENTARY FUSES

When the unit MOCP device value exceeds 60-A, unit-mounted supplementary fuses are required for each heater circuit. These fuses are included in accessory single point boxes, with power distribution and fuse blocks. The single point box will be installed directly under the unit control box, just to the left of the partition separating the indoor section (with electric heaters) from the outdoor section. The single point box has a hinged access cover. See Fig. 39. The single point box also includes a set of power taps and pigtails to complete the wiring between the single point box and the unit's main control box terminals. Refer to the Small Roof Top Units Accessory Electric Heater and single point box installation instructions for details on tap connections.

All fuses on 50GEQ units are 60-A. (Note that all heaters are qualified for use with a 60-A fuse, regardless of actual heater ampacity, so only 60-A fuses are necessary.)

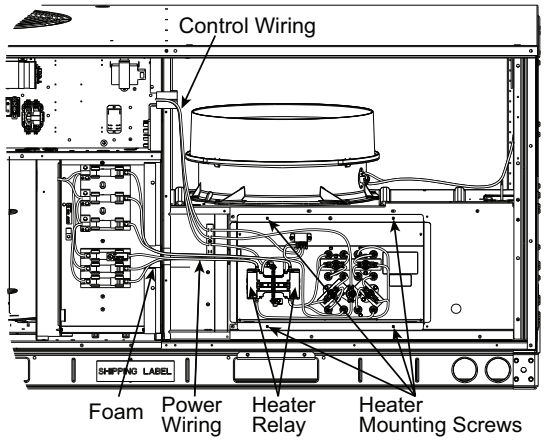



**Fig. 39 — Typical Single Point Installation**

SINGLE POINT BOXES WITHOUT FUSES

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

LOW-VOLTAGE CONTROL CONNECTIONS

Pull the low-voltage control leads from the heater module — WHT, VIO and BRN to the 4-pole terminal board TB4 (electromechanical units) or TB2 (SystemVu units) located on the heater bulkhead to the left of the Heater module. Connect the WHT lead from Heater circuit #1 to terminal TB4-1 (electromechanical units) or TB2-1 (SystemVu units). For 2 stage heating, connect the VIO lead from Heater circuit #2 to terminal TB4-2. Connect the BRN lead(s) to terminal TB4-3 (electromechanical units) or TB2-3 (SystemVu units). See Fig. 40.

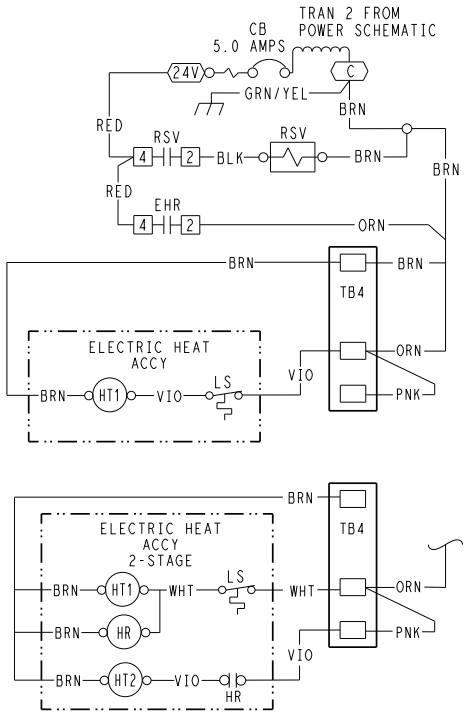



**Fig. 40 — Accessory Electric Heater Control Connections (Electromechanical Units Shown)**

HUMIDI-MIZER® SYSTEM CONTROL CONNECTIONS

***Humidi-MiZer Space RH Controller***

NOTE: The Humidi-MiZer system is a factory-installed option.

The Humidi-MiZer dehumidification system requires a field-supplied and field-installed space relative humidity control device such as Carrier's Connect Plus thermostat with isolated contact set for dehumidification control. See Fig. 41.

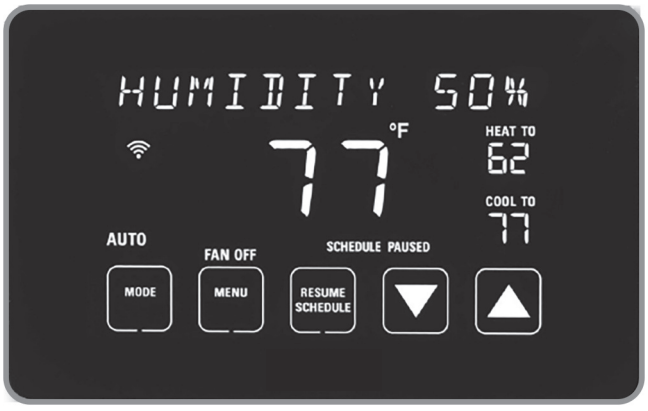



**Fig. 41 — Field-Installed Connect Plus Thermostat**

***Connecting the Carrier Connect Plus (33TCSPL-4)***

1. Route the Thermidistat multi-conductor thermostat cable (field-supplied) through the bushing the on unit's louvered end panel.
2. Route the cable through the snap-in wire tie and up to the web bushing near the control box. This provides the UL-required clearance between high-voltage and low-voltage wiring.
3. Feed the cable through the bushing and into the bottom left side of the control box after removing one of the two knock-outs in the corner of the box. Use a connector to protect the cable as it enters the control box.
4. Use the connector and the wire tie to reduce any slack in the thermostat cable to ensure that it will not be damaged by contact with the condenser coil.
5. For SystemVu controller units see Fig. 42. Refer to the installation instructions included with the Carrier Connect Plus thermostat for more information.

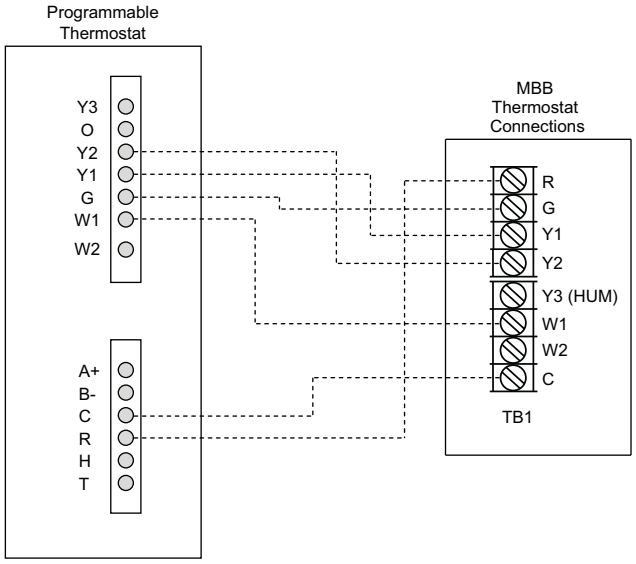



**Fig. 42 — Typical Thermostat Connections – SystemVu Controller MBB**

***Humidi-MiZer Connections to Connect Plus Thermostat***

1. Route the humidistat 2-conductor cable (field-supplied) through the bushing on the unit's louvered end panel.
2. Route the cable through the snap-in wire tie and up to the web bushing near the control box. This provides the UL-required clearance between high-voltage and low-voltage wiring.
3. Feed the cable through the bushing and into the bottom left side of the control box after removing one of the two knock-outs in the corner of the box. Use a connector to protect the cable as it enters the control box.
4. Use the connector and the wire tie to reduce any slack in the humidistat cable to ensure that it will not be damaged by contact with the condenser coil.
5. For 2-Stage SystemVu controller units connect one of the leads from the 2-conductor cable to the Y3 (HUM) terminal on the MBB (Main Base Board). Connect the other lead to the R terminal on the MBB. See Fig. 43.
6. For 3-Stage SystemVu controller units connect one of the leads from the 2-conductor cable to the TB3 terminal 3 on the MBB (Main Base Board). Connect the other lead to the TB3 terminal 4 on the MBB. See Fig. 44.

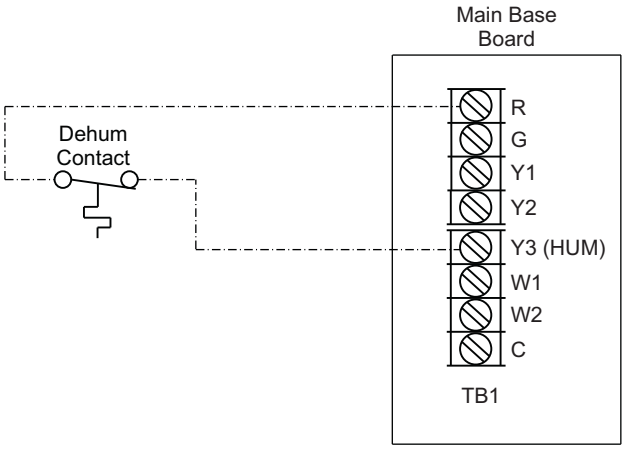



**Fig. 43 — Humidistat Connections to MBB (2-Stage SystemVu Units)**

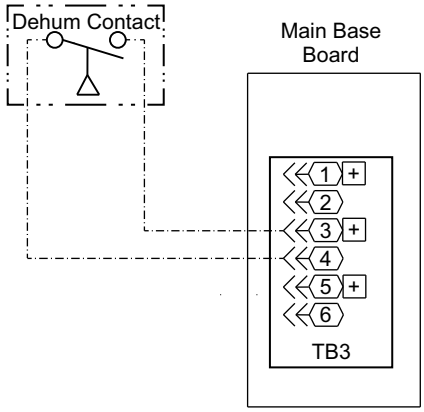



**Fig. 44 — Humidistat Connections to MBB (3-Stage SystemVu Units)**

CONTROL AND POWER WIRING DIAGRAMS

Figures 45-55 are typical control and power wiring diagrams. These wiring diagrams are mounted on the inside of the unit control box. Refer to the wiring diagrams in the unit control box when making field power wiring connections.

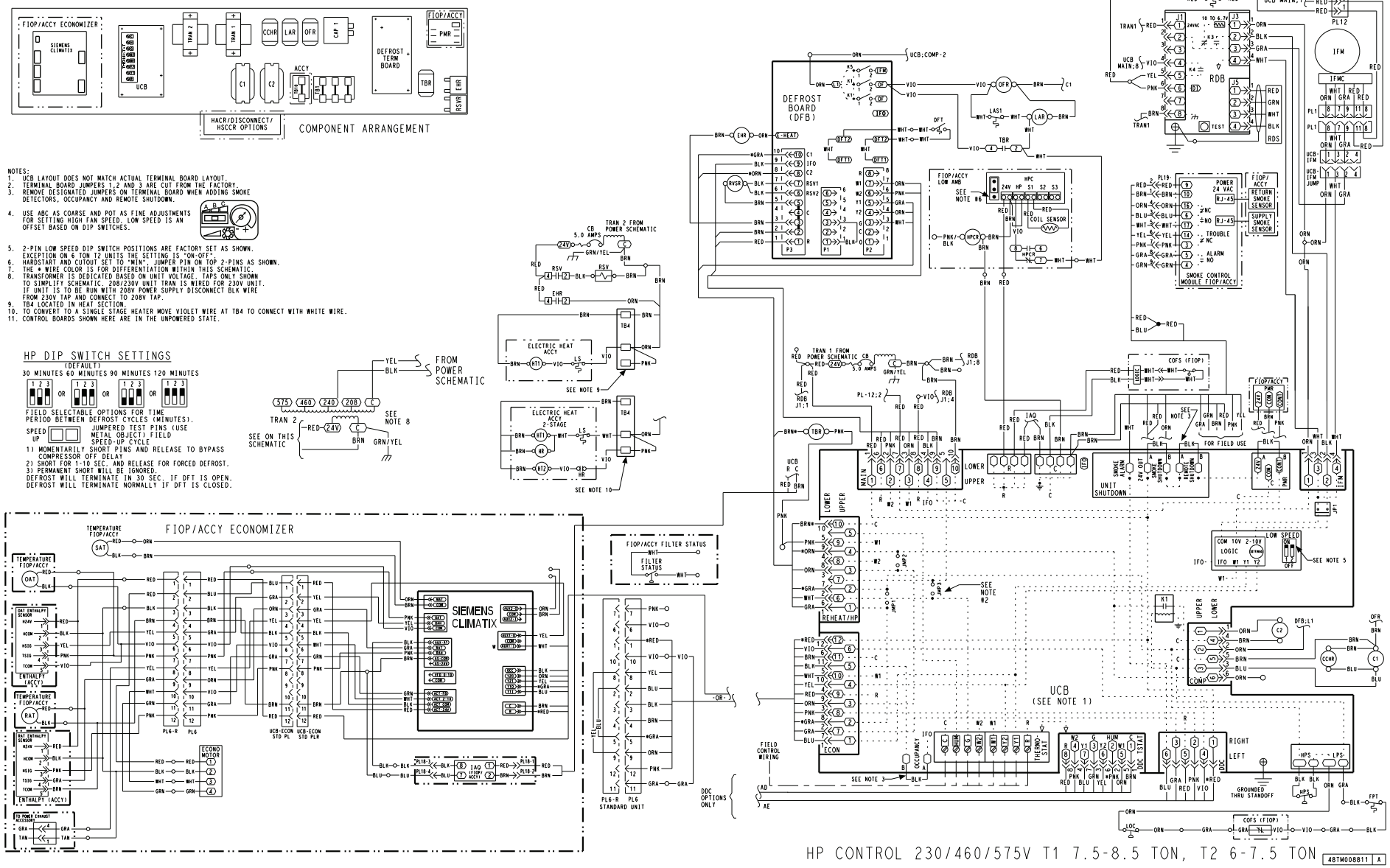



**Fig. 45 — Typical 2-Stage Control Wiring Diagram, Electromechanical Controller with POL224 (50GEQ*07-08 230/460/575-3-60 Shown)**

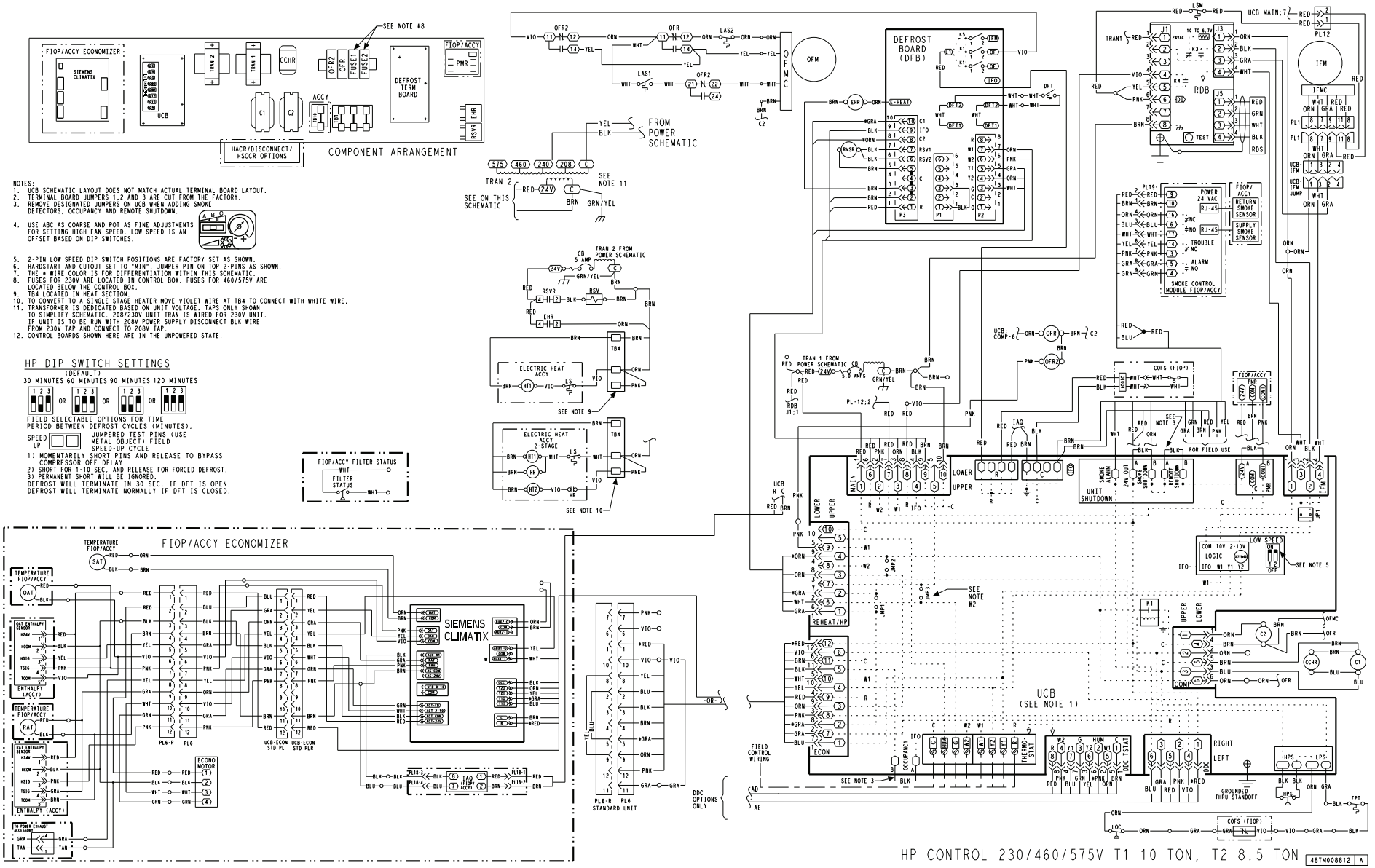



**Fig. 46 — Typical 2-Stage Control Wiring Diagram, Electromechanical Controller with POL224 (50GEQ*09 230/460/575-3-60 Shown)**

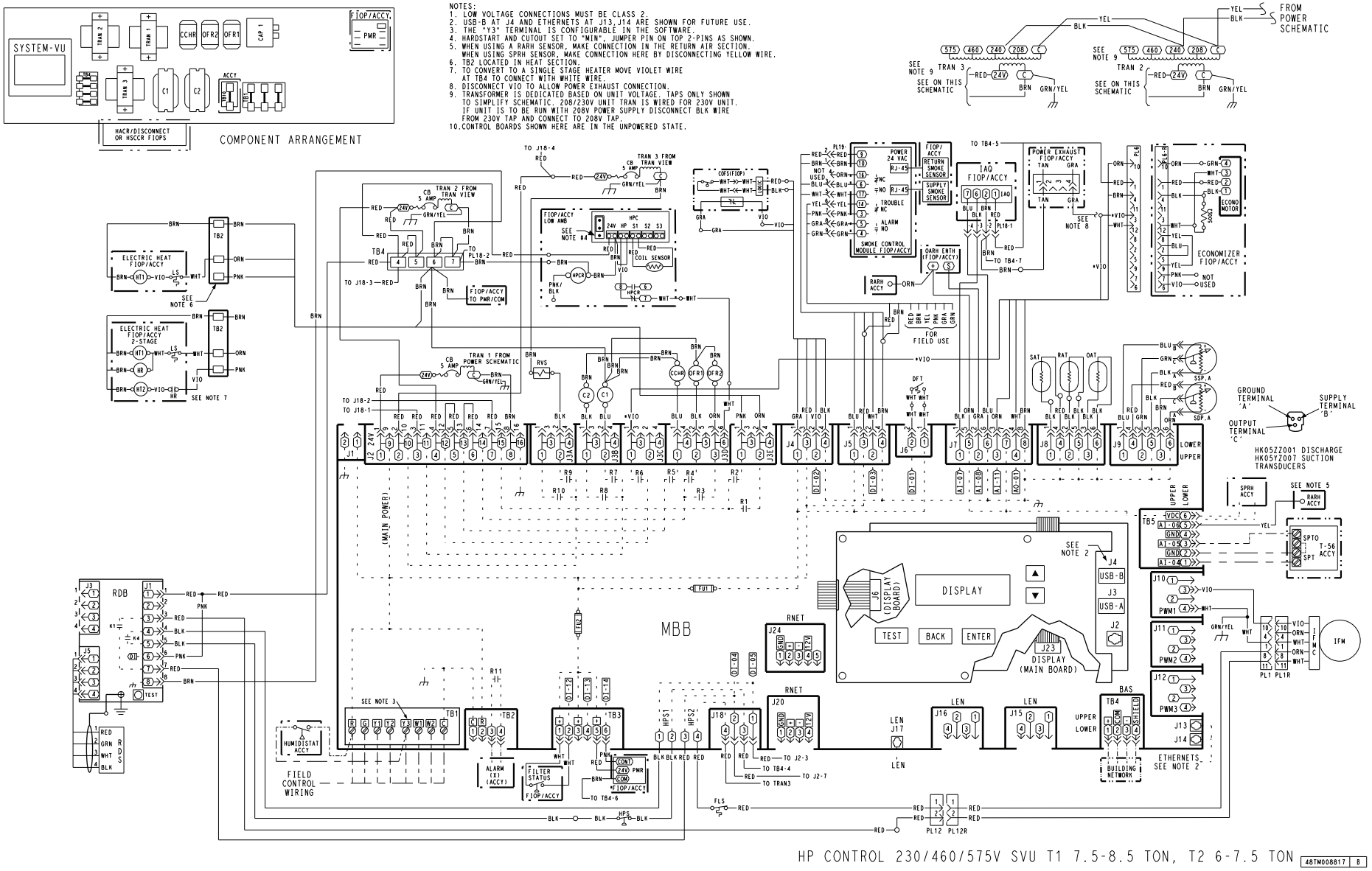



**Fig. 47 — Typical 2-Stage Control Wiring Diagram, SystemVu™ Controller (50GEQ*07-08 230/460/575-3-60 Shown)**

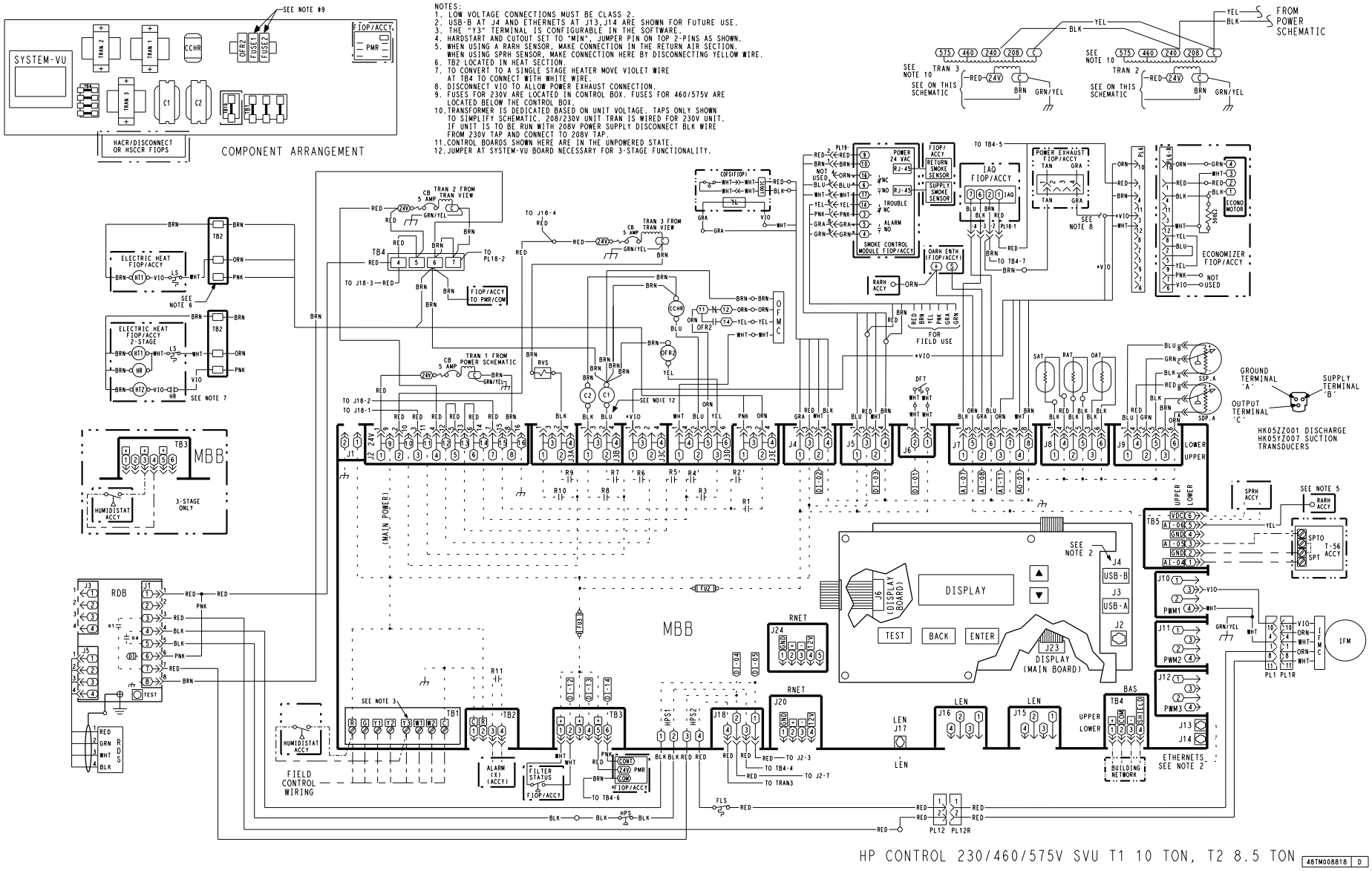



**Fig. 48 — Typical 2-Stage and 3-Stage Control Wiring Diagram, SystemVu™ Controller (50GEQ*09 230/460/575-3-60 Shown)**

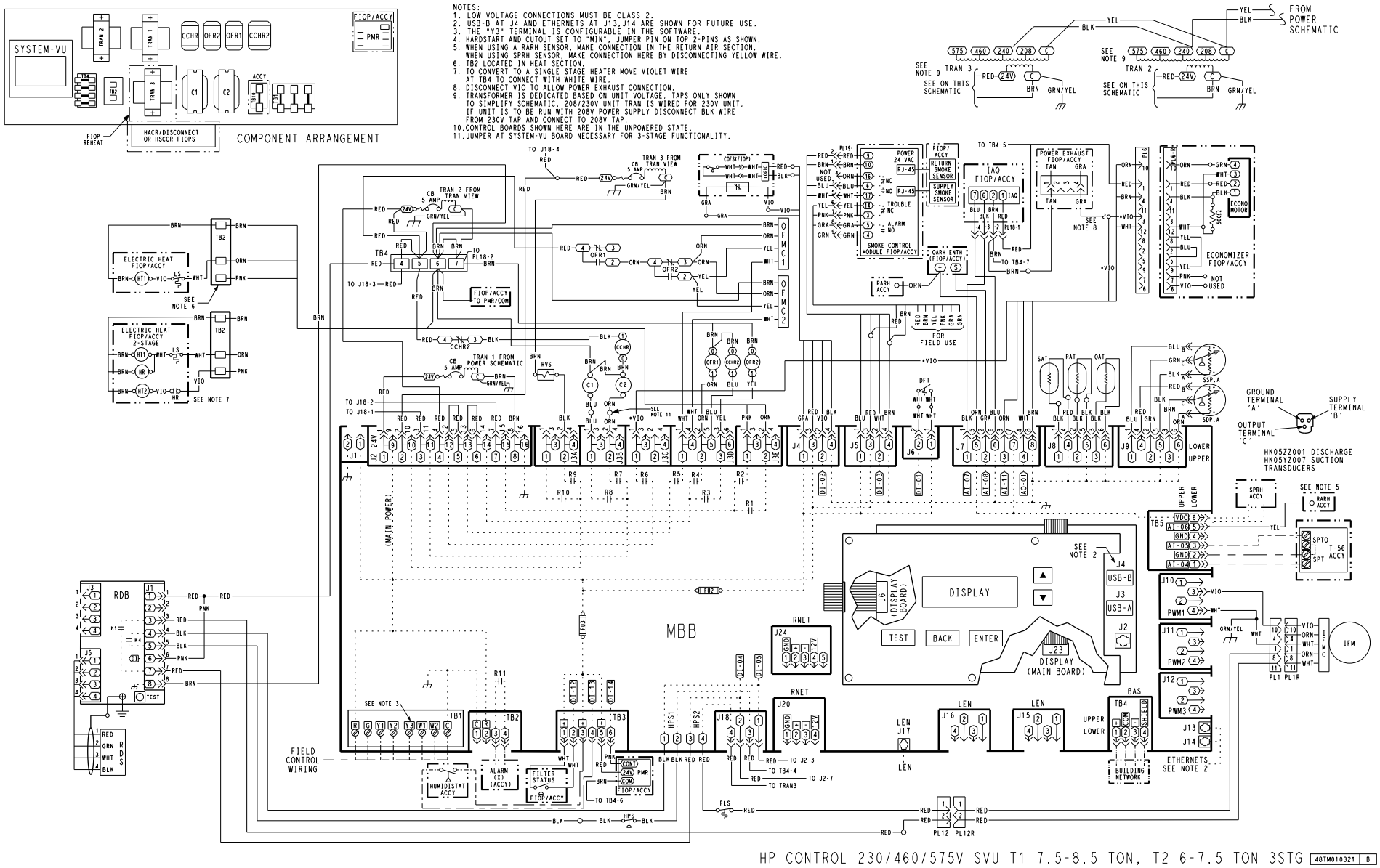



**Fig. 49 — Typical 3-Stage Control Wiring Diagram, SystemVu™ Controller (50GEQ*07-08 230/460/575-3-60 Shown)**

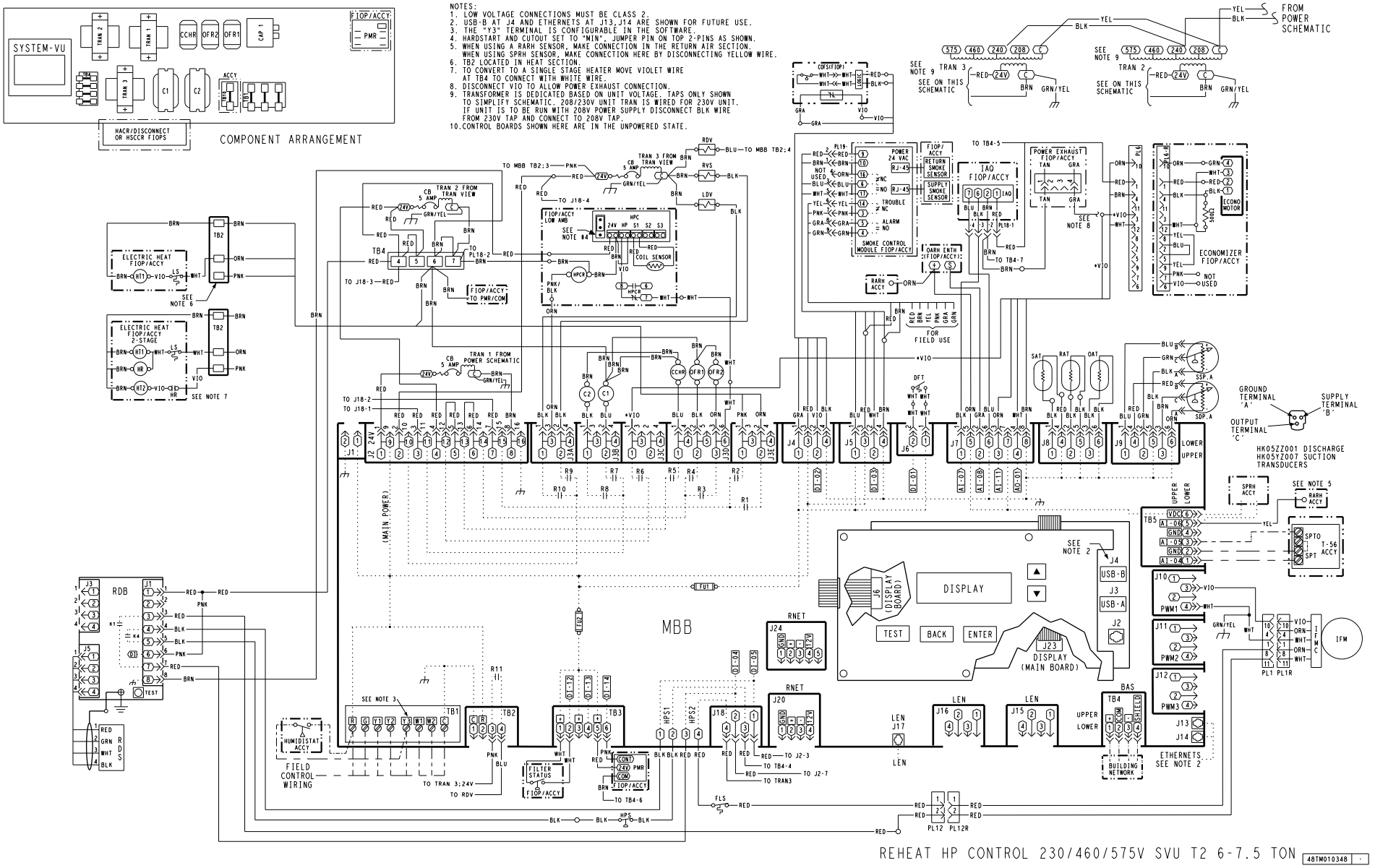



**Fig. 50 — Typical 2-Stage Control Wiring Diagram, SystemVu™ Controller with Humidi-MiZer™ System Option (50GEQ*07-08 230/460/575-3-60 Shown)**

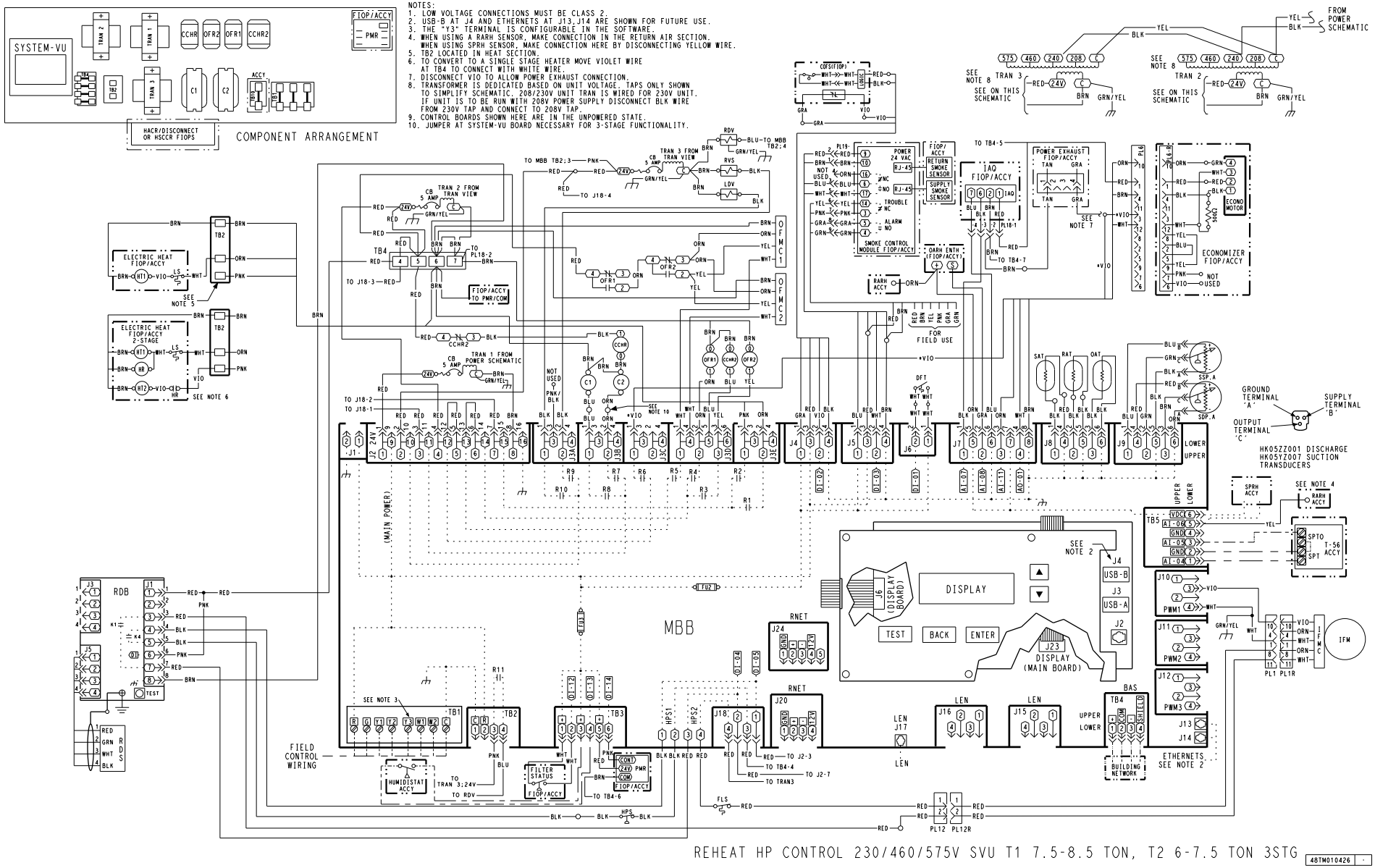
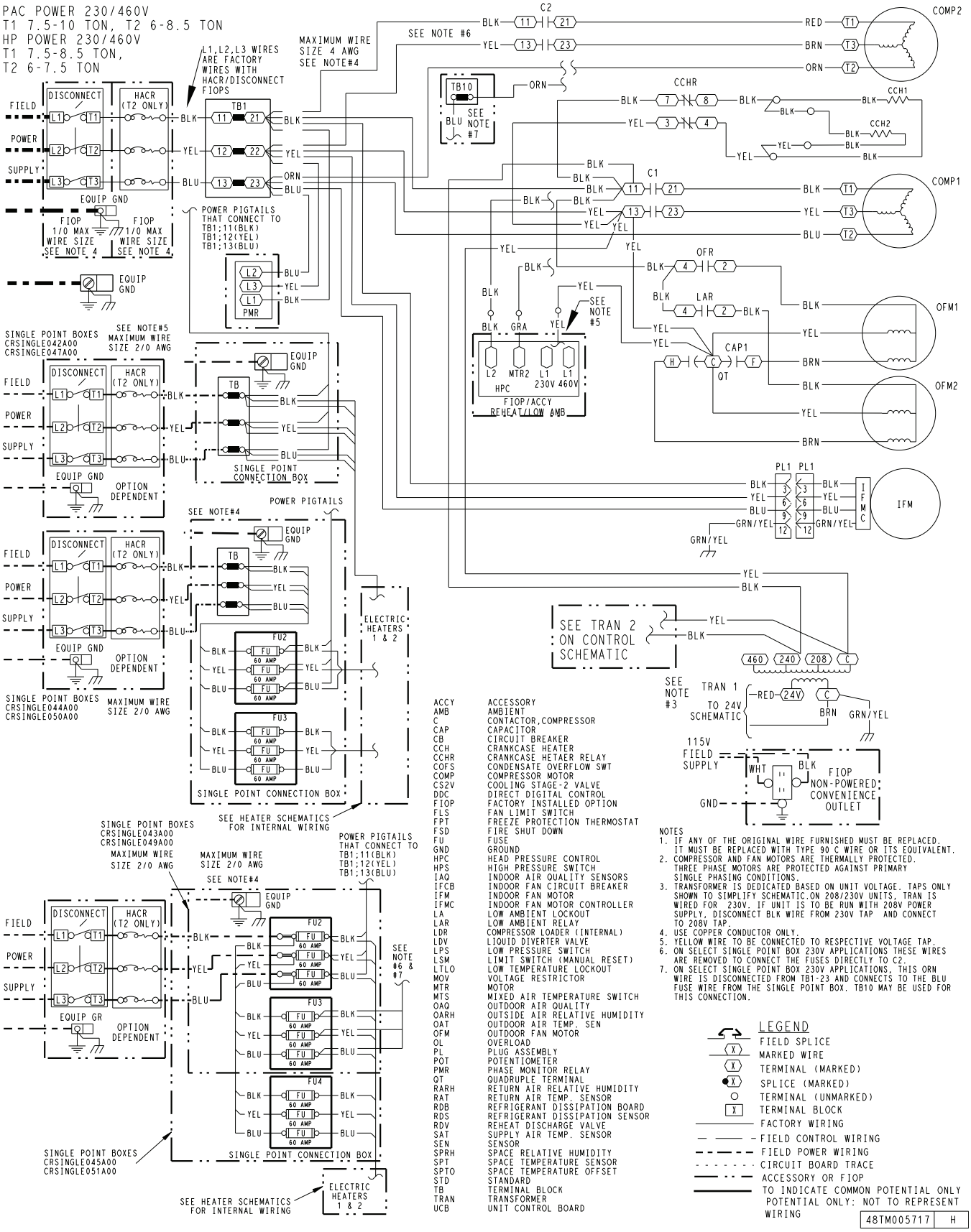



**Fig. 51 — Typical 3-Stage Control Wiring Diagram, SystemVu™ Controller with Humidi-MiZer™ System Option (50GEQ*07-08 230/460/575-3-60 Shown)**



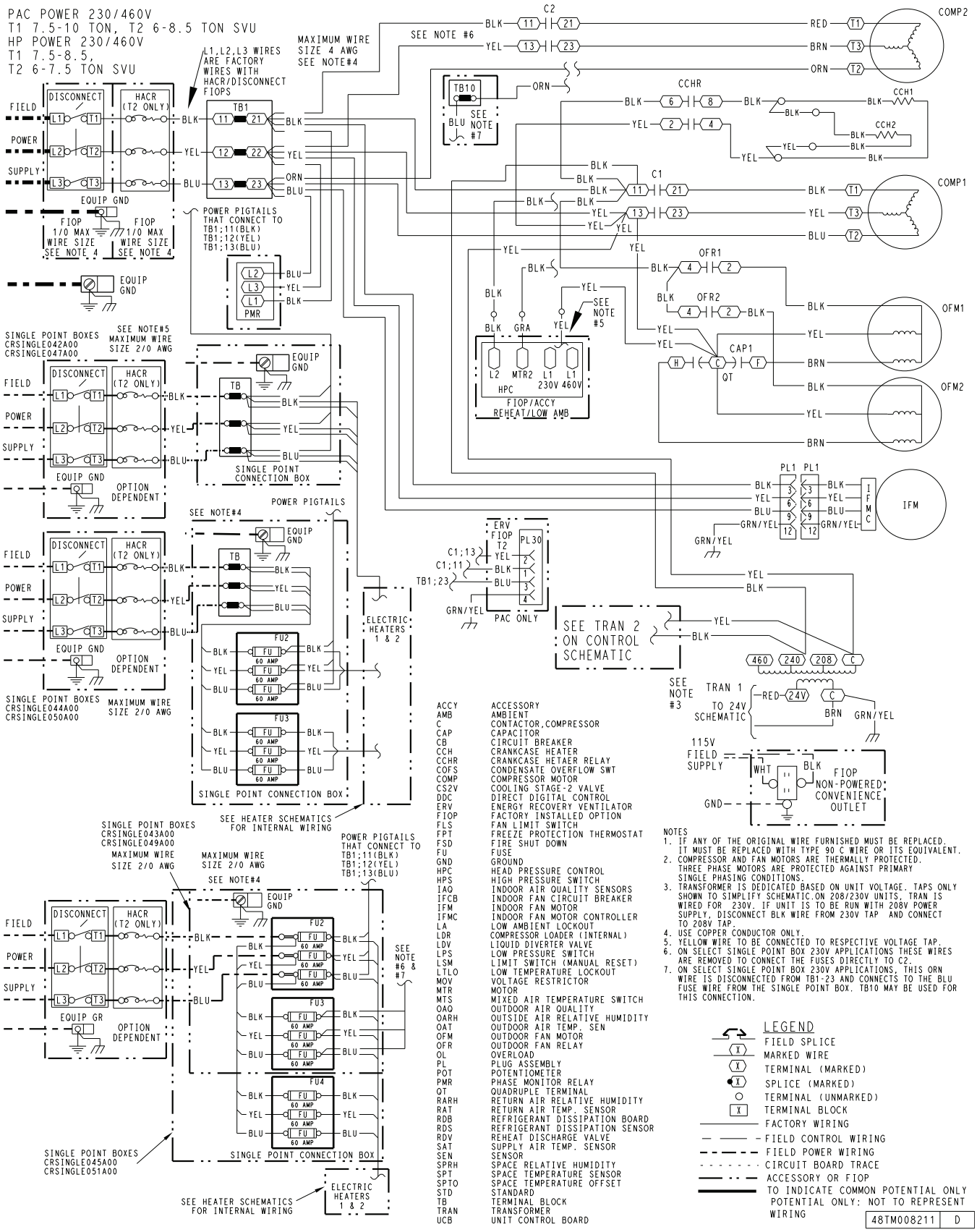

| | |
|---|---|
| ACCY | ACCESSORY |
| AMB | AMBIENT |
| C | CONTACTOR,COMPRESSOR |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HETAER RELAY |
| COFS | CONDENSATE OVERFLOW SWT |
| COMP | COMPRESSOR MOTOR |
| CS2V | COOLING STAGE-2 VALVE |
| DDC | DIRECT DIGITAL CONTROL |
| FIOP | FACTORY INSTALLED OPTION |
| FLS | FAN LIMIT SWITCH |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FSD | FIRE SHUT DOWN |
| FU | FUSE |
| GND | GROUND |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IFCB | INDOOR FAN CIRCUIT BREAKER |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROLLER |
| LA | LOW AMBIENT LOCKOUT |
| LAR | LOW AMBIENT RELAY |
| LDR | COMPRESSOR LOADER (INTERNAL) |
| LDV | LIQUID DIVERTER VALVE |
| LPS | LOW PRESSURE SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMPERATURE LOCKOUT |
| MOV | VOLTAGE RESTRICTOR |
| MTR | MOTOR |
| MTS | MIXED AIR TEMPERATURE SWITCH |
| OAQ | OUTDOOR AIR QUALITY |
| OARH | OUTSIDE AIR RELATIVE HUMIDITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OL | OVERLOAD |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| QT | QUADRUPLE TERMINAL |
| RARH | RETURN AIR RELATIVE HUMIDITY |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| SAT | SUPPLY AIR TEMP. SENSOR |
| SEN | SENSOR |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| STD | STANDARD |
| TB | TERMINAL BLOCK |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |

NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC.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.
4. USE COPPER CONDUCTOR ONLY.
5. YELLOW WIRE TO BE CONNECTED TO RESPECTIVE VOLTAGE TAP.
6. ON SELECT SINGLE POINT BOX 230V APPLICATIONS THESE WIRES ARE REMOVED TO CONNECT THE FUSES DIRECTLY TO C2.
7. ON SELECT SINGLE POINT BOX 230V APPLICATIONS, THIS ORN WIRE IS DISCONNECTED FROM TB1-23 AND CONNECTS TO THE BLU FUSE WIRE FROM THE SINGLE POINT BOX. TB10 MAY BE USED FOR THIS CONNECTION.

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

48TM005717 H

**Fig. 52 — Typical 2-Stage 50GEQ 07-08 Power Wiring Diagram, 230/460V-3-60 Shown (Electromechanical Control Units)**




| | |
|---|---|
| ACCY | ACCESSORY |
| AMB | AMBIENT |
| C | CONTACTOR,COMPRESSOR |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HETAER RELAY |
| COFS | CONDENSATE OVERFLOW SWT |
| COMP | COMPRESSOR MOTOR |
| CS2V | COOLING STAGE-2 VALVE |
| DDC | DIRECT DIGITAL CONTROL |
| ERV | ENERGY RECOVERY VENTILATOR |
| FIOP | FACTORY INSTALLED OPTION |
| FLS | FAN LIMIT SWITCH |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FSD | FIRE SHUT DOWN |
| FU | FUSE |
| GND | GROUND |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IFCB | INDOOR FAN CIRCUIT BREAKER |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROLLER |
| LA | LOW AMBIENT LOCKOUT |
| LDR | COMPRESSOR LOADER (INTERNAL) |
| LDV | LIQUID DIVERTER VALVE |
| LPS | LOW PRESSURE SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMPERATURE LOCKOUT |
| MOV | VOLTAGE RESTRICTOR |
| MTR | MOTOR |
| MTS | MIXED AIR TEMPERATURE SWITCH |
| OAQ | OUTDOOR AIR QUALITY |
| OARH | OUTSIDE AIR RELATIVE HUMIDITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| QT | QUADRUPLE TERMINAL |
| RARH | RETURN AIR RELATIVE HUMIDITY |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| SAT | SUPPLY AIR TEMP. SENSOR |
| SEN | SENSOR |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| STD | STANDARD |
| TB | TERMINAL BLOCK |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |

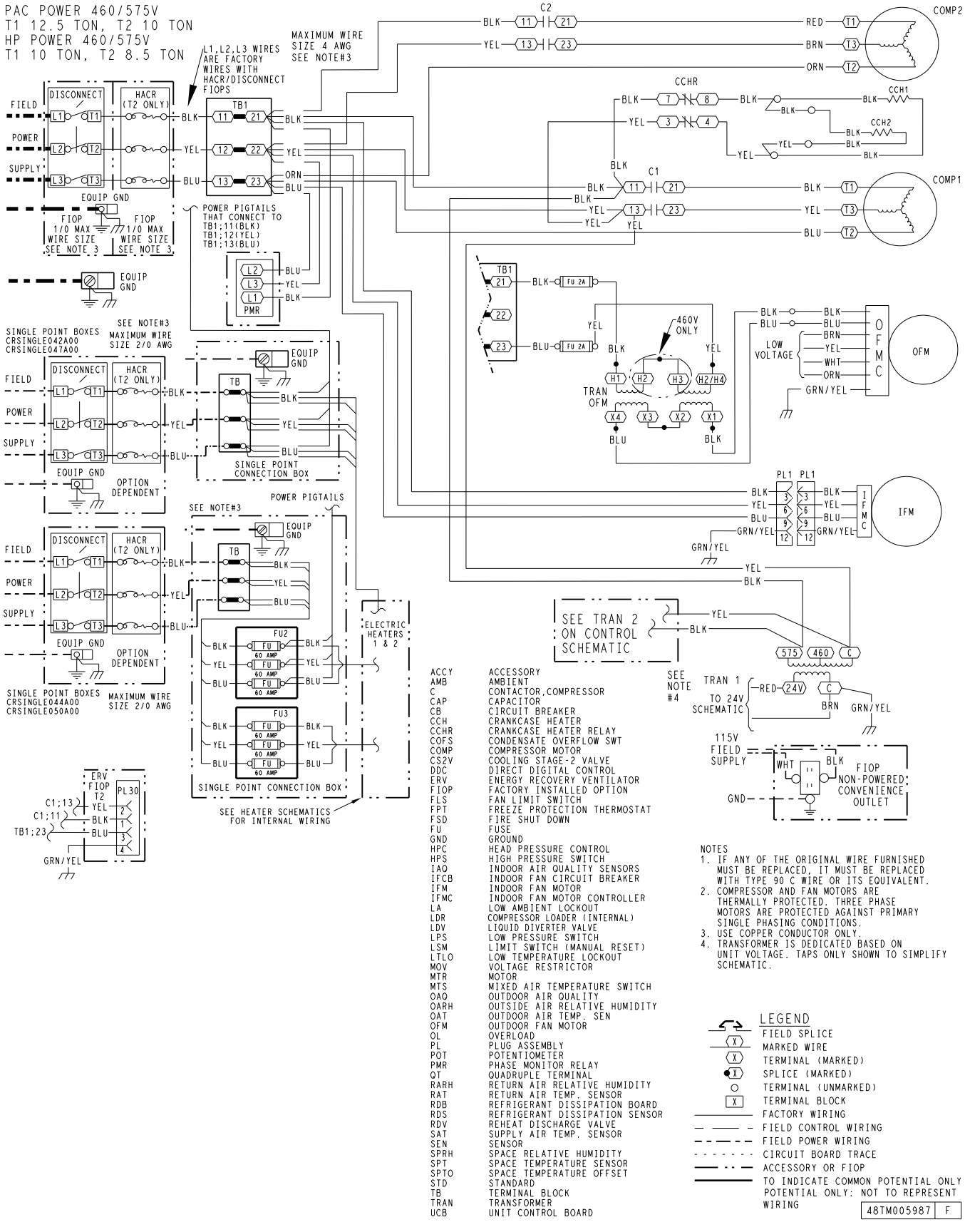
NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC.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.
4. USE COPPER CONDUCTOR ONLY.
5. YELLOW WIRE TO BE CONNECTED TO RESPECTIVE VOLTAGE TAP.
6. ON SELECT SINGLE POINT BOX 230V APPLICATIONS THESE WIRES ARE REMOVED TO CONNECT THE FUSES DIRECTLY TO C2.
7. ON SELECT SINGLE POINT BOX 230V APPLICATIONS, THIS ORN WIRE IS DISCONNECTED FROM TB1-23 AND CONNECTS TO THE BLU FUSE WIRE FROM THE SINGLE POINT BOX. TB10 MAY BE USED FOR THIS CONNECTION.

LEGEND

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

48TM008211 | D

**Fig. 53 — Typical 2-Stage 50GEQ 07-08 Power Wiring Diagram, 230/460V-3-60 Shown (SystemVu™ Control Units)**




| | |
|---|---|
| ACCY | ACCESSORY |
| AMB | AMBIENT |
| C | CONTACTOR,COMPRESSOR |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HEATER RELAY |
| COFS | CONDENSATE OVERFLOW SWT |
| COMP | COMPRESSOR MOTOR |
| CS2V | COOLING STAGE-2 VALVE |
| DDC | DIRECT DIGITAL CONTROL |
| ERV | ENERGY RECOVERY VENTILATOR |
| FIOP | FACTORY INSTALLED OPTION |
| FLS | FAN LIMIT SWITCH |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FSD | FIRE SHUT DOWN |
| FU | FUSE |
| GND | GROUND |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IFCB | INDOOR FAN CIRCUIT BREAKER |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROLLER |
| LA | LOW AMBIENT LOCKOUT |
| LDR | COMPRESSOR LOADER (INTERNAL) |
| LDV | LIQUID DIVERTER VALVE |
| LPS | LOW PRESSURE SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMPERATURE LOCKOUT |
| MOV | VOLTAGE RESTRICTOR |
| MTR | MOTOR |
| MTS | MIXED AIR TEMPERATURE SWITCH |
| OAQ | OUTDOOR AIR QUALITY |
| OARH | OUTSIDE AIR RELATIVE HUMIDITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OL | OVERLOAD |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| QT | QUADRUPLE TERMINAL |
| RARH | RETURN AIR RELATIVE HUMIDITY |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| SAT | SUPPLY AIR TEMP. SENSOR |
| SEN | SENSOR |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| STD | STANDARD |
| TB | TERMINAL BLOCK |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |

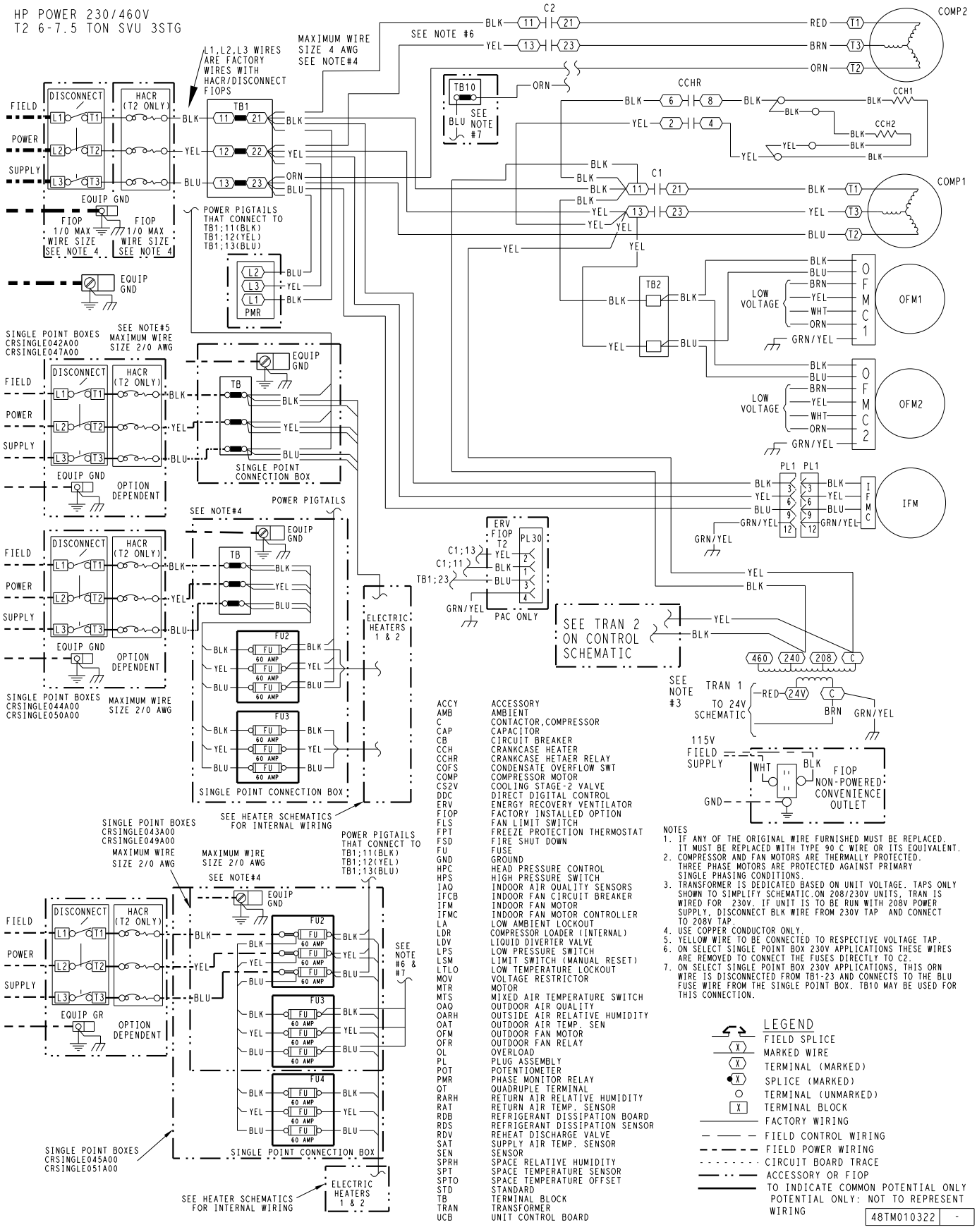
NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. USE COPPER CONDUCTOR ONLY.
4. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC.

LEGEND

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

48TM005987 | F

**Fig. 54 — Typical 2-Stage and 3-Stage 50GEQ 09 Power Wiring Diagram, 460/575V-3-60 Shown (Electromechanical and SystemVu™ Controller Units)**




| | |
|---|---|
| ACCY | ACCESSORY |
| AMB | AMBIENT |
| C | CONTACTOR,COMPRESSOR |
| CAP | CAPACITOR |
| CB | CIRCUIT BREAKER |
| CCH | CRANKCASE HEATER |
| CCHR | CRANKCASE HETAER RELAY |
| COFS | CONDENSATE OVERFLOW SWT |
| COMP | COMPRESSOR MOTOR |
| CS2V | COOLING STAGE-2 VALVE |
| DDC | DIRECT DIGITAL CONTROL |
| ERV | ENERGY RECOVERY VENTILATOR |
| FIOP | FACTORY INSTALLED OPTION |
| FLS | FAN LIMIT SWITCH |
| FPT | FREEZE PROTECTION THERMOSTAT |
| FSD | FIRE SHUT DOWN |
| FU | FUSE |
| GND | GROUND |
| HPC | HEAD PRESSURE CONTROL |
| HPS | HIGH PRESSURE SWITCH |
| IAQ | INDOOR AIR QUALITY SENSORS |
| IFCB | INDOOR FAN CIRCUIT BREAKER |
| IFM | INDOOR FAN MOTOR |
| IFMC | INDOOR FAN MOTOR CONTROLLER |
| LA | LOW AMBIENT LOCKOUT |
| LDR | COMPRESSOR LOADER (INTERNAL) |
| LDV | LIQUID DIVERTER VALVE |
| LPS | LOW PRESSURE SWITCH |
| LSM | LIMIT SWITCH (MANUAL RESET) |
| LTLO | LOW TEMPERATURE LOCKOUT |
| MOV | VOLTAGE RESTRICTOR |
| MTR | MOTOR |
| MTS | MIXED AIR TEMPERATURE SWITCH |
| OAQ | OUTDOOR AIR QUALITY |
| OARH | OUTSIDE AIR RELATIVE HUMIDITY |
| OAT | OUTDOOR AIR TEMP. SEN |
| OFM | OUTDOOR FAN MOTOR |
| OFR | OUTDOOR FAN RELAY |
| OL | OVERLOAD |
| PL | PLUG ASSEMBLY |
| POT | POTENTIOMETER |
| PMR | PHASE MONITOR RELAY |
| QT | QUADRUPLE TERMINAL |
| RARH | RETURN AIR RELATIVE HUMIDITY |
| RAT | RETURN AIR TEMP. SENSOR |
| RDB | REFRIGERANT DISSIPATION BOARD |
| RDS | REFRIGERANT DISSIPATION SENSOR |
| RDV | REHEAT DISCHARGE VALVE |
| SAT | SUPPLY AIR TEMP. SENSOR |
| SEN | SENSOR |
| SPRH | SPACE RELATIVE HUMIDITY |
| SPT | SPACE TEMPERATURE SENSOR |
| SPTO | SPACE TEMPERATURE OFFSET |
| STD | STANDARD |
| TB | TERMINAL BLOCK |
| TRAN | TRANSFORMER |
| UCB | UNIT CONTROL BOARD |

NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. TRANSFORMER IS DEDICATED BASED ON UNIT VOLTAGE. TAPS ONLY SHOWN TO SIMPLIFY SCHEMATIC.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.
4. USE COPPER CONDUCTOR ONLY.
5. YELLOW WIRE TO BE CONNECTED TO RESPECTIVE VOLTAGE TAP.
6. ON SELECT SINGLE POINT BOX 230V APPLICATIONS THESE WIRES ARE REMOVED TO CONNECT THE FUSES DIRECTLY TO C2.
7. ON SELECT SINGLE POINT BOX 230V APPLICATIONS, THIS ORN WIRE IS DISCONNECTED FROM TB1-23 AND CONNECTS TO THE BLU FUSE WIRE FROM THE SINGLE POINT BOX. TB10 MAY BE USED FOR THIS CONNECTION.

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

48TM010322 -

**Fig. 55 — Typical 3-Stage 50GEQ 07-08 Power Wiring Diagram, 230/460V-3-60 Shown (SystemVu™ Control Units)**

## Leak Dissipation System

50GEQ 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 dissipation control board (see Fig. 57) which are located in the Indoor Coil section of the unit (see the view labeled "BACK" in Fig. 2 on page 5 for size 07-08 units or Fig. 3 on page 8 for size 09 units). The A2L sensor is located between the indoor coil and the air filters.

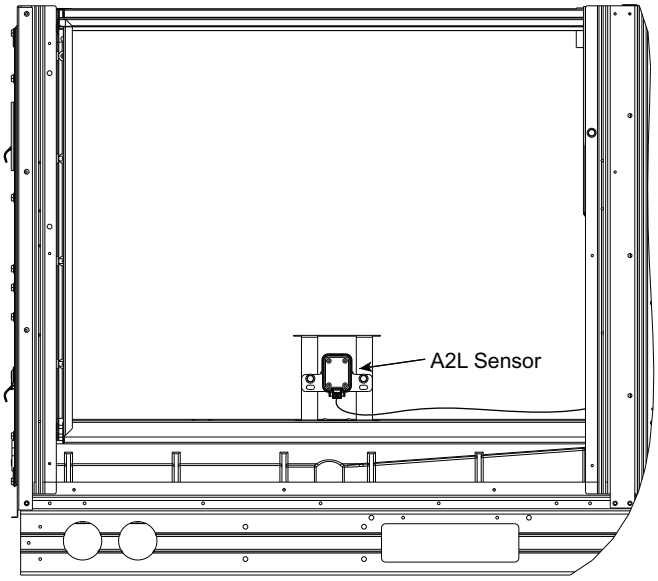



**Fig. 56 — Location of A2L Sensor**

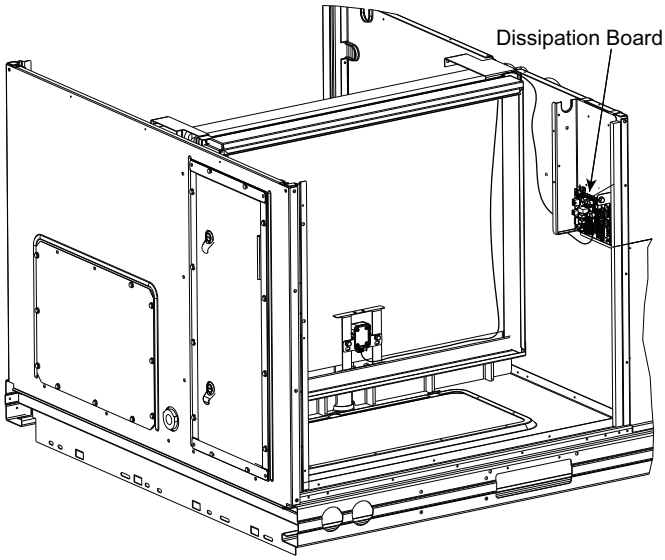



**Fig. 57 — Location of Dissipation Control Board (Shown with Dust Cover Removed)**

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

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

SEQUENCE OF OPERATION

The control functions as an R-454B refrigerant dissipation system. If the refrigerant detection sensor sends a signal indicating a refrigerant leak, the control board will prevent heating and cooling operation and begin dissipating the sensed refrigerant with a blower request. The refrigerant dissipation board will display a flash code from the yellow status LED (see Fig. 58) indicating the sensor that detected the refrigerant. See Fig. 60 on page 40 for the full text on the Dissipation Control dust cover label.

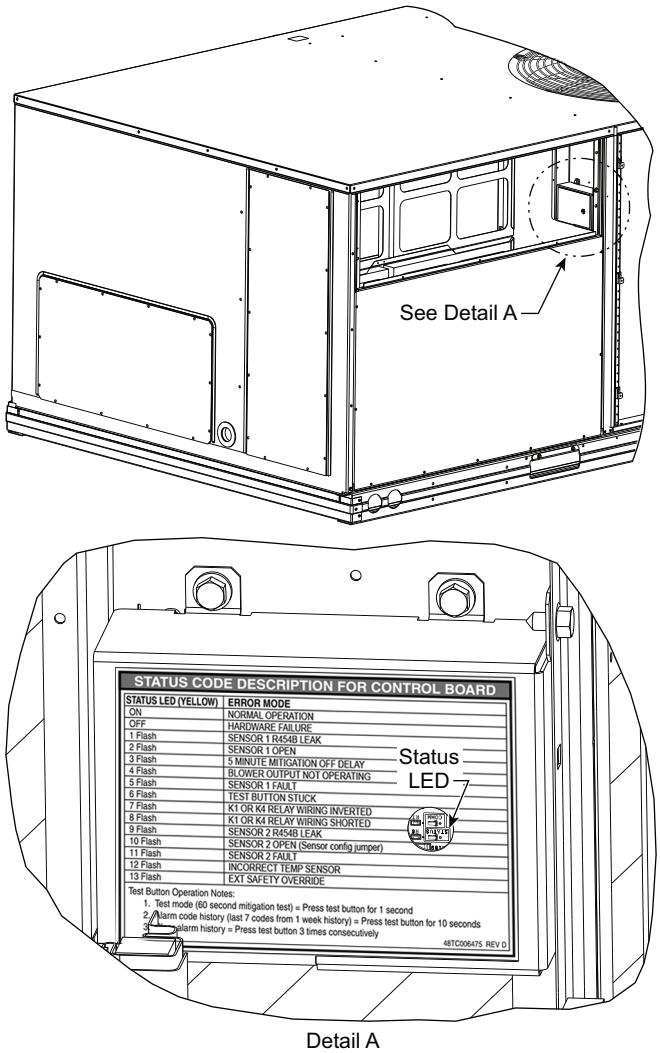
When the sensor signal indicates the refrigerant has dissipated, the dissipation board yellow status LED will display a flash code 3 and return to its normal state and allow unit operations after a 5 minute delay.

LEAK DISSIPATION SYSTEM SELF-TEST

Power on the unit and verify proper functioning of equipment. The yellow Status LED on the dissipation board should be steady (see Fig. 58). If flash codes are present, see Troubleshooting on page 40.

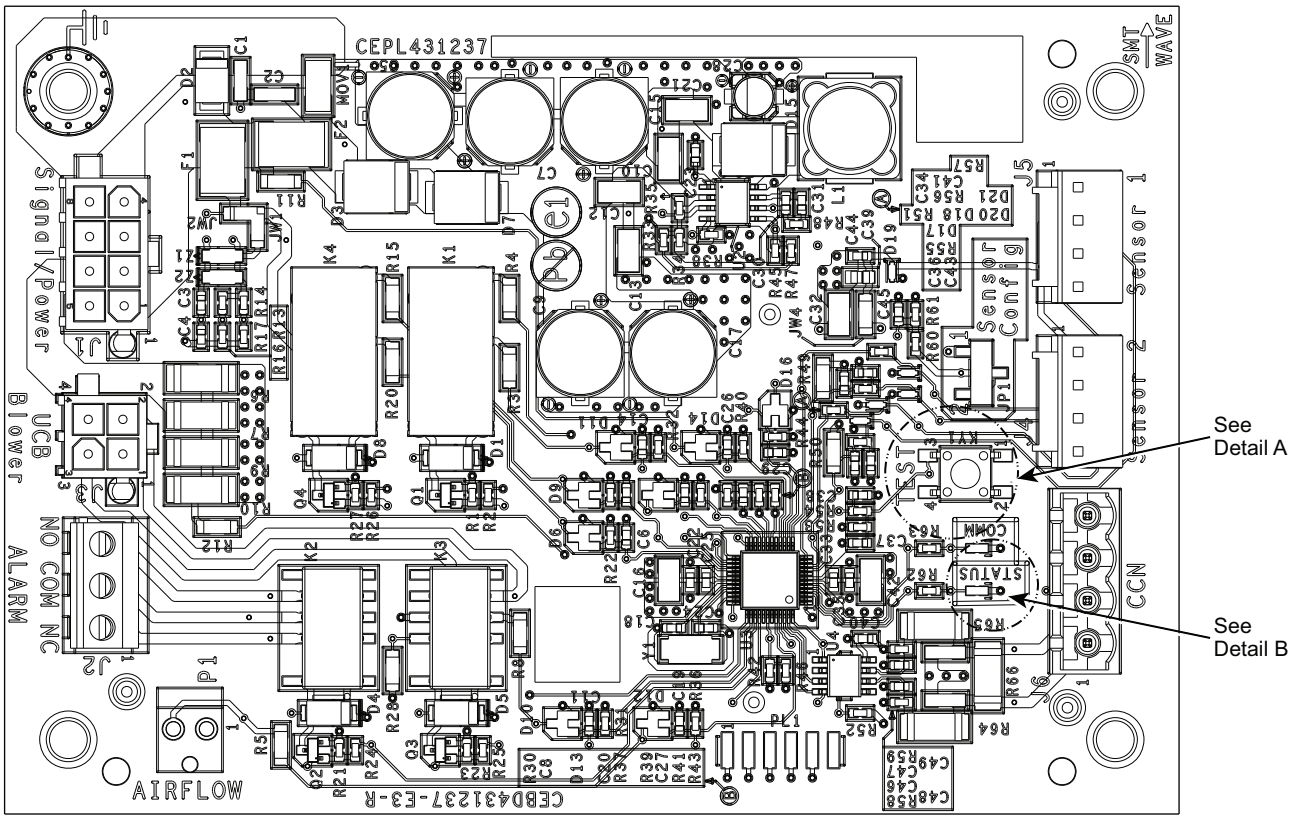
NOTE: Operation of the Test Mode is only possible if no faults exist on the dissipation board.

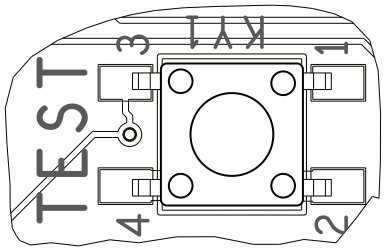
Remove the dust cover from the Dissipation control board to access the Test button (see Fig. 59). The Test button is located above the COMM LED.



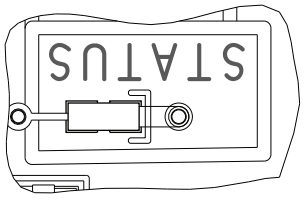

Detail A

**Fig. 58 — Yellow STATUS LED**




Detail A — Test Button




Detail B — Status LED

**Fig. 59 — Dissipation Control Board — Shown without Dust Cover**

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

IMPORTANT: Press the Test button for roughly ONE SECOND to enter Test Mode. Pressing the Test button for a longer periods enables different functions (see Table 7).

**Table 7 — Dissipation Board Test Button Functions**

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

Ensure that the unit is able to meet the minimum required dissipation mode airflows. These required minimum airflow rates during Dissipation Mode are listed in Table 8. They are based on the total system refrigerant charge quantity.

Table 9 details the required operational checks to ensure proper dissipation system function.

**Table 8 — Minimum Dissipation Air Flows**

| MINIMUM DISSIPATION AIR FLOW (cfm) | |
|---|---|
| **UNIT** | **cfm** |
| **50GEQM/T07** | 410 |
| **50GEQM/T08** | 450 |
| **50GEQM09** | 510 |
| **50GEQT09** | 570 |
| **50GEQN/U07** | 430 |
| **50GEQN/U08** | 640 |
| **50GEQN/U09** | 760 |

**Table 9 — Dissipation System Required Operational Checks**

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

Figure 60 shows the flash codes displayed on the Dissipation Control Board.

TROUBLESHOOTING

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

***No Power***

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

See Table 10 for details on the operating status and troubleshooting of the Dissipation system for the various flash codes.

**STATUS CODE DESCRIPTION FOR CONTROL BOARD**

| STATUS LED (YELLOW) | ERROR MODE |
|---|---|
| ON | NORMAL OPERATION |
| OFF | HARDWARE FAILURE |
| 1 Flash | SENSOR 1 R454B LEAK |
| 2 Flash | SENSOR 1 OPEN |
| 3 Flash | 5 MINUTE MITIGATION OFF DELAY |
| 4 Flash | BLOWER OUTPUT NOT OPERATING |
| 5 Flash | SENSOR 1 FAULT |
| 6 Flash | TEST BUTTON STUCK |
| 7 Flash | K1 OR K4 RELAY WIRING INVERTED |
| 8 Flash | K1 OR K4 RELAY WIRING SHORTED |
| 9 Flash | SENSOR 2 R454B LEAK |
| 10 Flash | SENSOR 2 OPEN (Sensor config jumper) |
| 11 Flash | SENSOR 2 FAULT |
| 12 Flash | INCORRECT TEMP SENSOR |
| 13 Flash | EXT SAFETY OVERRIDE |

Test Button Operation Notes:

1. Test mode (60 second mitigation test) = Press test button for 1 second
2. Alarm code history (last 7 codes from 1 week history) = Press test button for 10 seconds
3. Clear alarm history = Press test button 3 times consecutively

48TC006475 REV D

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

**Table 10 — 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 G output. | BLOWER OUTPUT NOT OPERATING | Dissipation in Process |
| **5 Flash** | Fault with the A2L digital sensor. | REFRIG SENSOR 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** | High temperature sensor attached on commercial. | OVERCURRENT INCORRECT SENSOR | Normal mode |
| **13 Flash**[b] | G input signal is lost. Indicates another unit safety will override dissipation. | EXT SAFETY OVERRIDE | Normal mode |

NOTE(S):

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

b. For electromechanical units: External Safety Override (flashing 13) can be cause by the following unit safeties: Phase Monitor Relay fault, Remote Shutdown, Smoke Shutdown, Fan Limit Switch (CH1-2 rooftop units, air handler units), or Fan Safety Relay (CH3-8 rooftop units, splits, air handler units).

LEGEND

**LFL** — Lower Flammable Limit

## Humidi-MiZer® Dehumidification System (Optional)

Units with the factory-installed Humidi-MiZer system option are capable of providing multiple modes of improved dehumidification as a variation of the normal cooling cycle. The Humidi-MiZer system option includes additional valves in the liquid line and discharge line of the refrigerant circuit and a reheat coil downstream of the evaporator.

NOTE: The reheat coil is downstream of the evaporator coil on the air side (not the refrigerant side). Figures 61-63 show both refrigerant and air flow.

Humidi-MiZer system operation requires the installation and configuration of a relative humidity switch input or a space relative humidity sensor. These provide the dehumidification demand to the control.

With Humidi-MiZer system units there are two additional HVAC modes available for the user: Dehumidification and Dehum/Mech Cooling. Selection of the Dehum/Mech Cooling mode is determined by the dehumidification demand and the cooling demand. Table 11 shows the corresponding circuit mode and output status for the different demand combinations.

NORMAL COOLING

This mode is the standard rated cooling system performance, and occurs when there is cooling demand without dehumidification demand.

For 50GEQ 07-09 units, refrigerant flows from the outdoor condenser through the de-energized 3-Way Liquid Diverter Valve (LDV) to the expansion device bypassing the reheat condenser coil. The Reheat Discharge Valve (RDV) is closed. (See Fig. 61.)

DEHUM/MECH COOLING (SUBCOOLING) MODE

This mode increases the latent heat removal and decreases sensible cooling compared to normal cooling. This occurs when there is a cooling and dehumidification demands.

For 50GEQ 07-09 units, refrigerant flows from the outdoor condenser, through the energized 3-Way LDV and through the reheat condenser coil to the expansion device. The RDV is closed. (See Fig. 62.)

DEHUMIDIFICATION (HOT GAS REHEAT) MODE

This mode provides maximum latent cooling with little to no sensible capacity. This occurs when there is a dehumidification demand and no cooling demand.

For 50GEQ 07-09 units, this is the same as the Subcooling mode but the RDV is open, which provides some compressor discharge gas to the reheat condenser to further increase the reheat of the evaporator air stream. (See Fig. 63.)

REHEAT CONTROL

When there is only a cooling demand, the unit will operate in normal cooling mode. When there is only dehumidification demand, the unit will operate in Dehumidification mode (Hot Gas Reheat). When there is both cooling demand and dehumidification demand, the unit will operate in Dehum/Mech Cooling mode (Subcooling). During Dehumidification and Dehum/Mech cooling mode, the unit will run all cooling stages.

**Table 11 — Humidi-MiZer System Control Modes (50GEQ 07-09)**

| DEMAND AND MODE | | | OUTPUTS | LDV Valve 3-WAY | RDV Valve 2-WAY |
|---|---|---|---|---|---|
| Space Humidity | Circuit Cooling Demand | Circuit Mode | Circuit Compressor | | |
| — | — | No power | Off | Off | Off (closed) |
| Low | No | Off | Off | Off | Off (closed) |
| | Yes | Cool | On | Off | Off (closed) |
| High | Yes | Dehum/Mech Cooling | On | On | Off (closed) |
| | No | Dehum | On | On | On (open) |

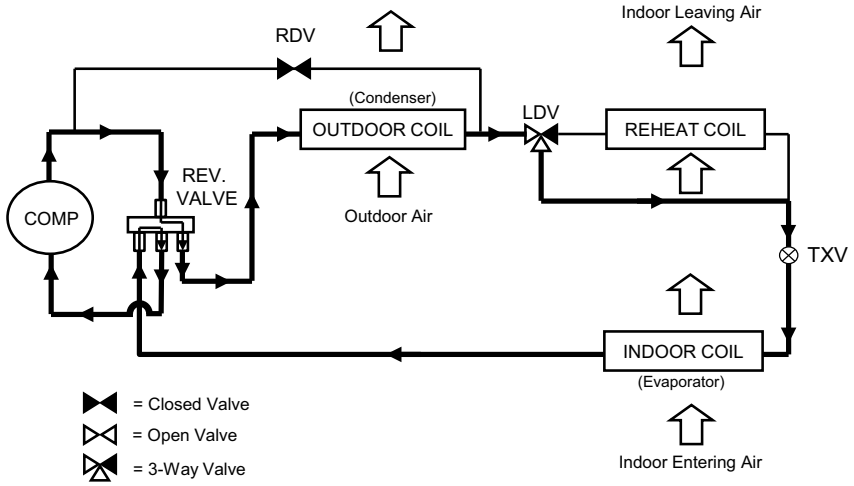



**Fig. 61 — Normal Cooling Mode — Humidi-MiZer System for 50GEQ 07-09**

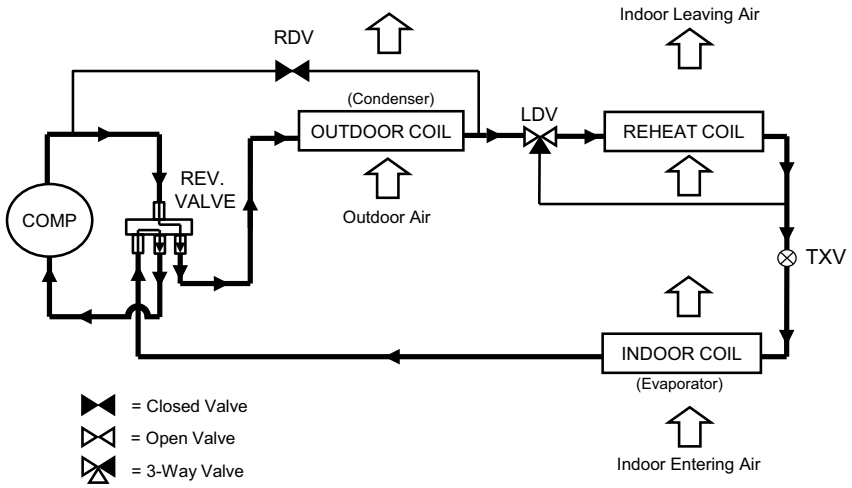



**Fig. 62 — Subcooling Mode — Humidi-MiZer System for 50GEQ 07-09**

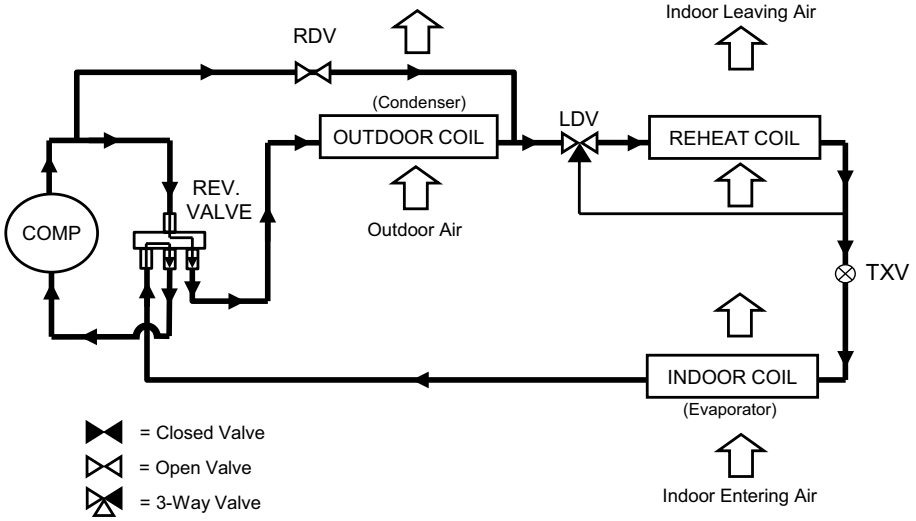



**Fig. 63 — Hot Gas Reheat Mode — Humidi-MiZer System for 50GEQ 07-09**

**IMPORTANT: EconomizerONE is available for 2-stage electromechanical controller models only!**

## EconomizerONE (Factory Option)

ECONOMIZER SETTINGS

***Interface Overview***

EconomizerONE

This option consists of the following:

- Low Leak Economizer Assembly
- HH79NZ039 OA (Outdoor Air) Dry Bulb Sensor
- HH79NZ039 Mixed Air Sensor
- POL224 Controller
- 50HE005489 Harness

POL224 Economizer Module Wiring

The economizer controller used on electromechanical units is a Siemens POL224, which is to be located in the RTU base unit's control box. See Fig. 64 for button description of the POL224 controller. Refer to the unit dimensional drawing for the location of the control box access panel.

The POL224 controller provides the following:

1. One-line LCD (Liquid Crystal Display) — After a period of inactivity, the controller displays the default HMI (Human Machine Interface) screen (free cooling status, 1FREECOOL YES or 1FREECOOL NO). See Fig. 64-68.
2. Operation button (Up button) — Move to the previous value, step, or category.
3. Operation button (Down Button) — Move to the next value, step, or category.
4. Operation Button (Enter Button):
   a. Press Enter to edit the current value or option.
   b. Press Enter to confirm a newly selected value or option.
   c. Press Enter + Up to jump up one entire category.
   d. Press Enter + Down to jump down one entire category.

User Interface and Keypad

The controller user interface consists of an LCD display and a 3-button keypad for input. The LCD is a 16 character by 1-line dot matrix display. The keypad is used to navigate and change the desired menu items on the display. See Fig. 64.

The Climatix™[1] mobile application allows for installation, commissioning, and servicing. Scanning a QR code on the controller allows users to download the mobile application on Android™[1] or Apple iOS®[1], but a Wi-Fi/WLAN stick is needed. See Fig. 64 and 65. Plug Wi-Fi/WLAN stick into controller USB port for temporary connection for mobile application set-up. The Wi-Fi/WLAN stick can be used for multiple units.

Menu Structure

Menus are displayed in the economizer controller via categories. There are eight first-level menus, each of which is represented by a number at the beginning of the line on the LCD. Pressing Enter + Up or Down can toggle between different first-level menus. Submenus follow the numbered first-level menus closely. Pressing Up or Down can toggle between different submenus.

At the end of the line, the LCD displays the value of the current submenu (if any). If the value is editable, pressing Enter will put the terminal in Edit mode. The value is then highlighted for change. After making a change by pressing Up or Down, press Enter to confirm the change and exit the Edit mode. See Fig. 67.

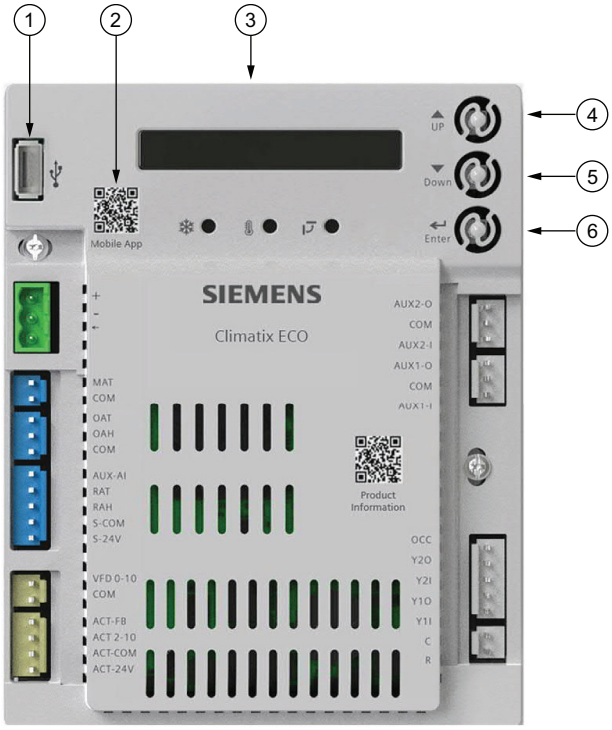
Powering the Economizer Controller

The POL224 controller power connections are made through the economizer harness (P/N 50HE005489). Connections from the harness are made to the C (24 vac common) and R (24 vac power) terminals of the economizer controller. See Fig. 66.

LED Indication

NOTE: If different faulty events occur at the same time, then sensor/DAC LED lights up following the priority below: Red → Yellow → Off. For example, if there is a humidity sensor error and air temperature failure at the same time, then the sensor LED turns red rather than yellow. See Fig. 68 and Table 12.

IMPORTANT: After the Economizer controller enters the running state, it may take one minute for peripheral devices to complete initialization. Before that, LED indication might be unstable.




NOTE: QR codes in this image are for reference only.

| NO. | DESCRIPTION |
|---|---|
| 1 | USB port for Wi-Fi/WLAN stick. |
| 2 | QR code to download Climatix™ mobile application. |
| 3 | One-line LCD. After a period of inactivity, the controller displays the default:<br>HMI screen (free cooling status, 1FREECOOL YES or 1FREECOOL NO) |
| 4 | Operation button (Up button) - Move to the previous value, step or category. |
| 5 | Operation button (Down button) - Move to the next value, step or category. |
| 6 | Operation button (Enter button):<br>• Press to edit the current value or option.<br>• Press to confirm a newly selected value or option.<br>• Press Enter + Up to jump up one entire category.<br>• Press Enter + Down to jump down one entire category. |

**Fig. 64 — POL224 Controller**

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


NOTE: QR code in this image is for reference only.

**Fig. 65 — Wi-Fi/WLAN Stick**

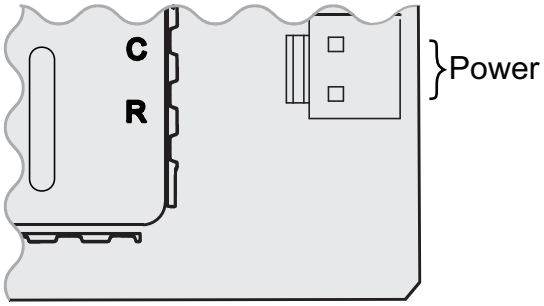
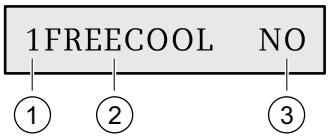


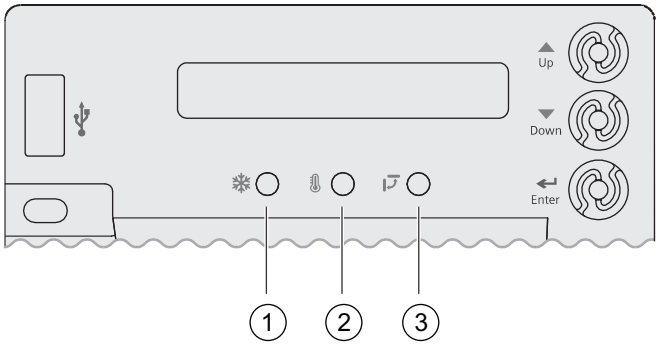

**Fig. 66 — Powering the EconomizerONE Controller**




| No. | Description |
|---|---|
| 1 | Number representing the first-level menu of **Status Display**. Different numbers represent different menus:<br>1: Status Display<br>2: Basic Settings<br>3: Advanced Settings<br>4: Alarms<br>5: Enter Configuration State and Reset<br>6: I/O Config<br>7: Testing<br>8: Enter Running State |
| 2 | Submenu[a] |
| 3 | Value of the current submenu[a] |

a. See “Setup and Configuration” on page 53 for detailed submenus together with possible values or ranges.

**Fig. 67 — Menu Structure Descriptions**




| NO. | DESCRIPTION |
|---|---|
| 1 | Free Cooling LED |
| 2 | Sensor LED |
| 3 | DAC LED |

**Fig. 68 — LED Indication**

**Table 12 — LED Indication**

| STATUS | FREE COOLING LED | SENSOR LED | DAC LED |
|---|---|---|---|
| **Commissioning mode** | Yellow Blinking | Yellow Blinking | Yellow Blinking |
| **Power start up** | Yellow On | Yellow On | Yellow On |
| **Free cooling is running** | Green On | — | — |
| **Free cooling is available but not running** | Green Blinking | — | — |
| **Not economizing when it should** | Red Blinking | — | — |
| **Economizing when it should not** | Red On | — | — |
| **Sensor working okay** | — | Green On | — |
| **Humidity sensor error** | — | Yellow On | — |
| **$CO_2$ sensor error** | — | LED Off | — |
| **Air temperature fault/failure** | — | Red On | — |
| **Excess outdoor air** | — | Red Blinking | — |
| **Damper working okay** | — | — | Green On |
| **Damper not modulating** | — | — | Red On |
| **Damper slippage** | — | — | Red Blinking |
| **Damper unplugged** | — | — | Fast Red Blinking |
| **Terminal ACT-FB is configured but no available feedback signal** | — | — | LED Off |

***Functions***

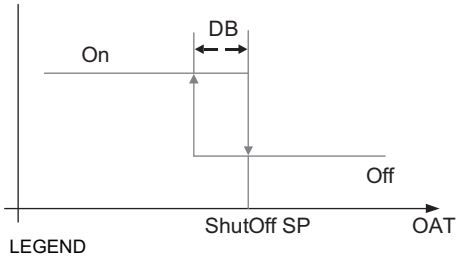
Free Cooling Economizing

Free cooling uses unconditioned outside air to cool the space directly. The economizer controller enables or disables free cooling after it judges which control mode is active. It also uses hysteresis to ensure a smooth switchover.

Depending on the sensors that are used, there are four different control modes. In different control modes, the assessed conditions are different. See Table 13.

Default Hysteresis Setting

Hysteresis setting (DB) defaults to 2°F (–17°C). See Fig. 69.




LEGEND
**OAT** — Outside Air Temperature
**DB** — Deadband
**SP** — Set Point

**Fig. 69 — Hysteresis Settings**

**Table 13 — Free Cooling Functions**

| CONTROL MODE | SENSORS USED | ENABLE FREE COOLING? |
|---|---|---|
| **Control Mode 1**<br>• Fixed Dry bulb | OA (outside air) Temperature Sensor and MA (Mixed Air) Temperature Sensor | The outside air dry bulb temperature is compared with the set temperature shutoff setpoint.<br>If the outside air dry bulb temperature is below the temperature shutoff setpoint, then the outside air is used to meet all or part of the cooling demand. |
| **Control Mode 2**<br>• Differential Dry bulb (Dual Dry bulbs) | OA Temperature Sensor, RA (Return Air) Temperature Sensor, and MA Temperature Sensor | The outside-air dry bulb temperature is compared with the return air dry bulb temperature.<br>If both OAT and RAT are higher than the temperature high limitation, then free cooling is prohibited.<br>If OAT or RAT is lower than the temperature high limitation and the outside air dry bulb temperature is lower than the return air dry-bulb temperature, then the outside air is used to meet all or part of the cooling demand. |
| **Control Mode 3**<br>• Combination Fixed Enthalpy and Fixed Dry bulb Control | OA Temperature and Humidity Sensor and MA Temperature Sensor | The outside air dry bulb temperature and enthalpy are compared with the set temperature and enthalpy shutoff setpoints.<br>If the outside air enthalpy is lower than the set enthalpy shutoff setpoint, and the outside air dry bulb temperature is lower than the temperature shutoff setpoint, then the outside air can be used for economizing. |
| **Control Mode 4**<br>• Combination of Differential Enthalpy and Fixed Dry bulb | OA Temperature and Humidity Sensor, RA Temperature and Humidity Sensor, and MA Temperature Sensor | The outside air dry bulb temperature and enthalpy are compared with the temperature shutoff setpoint and return air enthalpy.<br>If both OA enthalpy and RA enthalpy are higher than the enthalpy high limitation, then free cooling is prohibited.<br>If OA enthalpy or RA enthalpy is lower than the enthalpy high limitation, outside air enthalpy is lower than the return-air enthalpy, and the outside air dry bulb temperature is lower than the set temperature shutoff setpoint, then outside air can be used for economizing. |

Damper Modulation During Free Cooling

Once outside air is suitable for free cooling, the controller modulates the damper based on MAT (mixed air temperature, default) or OAT (outside air temperature). Refer to Table 13.

If MAT is used when free cooling is enabled, MAT setpoint (**3MAT SET**, configurable in "Parameter Settings — Advanced" on page 56) is used for MAT modulating. When MAT falls below the anti-freeze setpoint (**3FRZ PROT**), the damper either fully closes or opens to the minimum position (configurable in "Parameter Settings — Advanced" on page 56).

1. If MAT is lower than MAT setpoint, then the damper is modulated to maintain MAT setpoint, towards fully closed or open to the minimum position based on occupancy status if MAT continues dropping.
2. If MAT is in the range [MAT setpoint, (MAT setpoint + neutral zone band [1°F by default])], then the damper position does not change.
3. If MAT is higher than (MAT setpoint + neutral zone band), then the damper opens towards fully open.
4. If MAT is 10°F higher than MAT setpoint, then the damper fully opens to 100%.

If OAT is used when there is a cooling demand, the damper can be opened to different positions depending on different outside air temperatures:

1. If outside air is higher than 50°F but lower than the temperature shutoff setpoint, then the damper is fully open.
2. If outside air is higher than OAT lockout setpoint but lower than 50°F, then linear modulation is applied when only Cooling Stage 1 input (Y1I) is ON. Result of the following formula indicates the damper's open position:

   ([OAT - OAT Lockout Setpoint] / [50 - OAT Lockout Setpoint]) * (80% - MIN POS) + MIN POS

   NOTE: When both free cooling and mechanical cooling are on, damper remains fully open regardless of the modulating logic.

Location-Based Shutoff Setpoints

The economizer controller can get location-based temperature and enthalpy shutoff setpoints automatically if it is connected to the Climatix™ mobile application. Once a Wi-Fi/WLAN stick is plugged in, the economizer controller can establish network connection with the mobile application. The temperature and enthalpy shutoff setpoints obtained via the phone or tablet's GPS functionality can then be synchronized to the economizer controller.

Cooling Stage Operation

The economizer controller accepts inputs for 1 and 2-stage cooling inputs and reroutes to the RTU through the relay connection Y1 and Y2.

The operation of the cooling stages is determined by the availability of Free Cooling provided by the economizer operation mode. See Cooling Stage I/O Logic Tables 14-15. Based on the use of Free Cooling, the operating modes are as follows:

- Y1 is Stage 1 Cooling Demand.
- Y2 is Stage 2 Cooling Demand.
- Free Cooling is always the first cooling stage.
- Cooling Stage 1 call from the Commercial Thermostat (Y1) energizes the Y1 input to the economizer controller.
- Cooling Stage 2 call from the Commercial Thermostat (Y2) energizes the Y2 input to the economizer controller.

### Table 14 — 1 and 2-Stage Cooling Stage I/O Logic

| ECONOMIZER CONDITION MET | Y1 | Y2 | COOLING STAGE 1 | COOLING STAGE 2 |
|---|---|---|---|---|
| **NO** | On | On | On | On |
| **NO** | On | Off | On | Off |
| **NO** | Off | Off | Off | Off |
| **YES** | On | On | On | On/Off[a] |
| **YES** | On | Off | Off | Off |
| **YES** | Off | Off | Off | Off |

NOTE(S):

a. If OAT ≤ MAT setpoint (3MAT SET), then Relay 2 is always **OFF** to disable Cooling Stage 2. Otherwise, if both stages of cooling (Y1 and Y2) are **ON** for more than a set time (15 minutes by default), Y2 remains ON, and the OAT is higher than MAT setpoint, then Relay 2 energizes to allow Y2 pass-through to enable Cooling Stage 2.

### Table 15 — 2-Stage Cooling Stage I/O Logic

| ECONOMIZER CONDITION MET | Y1 | Y2 | COOLING STAGE 1 | COOLING STAGE 2 |
|---|---|---|---|---|
| **NO** | On | On | On | On |
| **NO** | On | On | On | On |
| **NO** | On | Off | On | Off |
| **NO** | Off | Off | Off | Off |
| **YES** | On | On | On | On |
| **YES** | On | On | On | On/Off |
| **YES** | On | Off | Off | Off |
| **YES** | Off | Off | Off | Off |

IMPORTANT: The economizer controller can tolerate thermostat wiring mismatch, e.g. Thermostat Y1 → Economizer Y2-In, Thermostat Y2 → Economizer Y1-In. The handling logic is Stage =Y1I + Y2I. For example, Y1O =1 if Stage > =1, Y2O =1 if Stage > = 2.

Multi-Speed Fan Support

The economizer controller supports connection to 2-speed fans. When the unit is equipped with a multi-speed fan, the damper responds to multiple fan speeds via multiple minimum positions **(MIN POS)** to keep minimum airflow. See Tables 16-18.

### Table 16 — Damper MIN POS for 2-Speed Fan[a]

| Y1 | Y2 | W1 OR O/B | SPD L | SPD H | POS L | POS H |
|---|---|---|---|---|---|---|
| **X** | **—** | — | X | — | X | — |
| **X** | **X** | — | — | X | — | X |
| **—** | **—** | X | — | X | — | X |

NOTE(S):

a. A multi-speed fan is not controlled by the economizer controller but by an external logic board.

LEGEND

**POS L** — Damper MIN POS for Low-Speed Fan
**POS H** — Damper MIN POS for High-Speed Fan
**SPD L** — Low-Speed (Fan)
**SPD H** — High-Speed (Fan)

### Table 17 — Different Fan Speeds with Different Configured Outputs[a]

| FAN TYPE | 1-SPEED COOLING[b] | 2-STAGE COOLING[b] |
|---|---|---|
| **1-SPEED FAN[c]** | • Spd H (regardless of cooling demand, OCC=Yes) | • Spd H (regardless of cooling demand, OCC=Yes) |
| **2-SPEED FAN[c]** | • Spd L (0 or 1 cooling demand)<br>• Spd H (2 cooling demands) | • Spd L (0 or 1 cooling demand)<br>• Spd H (2 cooling demands) |

NOTE(S):

a. If a single-speed fan connects to the Controller, it opens directly on the call of cooling/heating. The damper position is Pos H.
b. Configured by Y1O or Y2O.
c. Configured by 6FAN.

LEGEND

**Spd L** — Low Speed (Fan)
**Spd H** — High Speed (Fan)

### Table 18 — Different Damper Minimum Positions with Different Configured Outputs

| FAN TYPE | 1-SPEED COOLING[a] | 2-STAGE COOLING[a] |
|---|---|---|
| **1-SPEED FAN[b]** | • Pos H (regardless of cooling demand, OCC=Yes) | • Pos H (regardless of cooling demand, OCC=Yes) |
| **2-SPEED FAN[b]** | • Pos H (regardless of cooling demand, OCC=Yes) | • Pos L (0 or 1 cooling demand)<br>• Pos H (2 cooling demands) |

NOTE(S):

a. Configured by Y1O or Y2O.
b. Configured by 6FAN.

LEGEND

**Pos L** — Damper MIN POS for Low-Speed Fan
**Pos H** — Damper MIN POS for High-Speed Fan

If DCV (demand controlled ventilation) is enabled, each fan speed corresponds to two damper position ventilation setpoints (VENT MIN, VENT MAX), e.g., Pos L corresponds to 2VENTMIN L... 2VENTMAX L. See Table 19 for Different Damper Position Setting with Different Configured Outputs with DCV enabled.

If $CO_2$ sensor is connected but DCV is disabled, then each fan speed corresponds to one minimum damper position ventilation setpoint. See Table 20 for Different Damper Position Setting with Different Configured Outputs with DCV disabled.

**Table 19 — Different Damper Position Settings with Different Configured Outputs (DCV is Enabled)**

| FAN TYPE | 1-STAGE COOLING[a] | 2-STAGE COOLING[a] |
|---|---|---|
| 1-SPEED FAN[b] | • 2VENTMIN H to 2VENTMAX H (regardless of cooling demand, OCC=Yes) | • 2VENTMIN H to 2VENTMAX H (regardless of cooling demand, OCC=Yes) |
| 2-SPEED FAN[b] | • 2VENTMIN H to 2VENTMAX H (regardless of cooling demand, OCC=Yes) | • 2VENTMIN L to 2VENTMAX L (0 or 1 cooling demand)<br>• 2VENTMIN H to 2VENTMAX H (2 cooling demands) |

NOTE(S):

a. Configured by Y1O or Y2O.
b. Configured by 6FAN.

**Table 20 — Different Damper Position Settings with Different Configured Outputs (DCV is Disabled, $CO_2$ sensor is connected)**

| FAN TYPE | 1-STAGE COOLING[a] | 2-STAGE COOLING[a] |
|---|---|---|
| 1-SPEED FAN[b] | • 2VENTMIN H (regardless of cooling demand, OCC=Yes) | • 2VENTMIN H (regardless of cooling demand, OCC=Yes) |
| 2-SPEED FAN[b] | • 2VENTMIN H (regardless of cooling demand, OCC=Yes) | • 2VENTMIN L (0 or 1 cooling demand)<br>• 2VENTMIN H (2 cooling demands) |

NOTE(S):

a. Configured by Y1O or Y2O.
b. Configured by 6FAN.

Cooling Delay via Increasing Fan Speed

If there is cooling demand while outside air is suitable for economizing, then the economizer controller tries to increase fan speed to maximize the use of outside air first. If the cooling demand is not reached within a set time, then mechanical cooling will be enabled.

Typical field application:

1. Prerequisites:
   - Outside air is suitable for economizing and free cooling is ON.
   - Fan connected to the controller supports multiple speeds. Cooling delay function does not work if only a one-speed fan is connected to the controller.
2. If it is a 2-speed fan and there are two cooling demand inputs/outputs and Y1-Input is called, then the controller sets fan speed to Speed Low. Damper is fully open (100%).

   If Y2-Input is also called, then the controller increases fan speed to Speed High and starts fan delay (2FAN DLY) time. After the delay time runs out, the controller starts Y1-Output.

Demand Controlled Ventilation (DCV)

If a field-installed $CO_2$ sensor is connected to the EconomizerONE controller, then a demand controlled ventilation strategy will operate automatically. As the $CO_2$ level in the space increases above the setpoint (on the EconomizerONE controller), the minimum position of the dampers will be increased proportionally until the Maximum Ventilation setting is reached. As the space $CO_2$ level decreases because of the increase in fresh air, the outdoor damper will follow the higher demand condition from the DCV mode or from the free cooling mode.

The controller modulates the outside air damper based on the $CO_2$ level through the ppm value selected between the range of 500 and 2000 ppm. The measured $CO_2$ concentration value is compared with the set DCV setpoint. If the measured $CO_2$ concentration value is below the DCV setpoint, then keep the damper to the minimum position. Otherwise, enable DCV. Once DCV is enabled, the DCV PID starts to run to control the indoor $CO_2$ concentration value towards the DCV setpoint. The damper opens to the maximum position.

NOTE: DCV is disabled if the controller receives no occupancy signal.

DCV operation is available in Occupied and Unoccupied periods with the EconomizerONE system. However, a control modification will be required on the unit system to implement the Unoccupied period function. Refer to controller accessory installation instruction manual for further controls and command operation information.

High Humidity Limitation

The economizer controller applies high limit of humidity to enthalpy-based economizing. When the OA dew point is below the dew point setpoint, enthalpy-based economizing is available. Otherwise, enthalpy-based economizing is unavailable.

Anti-Freeze Protection

The economizer controller initiates the anti-freeze protection if MAT or OAT temperature falls below the anti-freeze setpoint.

MAT-Based Anti-Freeze Protection

1. If MAT temperature falls below the anti-freeze setpoint (3FRZ PROT), then:
   - The controller closes both damper and compressor if unit type is conventional unit and cooling/heating conventional operation mode is enabled.
   - The controller closes the damper if unit type is heat pump and heat pump operation mode is enabled.
2. If the MAT sensor fails, MAT is substituted by OAT to continue the anti-freeze assessment. If OAT fails too, the controller closes the damper immediately.

OAT-Based Anti-Freeze Protection

If OAT temperature falls below the OAT lockout setpoint (3OAT LOCK):

1. The controller stops the compressor from running if unit type is conventional unit and cooling/heating conventional operation mode is enabled.
2. The controller compressor is bypassed if unit type is heat pump and heat pump operation mode is enabled.

Exhaust Fan Operation

Up to two exhaust fans can be connected to the economizer controller.

- If Exhaust Fan 1 is connected and configured, then Exhaust Fan 1 parameter group (L, M, and H) is available, depending on fan configuration.
- If Exhaust Fan 2 is connected and configured, then Exhaust Fan 2 parameter group (L, M, and H) is available, depending on fan configuration.
- The controller energizes Exhaust Fan Relay 1 and Exhaust Fan Relay 2 if the damper position reaches Exhaust Fan 1 parameter setting and Exhaust Fan Relay 2 parameter setting respectively. The selection of L, M, or H matches the current fan speed.

NOTE: If terminal ACT-FB is configured, then the damper position is the damper feedback position. If feedback signal is unavailable, it is the simulated position.

Occupancy Input

The economizer controller can receive an occupancy signal from the connected thermostat or work under Occupied mode all the time. This is configurable in the Thermostat setup from the Climatix™ mobile application or under the I/O Configuration menu on the inbuilt display. See "Parameter Settings — I/O Configurations" on page 56 for more information.

IMPORTANT: On the call of cooling, when the controller is configured to receive signal from the thermostat but the thermostat is working under the Unoccupied mode, the damper is fully closed if outside air is not suitable for economizing. If outside air is suitable for economizing, the damper is fully open.

Pre-occupancy Purge

The pre-occupancy purge demand comes from the configuration of the Auxiliary features in the Climatix™ mobile application or 6AUX2-I under the I/O Configuration menu on the inbuilt display.

During pre-occupancy purge on the call of heating or when there is no cooling/heating demand, the damper position is MIN POS.

During pre-occupancy purge on the call of cooling, the damper position is MIN POS if outside air is not suitable for economizing. If outside air is suitable for economizing, then the damper is fully open.

Airflow Commissioning

Airflow measurement station (differential pressure signal) can connect to the controller temporarily to run airflow commissioning to calculate, calibrate, and store 4 fan speed characteristic curves automatically at damper positions 40%, 60%, 80%, and 100%. The controller places the damper to a proper position to meet minimum or any other airflow requests in cfm. Users can enable this function only from the Climatix™ mobile application if the related function is available in the current mobile application version.

Fault Detection and Diagnostics

The economizer controller can detect and diagnose free cooling faults, sensor operation faults, and damper modulating faults. It can also report anti-freeze and shutdown notifications and actuator errors. Following is a list of all detectable or reportable information:

- Sensor disconnected or has no signal.
- Sensor short or high signal (under range or over range).
- Not economizing.
- Unexpected economizing.
- Excess outdoor air.
- Damper not modulating.
- Input power monitor and brownout. After detecting brownout, the economizer controller enters the brownout protection mode and disables all of the relay outputs.
- Anti-freeze notifications.
- Shutdown notifications.
- Actuator errors.
- Too low or too high leaving air temperature.
- Cooling/heating error.
- Damper actuator cycle count. Parameter **1ACT CNT** indicates number of times actuator has cycled. It is resettable via HMI item **8ACT CNT RESET**.

IMPORTANT: The first 6 faults are detectable via LEDs or alarm reports on the LCD. See LED Indication on page 44 and Alarms on page 57 for fault indications. These faults can also be displayed in the Operating section of the Climatix™ mobile application.

Firmware Update

NOTE: Back up configurations before firmware update. All the previous configuration data are erased after firmware update. NOTE: Contact Application Engineering for more information on support for firmware.

IMPORTANT: If the controller enters the configuration state for the convenience of I/O configurations, then users can manually switch to the running state after finishing configurations. To do so, press Enter + Up at the same time, and then press Enter to confirm the switch after 8RUN STATE appears on the LCD.

**⚠ WARNING**

Failure to follow this caution may result in damage to equipment. Be sure to allow enough time for compressor startup and shutdown between checkout tests so that the compressors do not short-cycle.

### *Mounting Devices Connected to the Economizer Controller*

Devices like damper actuators, sensors (temperature sensor, humidity sensor, combination temperature and humidity sensor, $CO_2$ sensor), thermostats, and exhaust fans can be connected to the economizer controller. For information on how to mount the devices, see the device's installation instructions. See Fig. 70 and Table 21 for economizer controller wiring details.

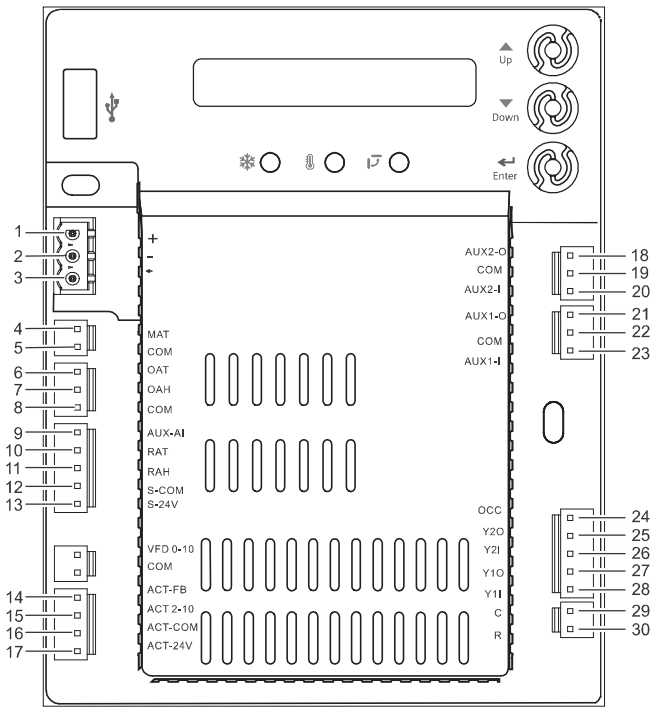



**Fig. 70 — EconomizerONE Control Wiring**

## Table 21 — EconomizerONE Control Wiring Settings

| NO. | LABEL | TYPE | DESCRIPTION |
|---|---|---|---|
| **1** | + | RS485 Modbus A | Line A |
| **2** | - | RS485 Modbus B | Line B |
| **3** | ¬ | GND_ISO | Earth Ground |
| **4** | MAT | Type II NTC 10K or 0-10 vdc | Mixed or Discharge Air Temperature Sensor |
| **5** | COM | COM | Mixed or Discharge Air Temperature Sensor Common |
| **6** | OAT | Type II NTC 10K or 0-10 vdc | Outside Air Temperature Sensor |
| **7** | OAH | 0-10 vdc or 4-20mA | Outside Air Relative Humidity Sensor |
| **8** | COM | COM | Outside Air Temperature Sensor or<br>Outside Air Relative Humidity Sensor Common |
| **9** | AUX-AI | 0-10 vdc, 2-10 vdc or 0-5 vdc | Air Quality Sensor or Pressure Sensor |
| **10** | RAT | Type II NTC 10K or 0-10 vdc | Return Air Temperature Sensor |
| **11** | RAH | 0-10 vdc or 4-20mA | Return Air Relative Humidity Sensor |
| **12** | S-COM | COM | 24 vac Common |
| **13** | S-24V | 24 vac | 24 vac Power Out to Sensors |
| **14** | ACT-FB | 2-10 vdc | Damper Actuator Feedback |
| **15** | ACT2-10 | 2-10 vdc | Damper Actuator Output |
| **16** | ACT-COM | COM | Damper Actuator Output Common |
| **17** | ACT-24V | 24 vac | 24 vac Power Out to Damper Actuator |
| **18** | AUX2-O | 24 vac OUT | Configurable:<br>• Exhaust Fan (1 or 2)<br>• System Alarm output (Title 24) |
| **19** | COM | COM | 24 vac Common |
| **20** | AUX2-I | 24 vac IN | Configurable:<br>• Shut Down<br>• Heat Conventional (W1)<br>• Heat Pump Changeover (reversing valve OB)<br>• Pre-occupancy |
| **21** | AUX1-O | 24 vac OUT | Configurable:<br>• Exhaust Fan (1 or 2)<br>• System Alarm output (Title 24) |
| **22** | COM | COM | 24 vac Common |
| **23** | AUX1-I | 24 vac IN | Configurable:<br>• Shut Down<br>• Heat Conventional (W1)<br>• Heat Pump Changeover (reversing valve OB)<br>• Pre-occupancy |
| **24** | OCC | 24 vac IN | Occupancy Input |
| **25** | Y2O | 24 vac OUT | Cooling Stage 2 Output to Stage 2 Mechanical Cooling |
| **26** | Y2I | 24 vac IN | Cooling Stage 2 Input from Commercial Thermostat |
| **27** | Y1O | 24 vac OUT | Cooling Stage 1 Output to Stage 1 Mechanical Cooling |
| **28** | Y1I | 24 vac IN | Cooling Stage 1 Input from Commercial Thermostat |
| **29** | C | COM | 24 vac Common |
| **30** | R | 24 vac | 24 vac Power |

***Connecting Peripheral Devices to the Economizer Controller***

See Fig. 71-75 for wiring details.

- Outside Air: Connect to the OAT and COM terminals of the device.
- Return Air (Differential): Connect to the RAT and S-COM terminals of the device.
- Mixed Air: Connect to the MAT and COM terminals of the device.

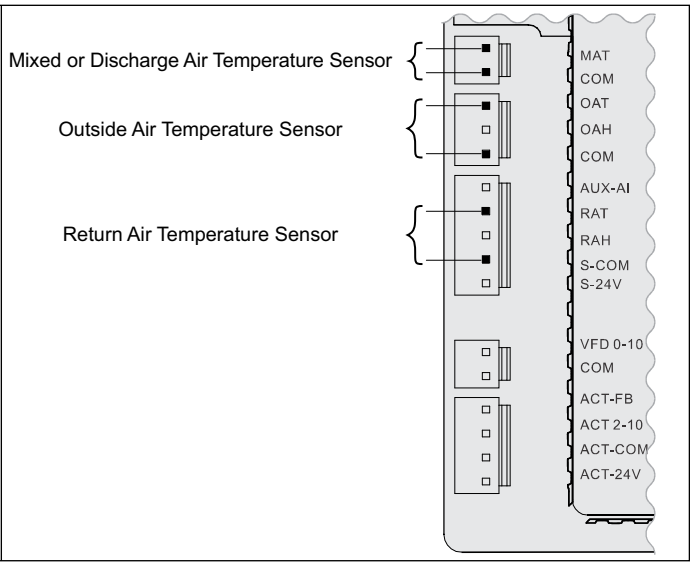



**Fig. 71 — Temperature Sensor Connection**

- Outside Air Relative Humidity: Connect to the OAH and COM terminals of the device.
- Return Air Relative Humidity: Connect to the RAH and S-COM terminals of the device.

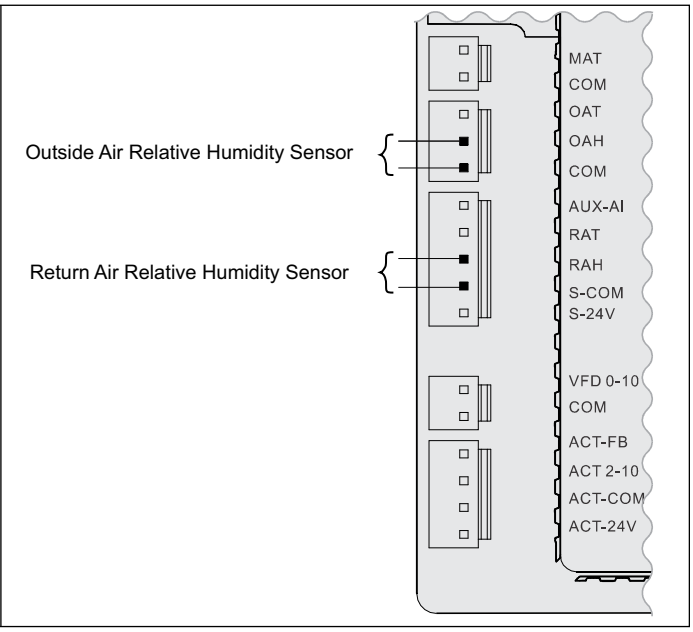



**Fig. 72 — Relative Humidity Sensor Connection**

- Outside Combination Temperature/ Humidity: Connect to the OAT, COM, and OAH terminals of the device.
- Return Combination Temperature/ Humidity: Connect to the RAT, S-COM, and RAH terminals of the device.

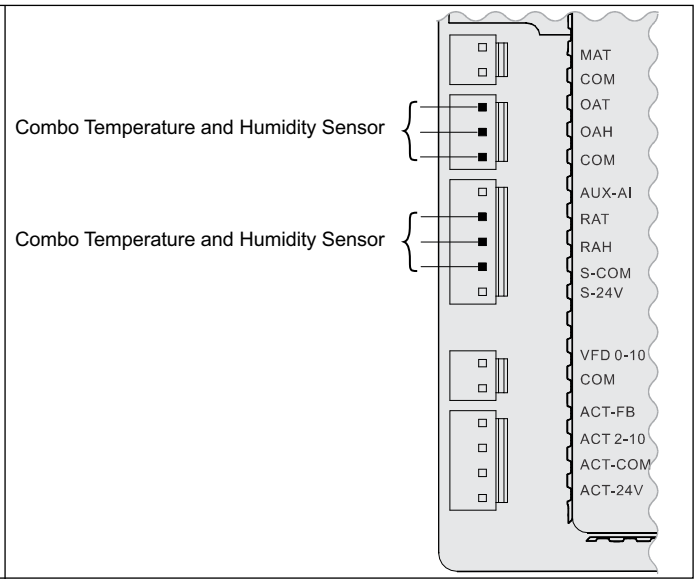



**Fig. 73 — Combination Temperature/Humidity Sensor Connection**

- Connect to the AUX-AI, S-COM, and S-24V terminals of the device.

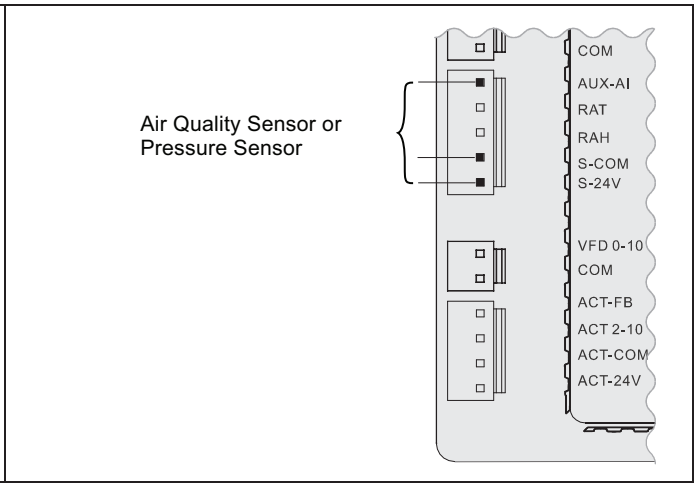



**Fig. 74 — $CO_2$/Pressure Sensor Connection**

- Connect to the ACT 2-10, ACT-COM, and ACT-24V terminals of the device.

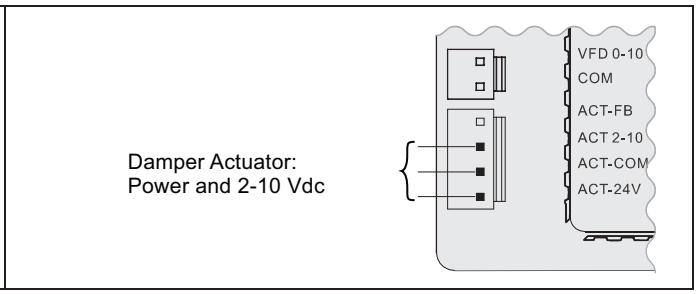



**Fig. 75 — Damper Actuator Connection**

## SETUP AND CONFIGURATION

IMPORTANT: Before setup and configuration, it is recommended to obtain some location-based values, such as shutoff points, or utilize the location services in the Climatix™ mobile application.

Set up and configure the economizer controller before putting it into usage. This can be accomplished by using the Climatix™ mobile application or the inbuilt display. After sensor, compressor, thermostat, or actuator is connected to the economizer controller, values/statuses are displayed in the Operating section of the mobile application and on the LCD. Users can manually change basic and advanced settings, configure I/Os, and test the damper operation and any configured outputs by modifying the corresponding parameter values in the local device or mobile application. See Tables 22-29 for complete list of all parameters available on the LCD display. Refer to it during the setup and configuration process.

NOTE: For all units, the Climatix application login is: **Administrator**. For units coming from the factory with $CO_2$ configuration or single enthalpy (control mode 3), the controller password is OneBT2.1. For all other units, use the controller password OneBT.

NOTE: Parameters and display menus may display differently/dynamically if different applications are configured. See Tables 22-29.

IMPORTANT: Not all operations are available on the local POL224. For example, users can only obtain shutoff setpoints and perform cfm commissioning via the Climatix™ mobile application. Setup and configuration on the local device are only recommended if operations from the mobile application are unavailable. Check the mobile application for all operations that can be performed from the mobile application end.

IMPORTANT: By connecting the RS485 port to a PC, all parameters are also readable or writable from PC tools such as Modbus Poll.exe via Modbus®[a] and Yabe.exe via BACnet®[a] MSTP (Bps 38400 [default], Bps 9600, Bps 19200, Bps 115200). Note that an external End of Line (EOL) element is required to achieve Baud Rate 115200 at a maximum cable length of 4000 ft (1.2 km).

NOTE(S):

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

## Table 22 — Status Display

| PARAMETER | DESCRIPTION | VALUE |
|---|---|---|
| **1FREECOOL** | Indicates whether the system can use outdoor air for free cooling. | YES<br>NO |
| **1ECON ENAB** | Indicates whether outdoor air is being used for the first stage of cooling. | |
| **1OCCUPIED** | Indicates whether the space is occupied. If users choose **ALWAYS** for **6OCC** when configuring I/Os, then the parameter value is **YES**; if users keep the default selection **T-STAT** for **6OCC** and the controller receives 24-v signal from OCC input, then the value is **YES**. Otherwise, the value is **NO**. | |
| **1Y1-IN** | Y1-In call from thermostat for Cooling Stage 1. | ON<br>OFF |
| **1Y1-OUT** | Y1-Out signal to compressor for Cooling Stage 1. | |
| **1Y2-IN** | Y2-In call from thermostat for Cooling Stage 2. | |
| **1Y2-OUT** | Y2-Out signal to compressor for Cooling Stage 2.<br>**Dynamic item:** Appears only if Y2-Out terminal is configured. | |
| **1AUX1-I** | Aux1-In signal<br>**Dynamic item:** Appears only if Aux1-In terminal is configured. | |
| **1AUX1-O** | Aux1-Out signal<br>**Dynamic item:** Appears only if Aux1-Out terminal is configured. | |
| **1AUX2-I** | Aux2-In signal<br>**Dynamic item:** Appears only if Aux2-In terminal is configured. | |
| **1AUX2-O** | Aux2-Out signal<br>**Dynamic item:** Appears only if Aux2-Out terminal is configured. | |
| **1COMP STAGE** | Indicates compressor current stage. | Off<br>1<br>2<br>3 |
| **1HEAT ENAB** | Indicates whether heating is enabled. | YES<br>NO |
| **1MIX AIR LOW** | Indicates whether the anti-freeze protection function is enabled for a mixed air temperature sensor. If the detected air temperature is lower than the anti-freeze protection setpoint (3FRZ PROT), then the parameter value is **YES**. Otherwise, it is **NO**. | |
| **1MAT PRES** | Indicates the present value of the mixed air temperature (MAT) sensor.<br>**Dynamic item:** Appears only if **MAT** or **AUTO** is selected for **3DIF T LOC** under Parameter Settings — Advanced on page 56. | The corresponding detected value is displayed on the LCD. |
| **1LAT PRES** | Indicates the present value of the leaving air temperature (LAT) sensor.<br>**Dynamic item:** Appears only if **LAT** or **AUTO** is selected for **3DIF T LOC**. | |
| **1OAT PRES** | Indicates the present value of the outdoor air temperature (OAT) sensor.<br>**Dynamic item:** Appears only if an OAT sensor is configured. | |
| **1OAH PRES** | Indicates the present value of the outdoor air relative humidity (OAH) sensor.<br>**Dynamic item:** Appears only if an OAH sensor is configured. | |
| **1RAT PRES** | Indicates the present value of the return air temperature (RAT) sensor.<br>**Dynamic item:** Appears only if a RAT sensor is configured. | |
| **1RAH PRES** | Indicates the present value of the return air relative humidity (RAH) sensor.<br>**Dynamic item:** Appears only if a RAH sensor is configured. | |
| **1CO2 PRES** | Indicates the present value of the $CO_2$ sensor.<br>**Dynamic item:** Appears only if a $CO_2$ sensor is configured. | |
| **1DCV STATUS** | Indicates the demand controlled ventilation (DCV) status.<br>**Dynamic item:** Appears only if a $CO_2$ sensor is configured.<br>Displays ON if the measured $CO_2$ concentration value is above the DCV setpoint and OFF if below the DCV setpoint. | ON<br>OFF |
| **1FAN SPD LV** | Indicates the current fan speed status (low, medium, or high). If a one-speed fan is connected and configured, then this item is invisible.<br>**Dynamic item:** Appears only if "**6FAN**" is configured as "**2SPEED**" under Parameter Settings — I/O Configurations on page 56. | L<br>H |
| **1ACT OUT** | Indicates current position of damper actuator in V. | The corresponding detected value is displayed on the LCD. |
| **1ACT FB** | Indicates feedback signal of damper actuator in V. | |
| **1ACT POS** | Indicates current position of damper actuator in % Open. | |
| **1ACT CNT** | Indicates number of times actuator has cycled (1 cycle = 180 degrees of movement in any direction). Resettable via HMI item **8ACT CNT RESET** under Enter Running State on page 58. | |
| **1EQUIP** | Indicates the equipment type. If **HP(O)** or **HP(B)** is chosen for **6AUX1-I**, then the parameter value is **HP(O)** or **HP(B)** respectively. If neither is chosen, then the value is **CON RTU**. | HP(O)<br>HP(B)<br>CON RTU |
| **1OAT LOCK** | Indicates status of the OAT cooling lockout function. | NO<br>LCKOUT<br>OVRD |
| **1INS** | Indicates the installation date of the economizer controller. If the installation date is incorrect, press Enter to change and confirm month, date, and year. | — |

## Table 23 — Parameter Settings — Basic

| PARAMETER | DESCRIPTION | RANGE | DEFAULT |
|---|---|---|---|
| **2 TEMP OFF** | Temperature shutoff setpoint can be obtained automatically if a smartphone or tablet with the mobile application installed on it is connected to the network provided by a Wi-Fi/WLAN stick plugged into the economizer controller. This can also be a manually defined setpoint. | 48...80°F; increment by 1 | 63°F |
| **2ENTH OFF** | Enthalpy shutoff setpoint can be obtained automatically if a smartphone or tablet with the mobile application installed on it is connected to the network provided by a Wi-Fi/WLAN stick plugged into the economizer controller. This can also be a manually defined setpoint.<br>**Dynamic item:** Appears only if an OAH sensor is configured. | 22...30 Btu/lbm; increment by 1 | 28 Btu/lbm |
| **2DVC** | Demand controlled ventilation setpoint can be obtained automatically if a smartphone or tablet with the mobile application installed on it is connected to the network provided by a Wi-Fi/WLAN stick plugged into the economizer controller. This can also be a manually defined setpoint.<br>**Dynamic item:** Appears only if a $CO_2$ sensor is configured. | 300...2000PPM; increment by 100 | 1100PPM |
| **2FAN L ACT** | Damper minimum position when fan runs at a low speed.<br>**Dynamic item:** Appears only if "**6FAN**" is configured as "**2SPEED**" under Parameter Settings — I/O Configurations on page 56. | 2...10V; increment by 0.1 | 3.6V |
| **2FAN H ACT** | Damper minimum position when fan runs at a high speed.<br>**Dynamic item:** Appears only if "**6FAN**" is configured as "**1SPEED**" or "**2SPEED**". | 2...10V; increment by 0.1 | 2.8V |
| **2VENTMAX L** | DCV maximum position when fan runs at a low speed.<br>**Dynamic item:** Appears only if a $CO_2$ sensor is configured and "**6FAN**" is configured as "**2SPEED**". | 2...10V; increment by 0.1 | 3.6V |
| **2VENTMAX H** | DCV maximum position when fan runs at a high speed.<br>**Dynamic item:** Appears only if a $CO_2$ sensor is configured and "**6FAN**" is configured as "**1SPEED**" or "**2SPEED**". | 2...10V; increment by 0.1 | 3.6V |
| **2VENTMIN L** | DCV minimum position when fan runs at a low speed.<br>**Dynamic item:** Appears only if a $CO_2$ sensor is configured and "**6FAN**" is configured as "**2SPEED**". | 2...10V; increment by 0.1 | 3.1V |
| **2VENTMIN H** | DCV minimum position when fan runs at a high speed.<br>**Dynamic item:** Appears only if a $CO_2$ sensor is configured and "**6FAN**" is configured as "**1SPEED**" or "**2SPEED**". | 2...10V; increment by 0.1 | 2.3V |
| **CFM COMM** | Air Flow Chart: **CFM commissioning** can only be initiated from the mobile application. When **CFM commissioning** is in progress, the local device reads "**CFM COMM**". | — | — |
| **2DEGREES** | Temperature unit (°F or °C). | — | °F |
| **2FAN** | Fan cfm. | 100...50,000cfm; increment by 100 | 5000cfm |
| **2EX1 L** | Exhaust Fan 1 low-speed parameter setting.<br>**Dynamic item:** Appears only if:<br>• Exhaust Fan 1 is configured.<br>• "**6FAN**" is configured as "**2SPEED**". | 0...100%; increment by 1 | 65% |
| **2EX1 H** | Exhaust Fan 1 high-speed parameter setting.<br>**Dynamic item:** Appears only if:<br>• Exhaust Fan 1 is configured.<br>• "**6FAN**" is configured as "**1SPEED**" or "**2SPEED**". | 0...100%; increment by 1 | 50% |
| **2EX2 L** | Exhaust Fan 2 low-speed parameter setting.<br>**Dynamic item:** Appears only if:<br>• Exhaust Fan 2 is configured.<br>• "**6FAN**" is configured as "**2SPEED**". | 0...100% | 80% |
| **2EX2 H** | Exhaust Fan 2 high-speed parameter setting.<br>**Dynamic item:** Appears only if:<br>• Exhaust Fan 2 is configured.<br>• "**6FAN**" is configured as "**1SPEED**" or "**2SPEED**". | 0...100%; increment by 1 | 75% |
| **2THL** | Temperature high limitation.<br>**Dynamic item:** Appears only if an RAT sensor is configured. | 0...100%; increment by 1 | 83% |
| **2EHL** | Enthalpy high limitation.<br>**Dynamic item:** Appears only if an RAH sensor is configured. | 30...50 Btu/lbm; increment by 1 | 33 Btu/lbm |
| **2FAN DLY** | Cooling delay via increasing fan speed. | 0...30 min; increment by 1 | 5 min. |

## Table 24 — Parameter Settings — Advanced

| PARAMETER | DESCRIPTION | VALUE/RANGE | DEFAULT |
|---|---|---|---|
| **3FREEZE POS** | Anti-freeze protection damper position (closed or minimum). | CLO<br>MIN | CLO |
| **3SD ACT POS** | Damper position during shutdown (open or closed). | CLO<br>OPN | CLO |
| **3DIF T LOC** | MAT sensor location:<br>• Choose **MAT** if the sensor is installed before the DX (Direct Expansion) coil.<br>• Choose **LAT** if the sensor is installed after the DX coil.<br>• Choose **AUTO** to let the economizer controller automatically detect the location. | MAT<br>LAT<br>AUTO | LAT |
| **3LAT LOW** | Low limit of leaving air temperature.<br>**Dynamic item:** Appears only if **LAT** or **AUTO** is selected for **3DIF T LOC**. | 35...65°F; increment by 1 | 45°F |
| **3LAT HIGH** | High limit of leaving air temperature.<br>**Dynamic item:** Appears only if **LAT** or **AUTO** is selected for **3DIF T LOC**. | 70...180°F; increment by 1 | 80°F |
| **3OAT CAL** | OAT sensor calibration. | –2.5...2.5°F; increment by 0.5 | 0°F |
| **3RAT CAL** | RAT sensor calibration.<br>**Dynamic item:** Appears only if an RAT sensor is configured. | –2.5...2.5°F; increment by 0.5 | — |
| **3OAH CAL** | OAH sensor calibration.<br>**Dynamic item:** Appears only if an OAH sensor is configured. | –10...10%; increment by 0.5 | 0% |
| **3RAH CAL** | RAH sensor calibration.<br>**Dynamic item:** Appears only if an RAH sensor is configured. | | |
| **3MAT CAL** | MAT or LAT sensor calibration. | –2.5...2.5°F; increment by 0.5 | 0°F |
| **3MAT SET** | Setpoint of MAT or LAT sensor. | 38...70°F; increment by 1 | 53°F |
| **3FRZ PROT** | Anti-freeze protection setpoint of MAT sensor. | 35...55°F; increment by 1 | 45°F |
| **3ACT TOLR** | Actuator tolerance setpoint between output (in percent) and feedback (in percent). | 0...15%; increment by 1 | 8% |
| **3OAT LOCK** | OAT lockout set point for anti-freeze protection. | –45...80°F; increment by 1 | 32°F |
| **3OAT LCKOVRD** | When OAT LOCKOUT is enabled, choose to override the cooling lockout function or not. | YES<br>NO | NO |
| **3OAT LOCKODLY** | Indicates the overridden time if "**YES**" is selected for "**3OAT LCKOVRD**". | 0...300 min; increment by 1 | 45 min. |

## Table 25 — Parameter Settings — I/O Configurations

| PARAMETER | DESCRIPTION | VALUE | DEFAULT |
|---|---|---|---|
| **6OCC** | Configures whether occupancy status receives signal from the connected thermostat or is displayed as ALWAYS in the economizer controller. | T-STAT<br>ALWAYS | T-STAT |
| **6AUX1-I** | Auxiliary DI-1. Configurable as:<br>• None<br>• Heat Conventional (W1) from thermostat<br>• Heat pump (reversing valve O)<br>• Heat pump (reversing valve B)<br>• Pre-occupancy signal from thermostat<br>• Shutdown signal from unit | NONE<br>HP(O)<br>HP(B)<br>PREOCC<br>SHUTDWN | W1 |
| **6AUX2-I** | Auxiliary DI-2. Configurable as:<br>• None<br>• Heat stage 1 (W1) from thermostat<br>• Heat pump (reversing valve O)<br>• Heat pump (reversing valve B)<br>• Pre-occupancy signal from thermostat<br>• Shutdown signal from unit<br>**NOTE:** Whichever is chosen for 6AUX1-I does not appear in the list of 6AUX2-I. | NONE<br>W1<br>HP(O)<br>HP(B)<br>PREOCC<br>SHUTDWN | NONE |
| **6OAT SIG** | Configures signal type of OAT sensor. | 0-10V<br>NTC10K | NTC10K |
| **6RAT SIG** | Configures signal type of RAT sensor. | 0-10V<br>NTC10K<br>NONE | NONE |
| **6OAH SIG** | Configures signal type of OAH sensor. | 0-10V<br>4-20mA<br>NONE | NONE |
| **6RAH SIG** | Configures signal type of RAH sensor. | | |
| **6MAT SIG** | Configures signal type of MAT or LAT sensor. | 0-10V<br>NTC10K | NTC10K |
| **6AUX-AI1** | Auxiliary AI-1. Configurable as:<br>• $CO_2$ sensor<br>• Static pressure (temporarily for cfm commissioning) sensor<br>• None | PRESSURE<br>CO2<br>NONE | NONE |
| **6X-AI1 SIG** | Configures $CO_2$ sensor type.<br>**Dynamic item**: Appears only if "**CO2**" is selected for "**6AUX-AI1**". | 0-10V<br>2-10V<br>0-5V | 0-10V |
| **6CO2 Rng L** | Configures the low limit of $CO_2$ measuring range.<br>**Dynamic item**: Appears only if "**CO2**" is selected for "**6AUX-AI1**". | 0...500; increment by 10 | 0 |
| **6C02 Rng H** | Configures the high limit of $CO_2$ measuring range.<br>**Dynamic item**: Appears only if "**CO2**" is selected for "**6AUX-AI1**". | 1000...3000;<br>increment by 50 | 2000 |
| **6AUX-AI2** | Choose **ACT FB** if feedback signal is available from the connected damper actuator. Otherwise, choose **NONE**. | ACT FB<br>NONE | ACT FB |

## Table 25 — Parameter Settings — I/O Configurations (cont)

| PARAMETER | DESCRIPTION | VALUE | DEFAULT |
|---|---|---|---|
| **6Y2O** | Choose "**COOL 2**" if Cooling Stage 2 is available (another compressor is connected to the Economizer). Otherwise, choose "**NONE**". | COOL 2<br>NONE | COOL 2 |
| **6AUX1-O** | Auxiliary DO-1. Configurable as:<br>• None.<br>• Exhaust fan (1 or 2).<br>• Alarm output to thermostat (Title 24). | NONE<br>ALARM<br>EXHAUST | EXHAUST |
| **6AUX2-O** | Auxiliary DO-2. Configurable as:<br>• None.<br>• Exhaust fan (1 or 2).<br>• Alarm output to thermostat (Title 24).<br>**NOTE:** Except for Exhaust Fan, whichever is chosen for 6AUX1-O does not appear in the list of 6AUX2-O. | NONE<br>ALARM<br>EXHAUST | ALARM |
| **6RS485** | Switch between MSTP and Modbus. | MSTP<br>MODBUSSLV | MSTP |

## Table 26 — Alarm Parameters[a,b]

| PARAMETER | DESCRIPTION |
|---|---|
| **NO ALARM** | No alarm is activated. |
| **4MAT SEN ALARM** | MAT sensor has failed, gone out of range, or become disconnected. |
| **4CO2 SEN ALARM** | $CO_2$ sensor has failed, gone out of range, or become disconnected. |
| **4OAT SEN ALARM** | OAT sensor has failed, gone out of range, or become disconnected. |
| **4OAH SEN ALARM** | OAH sensor has failed, gone out of range, or become disconnected. |
| **4RAT SEN ALARM** | RAT sensor has failed, gone out of range, or become disconnected. |
| **4RAH SEN ALARM** | RAH sensor has failed, gone out of range, or become disconnected. |
| **4FREEZE ALARM** | Anti-freeze notification when MAT sensor is below anti-freeze protection setpoint. |
| **4RTU SHUTDOWN** | Notification of Shutdown Active when SHUTDWN is chosen for 6AUX1-I or 6AUX2-I. |
| **4ACTUATOR ALARM** | Actuator gets disconnected or has failed. |
| **4ACT UNDER V** | Voltage received by the actuator is below expected range. |
| **4ACT OVER V** | Voltage received by the actuator is above expected range. |
| **4ACT STALLED** | Damper actuator stopped before achieving commanded position. |
| **4ACT SLIPPING** | Damper actuator slips after reaching commanded position. |
| **4NOT ECON** | Not economizing when it should. |
| **4ECON SHOULDNT** | Economizing when it should not. |
| **4EXCESS OA** | Excess outdoor air. Outside air intake is significantly higher than it should be. |
| **4LLA ALARM** | Leaving air temperature is lower than the low limit (3LAT LOW). |
| **4HLA ALARM** | Leaving air temperature is higher than the high limit (3LAT HIGH). |

NOTE(S):

a. All alarms are dynamic items. An alarm appears only if a related symptom mentioned above is detected.
b. An alarm activation triggers a general alarm and then the configured system alarm output (AUX1-O or AUX2-O) is activated. If there is no alarm, then NO ALARM is displayed on the HMI.

## Table 27 — Test Commands

| PARAMETER | DESCRIPTION |
|---|---|
| **7DAMPER MIN POS** | Press Enter to test whether the economizer controller can drive damper to minimum position. |
| **7DAMPER CLOSE** | Press Enter to test whether the economizer controller can drive damper to 100% Closed. |
| **7DAMPER OPEN** | Press Enter to test whether the economizer controller can drive damper to 100% Open. |
| **7DAMPER ALL** | Press Enter to perform all the above tests. |
| **7DAMPER** | Press Enter to test whether the economizer controller can drive damper to the selected voltage. |
| **7Y1O** | Press Enter to test whether the economizer controller can turn on or off the first stage of cooling (close or open relay Y1O). |
| **7Y2O** | Press Enter to test whether the economizer controller can turn on or off the second stage of cooling (close or open relay Y2O). |
| **7AUX1-O** | Press Enter to test AUX1-O connection (close or open relay AUX1-O). |
| **7AUX2-O** | Press Enter to test AUX2-O connection (close or open relay AUX2-O). |

**Table 28 — Enter Running State**

| PARAMETER | DESCRIPTION |
|---|---|
| **8RUN STATE** | Change to Running State. Press Enter to confirm the change. |
| **8ENTER RUN?** | Confirm the change to Running State. |
| **8FACTORY DEF** | Perform factory reset. Press Enter to confirm the reset. (This action resets the controller password to default: OneBT.) |
| **8DEF CONFIRM?** | Confirm the factory resetting. |
| **8ACT CNT RESET** | Damper count reset. |
| **8VER x.x.x** | Firmware version information such as 0.1.10. |

**Table 29 — Enter Configuration State and Restart**

| PARAMETER | DESCRIPTION |
|---|---|
| **5CONFIG STATE** | Change to Configuration State. Press Enter to confirm the change. |
| **5ENTER CONFIG?** | Confirm the change to Configuration State. |
| **5RESTART** | Restart the economizer controller. Press Enter to confirm the restart. |
| **5CONF RESTART** | Confirm the restart. |

## INSTALLING OPTIONAL HH57LW001 SINGLE OUTSIDE AIR ENTHALPY SENSOR

When using the HH57LW001 enthalpy sensor (see Fig. 76) for outside air changeover, the existing HH79NZ039 dry bulb sensor (see Fig. 77) must be removed. The enthalpy sensor will be mounted in the same location as the dry bulb sensor (see Fig. 78). When the enthalpy sensor's OA (Outside Air) temperature, enthalpy, and dew point are below their respective setpoints, the outside air can be used for free cooling. When any of these are above the setpoint, free cooling will not be available. Enthalpy setpoints are configurable and create an enthalpy boundary according to the user's input. For additional details, see Fig. 79-80 and Table 30.

Harness 48TC005213 is required to be connected between the EconomizerONE harness in the return air chamber. Harness 48TC005213 has a 5-pin plug that connects directly to the HH57LW001 enthalpy sensor. The CRENTSEN001A00 accessory kit includes enthalpy sensor (HH57LW001) and associated 5-pin plug (48TC005213) and may be ordered as a finished good.

### *Enthalpy Control Sensor Configuration*

The optional enthalpy control sensor (P/N: HH57LW001) communicates with the POL224 economizer controller using the 5-wire harness, 48TC005213. The HH57LW001 sensor can be used as a single outside air enthalpy, a differential return enthalpy, or a differential return temperature sensor. Refer to the base unit control wiring diagrams found earlier in this book to wire the HH57LW001 enthalpy sensor for each option. Use Fig. 76 and Table 32 on page 61 to locate the wiring terminals for each enthalpy control sensor.

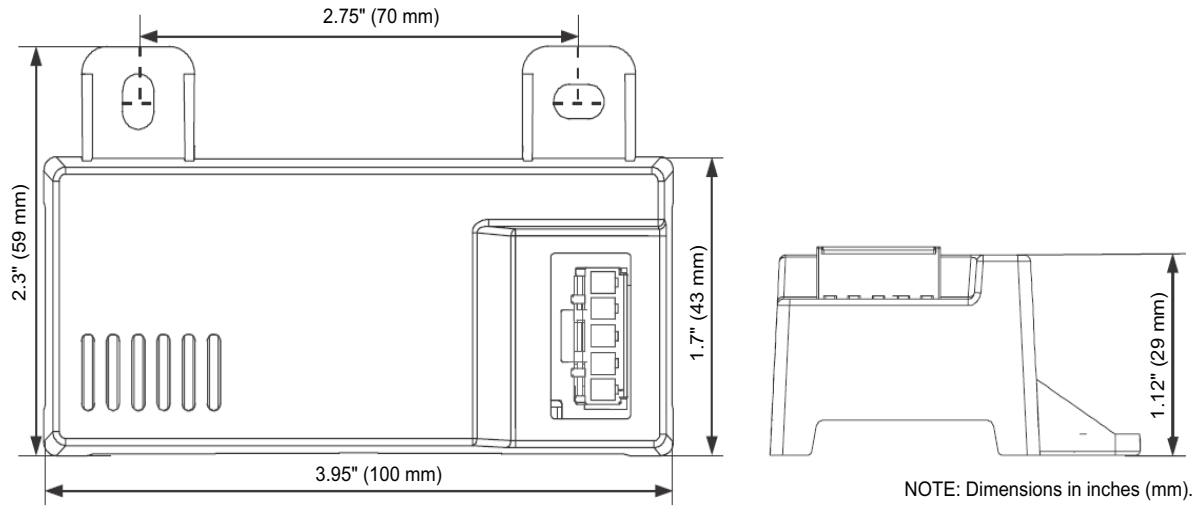



**Fig. 76 — HH57LW001 Dimensional, Connection and Switching Information**

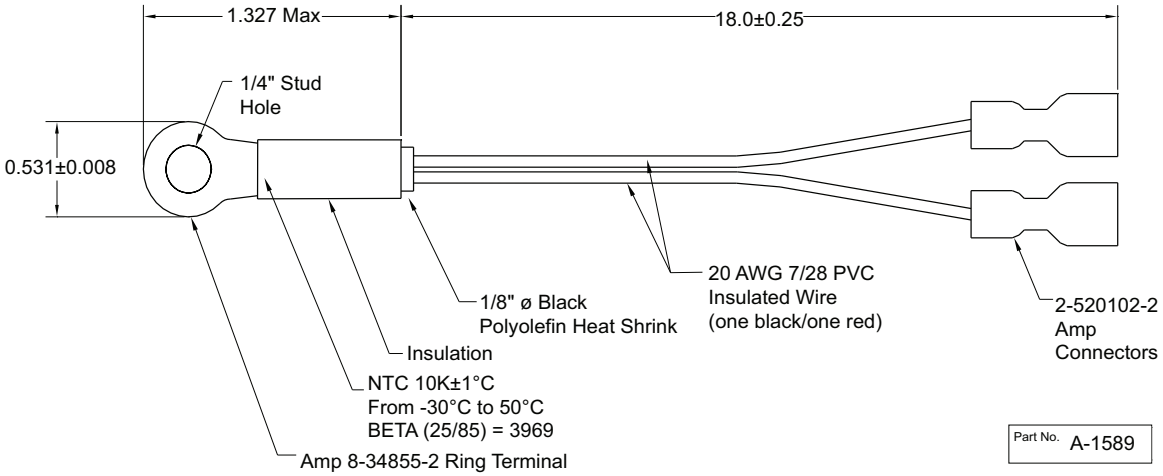



**Fig. 77 — HH79NZ039 Dry Bulb and Mixed Air Sensor Wiring**

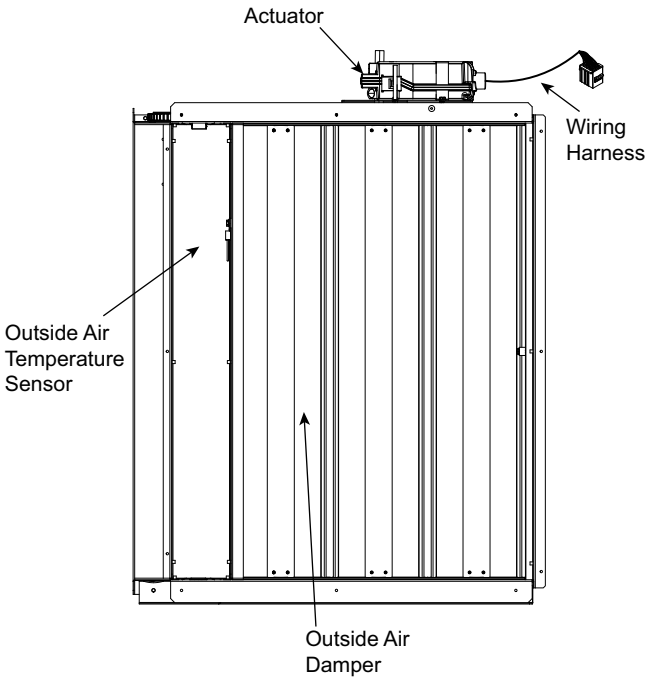



**Fig. 78 — EconomizerONE Component Locations (CRECOMZR108A00 Shown)**

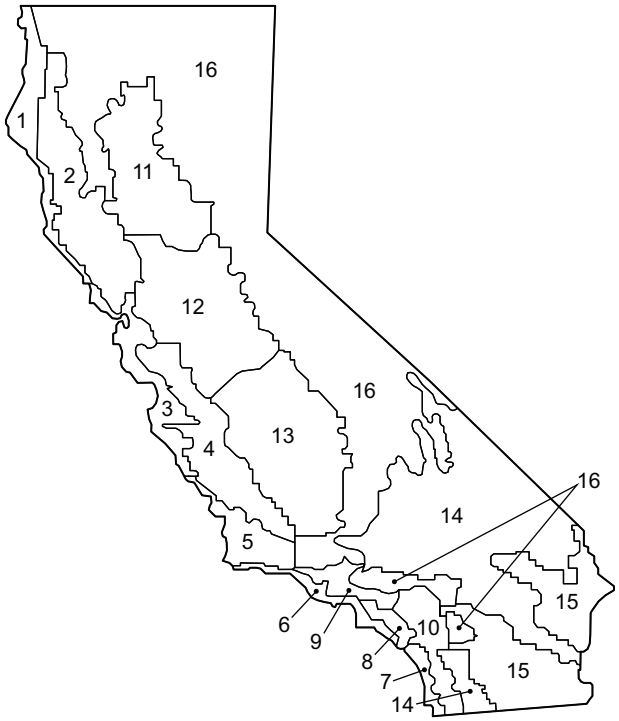



**Fig. 79 — California Title 24 Zones**

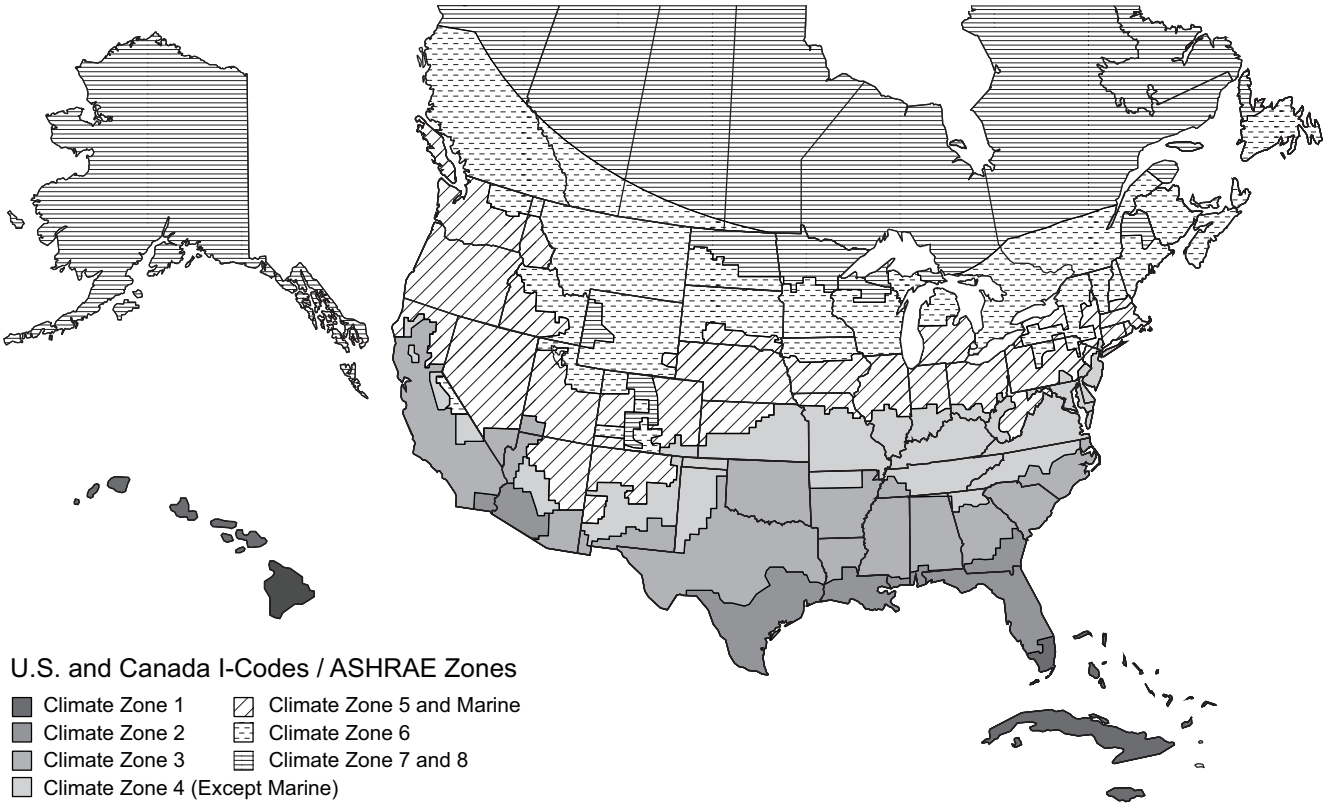



**Fig. 80 — U.S. and Canada Climate Zones**

**Table 30 — Enthalpy Manual Entry Setpoints for EconomizerONE Per Climate Zone**

| CLIMATE ZONES[a] | 2 TEMP OFF | LOWEST SETTING | RH% | 2 ENTH OFF | RH% | 2THL | 2EHL | RH% |
|---|---|---|---|---|---|---|---|---|
| 1 | 65°F | 22 Btu/lbm | 43% | 28 Btu/lbm | 86% | 83°F | 33 Btu/lbm | 48% |
| 2 | 65°F | 22 Btu/lbm | 43% | 28 Btu/lbm | 86% | 83°F | 33 Btu/lbm | 48% |
| 3 | 65°F | 22 Btu/lbm | 43% | 28 Btu/lbm | 86% | 83°F | 33 Btu/lbm | 48% |
| 4 | 65°F | 22 Btu/lbm | 43% | 28 Btu/lbm | 86% | 83°F | 33 Btu/lbm | 48% |
| 5 | 70°F | 22 Btu/lbm | 28% | 28 Btu/lbm | 65% | 83°F | 33 Btu/lbm | 48% |
| 6 | 70°F | 22 Btu/lbm | 28% | 28 Btu/lbm | 65% | 83°F | 33 Btu/lbm | 48% |
| 7 and 8 | 75°F | 22 Btu/lbm | 19% | 28 Btu/lbm | 50% | 83°F | 33 Btu/lbm | 48% |
| **CALIFORNIA TITLE 24 ZONES[b]** | **2 TEMP OFF** | **LOWEST SETTING** | **RH%** | **2 ENTH OFF** | **RH%** | **2THL** | **2EHL** | **RH%** |
| 1 | 75°F | 22 Btu/lbm | 19% | 28 Btu/lbm | 50% | 83°F | 33 Btu/lbm | 48% |
| 2 | 73°F | 22 Btu/lbm | 22% | 28 Btu/lbm | 55% | 83°F | 33 Btu/lbm | 48% |
| 3 | 75°F | 22 Btu/lbm | 19% | 28 Btu/lbm | 55% | 83°F | 33 Btu/lbm | 48% |
| 4 | 73°F | 22 Btu/lbm | 22% | 28 Btu/lbm | 55% | 83°F | 33 Btu/lbm | 48% |
| 5 | 75°F | 22 Btu/lbm | 19% | 28 Btu/lbm | 50% | 83°F | 33 Btu/lbm | 48% |
| 6 | 71°F | 22 Btu/lbm | 28% | 28 Btu/lbm | 62% | 83°F | 33 Btu/lbm | 48% |
| 7 | 69°F | 22 Btu/lbm | 32% | 28 Btu/lbm | 68% | 83°F | 33 Btu/lbm | 48% |
| 8 | 71°F | 22 Btu/lbm | 28% | 28 Btu/lbm | 62% | 83°F | 33 Btu/lbm | 48% |
| 9 | 71°F | 22 Btu/lbm | 28% | 28 Btu/lbm | 62% | 83°F | 33 Btu/lbm | 48% |
| 10 | 73°F | 22 Btu/lbm | 22% | 28 Btu/lbm | 55% | 83°F | 33 Btu/lbm | 48% |
| 11 | 75°F | 22 Btu/lbm | 19% | 28 Btu/lbm | 50% | 83°F | 33 Btu/lbm | 48% |
| 12 | 75°F | 22 Btu/lbm | 19% | 28 Btu/lbm | 50% | 83°F | 33 Btu/lbm | 48% |
| 13 | 75°F | 22 Btu/lbm | 19% | 28 Btu/lbm | 50% | 83°F | 33 Btu/lbm | 48% |
| 14 | 75°F | 22 Btu/lbm | 19% | 28 Btu/lbm | 50% | 83°F | 33 Btu/lbm | 48% |
| 15 | 75°F | 22 Btu/lbm | 19% | 28 Btu/lbm | 50% | 83°F | 33 Btu/lbm | 48% |
| 16 | 75°F | 22 Btu/lbm | 19% | 28 Btu/lbm | 50% | 83°F | 33 Btu/lbm | 48% |
| **CONTROLLER DEFAULT SETTINGS** | **2 TEMP OFF** | **—** | **—** | **2 ENTH OFF** | **—** | **2THL** | **2EHL** | **RH%** |
| **DEFAULT SET POINTS** | 63°F | — | — | 28 Btu/lbm | 94% | 83°F | 33 Btu/lbm | 48% |

NOTE(S):

a. See Fig. 80 for map of U.S. and Canada climate zones.
b. See Fig. 79 for map of California Title 24 zones.

Economizers are shipped standard with an HH79NZ039 outside air dry bulb sensor (see Fig. 77). System default setting (high temp limit) is 63°F (17°C) and has a range of 48°F to 80°F (9°C to 27°C). Sensor is factory installed on economizer.

NOTE: A second HH79NZ039 sensor is provided for mixed air temperature.

NOTE: California high temperature setting requirements by region are shown in Table 31.

Enthalpy Settings (Enthalpy Option)

If installing the optional HH57LW001 enthalpy sensor, the HH79NZ039 dry bulb outside air sensor must first be removed. Wire sensor to harness 48TC005213 and the (5) wires from the harness to the EconomizerONE harness in the return air chamber. Harness 48TC005213 has a 5-pin plug that connects directly to the HH57LW001 enthalpy sensor. Refer to the base unit control wiring diagrams earlier in this book for wiring connections. Refer to Fig. 76 and Table 32.

### *California's Title 24 High Temperature Limit Settings*

California's Title 24 code requires a high temperature limit setting for all dry bulb outside air economizer changeover. The temperatures vary by the region within California. See Table 31 for high limit settings.

**Table 31 — California Title 24 Regional High Limit Dry Bulb Temperature Settings[a]**

| DEVICE TYPE[b] | CLIMATE ZONES | REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN): DESCRIPTION |
|---|---|---|
| FIXED DRY BULB | 1, 3, 5, 11-16 | OAT exceeds 75°F (23.8°C) |
| | 2, 4, 10 | OAT exceeds 73°F (22.7°C) |
| | 6, 8, 9 | OAT exceeds 71°F (21.6°C) |
| | 7 | OAT exceeds 69°F (20.5°C) |
| DIFFERENTIAL DRY BULB | 1, 3, 5, 11-16 | OAT exceeds RA temperature |
| | 2, 4, 10 | OAT exceeds return air temperature –2°F (–18.8°C) |
| | 6, 8, 9 | OAT exceeds return air temperature –4°F (–20°C) |
| | 7 | OAT exceeds return air temperature –6°F (–21.1°C) |
| FIXED ENTHALPY[c] + FIXED DRY BULB | All | OAT exceeds 28 Btu/lb of dry air[b] or OAT exceeds 75°F (23.8°C) |

NOTE(S):

a. This table sourced from 2019 California Energy Code, Title 24, Part 6, Table 140.4-E Air Economizer High Limit Shut Off Control Requirements.
b. Only the high limit control devices listed are allowed to be used and at the set points listed. Others such as Dew Point, Fixed Enthalpy, Electronic Enthalpy, and Differential Enthalpy Controls, may not be used in any climate zone for compliance with Section 140.4(e)1 unless approval for use is provided by the Energy Commission Executive Director.
c. At altitudes substantially different than sea level, the Fixed Enthalpy limit value shall be set to the enthalpy value at 75°F and 50% relative humidity. As an example, at approximately 6,000 foot elevation, the fixed enthalpy limit is approximately 30.7 Btu/lb.

LEGEND

**OAT** — Outdoor-air Thermostat
**RA** — Return Air

**Table 32 — HH57LW001 Sensor Wiring Terminations**

| TERMINAL NUMBER | TERMINAL LABEL | TYPE | DESCRIPTION |
|---|---|---|---|
| **1** | TCOM | NTC 10k | Outside Air Temperature Sensor Output |
| **2** | TSIG | NTC 10k | Outside Air Temperature Sensor Output |
| **3** | HSIG | 0-10 vdc | Outside Air Relative Humidity Sensor Output |
| **4** | HCOM | COMMON | Sensor 24-v Common Input |
| **5** | H24V | 24 vac | Sensor 24-v Operating Voltage Input |

CHECKOUT

Inspect all wiring connections at the economizer module's terminals, and verify compliance with the installation wiring diagrams. For checkout, review the Status of each configured parameter and perform the Test Commands tests (refer to Table 27).

For information about menu navigation and use of the keypad see Interface Overview on page 43.

**⚠ WARNING**

ELECTRIC SHOCK HAZARD

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

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

If any wiring changes are required, first be sure to remove power from the economizer module before starting work. Pay particular attention to verifying the power connection (24 vac).

***Power Up***

After the POL224 module is mounted and wired, apply power.

Initial Menu Display

On initial start up, "Welcome" displays on the economizer HMI screen. After a brief pause, the Parameter Settings — I/O Configuration (refer to Table 25) of the software appears, allowing the user to check that presets and default values are configured correctly.

***Power Loss (Outage or Brownout)***

All set points and advanced settings are restored after any power loss or interruption.

NOTE: All settings are stored in non-volatile flash memory.

***Status***

Use the Status menu (refer to Table 22) to check the parameter values for the various devices and sensors configured.

NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 43.

***Checkout Tests***

Use the Test Commands menu (refer to Table 27) to test the damper operation and any configured outputs. Only items that are configured are shown in the Test Commands menu.

NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 43.

To perform a Test Command test:

1. Scroll to the desired test in Test Command menu 7 using the Up and Down buttons.
2. Press the Enter button to select the item. RUN? appears.
3. Press the Enter button to start the test. The unit pauses and then displays IN PROGRESS. When the test is complete, DONE appears.
4. When all desired parameters have been tested, press Enter + Up to end the test.

The Checkout tests can all be performed at the time of installation or at any time during the operation of the system as a test that the system is operable.

**⚠ CAUTION**

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

Be sure to allow enough time for compressor start-up and shutdown between checkout tests so that you do not short-cycle the compressors.

TROUBLESHOOTING

For EconomizerONE troubleshooting issues see Table 33.

## Table 33 — Operating Issues and Concerns

| SYMPTOM | REASON | SOLUTION |
|---|---|---|
| **An alarm is displayed on the LCD** | Sensor, damper, or the whole working system may not work properly | Check sensor, damper, or the whole working system following the detailed alarm information. |
| **DAC LED is blinking RED** | Damper slippage | Check whether the damper works properly. |
| **DAC LED is blinking RED quickly** | Damper unplugged | Check whether the damper is connected. |
| **DAC LED is OFF** | Terminal ACT-FB is configured but there is no available feedback signal | Check whether the feedback signal is connected; check if ACT-FB is faulty. |
| **Economizer controller has no alarm, but the Free Cooling LED will not turn on when the OA seems to be suitable for Free Cooling** | Shutoff SP setting error | Shutoff temperature and/or enthalpy set point is incorrectly set up. Consult an HVAC professional to set up the shutoff set point correctly. |
| | OA temp is too low | The OA temperature is too low; therefore, there is no cooling demand. This could possibly enable anti-freeze protection. |
| | OA temp is too high or too humid | In DIFF mode, even though OA temperature is lower than RA temperature, if both OA and RA temperatures exceed the high limit, then Free Cooling turns off.<br>In Differential Enthalpy control mode, even though OA enthalpy is lower than RA enthalpy, if both OA and RA enthalpy exceed the high limit, then Free Cooling turns off. |
| **Economizer controller/mechanical cooling is not operating** | No input power | Use a multi-meter to check whether there is 24 vac ± 25% (18-30 vac) at the POWER terminals. If there is no voltage or if the voltage is significantly low, then check the transformer output voltage at the RTU. If 24-v is not present at the transformer secondary side, then check the primary line voltage to the transformer. If the line voltage is not present at the transformer primary side, then check the primary power to the RTU, fuses, circuit breaker, and so on. |
| | Brownout | If voltage is below 17-v, then the economizer controller may be in Brownout Protection mode. This mode disables all of the relay outputs. When the power is 19 vac or higher, the economizer controller and RTU operate normally. |
| | Y1/Y2 signal is missing from the thermostat | Mechanical cooling does not run until there is cooling demand (Y1/Y2 Active). Check the wiring from Y1I and Y2I terminals to the commercial thermostat. 24-v should be present between Y1I/Y2I and Y1O/Y2O respectively. |
| | 24 vac~ and 24 vac ⊥ are incorrectly wired | 24 vac power supply has polarity when all devices are powered by the same 24 vac transformer; reversing polarity may cause a short circuit that can damage the system.<br>Follow the transformer polarity mark, check the wiring of 24-v~ (or G or 24-v+), and ensure that they are tied to the same polar of 24 vac power supply; while checking the wiring of ⊥ (or G0 or 24-v- or COM), ensure that they are all tied to another polar of 24 vac power supply. |
| **Firmware update failure** | Application file is damaged, operation is incorrect, and/or USB flash disk does not work properly | Reload a BIN file, restart the controller, update firmware[a], or change a USB flash disk. Contact service provider if failure still exists. |
| **Free Cooling LED is solid RED** | Sensor, damper, or whole working system may not work properly | Check sensor, damper, or the whole working system following the detailed alarm information. |
| **Free Cooling LED is blinking RED** | Not economizing when it should | Check the whole economizer working system, such as the sensor, damper, and thermostat. |
| **Incorrect controller password error on mobile application** | For $CO_2$ and single enthalpy (control mode 3) configurations from the factory, the password has changed | For units coming from the factory with $CO_2$ configuration or single enthalpy (control mode 3), use the controller password OneBT2.1.<br>For all other units, use the controller password OneBT.<br>Performing a factory reset on the controller will also reset the password to OneBT. |
| **RS485 communication failure** | RS485 signal or configuration error | Check wiring, configuration, Baud Rate (using mobile application), and other network communication parameters. |
| **Sensor LED is blinking RED** | Excess outdoor air | Check the whole economizer working system, such as the sensor, damper, and thermostat. |
| **Sensor LED is solid RED** | Mixed Air (MA) sensor error | Check the MA sensor. It must be either a Type II NTC 10K or 0-10 vdc sensor. |
| | Outside Air (OA)/Return Air (RA) sensor error | Check the wiring and signal of the OA sensor. If in Differential (DIFF) mode, also check the RA sensor. The following sensor signals are valid:<br>Type II NTC 10K or 0-10 vdc temperature.<br>0-10 vdc or 4-20 mA humidity. |
| | Air temperature failure/fault | Check the air temperature sensor signal. The valid signal must be Type II NTC 10K or 0-10 vdc. |
| **Sensor LED is OFF** | $CO_2$ sensor error | Check $CO_2$ sensor connection, sensor signal (under range or over range), and sensor signal type. |
| **Sensor LED is YELLOW** | Humidity sensor error | Check humidity sensor connection, sensor signal (under range or over range), and sensor signal type. |
| **Wi-Fi connection failure** | Wi-Fi/WLAN stick error or wrong user name and password | Unplug and re-plug in the Wi-Fi/WLAN stick, enter a correct user name and password, restart the controller, or replace the Wi-Fi/WLAN stick. If the Wi-Fi/WLAN stick is POL903.00/100, then the default user name and password are Siemens-WLAN-Stick and SIBPAdmin. DNS name is siemens.wlanstick. Contact Application Engineering for information on this accessory. |

NOTE(S):

a. Back up configurations before firmware update. All the previous configuration data is erased after firmware update. Contact Application Engineering for more information on support for firmware.
IMPORTANT: If the controller enters the configuration state for the convenience of I/O configurations, then users can manually switch to the running state after finishing configurations. To do so, press Enter + Up at the same time, then press Enter to confirm the switch after 8RUN STATE appears on the LCD.

## SystemVu™ Controller (Factory Option)

For details on operating 50GEQ*07-09 units equipped with the factory-installed SystemVu controller option refer to the *FEQ/GEQ/QE Series Single Package Rooftop Units with SystemVu Controller Controls, Start-up, Operation and Troubleshooting* manual.

## Controller Options

LOW AMBIENT

If the unit comes with Electromechanical (EM) control, then no adjustment is necessary.

If the unit comes with SystemVu controller option, then refer to its installation control manual for details on adjusting "Cooling Lock-Out" setting and configure for the specific job requirements.

## Smoke Detectors

Smoke detectors are available as factory-installed options on 50GEQ models. Smoke detectors may be specified for supply air only, for return air without or with economizer, or in combination of supply air and return air. All components necessary for operation are factory-provided and mounted. The unit is factory-configured for immediate smoke detector shutdown operation; additional wiring or modifications to unit terminal board may be necessary to complete the unit and smoke detector configuration to meet project requirements.

Units equipped with factory-optional return-air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 81 for the as-shipped location.

COMPLETING INSTALLATION OF RETURN-AIR SMOKE SENSOR

1. Remove sensor and bracket assembly from shipping location. Remove sensor and discard shipping bracket.
2. Unscrew the two screws holding the return-air smoke detector assembly. See Fig. 82, Step 1.
3. Save the screws.
4. Turn the assembly 90 degrees and then rotate end to end. Make sure that the elbow fitting is pointing down. See Fig. 82, Step 2.
5. Screw the sensor and detector plate into its operating position using screws from Step 2. See Fig. 82, Step 3.
6. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

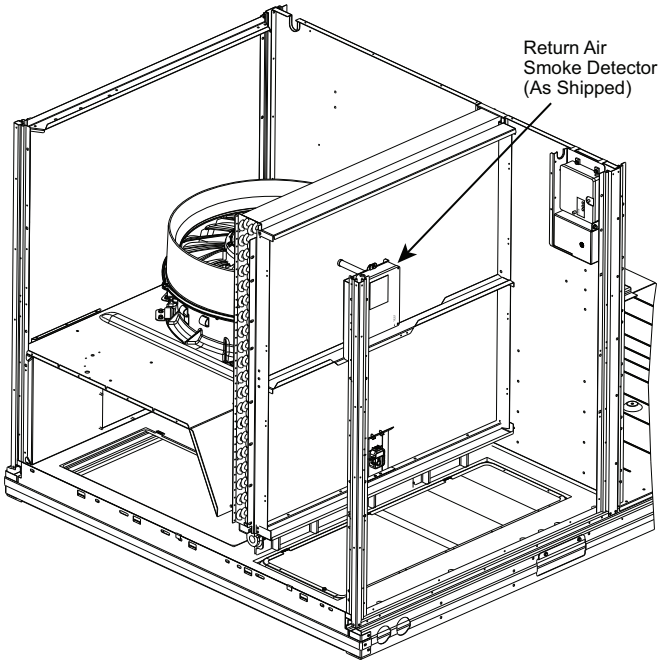



**Fig. 81 — Return Air Smoke Detector; Shipping Position**

ADDITIONAL APPLICATION DATA

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

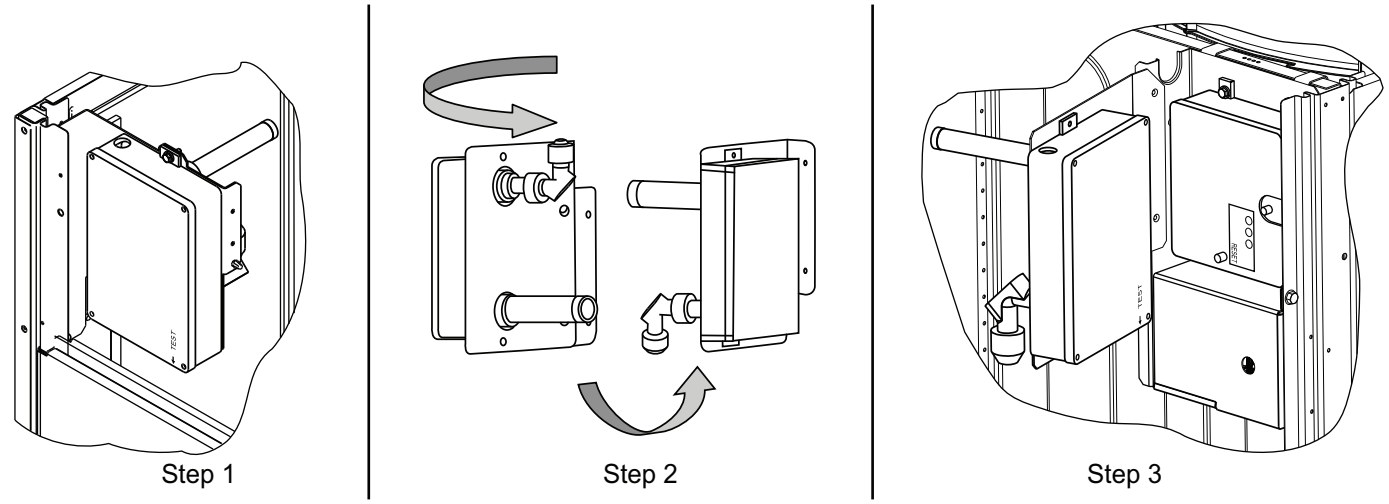



**Fig. 82 — Completing Installation of Return Air Smoke Sensor**

## Step 11 — Adjust Factory-Installed Options

SMOKE DETECTORS

Smoke detector(s) will be connected at the Unit Control Board (UCB), at terminals marked "Smoke Shutdown."

ECONOMIZERONE OCCUPANCY SWITCH

External occupancy control is managed through a connection on the Unit Control Board.

If external occupancy control is desired, connect a time clock or remotely controlled switch (closed for Occupied, open for Unoccupied sequence) at terminals marked OCCUPANCY. Detach the jumper covering the "Occupancy" terminals on the UCB and then attach the required connections.

## Step 12 — Install Accessories

Available accessories include:

- Roof curb
- Thru-base connection kit (must be installed before unit is set on curb)
- Manual outside air damper
- Two-Position motorized outside air damper
- EconomizerONE (with POL224 control)
- EconoMi$er2 (without control/for external signal and integrated barometric relief)
- Power exhaust
- Differential dry-bulb sensor (EconomizerONE)
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- Electric heaters
- Single point kits
- Low Ambient Controls
- Thermostat / Sensors
- $CO_2$ sensor
- Louvered hail guard
- Phase monitor control

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

## Step 13 — Fan Speed Set Up

UNITS WITH ELECTROMECHANICAL CONTROLS

The Fan Speed set up controls are located on the lower section of the Unit Control Board (UCB). See Fig. 83 for location.

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. 84), calculate the Vdc from the CFM and ESP for the base unit plus any field accessories (as listed on the label).

   NOTE: The Fan Speed Set Up labels are located on the High Voltage cover in the Control Box.
3. Connect a multimeter to the Vdc terminals on the UCB.
4. Set the Range Switch to either A, B, or C per the Switch Range table.
5. Using a straight blade screwdriver turn the Vdc control dial to fine tune the Vdc reading.
6. Record the reading in the Field Setting field.

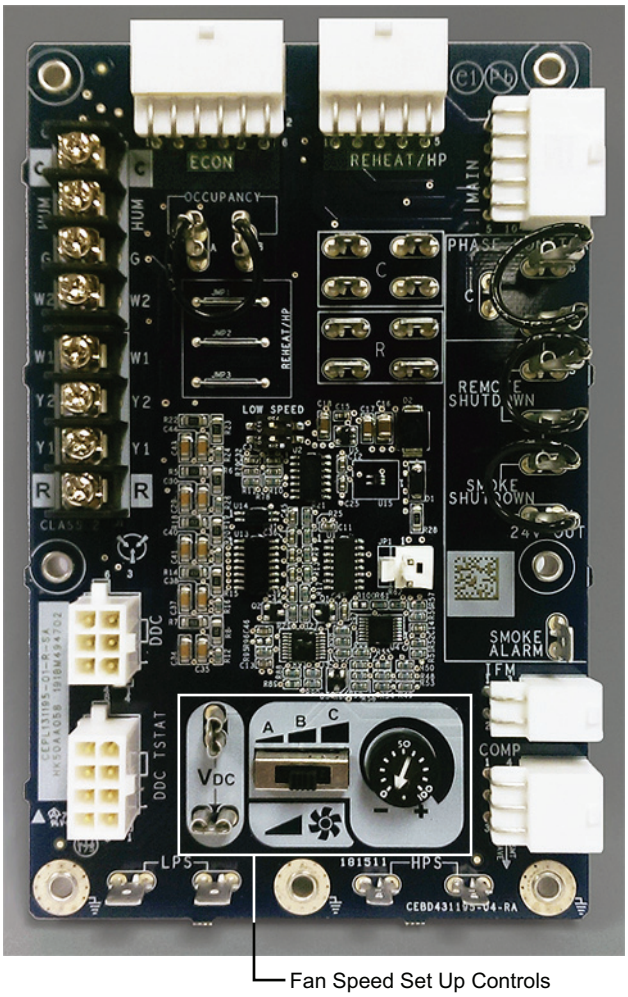
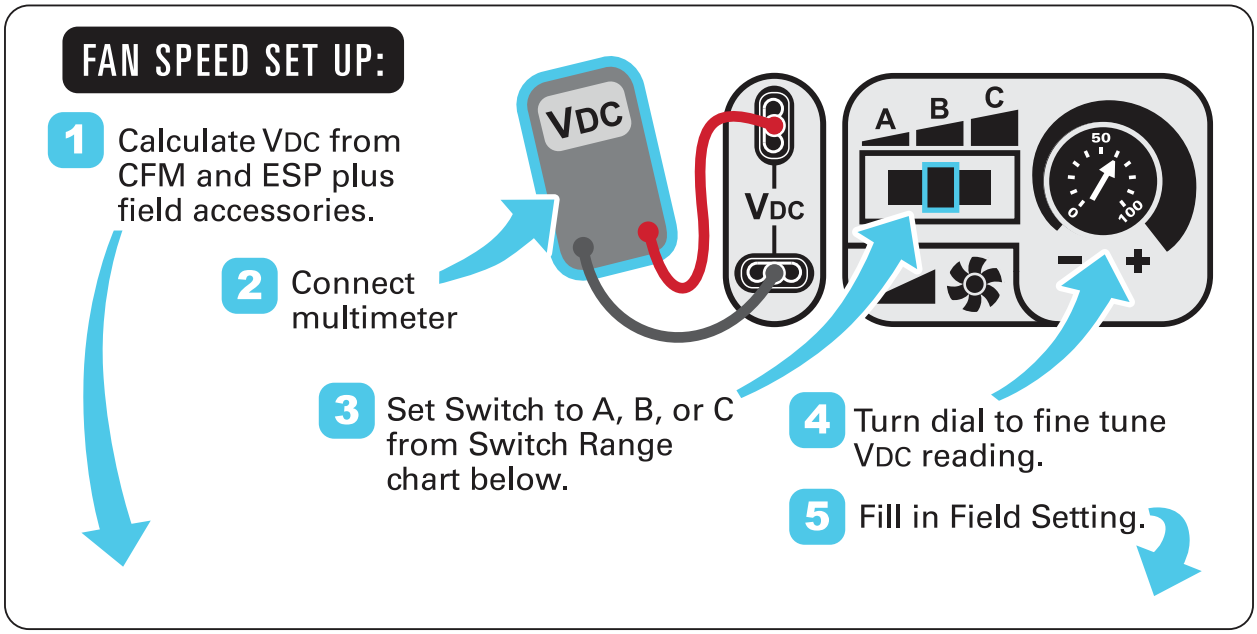



**Fig. 83 — UCB Fan Speed Controls**




VDC 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 | 5.4 | 6.2 | 6.9 | 7.5 | 8.1 | 8.6 | 9.1 | 9.6 | | |
| 1625 | 5.8 | 6.5 | 7.1 | 7.7 | 8.3 | 8.8 | 9.3 | 9.8 | | |
| 1750 | 6.1 | 6.8 | 7.4 | 8.0 | 8.5 | 9.0 | 9.5 | 9.9 | | |
| 1875 | 6.5 | 7.1 | 7.7 | 8.2 | 8.7 | 9.2 | 9.7 | | | |
| 2000 | 6.8 | 7.4 | 7.9 | 8.5 | 9.0 | 9.5 | 9.9 | | | |
| 2125 | 7.2 | 7.7 | 8.2 | 8.7 | 9.2 | 9.7 | | | | |
| 2250 | 7.6 | 8.0 | 8.5 | 9.0 | 9.5 | 10.0 | | | | |
| 2375 | 7.9 | 8.4 | 8.8 | 9.3 | 9.8 | | | | | |
| 2500 | 8.3 | 8.7 | 9.2 | 9.6 | | | | | | |
| **Field Accessories:** | | | | | | | | | | |
| Economizer | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | | |
| 1 Stage E Heat | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | | |
| 2 Stage E Heat | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | | |

**Factory Setting: 9.0 VDC**

**Field Setting:**

*Record field setting here*

_____ VDC

**Switch Range:** *

| | |
|---|---|
| A | 4.1 - 7.5 |
| B | 6.9 - 8.7 |
| C | 7.7 - 10.0 |

** Overlap in A, B, C switch range designed for maximum field adjustment potential. For example 7.2 can be set at either A or B.*

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

**Fig. 84 — Example of Fan Speed Set Up Labels for Electromechanical Controls**

UNITS WITH SYSTEMVU™ CONTROLS

On units equipped with the factory-installed SystemVu controller 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. 85), calculate the RPM from the CFM and ESP for the base unit plus any field accessories (as listed on the label).

   NOTE: The Fan Speed Set Up labels are located on the High Voltage cover in the Control Box.
3. Press any key on the SystemVu interface to activate the display backlight and then press the MENU key.
4. Using the UP and DOWN arrow keys highlight SETTINGS and then press ENTER.
5. Use the DOWN arrow key highlight the UNIT CONFIGURATIONS menu then press ENTER.
6. Highlight UNIT CONFIGURATIONS 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. 85). 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 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™

MAIN MENU:

## FAN SPEED SETUP (RPM)

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. A

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 | 1301 | 1477 | 1639 | 1788 | 1925 | 2054 | 2174 | 2289 | | |
| 1625 | 1381 | 1544 | 1699 | 1843 | 1976 | 2101 | 2220 | 2332 | | |
| 1750 | 1463 | 1615 | 1763 | 1902 | 2031 | 2152 | 2268 | 2378 | | |
| 1875 | 1548 | 1688 | 1828 | 1962 | 2087 | 2206 | 2318 | | | |
| 2000 | 1633 | 1764 | 1897 | 2025 | 2146 | 2262 | 2372 | | | |
| 2125 | 1720 | 1842 | 1967 | 2090 | 2208 | 2320 | | | | |
| 2250 | 1808 | 1921 | 2040 | 2157 | 2271 | 2380 | | | | |
| 2375 | 1897 | 2003 | 2115 | 2227 | 2336 | | | | | |
| 2500 | 1987 | 2068 | 2191 | 2298 | | | | | | |
| **Field Accessories:** | | | | | | | | | | |
| Economizer | 66 | 66 | 66 | 66 | 66 | 66 | 66 | 66 | | |
| 1 Stage E Heat | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | | |
| 2 Stage E Heat | 107 | 107 | 107 | 107 | 107 | 107 | 107 | 107 | | |

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

**Fig. 85 — Example of Fan Speed Set Up Labels for SystemVu™ Controls**

## COMPRESSOR ROTATION

**⚠ CAUTION**

EQUIPMENT DAMAGE HAZARD

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

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

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

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

1. Connect service gauges to suction and discharge pressure fittings.
2. Energize the compressor.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.
4. Turn off power to the unit.
5. Reverse any two of the three unit power leads.
6. Reapply electrical power to the compressor. The suction pressure should drop and the discharge pressure should rise which is normal for scroll compressors on start-up.
7. Replace compressor if suction/discharge pressures are not within specifications for the specific compressor.

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

## FASTENER TORQUE VALUES

Table 33 details the torque values for fasteners referenced in this installation instruction.

### Table 34 — Fastener Torque Values

| FASTENER | TORQUE VALUE |
|---|---|
| **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) |
| **Control box grounding lug** | 20 in.-lb (2.25 Nm) ±2 in.-lb (0.2 Nm) |

## TYPICAL UNIT PIPING

Each heat pump system includes two compressors, a reversing valve, dual-function outdoor and indoor coils, a common liquid line with bi-flow TXV, and dedicated cooling and heating TXVs. 50GEQ*07 and 08 unit outdoor coils contain a vapor header check valve. 50GEQ*09 unit indoor coils contain a vapor header check valve. See Fig. 86-91 and Tables 35-40 for typical unit piping schematic parallel coil circuits during evaporator-function operation and converging coil circuits during the condenser-function operation.

### Table 35 — 50GEQ*07-08 – Cooling Mode

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

### Table 36 — 50GEQ*07-08 – Heating Mode

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

### Table 37 — 50GEQ*07-08 – Defrost Mode

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

### Table 38 — 50GEQ*09 – Cooling Mode

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

### Table 39 — 50GEQ*09 – Heating Mode

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

### Table 40 — 50GEQ*09 – Defrost Mode

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

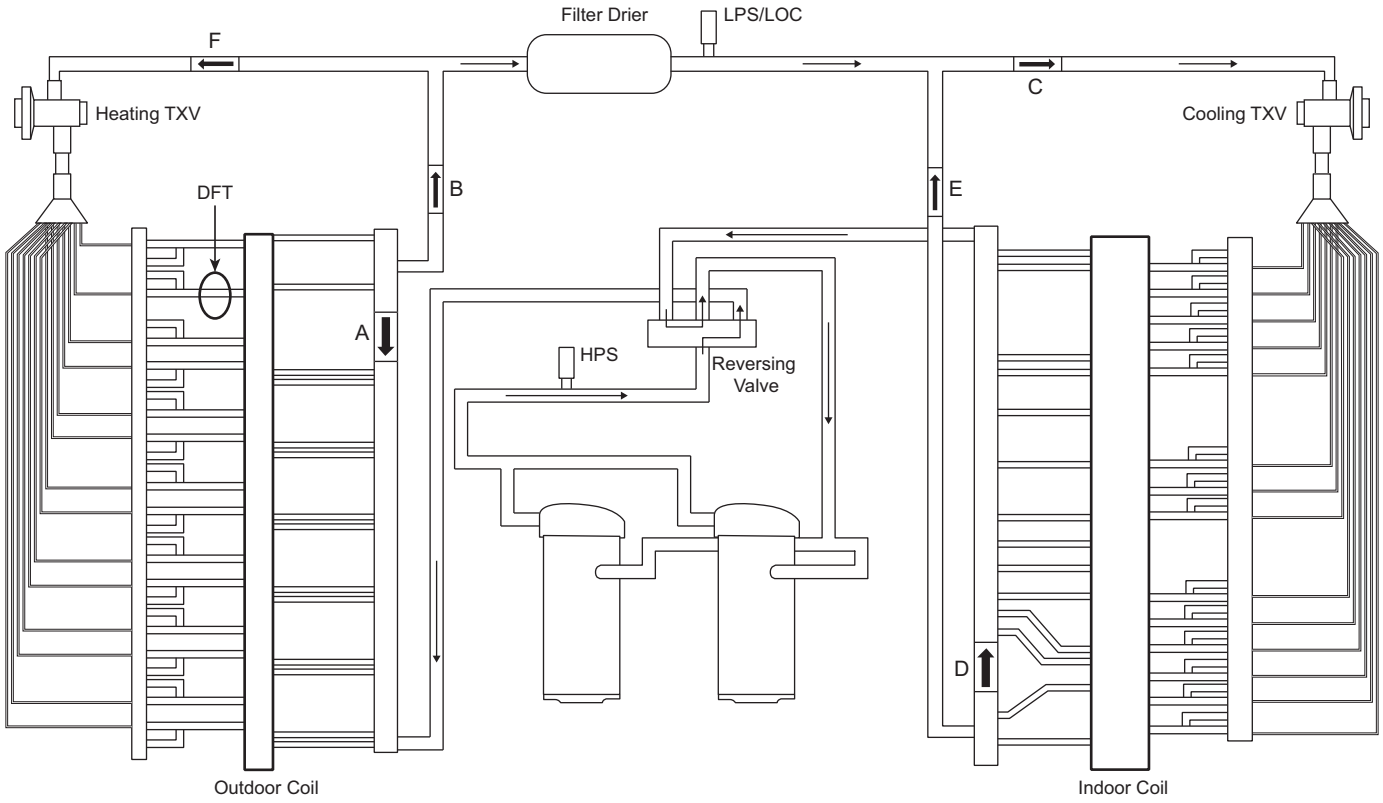



**Fig. 86 — Piping Schematic — 50GEQ*07 Cooling Mode**

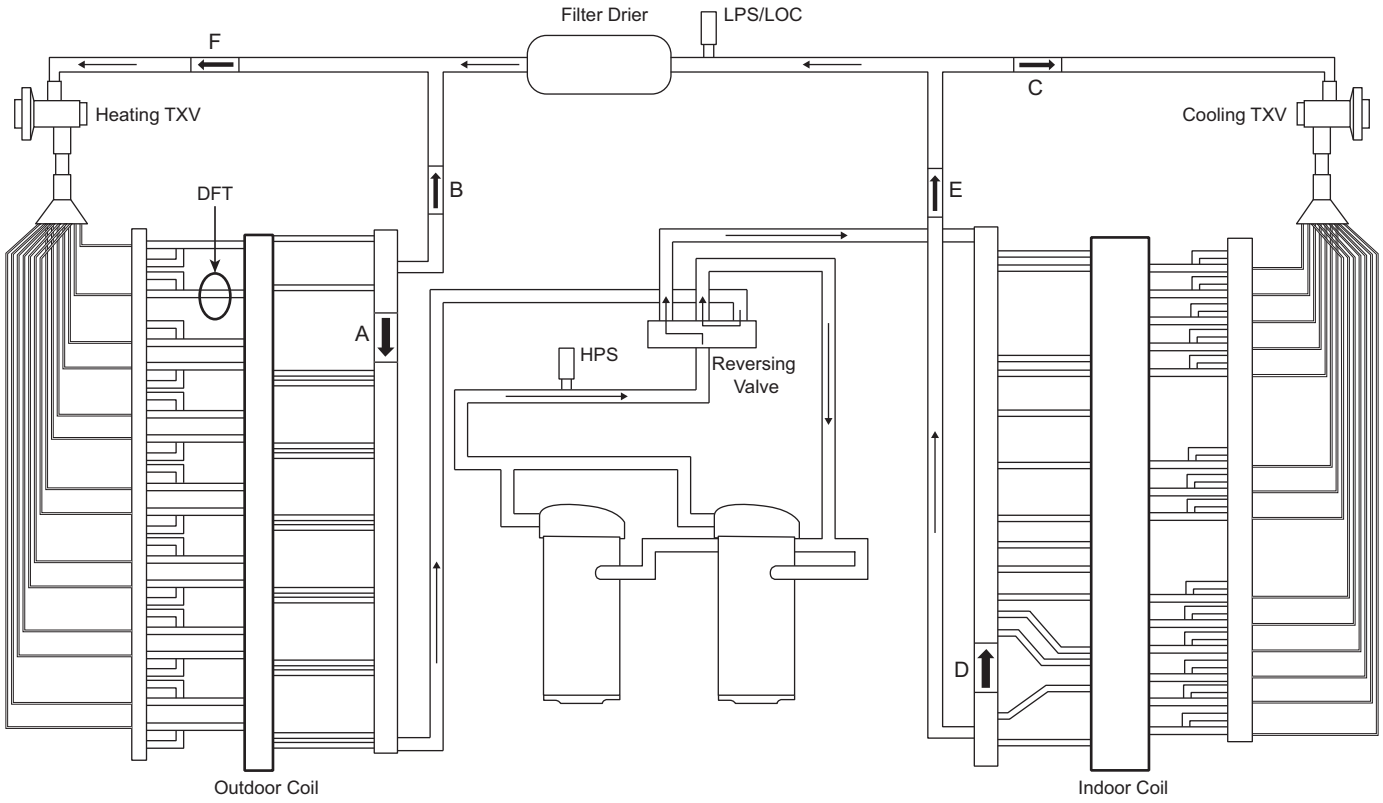



**Fig. 87 — Piping Schematic — 50GEQ*07 Heating Mode**

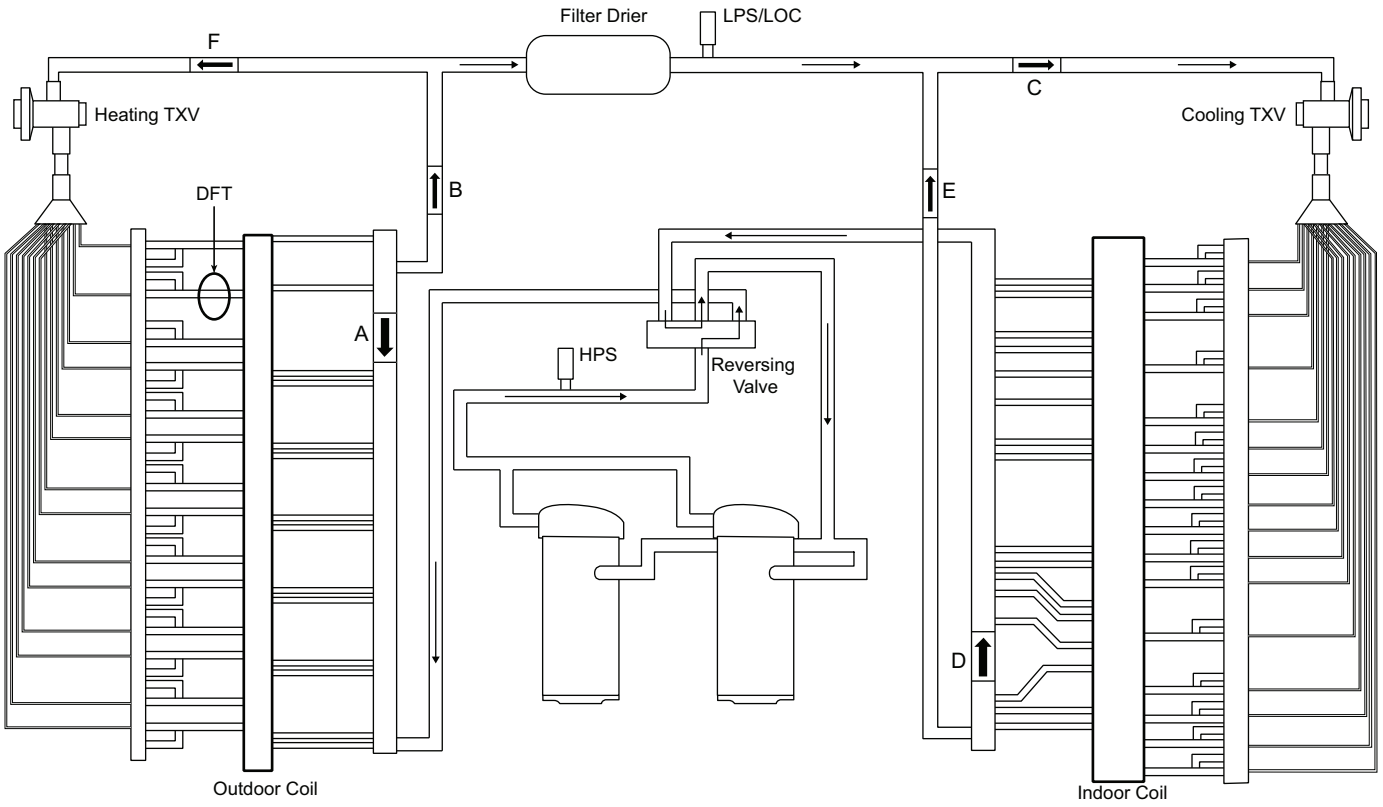



**Fig. 88 — Piping Schematic — 50GEQ*08 Cooling Mode**

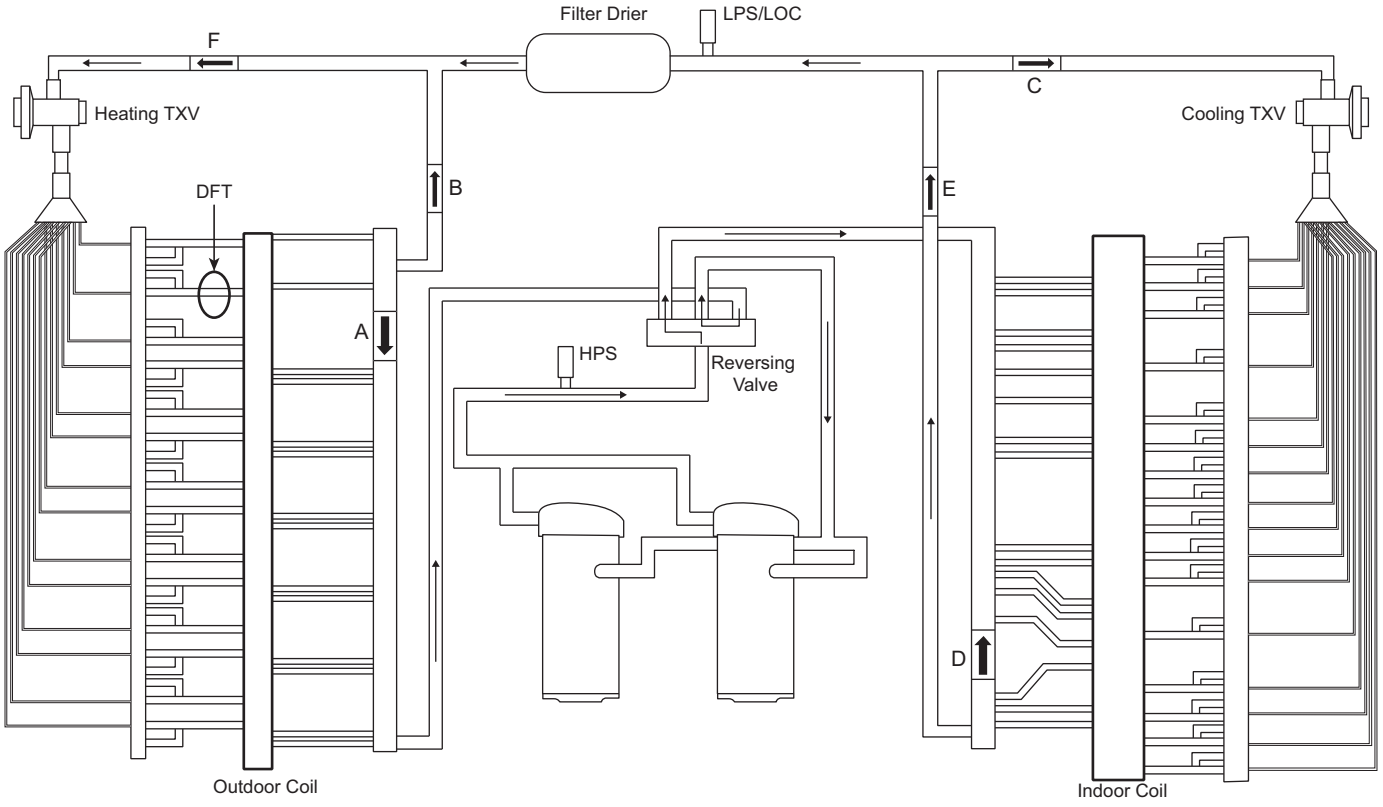



**Fig. 89 — Piping Schematic — 50GEQ*08 Heating Mode**

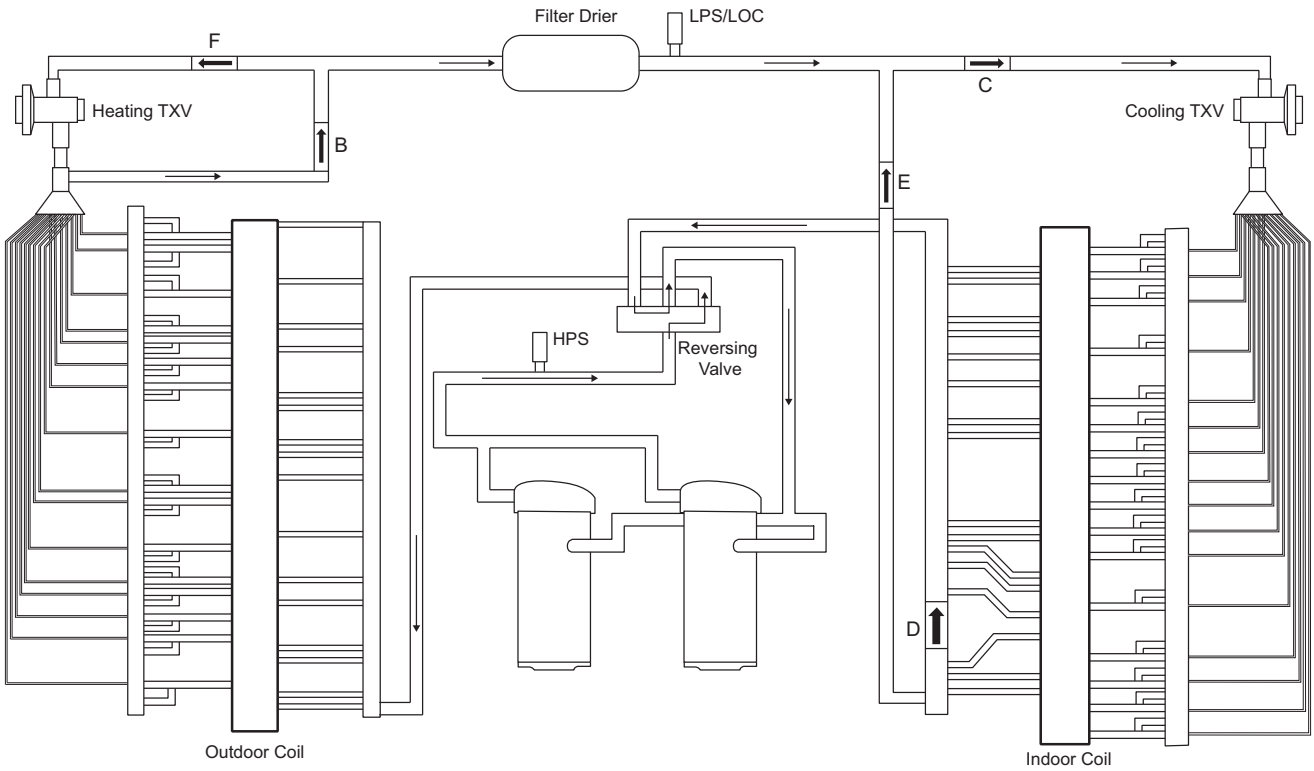



**Fig. 90 — Piping Schematic — 50GEQ*09 Cooling Mode**

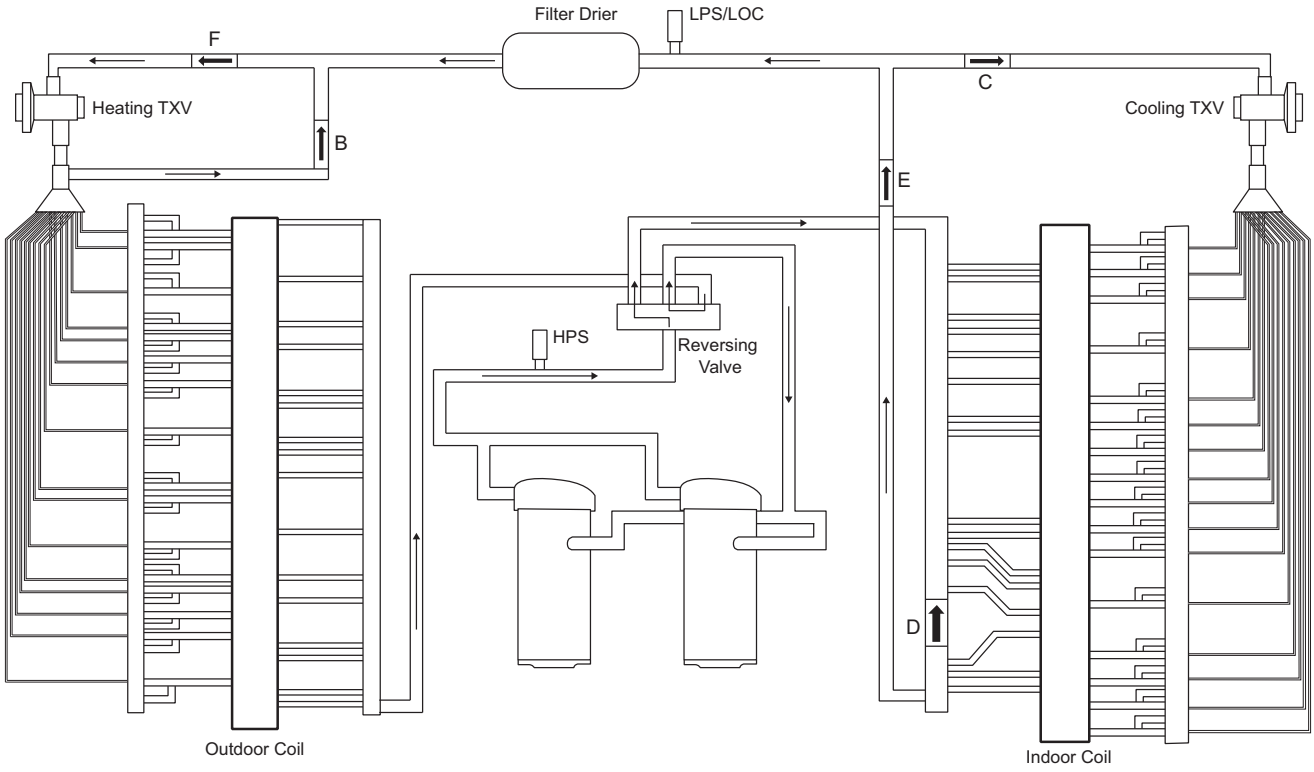



**Fig. 91 — Piping Schematic — 50GEQ*09 Heating Mode**

## START-UP CHECKLIST

50GEQ-*07-09 Single Package Rooftop Electric Cooling Unit
(Remove and use for job file)

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

### I. PRELIMINARY INFORMATION

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

### II. PRE-START-UP

| | |
|---|---|
| Verify that all packaging materials have been removed from unit. | (Y/N) _____ |
| Verify installation of outdoor air hood. | (Y/N) _____ |
| Verify 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) _____ |
| Check that indoor-air filters are clean and in place. | (Y/N) _____ |
| Check that outdoor air inlet screens are in place. | (Y/N) _____ |
| Verify that unit is level. | (Y/N) _____ |
| Verify that fan assembly is free of obstructions and rotor spins freely. | (Y/N) _____ |
| Verify that scroll compressors are rotating in the correct direction. | (Y/N) _____ |
| Verify yellow LED light on dissipation board is steady. | (Y/N) _____ |
| Verify the dissipation board test button will operate the indoor fan for 1 minute. | (Y/N) _____ |
| Verify installation of thermostat. | (Y/N) _____ |

### III. START-UP

### ELECTRICAL

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

### TEMPERATURES

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

## PRESSURES

| | | | |
|---|---|---|---|
| Refrigerant Suction | STAGE 1 | _____ PSIG | |
| | STAGE 2 | _____ PSIG | |
| | STAGE 3 | _____ PSIG | |
| Refrigerant Discharge | STAGE 1 | _____ PSIG | |
| | STAGE 2 | _____ PSIG | |
| | STAGE 3 | _____ PSIG | |

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

## GENERAL

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

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

## IV. HUMIDI-MIZER® SYSTEM START-UP

## STEPS

1. Use Service Test mode to turn on maximum cooling.
   a. Turn on Cool A1 test under Cool Test menu (Y/N) _____
   b. Turn on Cool A2 Test 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 Humidimizer 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. LDV solenoid energized (valve switches to reheat coil flow) (Y/N) _____
4. Switch unit to DEHUMID (REHEAT) by turning Humidimizer 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. LDV solenoid energized (valve switches to reheat coil flow) (Y/N) _____
   e. RDV solenoid energized, valve opens for flow (Y/N) _____
5. Switch unit to OFF by turning Humidimizer test to OFF under the COOL TEST menu. Compressor and outdoor fan stop, RDV or LDV solenoids de-energized. (Y/N) _____

CUT ALONG DOTTED LINE

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