Installation Instructions

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SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloths for brazing operations and have a fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and appropriate national electrical codes (in USA, ANSI/NFPA70, National Electrical Code (NEC); in Canada, CSA C22.1) for special requirements.

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

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

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.

**WARNING**

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

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

**WARNING**

Failure to follow this warning could result in 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.

**CAUTION**

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.

**WARNING**

CARBON-MONOXIDE POISONING HAZARD

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

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

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

---

**MODEL NUMBER NOMENCLATURE AND DIMENSIONS**

See Fig. 1 for 48HC model number nomenclature. See Fig. 2 for unit dimensional drawings. Figure 3 shows service clearance dimensions.

**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**

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>FULL LOAD AIRFLOW (CFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48HC*A/B/F04</td>
<td>1050</td>
</tr>
<tr>
<td>48HC*A/B/F05</td>
<td>1400</td>
</tr>
<tr>
<td>48HC*A/B/F06</td>
<td>1625</td>
</tr>
</tbody>
</table>

---

**WARNING**

FIRE HAZARD

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

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

**WARNING**

FIRE HAZARD

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

Manifold pressure tap set screw must be tightened and 1/8 in. NPT pipe plug must be installed to prevent gas leaks.
### Fig. 1 — 48HC 04-06 Model Number Nomenclature (Example)

<table>
<thead>
<tr>
<th>Position:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example:</td>
<td>4</td>
<td>8</td>
<td>H</td>
<td>C</td>
<td>E</td>
<td>A</td>
<td>0</td>
<td>4</td>
<td>A</td>
<td>2</td>
<td>A</td>
<td>6</td>
<td>A</td>
<td>0</td>
<td>A</td>
<td>3</td>
<td>B</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Unit Heat Type
- 48 - Gas Heat Packaged Rooftop
- HC - High Efficiency

#### Model Series - WeatherMaster®

#### Heat Options
- D = Low Gas Heat
- E = Medium Gas Heat
- F = High Gas Heat
- L = Low NOx — Low Gas Heat
- M = Low NOx — Medium Gas Heat
- N = Low NOx — High Gas Heat
- S = Low Heat w/ Stainless Steel Exchanger
- T = High Heat w/ Stainless Steel Exchanger
  *(Low NOx models include — Stainless Steel HX)*

#### Refrig. Systems Options
- A = Single stage cooling models
- B = Single stage cooling models with Humidi-MiZer® System
- F = Single stage cooling models with MotorMaster® Low Ambient Controller

#### Cooling Tons
- 04 - 3 ton
- 05 - 4 ton
- 06 - 5 ton

#### Sensor Options
- A = None
- B = RA Smoke Detector
- C = SA Smoke Detector
- D = RA + SA Smoke Detector
- E = CO₂
- F = RA Smoke Detector and CO₂
- G = SA Smoke Detector and CO₂
- H = RA + SA Smoke Detector and CO₂

#### Indoor Fan Options
- 0 = Electric (Direct) Drive x13 Motor (non Humidi-MiZer® models only)
- 1 = Standard Static Option - Belt Drive (Humidi-MiZer® models only)
- 2 = Medium Static Option - Belt Drive
- 3 = High Static Option - Belt Drive

#### Coil Options (RTPF) (Outdoor - Indoor - Hail Guard)
- A = Al/Cu - Al/Cu
- B = Precoat Al/Cu - Al/Cu
- C = E-coat Al/Cu - Al/Cu
- D = E-coat Al/Cu - E-coat Al/Cu
- E = Cu/Cu - Al/Cu
- F = Cu/Cu - Cu/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

#### Factory Assigned
- 0 = Standard
- 1 = LTL

#### Electrical Options
- A = None
- B = HACR Breaker
- C = Non-Fused Disconnect
- D = Thru-The-Base Connections
- E = HACR and Thru-The-Base Connections
- F = Non-Fused Disconnect and Thru-The-Base Connections

#### Service Options
- 0 = None
- 1 = Unpowered Convenience Outlet
- 2 = Powered Convenience Outlet
- 3 = Hinged Access Panels
- 4 = Hinged Access Panels and Unpowered Convenience Outlet
- 5 = Hinged Panels and Powered Convenience Outlet
- C = Foil Faced Insulation
- D = Foil Faced Insulation and Unpowered Convenience Outlet
- E = Foil Faced Insulation and Powered Convenience Outlet
- F = Foil Faced Insulation and Hinged Access Panels
- G = Foil Faced Insulation, Hinged Access Panels and Unpowered Convenience Outlet
- H = Foil Faced Insulation, Hinged Access Panels and Powered Convenience Outlet

#### Intake / Exhaust Options
- A = None
- B = Temperature Economizer w/ Barometric Relief
- F = Enthalpy Economizer w/ Barometric Relief
- K = 2-Position Damper

#### Base Unit Controls
- 0 = Base Electromechanical Controls
- 1 = PremierLink™ Controller
- 2 = RTU Open Multi-Protocol Controller
- D = ComfortLink Controls

#### Design Revision
- A = Factory Design Revision

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

**Note:** On single phase (-3 voltage code) models, the following are not available as a factory installed option:
- Humidi-MiZer® System
- Coated Coils or Cu Fin Coils
- Louvered Hail Guards
- Economizer or 2 Position Damper
- Powered 115 Volt Convenience Outlet
Fig. 2 — Unit Dimensional Drawing
Fig. 2 — Unit Dimensional Drawing (cont)

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>DIMENSION</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>48 in. (1219 mm)</td>
<td>Unit disconnect is mounted on panel</td>
</tr>
<tr>
<td></td>
<td>18 in. (457 mm)</td>
<td>No disconnect, convenience outlet option</td>
</tr>
<tr>
<td></td>
<td>18 in. (457 mm)</td>
<td>Recommended service clearance</td>
</tr>
<tr>
<td></td>
<td>12 in. (305 mm)</td>
<td>Minimum clearance</td>
</tr>
<tr>
<td>B</td>
<td>40 in. (1067 mm)</td>
<td>Surface behind servicer is grounded (e.g., metal, masonry wall)</td>
</tr>
<tr>
<td></td>
<td>36 in. (914 mm)</td>
<td>Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass)</td>
</tr>
<tr>
<td></td>
<td>Special</td>
<td>Check sources of flue products within 10 ft (3 m) of unit fresh air intake hood</td>
</tr>
<tr>
<td>C</td>
<td>36 in. (914 mm)</td>
<td>Side condensate drain is used</td>
</tr>
<tr>
<td></td>
<td>18 in. (457 mm)</td>
<td>Minimum clearance</td>
</tr>
<tr>
<td>D</td>
<td>48 in. (1219 mm)</td>
<td>No flue discharge accessory installed, surface is combustible material</td>
</tr>
<tr>
<td></td>
<td>42 in. (1067 mm)</td>
<td>Surface behind servicer is grounded (e.g., metal, masonry wall)</td>
</tr>
<tr>
<td></td>
<td>36 in. (914 mm)</td>
<td>Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass)</td>
</tr>
<tr>
<td></td>
<td>Special</td>
<td>Check for adjacent units or building fresh air intakes within 10 ft (3 m) of this unit's flue outlet</td>
</tr>
</tbody>
</table>

Fig. 3 — Service Clearance Dimensional Drawing

*Standard unit weight is with low gas heat and without packaging. For other options and accessories refer to the product data catalog.*
INSTALLATION

Jobsite Survey

Complete the following checks before installation.

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

Step 1 — Plan for Unit Location

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

NOTE: Consider also the effect of adjacent units.

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

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

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

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

Locate mechanical draft system flue assembly at least 4 ft (1.2 m) from any opening through which combustion products could enter the building, and at least 4 ft (1.2 m) from any adjacent building (or per local code). Locate the flue assembly at least 10 ft (3.05 m) from an adjacent unit's fresh air intake if within 3 ft (0.91 m) of same elevation (or per local code). Locate the flue assembly at least 10 ft (3.05 m) from any opening through which combustion products could enter the building, and at least 4 ft (1.2 m) from any opening through which contaminated air or other) that provides for the minimum clearances required for safety. This includes the clearance to combustible surfaces, unit performance and service access below, around and above unit as specified in unit drawings. See Fig. 3.

NOTE: Consider also the effect of adjacent units.

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

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

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

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

Select a unit mounting system that provides adequate height to allow installation of condensate trap per requirements. Refer to Step 12 — Install External Condensate Trap and Line on page 13 for required trap dimensions.

**ROOF MOUNT**

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

<table>
<thead>
<tr>
<th>Table 2 — Operating Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>48HC—</strong></td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Base Unit</td>
</tr>
<tr>
<td>Economizer</td>
</tr>
<tr>
<td>Vertical</td>
</tr>
<tr>
<td>Horizontal</td>
</tr>
<tr>
<td>Humidi-MiZer® System</td>
</tr>
<tr>
<td>Cu Fins</td>
</tr>
<tr>
<td>Powered Outlet</td>
</tr>
<tr>
<td>Curb</td>
</tr>
<tr>
<td>14 in. (356 mm)</td>
</tr>
<tr>
<td>24 in. (610 mm)</td>
</tr>
</tbody>
</table>

**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 Step 12 — Install External Condensate Trap and Line on page 13 for details)
5. Rig and place unit
6. Install outdoor air hood
7. Install flue hood
8. Install gas piping
9. Install condensate line trap and piping
10. Make electrical connections
11. Install other accessories

**Pad-Mounted Installation**

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

**Frame-Mounted Installation**

Frame-mounted applications generally follow the sequence for a curb installation. Adapt the sequence 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. Assemble and install accessory roof curb in accordance with instructions shipped with the curb.

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

Curb should be level. This is necessary for unit drain to function properly. Unit leveling tolerances are shown in Fig. 5. Refer to Accessory Roof Curb Installation Instructions for additional information as required.
Fig. 4 — Roof Curb Details

NOTES:
1. ROOF CURB ACCESSORY IS SHIPPED DISASSEMBLED.
2. INSULATED PANELS: 25 4/32" THICK POLYURETHANE FOAM. 44.5 [1-3/4]# DENSITY.
3. DIMENSIONS IN [ ] ARE IN MILLIMETERS.
4. ROOF CURB: 18 GAUGE 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 CRBTMPWR001A01 IS FOR THRU-THE-CURB GAS TYPE
   PACKAGE CRBTMPWR003A01 IS FOR THRU-THE-BOTTOM TYPE GAS CONNECTIONS.

CONNECTOR PKG. GAS CONNECTION TYPE GAS FITTING POWER WIRING FITTING CONTROL WIRING FITTING ACCESSORY CONVENIENCE OUTLET WIRING CONNECTOR
CRBTMPWR003A01 THRU THE BOTTOM 1/2" [12.7] NPT

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 GAUGE 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 CRBTMPWR001A01 IS FOR THRU-THE-CURB GAS TYPE
   PACKAGE CRBTMPWR003A01 IS FOR THRU-THE-BOTTOM TYPE GAS CONNECTIONS.

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CRBTMPWR003A01 THRU THE BOTTOM 1/2" [12.7] NPT

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 GAUGE 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 CRBTMPWR001A01 IS FOR THRU-THE-CURB GAS TYPE
   PACKAGE CRBTMPWR003A01 IS FOR THRU-THE-BOTTOM TYPE GAS CONNECTIONS.
Fig. 5 — Unit Leveling Tolerances

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 field-installed thru-the-roof curb gas connections are desired, use factory-supplied 1/2-in. pipe coupling and gas plate assembly to mount the thru-the-roof curb connection to the roof curb. Gas connections and power connections to the unit must be field-installed after the unit is installed on the roof curb.

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

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.

A minimum clearance is not required around ductwork.

Step 6 — Rig and Place Unit

Keep unit upright and do not drop. Spread bars are required. Rollers may be used to move unit across a roof. Rigging materials under unit (cardboard or wood) must be removed PRIOR to placing the unit on the roof curb. Level by using unit frame as a reference. See Table 2 and Fig. 6 for additional information.

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

Rigging materials under unit (cardboard 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 plug can be tightened with a 1/2-in. square socket drive extension. For further details, see “Step 12 — Install External Condensate Trap and Line” on page 13.

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

<table>
<thead>
<tr>
<th>A-B</th>
<th>B-C</th>
<th>A-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 (13)</td>
<td>1.0 (25)</td>
<td>1.0 (25)</td>
</tr>
</tbody>
</table>

CAUTION

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.

Failure to follow this caution may result in injury or equipment damage.

All panels must be in place when rigging. Unit is not designed for handling by fork truck when panels or packaging are 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.
**NOTES:**

1. SPREADER BARS ARE REQUIRED. Top damage will occur if spreader bars are not used.
2. Dimensions in ( ) are in millimeters.

**POSITIONING ON CURB**

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

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

**Step 7 — Convert to Horizontal and Connect Ductwork (When Required)**

Unit is shipped in the vertical duct configuration. Unit without factory-installed economizer or return air smoke detector option may be field-converted to horizontal ducted configuration. To convert to horizontal configuration, remove screws from side duct opening covers and remove covers. Using the same screws, install covers on vertical duct openings with the insulation-side down. Seals around duct openings must be tight. See Fig. 7.

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

Do not cover or obscure visibility to the unit’s informative data plate when insulating horizontal ductwork.
Step 8 — Install Outside Air Hood

ECONOMIZER AND TWO POSITION DAMPER HOOD PACKAGE REMOVAL AND SETUP (FACTORY OPTION)

NOTE: Economizer and two position damper are not available as factory installed options for single phase (-3 voltage code) models.

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.

1. To gain access to the hood, remove the filter access panel. See Fig. 8.

Fig. 8 — Typical Access Panel Locations

2. 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. 9. Be careful to not damage any wiring or cut tie-wraps securing any wiring.

Fig. 9 — Economizer and Two-Position Damper Hood Parts Location

3. Carefully lift the hood assembly (with metal tray) through the filter access opening and assemble per the steps outlined in the Economizer Hood and Two-Position Hood section below.

ECONOMIZER AND TWO-POSITION HOOD

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

1. The indoor coil access panel will be used as the top of the hood. Remove the screws along the sides and bottom of the indoor coil access panel. See Fig. 10.

Fig. 10 — 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. 11.

Fig. 11 — 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. 11 and 12. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.
5. Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 12.
6. Caulk the ends of the joint between the unit top panel and the hood top.
7. Replace the filter access panel.
Step 9 — Units with Hinged Panels Only

Relocate latch shipped inside the compressor compartment behind the hinged compressor door to location shown in Fig. 13 after unit installation.

If the unit does not have hinged panels, skip this step and continue at Step 10 below.

Step 10 — Install Flue Hood

Flue hood is shipped screwed to the basepan beside the burner compartment access panel. Remove from shipping location and using screws provided, install flue hood and screen in location shown in Fig. 14.

Table 3 — Natural Gas Supply Line Pressure Ranges

<table>
<thead>
<tr>
<th>UNIT MODEL</th>
<th>UNIT SIZE</th>
<th>MIN.</th>
<th>MAX.</th>
</tr>
</thead>
<tbody>
<tr>
<td>48HCD/E/L/M/S/R</td>
<td>04, 05, 06</td>
<td>4.0 in. wg (996 Pa)</td>
<td>13.0 in. wg (3240 Pa)</td>
</tr>
<tr>
<td>48HCF/N/T (High Heat Units Only)</td>
<td>05, 06</td>
<td>5.0 in. wg (1245 Pa)</td>
<td>13.0 in. wg (3240 Pa)</td>
</tr>
</tbody>
</table>

The gas supply pipe enters the unit at the burner access panel on the front side of the unit, through the long slot at the bottom of the access panel. The gas connection to the unit is made to the 1/2-in. FPT gas inlet port on the unit gas valve.

Manifold pressure is factory-adjusted for natural gas fuel use. Adjust as required to obtain best flame characteristics. See Table 4.

Table 4 — Natural Gas Manifold Pressure Ranges

<table>
<thead>
<tr>
<th>UNIT MODEL</th>
<th>UNIT SIZE</th>
<th>HIGH FIRE</th>
<th>LOW FIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>48HCD/E/L/M/S/R</td>
<td>04, 05, 06</td>
<td>3.5 in. wg (872 Pa)</td>
<td>1.7 in. wg (423 Pa)</td>
</tr>
<tr>
<td>48HCF/N/T (High Heat Units Only)</td>
<td>05, 06</td>
<td>3.5 in. wg (872 Pa)</td>
<td>1.7 in. wg (423 Pa)</td>
</tr>
</tbody>
</table>

Step 11 — Install Gas Piping

Installation of the gas piping must be accordance with local building codes and with applicable national codes. In U.S.A., refer to NFPA 54/ANSI Z223.1 National Fuel Gas Code (NFGC). In Canada, installation must be accordance with the CAN/CSA B149.1 and CAN/CSA B149.2 installation codes for gas burning appliances.

This unit is factory equipped for use with Natural Gas fuel at elevations up to 2000 ft (610 m) above sea level. Unit may be field converted for operation at elevations above 2000 ft (610 m) and/or for use with liquefied petroleum fuel. See accessory kit installation instructions regarding these accessories.

NOTE: Furnace gas input rate on rating plate is for installation up to 2000 ft (610 m) above sea level. In U.S.A. the input rating for altitudes above 2000 ft (610 m) must be derated by 4% for each 1000 ft (305 m) above sea level. In Canada the input rating must be derated by 10% for altitudes of 2000 ft (610 m) to 4500 ft (1372 m) above sea level.

For natural gas applications, gas pressure at unit gas connection must not be less than 4 in. wg (996 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating. On 48HCF/N/T05-06 (high-heat) units, the gas pressure at unit gas connection must not be less than 5 in. wg (1245 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating. See Table 3. For liquefied petroleum applications, the gas pressure must not be less than 11 in. wg (2740 Pa) or greater than 13.6 in. wg (3390 Pa) at the unit connection.

Failure to follow this caution may result in equipment damage.

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

Install a gas supply line that runs to the unit heating section. Refer to the NFPA 54/NFGC or equivalent code for gas pipe sizing data. Do not use a pipe size smaller than 1/2-in. Size the gas supply line to allow for a maximum pressure drop of 0.5-in. wg (124 Pa) between gas regulator source and unit gas valve connection when unit is operating at high-fire flow rate.
The gas supply line can approach the unit in three ways: horizontally from outside the unit (across the roof), thru-curb/under unit basepan (accessory kit required), or through unit basepan (factory option or accessory kit required). Consult accessory kit installation instructions for details on these installation methods. Observe clearance to gas line components per Fig. 15.

Install a 1/2-in. NPT street elbow on the thru-base gas fitting. Attach a 1/2-in. pipe nipple with minimum length of 16-in. (406 mm) (field-supplied) to the street elbow and extend it through the access panel at the gas support bracket. See Fig. 17.

**Fig. 17 — Gas Line Piping for 3 to 5 Ton Units Only**

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

**FACTORY-OPTION THRU-BASE CONNECTIONS (GAS CONNECTIONS)**

This service connection kit consists of a 1/2-in. NPT gas adapter fitting (brass), a 1/2-in. electrical bulkhead connector and a 1/2-in. electrical bulkhead connector, all factory-installed in the embossed (raised) section of the unit basepan in the condenser section. See Fig. 16.

**Fig. 15 — Gas Piping Guide (with Accessory Thru-the-Curb Service Connections)**

**Fig. 16 — Thru-Base Gas Connection Fittings**

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

Check tightness of connector lock nuts before connecting gas piping.

**Fig. 17 — Gas Piping, Typical Curb Sidewall Piping (Example 1)**

<table>
<thead>
<tr>
<th>STEEL PIPE NOMINAL DIAMETERS (IN.)</th>
<th>SPACING OF SUPPORTS X DIMENSION (FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>6</td>
</tr>
<tr>
<td>3/4 or 1</td>
<td>8</td>
</tr>
<tr>
<td>1-1/4 or larger</td>
<td>10</td>
</tr>
</tbody>
</table>

Legend:
- NFGC — National Fuel Gas Code
- Field supplied
- NOTE: Follow all local codes

**STEEL PIPE NOMINAL DIAMETERS (IN.)**

- 1/2
- 3/4 or 1
- 1-1/4 or larger

**SPACING OF SUPPORTS X DIMENSION (FT.)**

- 6
- 8
- 10

**Fig. 18 — Gas Piping, Typical Curb Sidewall Piping (Example 1)**
When installing the gas supply line, observe local codes pertaining to gas pipe installations. Refer to the NFPA 54/ANSI Z223.1 NFGC latest edition (in Canada, CAN/CSA B149.1). In the absence of local building codes, adhere to the following pertinent recommendations:

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

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

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

**WARNING**

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

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

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

**Step 12 — Install External Condensate Trap and Line**

The unit has one 3/4-in. condensate drain connection on the end of the condensate pan and an alternate connection on the bottom. See Fig. 22. Unit airflow configuration does not determine which drain connection to use. Either drain connection can be used with vertical or horizontal applications.

When using the standard side drain connection, ensure the red plug in the alternate bottom connection is tight. Do this before setting the unit in place. The red drain pan can be tightened with a 1/2-in. square socket drive extension.

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

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

*Teflon is a registered trademark of DuPont.
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 per 3 m) of run. Do not use a pipe size smaller than the unit connection (3/4 in.).

Step 13 — Make Electrical Connections

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

Do not use gas piping as an electrical ground. Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code); ANSI/NFPA 70, latest edition (in Canada, Canadian Electrical Code CSA [Canadian Standards Association] C22.1), and local electrical codes.

Field-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 Convenience Outlets on page 16 for power transformer connections.

The 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. Maximum wire size is #2ga AWG (copper only) per pole on contactors and #2ga AWG (copper only) per pole on optional disconnect or HACR. See Fig. 24 and unit label diagram for field power wiring connections.

NOTE: Unit may be equipped with short test leads (pigtailed) 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.

Failure to follow this caution could result in fire, intermittent operation, or unsatisfactory performance.

Do not connect aluminum wire between disconnect switch and air conditioning unit. Use only copper wire. See Fig. 25.
UNITS WITH FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR

The factory-installed option non-fused disconnect (NFD) or HACR 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. 24).

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

Field-Install the NFD Shaft and Handle

1. Remove unit front panel (see Fig. 2).
2. Remove (3) hex screws on the NFD enclosure — (2) on the face of the cover and (1) on the left side cover. See Fig. 26.
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. See Fig. 27.
6. Measure from the tip of the shaft to the top surface of the black pointer; the measurement should be 3.75 to 3.88 in. (95 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 at 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.

Field-Install the HACR Shaft and Handle

1. Remove unit front panel (see Fig. 2).
2. Remove (3) hex screws on the HACR enclosure — (2) on the face of the cover and (1) on the left side cover. See Fig. 28.
3. Remove the front cover of the HACR enclosure.
4. Make sure the HACR 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. See Fig. 29.
6. Tighten the locking screw to secure the shaft to the HACR.
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 enclosure.
11. Re-install the unit front panel.
Fig. 29 — HACR Handle and Shaft Assembly

UNITS WITHOUT FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR

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.

ALL UNITS

All field wiring must comply with NEC and all local codes. Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 24 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is #2ga AWG (copper only) per pole on contactors. See Fig. 24 and unit label diagram for field power wiring connections.

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 field wiring must comply with the NEC and local requirements.

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

NOTE: Check all factory and field electrical connections for tightness.

CONVENIENCE OUTLETS

**WARNING**

Failure to follow this caution 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 48HC models: non-powered and unit-powered. Both types provide a 125-volt GFCI (ground-fault circuit interrupter) duplex receptacle rated at 15A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 30.

**Installing Weatherproof Cover**

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

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

**WARNING**

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

Disconnect all power to unit and convenience outlet. Lock-out and tag-out all power.

1. Remove the blank cover plate at the convenience outlet; discard the blank cover.
2. 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.
3. 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).
4. Mount the weatherproof cover to the backing plate as shown in Fig. 31.
5. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover.
6. Check for full closing and latching.

Fig. 31 — Weatherproof Cover Installation

Non-Powered Convenience Outlet

This type requires the field installation of a general-purpose 125v 15A 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 125v power supply conductors into the bottom of the utility box containing the duplex receptacle.

Unit-Powered Convenience Outlet

A unit-mounted transformer is factory-installed to step down the main power supply voltage to the unit to 115v 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. 30.

The primary leads to the convenience outlet transformer are not factory-connected. Selection of primary power source is a customer option. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect or HACR breaker switch; this will provide service power to the unit when the unit disconnect switch or HACR switch is open. Other connection methods will result in the convenience outlet circuit being de-energized when the unit disconnect or HACR switch is open. See Fig. 32.

Using Unit-Mounted Convenience Outlets

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

Fuse On Power Type

The factory fuse is a Bussman “Fusetron” T-15, non-renewable screw-in (Edison base) type plug fuse.

Duty Cycle

The unit-powered convenience outlet has a duty cycle limitation. The transformer is intended to provide power on an intermittent basis for service tools, lamps, etc; it is not intended to provide 15-amps loading for continuous duty loads (such as electric heaters for overnight use). Observe a 50% limit on circuit loading above 8 amps. Convenience outlet usage rating:

- Continuous usage: 8 amps maximum
- Intermittent usage: Up to 15 amps maximum for up to 2 hours maximum

See Fig. 33.

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.
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. 34). See unit nameplates for the proper fuse, HACR or maximum over-current protection device required on the unit with field-installed accessories.

FACTORY-OPTION THRU-BASE CONNECTIONS (ELECTRICAL CONNECTIONS)

This service connection kit consists of a 1/2-in. NPT gas adapter fitting (brass), a 1/2-in. electrical bulkhead connector, and a 3/4-in. electrical bulkhead connector, all 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. 16 on page 12.

Check tightness of connector lock nuts before connecting electrical conduits.

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

UNITS WITHOUT THRU-BASE CONNECTIONS (ELECTRICAL 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. 24 on page 14.

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 shown in the example below 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.

Example: Supply voltage is 230-3-60

\[
\begin{align*}
AB &= 224 \text{ v} \\
BC &= 231 \text{ v} \\
AC &= 226 \text{ v}
\end{align*}
\]

Determine maximum deviation from average voltage.

\[
\begin{align*}
\text{Maximum deviation} &= 681 \div 3 = 227 \\
\text{Maximum deviation} &= 4 \text{ v}
\end{align*}
\]

Determine percent of voltage imbalance.

\[
\begin{align*}
\text{% Voltage Imbalance} &= 100 \times \frac{4}{227} = 1.78\%
\end{align*}
\]

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

FIELD CONTROL WIRING

The 48HC unit requires an external temperature control device. This device can be a thermostat (field-supplied) or a PremierLink™ controller (available as factory-installed option or as field-installed accessory, for use on a Carrier Comfort Network® or as a stand alone control) or the RTU Open Controller for Building Management Systems using non-CCN protocols (RTU Open is available as a factory-installed option only).

THERMOSTAT

Install a Carrier-approved accessory thermostat according to installation instructions included with the accessory. For complete economizer function, select a two-stage cooling thermostat. Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions. Typical low-voltage connections are shown in Fig. 35.
Fig. 35 — Low-Voltage Thermostat Connections

If the thermostat contains a logic circuit requiring 24v power, use a thermostat cable or equivalent single leads of different colors with minimum of seven leads. If the thermostat does not require a 24v source (no “C” connection required), use a thermostat cable or equivalent with minimum of six leads. Check the thermostat installation instructions for additional features which might require additional conductors in the cable.

For wire runs up to 50 ft. (15 m), use no. 18 AWG (American Wire Gage) insulated wire [95°F (35°C) minimum]. For 50 to 75 ft. (15 to 23 m), use no. 16 AWG insulated wire [95°F (35°C) minimum]. For over 75 ft. (23 m), use no. 14 AWG insulated wire [95°F (35°C) minimum]. 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.

Thermostat Wiring, Units Without Thru-Base Connection Kit

Pass the thermostat control wires through the hole provided in the corner post; then feed the wires through the raceway built into the corner post to the control box. Pull the wires over to the terminal strip on the upper-left corner of the Controls Connection Board. See Fig. 36.

NOTE: If thru-the-bottom connections accessory is used, refer to the accessory installation instructions for information on routing power and control wiring.
Connecting the Carrier Humidistat (HL38MG029)
1. Route the humidistat 2-conductor cable (field-supplied) through the hole provided in the unit corner post.
2. Feed wires through the raceway built into the corner post (see Fig. 36) to the 24v barrier located on the left side of the control box. The raceway provides the UL-required clearance between high-voltage and low-voltage wiring.
3. Use wire nuts to connect humidistat cable to two PINK leads in the low-voltage wiring as shown in Fig. 39.

Connecting the Thermidistat device (33CS2PPRH-01)
1. Route the Thermidistat multi-conductor thermostat cable (field-supplied) through the hole provided in the unit corner post.
2. Feed wires through the raceway built into the corner post (see Fig. 36) to the 24-v barrier located on the left side of the control box. The raceway provides the UL-required clearance between high-voltage and low-voltage wiring.
3. The Thermidistat has dry contacts at terminals D1 and D2 for dehumidification operation (see Fig. 40). The dry contacts must be wired between CTB terminal R and the PINK lead to the LTLO switch with field-supplied wire nuts. Refer to the installation instructions included with the Carrier Edge® Pro Thermidistat device for more information.
LOW AMBIENT CONTROL (FACTORY OPTION)

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

If the unit comes with PremierLink™ or RTU Open control option, then refer to its installation control manual for details on adjusting “Cooling Lock-Out” setting and configure for the specific job requirements.

INTEGRATED GAS CONTROLLER

This unit contains an Integrated Gas Controller (IGC) board. The IGC control board uses a flue gas pressure switch that senses pressure drop in the heat exchanger due to the combustion inducer. See Fig. 41.

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

When the thermostat is satisfied, W1 and W2 open and the gas valve closes, interrupting the flow of gas to the main burners. If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto, the indoor fan motor will continue to operate for an additional 45 seconds, then stop. An LED indicator is provided on the IGC to monitor operation.

See Fig. 42 for IGC board component layout. Fig. 43 is a typical IGC control wiring diagram.
Fig. 42 — IGC Board Component Layout

Fig. 43 — Typical IGC Control Wiring Diagram
For details on operating 48HC units equipped with the factory installed ComfortLink option, refer to "Controls, Start-Up, Operation and Troubleshooting for 48/50HC 04-28 Single Package Rooftop Unit with ComfortLink Controls." See Fig. 44-48 for wiring details.

Fig. 44 — 48HC Control Box Component Locations with ComfortLink Controls
Fig. 45 — ComfortLink Control Wiring Diagram (48HC 3-5 Ton Units)
Fig. 46 — 48HC ComfortLink with Humidi-MiZer® — Power Wiring Diagram, 208/230V-1 Ph-60 Hz
Fig. 48 — 48HC ComfortLink with Humidi-Mizer® — Power Wiring Diagram, 575V - 3Ph - 60 Hz
**ECONOMISER® (FACTORY OPTION)**

The EconoMiSer X system is an expandable economizer control system, which includes a W7220 economizer module (controller) with an LCD and keypad (See Fig. 49). The W7220 can be configured with optional sensors.

**Fig. 49 — W7220 Economizer Module**

The W7220 economizer module can be used as a stand-alone economizer module wired directly to a commercial setback space thermostat and sensors to provide outside air dry-bulb economizer control.

The W7220 economizer module can be connected to optional sensors for single or differential enthalpy control. The W7220 economizer module provides power and communications for the sensors.

The W7220 economizer module automatically detects sensors by polling to determine which sensors are present. If a sensor loses communications after it has been detected, the W7220 economizer controller indicates a device fail error on its LCD.

**System Components**

The EconoMiSer X system includes an economizer module, 20k mixed air sensor, damper actuator, and either a 20k outdoor air temperature sensor or S-Bus enthalpy sensors.

**Economizer Module**

The module is the core of the EconoMiSer X system. The module is mounted in the unit’s control box, and includes the user interface for the system. The W7220 economizer module provides the basic inputs and outputs to provide simple economizer control. When used with the optional sensors, the economizer module provides more advanced economizer functionality.

**S-Bus Enthalpy Control Sensors**

The sensor is a combination temperature and humidity sensor which is powered by and communicates on the S-Bus. Up to three sensors may be configured with the W7220 economizer module.

**CO₂ Sensor (optional)**

The sensor can be added for Demand Controlled Ventilation (DCV).

**Specifications**

**W7220 Economizer Module**

The module is designed for use with 2 to 10 Vdc or bus communicating actuator. The module includes terminals for CO₂ sensor, Mixed Air sensor, and an Outdoor Dry Bulb sensor. Enthalpy and other options are available with bus sensors.

**User Interface**

Provides status for normal operation, setup parameters, checkout tests, and alarm and error conditions with a 2-line 16 character LCD display and four button keypad.

**Electrical**

- Rated Voltage — 20 to 30 Vac RMS, 50/60 Hz
- Transformer — 100 VA maximum system input
- Nominal Power Consumption (at 24 Vac, 60 Hz) — 11.5 VA without sensors or actuators
- Relay Digital Output Rating at 30 Vac (maximum power from Class 2 input only) — 1.5A run: 3.5A inrush at 0.45PF (200,000 cycles) or 7.5A inrush at 0.45PF (100,000 cycles)
- External Sensors Power Output — 21 Vdc ± 5% at 48mA

**Inputs**

**Sensors**

**NOTE:** A Mixed Air (MA) analog sensor is required on all W7220 units; either an Outdoor Air (OA) sensor for dry bulb changeover or an OA bus sensor for outdoor enthalpy changeover is required in addition to the MA sensor. An additional Return Air (RA) bus sensor can be added to the system for differential enthalpy or dry bulb changeover. For differential dry bulb changeover a 20k ohm sensor is required in the OA and a bus sensor in the RA. DIP switch on RA bus sensor must be set in the RA position.

**Dry Bulb Temperature (optional) and Mixed Air (required), 20k NTC**

- 2-wire (18 to 22 AWG);
- Temperature range –40 to 150°F (–40 to 65°C)
- Temperature accuracy –0°F/+2°F

**Temperature and Humidity, C7400S1000 (optional)**

- S-Bus; 2-wire (18 to 22 AWG)
- Temperature: range –40 to 150°F (–40 to 65°C)
- Temperature accuracy –0°F/+2°F
- Humidity: range 0 to 100% RH with 5% accuracy.

**NOTE:** Up to three (3) S-Bus sensors may be connected to the W7220 economizer module. For outdoor air (OA), return air (RA) and discharge (supply) air (DA).

**7 Binary Inputs — 1-wire 24 Vac + common GND (see page 30 for wiring details).**

**24 Vac power supply — 20 to 30 Vac 50/60Hz; 100 VA Class 2 transformer.**

**Outputs**

**Actuator Signal**

- 2-10 Vdc; minimum actuator impedance is 2k ohm; bus two-wire output for bus communicating actuators.

**Exhaust fan, Y1, Y2 and AUX1 O**

- All Relay Outputs (at 30 Vac):
- Running: 1.5A maximum
- Inrush: 7.5A maximum

**Environmental**

**Operating Temperature**

- –40 to 150°F (–40 to 65°C).

**Exception of display operation down to –4°F with full recovery at –4°F from exposure to –40°F**

**Storage Temperature**

- –40 to 150°F (–40 to 65°C)
**Shipping Temperature**
-40 to 150°F (-40 to 65°C)

**Relative Humidity**
5% to 95% RH non-condensing

**Economizer Module Wiring Details**

Use Fig. 50 and Tables 5 and 6 to locate the wiring terminals for the Economizer module.

NOTE: The four terminal blocks are removable. Slide out each terminal block, wire it, and then slide it back into place.

### Table 5 — Economizer Module - Left Hand Terminal Blocks

<table>
<thead>
<tr>
<th>LABEL</th>
<th>TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT</td>
<td>MAT</td>
<td>Mixed Air Temperature Sensor (Polarity Insensitive Connection)</td>
</tr>
<tr>
<td>MAT</td>
<td>20k NTC and COM</td>
<td>Mixed Air Temperature Sensor (Polarity Insensitive Connection)</td>
</tr>
<tr>
<td>OAT</td>
<td>OAT</td>
<td>Outdoor Air Temperature Sensor (Polarity Insensitive Connection)</td>
</tr>
<tr>
<td>OAT</td>
<td>20k NTC and COM</td>
<td>Outdoor Air Temperature Sensor (Polarity Insensitive Connection)</td>
</tr>
<tr>
<td>S-BUS</td>
<td>S-BUS</td>
<td>Enthalpy Control Sensor (Polarity Insensitive Connection)</td>
</tr>
<tr>
<td>S-BUS</td>
<td>(Sylk* Bus)</td>
<td>Enthalpy Control Sensor (Polarity Insensitive Connection)</td>
</tr>
</tbody>
</table>

### Table 6 — Economizer Module - Right Hand Terminal Blocks

<table>
<thead>
<tr>
<th>LABEL</th>
<th>TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUX2-I</td>
<td>24 vac IN</td>
<td>The first terminal is not used.</td>
</tr>
<tr>
<td>OCC</td>
<td>24 vac IN</td>
<td>Shut Down (SD) or HEAT (W) Conventional only and Heat Pump Changeover (O-B) in Heat Pump mode.</td>
</tr>
<tr>
<td>E-GND</td>
<td>E-GND</td>
<td>Occupied/Unoccupied Input</td>
</tr>
<tr>
<td>EXH1</td>
<td>24 vac OUT</td>
<td>Exhaust Fan 1 Output</td>
</tr>
<tr>
<td>AUX1 O</td>
<td>24 vac OUT</td>
<td>Programmable: Exhaust fan 2 output or ERV or System alarm output</td>
</tr>
</tbody>
</table>

*Sylk is a trademark of Honeywell International Inc.*

![Fig. 50 — W7220 Wiring Terminals](image-url)
**S-Bus Sensor Wiring**

The labels on the sensors and controller are color coded for ease of installation. Orange labeled sensors can only be wired to orange terminals on the controller. Brown labeled sensors can only be wired to S-bus (brown) terminals. Use Fig. 51 and Table 7 to locate the wiring terminals for each S-Bus sensor.

Use Fig. 51 and Table 7 to locate the wiring terminals for each enthalpy control sensor.

---

**Table 7 — HH57AC081 Sensor Wiring Terminations**

<table>
<thead>
<tr>
<th>TERMINAL NUMBER</th>
<th>TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S-BUS</td>
<td>S-BUS Communications (Enthalpy Control Sensor Bus)</td>
</tr>
<tr>
<td>2</td>
<td>S-BUS</td>
<td>S-BUS Communications (Enthalpy Control Sensor Bus)</td>
</tr>
</tbody>
</table>

Use Fig. 51 and Table 8 to set the DIP switches for the desired use of the sensor.

**Table 8 — HH57AC081 Sensor DIP Switch**

<table>
<thead>
<tr>
<th>USE</th>
<th>DIP SWITCH POSITIONS FOR SWITCHES 1, 2, AND 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA</td>
<td>OFF</td>
</tr>
<tr>
<td>RA</td>
<td>ON</td>
</tr>
<tr>
<td>OA</td>
<td>OFF</td>
</tr>
</tbody>
</table>

NOTE: When an S-Bus sensor is connected to an existing network, it will take 60 minutes for the network to recognize and auto-configure itself to use the new sensor.

During the 60-minute setup period, no alarms for sensor failures (except SAT) will be issued and no economizing function will be available.

**CO2 Sensor Wiring**

When using a CO2 sensor the black and brown common wires are internally connected and only one is connected to “IAQ COM” on the W7220. Use the power from the W7220 to power the CO2 sensor OR make sure the ground for the power supplies are common. See Fig. 52 for CO2 sensor wiring.

---

**Table 9 — HH57AC081 Sensor DIP Switches**

Use Fig. 51 and Table 8 to set the DIP switches for the desired use of the sensor.

**Interface Overview**

This section describes how to use the EconoMi$er® user interface for:

- Keypad and menu navigation
- Settings and parameter changes
- Menu structure and selection

**User Interface**

The user interface consists of a 2-line LCD display and a 4-button keypad on the front of the economizer controller.

**Keypad**

Use the four navigation buttons (see Fig. 53) to scroll through the menus and menu items, select menu items, and to change parameter and configuration settings.

To use the keypad when working with menus:

- Press the ▲ (Up arrow) button to move to the previous menu.
- Press the ▼ (Down arrow) button to move to the next menu.
- Press the → (Enter) button to display the first item in the currently displayed menu.

![Fig. 52 — CO2 Sensor Wiring](image)

**Fig. 52 — CO2 Sensor Wiring**

**Fig. 53 — W7220 Controller Navigation Buttons**

Press the ↑ (Menu Up/Exit) button to exit a menu’s item and return to the list of menus. To use the keypad when working with Setpoints, System and Advanced Settings, Checkout tests and Alarms:

1. Navigate to the desired menu.
2. Press the → (Enter) button to display the first item in the currently displayed menu.
3. Use the ▲ and ▼ buttons to scroll to the desired parameter.
4. Press the  (Enter) button to display the value of the currently displayed item.
5. Press the ▲ button to increase (change) the displayed parameter value.
6. Press the ▼ button to decrease (change) the displayed parameter value.

NOTE: When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment or decrement.

1. Press the  (Enter) button to accept the displayed value and store it in nonvolatile RAM. “CHANGE STORED” displays.
2. Press the  (Enter) button to return to the current menu parameter.
3. Press the  (Menu Up/Exit) button to return to the previous menu.

Menu Structure
Table 9 illustrates the complete hierarchy of menus and parameters for the EconoMi$er® X system.

The Menus in display order are:
• STATUS
• SETPOINTS
• SYSTEM SETUP
• ADVANCED SETUP
• CHECKOUT
• ALARMS

IMPORTANT: Table 9 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration.

For example if you do not have a DCV (CO₂) sensor, then none of the DCV parameters appear and only MIN POS will display. If you have a CO₂ sensor, the DCV MIN and DCV MAX will appear.

NOTE: Some parameters in the menus use the letters MA or MAT, indicating a mixed air temperature sensor location before the cooling coil. This unit application has the control sensor located after the cooling coil, in the fan section, where it is designated as (Cooling) Supply Air Temperature or SAT sensor.

Setup and Configuration
Before being placed into service, the W7220 Economizer module must be set up and configured for the installed system.

The setup process uses a hierarchical menu structure that is easy to use. Press the ▲ and ▼ arrow buttons to move forward and backward through the menus and press the button to select and confirm setup item changes.

Time-Out and Screensaver
When no buttons have been pressed for 10 minutes, the LCD displays a screen saver, which cycles through the Status items. Each Status items displays in turn and cycles to the next item after 5 seconds.

IMPORTANT: During setup, the economizer module is live at all times.
<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT†</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECONO AVAIL</td>
<td>NO</td>
<td>YES/NO</td>
<td>FIRST STAGE COOLING DEMAND (Y1–IN)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>YES = economizing available; the system can use outside air for free cooling when required</td>
</tr>
<tr>
<td>ECONOMIZING</td>
<td>NO</td>
<td>YES/NO</td>
<td>FIRST STAGE COOLING RELAY OUTPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>YES = outside air being used for 1 stage cooling</td>
</tr>
<tr>
<td>OCCUPIED</td>
<td>NO</td>
<td>YES/NO</td>
<td>OCCUPIED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>YES = OCC signal received from space thermostat or unitary controller</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>YES = 24 Vac on terminal OCC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NO = 0 Vac on terminal OCC</td>
</tr>
<tr>
<td>HEAT PUMP</td>
<td>N/A**</td>
<td>COOL HEAT</td>
<td>HEAT PUMP MODE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays COOL or HEAT when system is set to heat pump</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Non-conventional)</td>
</tr>
<tr>
<td>COOL Y1—IN</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>FIRST STAGE COOLING DEMAND (Y1–IN)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y1–I signal from space thermostat or unitary controller for cooling stage 1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ON = 24 Vac on terminal Y1–I</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OFF = 0 Vac on terminal Y1–I</td>
</tr>
<tr>
<td>COOL Y1—OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>FIRST STAGE COOLING RELAY OUTPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cool stage 1 Relay Output to stage 1 mechanical cooling</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Y1–OUT terminal)</td>
</tr>
<tr>
<td>COOL Y2—IN</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>SECOND STAGE COOLING DEMAND (Y2–IN)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y2–I signal from space thermostat or unitary controller for second stage cooling.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ON = 24 Vac on terminal Y2–I</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OFF = 0 Vac on terminal Y2–I</td>
</tr>
<tr>
<td>COOL Y2—OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>SECOND STAGE COOLING RELAY OUTPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cool Stage 2 Relay Output to mechanical cooling</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Y2–OUT terminal)</td>
</tr>
<tr>
<td>MA TEMP</td>
<td>_ _ . _ F</td>
<td>0 to 140 F</td>
<td>SUPPLY AIR TEMPERATURE, Cooling Mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays value of measured mixed air from MAT sensor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays _ _ . _ F if not connected, short or out-of-range.</td>
</tr>
<tr>
<td>DA TEMP</td>
<td>_ _ . _ F</td>
<td>0 to 140 F</td>
<td>DISCHARGE AIR TEMPERATURE, after Heating section</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays when Discharge Air sensor is connected and displays measured discharge temperature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays _ _ . _ F if sensor sends invalid value, if not connected, short or out-of-range.</td>
</tr>
<tr>
<td>OA TEMP</td>
<td>_ _ . _ F</td>
<td>-40 to 140 F</td>
<td>OUTSIDE AIR TEMP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays measured value of outdoor air temperature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays _ _ . _ F if sensor sends invalid value, short or out-of-range.</td>
</tr>
<tr>
<td>OA HUM</td>
<td>_ _ %</td>
<td>0 to 100%</td>
<td>OUTSIDE AIR RELATIVE HUMIDITY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays measured value of outdoor humidity from OA sensor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays _ _ % if not connected short, or out-of-range.</td>
</tr>
<tr>
<td>RA TEMP</td>
<td>_ _ . _ F</td>
<td>0 to 140 F</td>
<td>RETURN AIR TEMPERATURE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays measured value of return air temperature from RAT sensor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays _ _ . _ F if sensor sends invalid value, if not connected, short or out-of-range.</td>
</tr>
<tr>
<td>RA HUM</td>
<td>_ _ %</td>
<td>0 to 100%</td>
<td>RETURN AIR RELATIVE HUMIDITY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays measured value of return air humidity from RA sensor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays _ _ % if sensor sends invalid value, if not connected, short or out-of-range.</td>
</tr>
<tr>
<td>IN CO2</td>
<td>_ _ ppm</td>
<td>0 TO 2000 ppm</td>
<td>SPACE/RETURN AIR CO₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays value of measured CO₂ from CO₂ sensor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Invalid if not connected, short or out-of-range</td>
</tr>
<tr>
<td>DCV STATUS</td>
<td>N/A</td>
<td>ON/OFF</td>
<td>DEMAND CONTROLLED VENTILATION STATUS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays ON if above setpoint and OFF if below setpoint, and ONLY if a CO₂ sensor is connected.</td>
</tr>
<tr>
<td>DAMPER OUT</td>
<td>2.0v</td>
<td>2.0 TO 10.0v</td>
<td>Displays voltage output to the damper actuator.</td>
</tr>
<tr>
<td>ACT POS</td>
<td>N/A</td>
<td>0 to 100%</td>
<td>Displays actual position of outdoor air damper actuator.</td>
</tr>
</tbody>
</table>
### Table 9 — Menu Structure* (cont)

<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATUS (CONT)</td>
<td>ACT COUNT</td>
<td>N/A</td>
<td>1 to 65535</td>
<td>Displays number of times actuator has cycled. 1 cycle equals 180 deg. of actuator movement in any direction.</td>
</tr>
<tr>
<td></td>
<td>ACTUATOR</td>
<td>N/A</td>
<td>OK/Alarm (on Alarm menu)</td>
<td>Displays ERROR if voltage or torque is below actuator range.</td>
</tr>
<tr>
<td></td>
<td>EXH1 OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>EXHAUST STAGE 1 RELAY OUTPUT Output of EXH1 terminal: ON = relay closed OFF = relay open</td>
</tr>
<tr>
<td></td>
<td>EXH2 OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>EXHAUST STAGE 2 RELAY OUTPUT Output of AUX terminal; displays only if AUX = EXH2</td>
</tr>
<tr>
<td></td>
<td>ERV</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>ENERGY RECOVERY VENTILATOR Output of AUX terminal; displays only if AUX = ERV</td>
</tr>
<tr>
<td></td>
<td>MECH COOL ON</td>
<td>0</td>
<td>0, 1, or 2</td>
<td>Displays stage of mechanical cooling that is active. Displays the stage of heat pymp heating that is active.</td>
</tr>
<tr>
<td></td>
<td>FAN SPEED</td>
<td>N/A</td>
<td>LOW or HIGH</td>
<td>SUPPLY FAN SPEED Displays speed setting of fan on a 2-speed fan unit.</td>
</tr>
<tr>
<td></td>
<td>W (HEAT ON)</td>
<td>N/A</td>
<td>ON/OFF</td>
<td>HEAT DEMAND STATUS Displays status of heat demand on a 2-speed fan unit.</td>
</tr>
<tr>
<td></td>
<td>MAT SET</td>
<td>53F</td>
<td>38 to 65 F; increment by 1</td>
<td>SUPPLY AIR SETPOINT Setpoint determines where the economizer will modulate the OA damper to maintain the mixed air temperature.</td>
</tr>
<tr>
<td></td>
<td>LOW T LOCK</td>
<td>32F</td>
<td>-45 to 80 F; increment by 1</td>
<td>COMPRESSOR LOW TEMPERATURE LOCKOUT Setpoint determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout.</td>
</tr>
<tr>
<td></td>
<td>DRYBLB SET</td>
<td>63F</td>
<td>48 to 80 F; increment by 1</td>
<td>OA DRY BULB TEMPERATURE CHANGEOVER SETPOINT Setpoint determines where the economizer will assume outdoor air temperature is good for free cooling; e.g., at 63 F unit will economize at 62 F and below and not economize at 64 F and above. There is a 2 F dead-band.</td>
</tr>
<tr>
<td></td>
<td>ENTH CURVE</td>
<td>ES3</td>
<td>ES1, ES2, ES3, ES4, or ES5</td>
<td>ENTHALPY CHANGEOVER CURVE Enthalpy boundary “curves” for economizing using single enthalpy.</td>
</tr>
<tr>
<td></td>
<td>DCV SET</td>
<td>1100ppm</td>
<td>500 to 2000 ppm; increment by 100</td>
<td>DEMAND CONTROLLED VENTILATION Displays only if CO2 sensor is connected. Setpoint for Demand Control Ventilation of space. Above the setpoint, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the setpoint.</td>
</tr>
<tr>
<td></td>
<td>MIN POS</td>
<td>2.8 V</td>
<td>2 to 10 Vdc</td>
<td>VENTILATION MINIMUM POSITION Displays only if a CO2 sensor is NOT connected.</td>
</tr>
<tr>
<td>SETPOINTS</td>
<td>VENTMAX</td>
<td>2.8 V</td>
<td>2 to 10 Vdc</td>
<td>DCV MAXIMUM DAMPER POSITION Displays only if a CO2 sensor is connected. Used for Vb2 (ventilation max cfm) setpoint. Displays 2 to 10 V if &lt;3 sensors (RA, OA, and MA). In AUTO mode dampers controlled by CFM.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100 to 9990 cfm; increment by 10</td>
<td>If OA, MA, RA, and CO2 sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 CFM. With 2-speed fan units VENT L (low speed fan) and MIN POS H (high speed fan) settings are required. Default for VENTMAX L is 3.2V and VENTMAX H is 2.8V</td>
</tr>
<tr>
<td></td>
<td>VENTMIN</td>
<td>2.25 V</td>
<td>2 to 10 Vdc or 100 to 9990 cfm; increment by 10</td>
<td>DCV MINIMUM DAMPER POSITION Displays only if a CO2 sensor is connected. Used for Bx (ventilation min cfm) setpoint. Displays 2 to 10 V if &lt;3 sensors (RA, OA, and MA). Va is only set if DCV is used. This is the ventilation for less than maximum occupancy of the space. In AUTO mode dampers controlled by CFM.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100 to 9990 cfm; increment by 10</td>
<td>If OA, MA, RA, and CO2 sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 CFM. With 2-speed fan units VENTMIN L (low speed fan) and MIN POS H (high speed fan) settings are required. Default for VENTMIN L is 3.2V and VENTMIN H is 2.8V</td>
</tr>
<tr>
<td></td>
<td>ERV OAT SP††</td>
<td>32°F</td>
<td>0 to 50 F; increment by 1</td>
<td>ENERGY RECOVERY VENTILATOR UNIT OUTDOOR AIR TEMPERATURE SETPOINT Only when AUX1 O = ERV</td>
</tr>
<tr>
<td></td>
<td>EXH1 SET</td>
<td>50%</td>
<td>0 to 100%; increment by 1</td>
<td>EXHAUST FAN STAGE 1 SETPOINT Setpoint for OA damper position when exhaust fan 1 is powered by the economizer. With 2-speed fan units Exh1 L (low speed fan) and Exh1 H (high speed fan) settings are required. Default for Exh1 L is 65% and Exh1 H is 50%</td>
</tr>
<tr>
<td></td>
<td>EXH2 SET</td>
<td>75%</td>
<td>0 to 100%; increment by 1</td>
<td>EXHAUST FAN STAGE 2 SETPOINT Setpoint for OA damper position when exhaust fan 2 is powered by the economizer. Only used when AUX1 O is set to EHx2. With 2-speed fan units Exh2 L (low speed fan) and Exh2 H (high speed fan) settings are required. Default for Exh2 L is 80% and Exh2 H is 75%</td>
</tr>
<tr>
<td>MENU</td>
<td>PARAMETER</td>
<td>PARAMETER DEFAULT VALUE</td>
<td>PARAMETER RANGE AND INCREMENT†</td>
<td>NOTES</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>-------------------------</td>
<td>-------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>INSTALL</td>
<td>01/01/10</td>
<td>N/A</td>
<td>Display order = MM/DD/YY</td>
<td>Setting order = DD, MM, then YY.</td>
</tr>
<tr>
<td>UNITS DEG</td>
<td>F</td>
<td>F or C</td>
<td>Sets economizer controller in degrees Fahrenheit or Celsius</td>
<td></td>
</tr>
<tr>
<td>EQUIPMENT</td>
<td>CONV</td>
<td>Conventional or HP</td>
<td>CONV = conventional;</td>
<td>HP O/B = Enable Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller. See Menu Note 4.</td>
</tr>
<tr>
<td>AUX2 IN</td>
<td>W</td>
<td>SD/W or HP/(O)/ HP/(B)</td>
<td>In CONV mode:</td>
<td>SD = Enables configuration of shutdown (default); W = informs controller that system is in heating mode. NOTE: If using 2-speed fan mode, you must program CONV mode for W. Shutdown is not available in 2-speed fan mode. See Menu Note 4. In HP O/B mode: HP/(O) = energize heat pump on Cool (default); HP/(B) = energize heat pump on heat.</td>
</tr>
<tr>
<td>FAN SPEED</td>
<td>2 speed</td>
<td>1 speed/2 speed</td>
<td>Sets the economizer controller for operation of 1 speed or 2 speed supply fan. NOTE: 2-speed fan option also needs Heat (W1) programmed in AUX 2 In. See Menu Note 4.</td>
<td></td>
</tr>
<tr>
<td>FAN CFM</td>
<td>5000cfm</td>
<td>100 to 15000 cfm;</td>
<td>UNIT DESIGN AIRFLOW (CFM)</td>
<td>increment by 100. The value is found on the nameplate label for the specific unit.</td>
</tr>
<tr>
<td>AUX1 OUT</td>
<td>NONE</td>
<td>NONE</td>
<td>Select OUTPUT for AUX1 O relay</td>
<td>• NONE = not configured (output is not used) • ERV = Energy Recovery Ventilator†† • EXH2 = second damper position relay closure for second exhaust fan • SYS = use output as an alarm signal</td>
</tr>
<tr>
<td>OCC</td>
<td>INPUT</td>
<td>INPUT or ALWAYS</td>
<td>OCCUPIED MODE BY EXTERNAL SIGNAL</td>
<td>When using a setback thermostat with occupancy out (24 vac), the 24 vac is input &quot;INPUT&quot; to the OCC terminal. If no occupancy output from the thermostat then change program to &quot;ALWAYS&quot; OR add a jumper from terminal R to OCC terminal.</td>
</tr>
<tr>
<td>FACTORY DEFAULT</td>
<td>NO</td>
<td>NO or YES</td>
<td>Resets all set points to factory defaults when set to YES. LCD will briefly flash YES and change to NO but all parameters will change to the factory default values. NOTE: RECHECK AUX2 IN and FANTYPE for required 2-speed values.</td>
<td></td>
</tr>
<tr>
<td>MA LO SET</td>
<td>45°F</td>
<td>35 to 55 °F; incremented by 10</td>
<td>SUPPLY AIR TEMPERATURE LOW LIMIT</td>
<td>Temperature to achieve Freeze Protection (close damper and alarm if temperature falls below setup value).</td>
</tr>
<tr>
<td>FREEZE POS</td>
<td>CLO</td>
<td>CLO or MIN</td>
<td>FREEZE PROTECTION DAMPER POSITION</td>
<td>Damper position when freeze protection is active (closed or MIN POS).</td>
</tr>
<tr>
<td>CO2 ZERO</td>
<td>0ppm</td>
<td>0 to 500 ppm;</td>
<td>CO₂ ppm level to match CO₂ sensor start level.</td>
<td>increment by 10.</td>
</tr>
<tr>
<td>CO2 SPAN</td>
<td>2000ppm</td>
<td>1000 to 3000 ppm;</td>
<td>CO₂ ppm span to match CO₂ sensor.</td>
<td>increment by 10.</td>
</tr>
<tr>
<td>STG3 DLY</td>
<td>2.0h</td>
<td>0 min, 5 min, 15 min,</td>
<td>COOLING STAGE 3 DELAY</td>
<td>Delay after stage 2 cool has been active. Turns on 2nd stage of cooling when economizer is 1st stage and mechanical cooling is 2nd stage. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling</td>
</tr>
<tr>
<td>SD DMPR POS</td>
<td>CLO</td>
<td>CLO or OPN</td>
<td>Indicates shutdown signal from space thermostat or unitary controller. When controller receives 24 Vac input on the SD terminal in conventional mode, the OA damper will open if programmed for OPN and OA damper will close if programmed for CLO. All other controls, e.g., fans, etc. will shut off.</td>
<td></td>
</tr>
<tr>
<td>DA LO ALM</td>
<td>45 F (7 C)</td>
<td>35 to 65 °F; (2 to</td>
<td>Used for alarm when the DA air temperature is too low. Set lower range of alarm, below this temperature the alarm will show on the display.</td>
<td>18 C) incremented by 5 deg.</td>
</tr>
<tr>
<td>DA HI ALM</td>
<td>80 F (27 C)</td>
<td>70 to 180 °F; (21 to</td>
<td>Used for alarm when the DA air temperature is too high. Set upper range of alarm, above this temperature the alarm will show on the display.</td>
<td>82 C) Incremented by 5 deg.</td>
</tr>
<tr>
<td>DCVCAL ENA</td>
<td>MAN</td>
<td>MAN (manual) AUTO</td>
<td>Turns on the DCV automatic control of the dampers. Resets ventilation based on the RA, OA, and MA sensor conditions. Requires all 3 RA, OA, and MA sensors.</td>
<td></td>
</tr>
<tr>
<td>MENU</td>
<td>PARAMETER</td>
<td>PARAMETER DEFAULT VALUE</td>
<td>PARAMETER RANGE AND INCREMENT†</td>
<td>NOTES</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------</td>
<td>-------------------------</td>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>ADVANCED SETUP (CONT)</strong></td>
<td>MAT CAL</td>
<td>0.0°F</td>
<td>±2.5°F</td>
<td>SUPPLY AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.</td>
</tr>
<tr>
<td></td>
<td>OAS CAL</td>
<td>0.0°F</td>
<td>±2.5°F</td>
<td>OUTSIDE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.</td>
</tr>
<tr>
<td></td>
<td>OA H CAL</td>
<td>0% RH</td>
<td>±10% RH</td>
<td>OUTSIDE AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor.</td>
</tr>
<tr>
<td></td>
<td>RA CAL</td>
<td>0.0°F</td>
<td>±2.5°F</td>
<td>RETURN AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.</td>
</tr>
<tr>
<td></td>
<td>RA H CAL</td>
<td>0% RH</td>
<td>±10% RH</td>
<td>RETURN AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor.</td>
</tr>
<tr>
<td></td>
<td>DA CAL</td>
<td>0.0°F</td>
<td>±2.5°F</td>
<td>DISCHARGE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.</td>
</tr>
<tr>
<td></td>
<td>2SP FAN DELAY</td>
<td>5 Minutes</td>
<td>0 to 20 minutes in 1 minute increments</td>
<td>TIME DELAY ON 2nd STAGE ECONOMIZING When in economizing mode this is the delay for the high speed fan to try to satisfy the call for second stage cooling before the first stage mechanical cooling is enabled.</td>
</tr>
<tr>
<td><strong>CHECKOUT</strong></td>
<td>DAMPER MINIMUM POSITION</td>
<td>N/A</td>
<td>N/A</td>
<td>The checkout for the damper minimum position is based on the system.</td>
</tr>
<tr>
<td></td>
<td>DAMPER OPEN</td>
<td>N/A</td>
<td>N/A</td>
<td>Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure you pause in the mode to allow exhaust contacts to energize due to the delay in the system.</td>
</tr>
<tr>
<td></td>
<td>DAMPER CLOSE</td>
<td>N/A</td>
<td>N/A</td>
<td>Positions damper to the fully closed position</td>
</tr>
<tr>
<td></td>
<td>CONNECT Y1–O</td>
<td>N/A</td>
<td>N/A</td>
<td>Closes the Y1-O relay (Y1–O)</td>
</tr>
<tr>
<td></td>
<td>CONNECT Y2–O</td>
<td>N/A</td>
<td>N/A</td>
<td>Closes the Y2-O relay (Y2–O)</td>
</tr>
</tbody>
</table>
|                         | CONNECT AUX1–O             | N/A                     | N/A                           | Energizes the AUX output. If Aux setting is: 
• NONE — not action taken 
• ERV — 24 Vac out. Turns on or signals an ERV that the conditions are not good for economizing but are for ERV operation.†† 
• SYS — 24 Vac out. Issues a system alarm |
|                         | CONNECT EXH1               | N/A                     | N/A                           | Closes the power exhaust fan 2 relay (EXH1) |
| **ALARMS**              | MAT SENS ERR               | N/A                     | N/A                           | SUPPLY AIR TEMPERATURE SENSOR ERROR Mixed air sensor has failed or become disconnected - check wiring then replace sensor if the alarm continues. |
|                         | CO2 SENS ERR               | N/A                     | N/A                           | CO2 SENSOR ERROR CO2 sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues. |
|                         | OA SYLK T ERR              | N/A                     | N/A                           | OUTSIDE AIR S-BUS SENSOR ERROR Outdoor air enthalpy sensor has failed or become disconnected - check wiring then replace sensor if the alarm continues. |
|                         | OA SYLK H ERR              | N/A                     | N/A                           | RETURN AIR S-BUS SENSOR ERROR Return air enthalpy sensor has failed or become disconnected - check wiring then replace sensor if the alarm continues. |
|                         | RA SYLK T ERR              | N/A                     | N/A                           | DISCHARGE AIR S-BUS SENSOR ERROR Discharge air sensor has failed or become disconnected - check wiring then replace sensor if the alarm continues. |
|                         | RA SYLK H ERR              | N/A                     | N/A                           | OUTSIDE AIR TEMPERATURE SENSOR ERROR Outdoor air temperature sensor has failed or become disconnected - check wiring then replace if the alarm continues. |
|                         | ACT ERROR                  | N/A                     | N/A                           | ACTUATOR ERROR Actuator has failed or become disconnected - check for stall, over voltage, under voltage and actuator count. Replace actuator if damper is movable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu. |
|                         | FREEZE ALARM               | N/A                     | N/A                           | Check if outdoor temperature is below the LOW Temp Lockout on set-point menu. Check if Mixed air temperature on STATUS menu is below the Lo Setpoint on Advanced menu. When conditions are back in normal range then the alarm will go away. |
## Table 9 — Menu Structure* (cont)

<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT†</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SHUTDOWN ACTIVE</td>
<td>N/A</td>
<td>N/A</td>
<td>AUX2 IN is programmed for SHUTDOWN and 24 V has been applied to AUX2 IN terminal.</td>
</tr>
<tr>
<td></td>
<td>DMP CAL RUNNING</td>
<td>N/A</td>
<td>N/A</td>
<td>DAMPER CALIBRATION ROUTINE RUNNING. If DCV Auto enable has been programmed, when the W7220 is completing a calibration on the dampers, this alarm will display. Wait until the calibration is completed and the alarm will go away. Must have OA, MA and RA sensors for DCV calibration; set up in the Advanced setup menu.</td>
</tr>
<tr>
<td></td>
<td>DA SENS ALM</td>
<td>N/A</td>
<td>N/A</td>
<td>DISCHARGE AIR TEMPERATURE SENSOR ALARM. Discharge air temperature is out of the range set in the ADVANCED SETUP Menu. Check the temperature of the discharge air.</td>
</tr>
<tr>
<td></td>
<td>SYS ALARM</td>
<td>N/A</td>
<td>N/A</td>
<td>When AUX1-0 is set to SYS and there is any alarm (e.g., failed sensors, etc.), the AUX1-0 terminal has 24 Vac out.</td>
</tr>
<tr>
<td></td>
<td>ACT UNDER V</td>
<td>N/A</td>
<td>N/A</td>
<td>ACTUATOR VOLTAGE LOW. Voltage received by actuator is above expected range.</td>
</tr>
<tr>
<td></td>
<td>ACT OVER V</td>
<td>N/A</td>
<td>N/A</td>
<td>ACTUATOR VOLTAGE HIGH. Voltage received by actuator is below expected range.</td>
</tr>
<tr>
<td></td>
<td>ACT STALLED</td>
<td>N/A</td>
<td>N/A</td>
<td>ACTUATOR STALLED. Actuator stopped before achieving commanded position.</td>
</tr>
</tbody>
</table>

### ALARMS (CONT)

**Table 9 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration. For example, if you do not have a DCV (CO2) sensor, then none of the DCV parameters appear.**

† When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment.

** ERV Operation: When in cooling mode AND the conditions are NOT OK for economizing - the ERV terminal will be energized. In the Heating mode, the ERV terminal will be energized when the OA is below the ERV OAT setpoint in the setpoint menu.**

### NOTES:

1. **STATUS —› OCCUPIED** — The factory-standard Occupancy signal originates with a thermostat or other controller call for indoor fan operation at CTB terminal G. This signal passes through the Central Terminal Board's OCCUPIED jumper JMP1 to the ECONO connector and to the W7220's OCC input terminal. An external timeclock or relay is required to implement an Occupancy schedule on the economizer damper position.

2. **STATUS —› MA TEMP, SETPOINTS —› MAT SET** — The W7220 menu parameters and labels include designations MA, MAT and Mixed Air for the economizer cooling control sensor. On these rooftop units, the economizer control sensor is located downstream of the evaporator/indoor coil in the supply fan section where this sensor is designated as Supply Air Temperature (SAT) sensor.

3. **SETPOINTS —› DRYBLB SET** — This point is not displayed if a Return Air (differential) temperature sensor or an Outdoor Air enthalpy sensor is connected.

4. **SYSTEM SETUP parameters must be configured as noted for 2-Speed unit operation:**

   ```
   EQUIPMENT = CONV
   AUX2 I = W
   FAN SPEED = 2SPEED
   ```

For damper minimum position settings and checkout menu readings, see Table 10. For dry bulb operation with a 1 speed indoor fan, with or without DCV, see Tables 11 and 12. For enthalpy operation with a 1 speed indoor fan, with or without DCV, see Tables 13 and 14.
**Table 10 — Damper Minimum Position Settings and Readings on Checkout Menu**

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (CO₂ SENSOR)</th>
<th>SETPOINTS</th>
<th>FAN SPEED</th>
<th>CHECKOUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>MIN POS</td>
<td>1</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>1</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>MIN POS H</td>
<td>2</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td>MIN POS L</td>
<td>2</td>
<td>VMAX–LS</td>
</tr>
<tr>
<td>YES</td>
<td>VENT MIN</td>
<td>1</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td>VENT MAX</td>
<td>1</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td>VENT MIN H</td>
<td>2</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td>VENT MAX H</td>
<td>2</td>
<td>VMAX–LS</td>
</tr>
<tr>
<td></td>
<td>VENT MIN L</td>
<td>2</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>VENT MAX L</td>
<td>2</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Table 11 — Dry Bulb Operation No DCV (CO₂ Sensor) — 1 Speed Fan**

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (DCV)</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>NO</td>
<td>OFF</td>
<td>OFF</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>HIGH</td>
<td>24v/On</td>
<td>24v/On</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td>NONE</td>
<td>YES</td>
<td>OFF</td>
<td>OFF</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>HIGH</td>
<td>24v/On</td>
<td>24v/On</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
</tbody>
</table>

*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

**Table 12 — Dry Bulb Operation with DCV (CO₂ Sensor) — 1 Speed Fan**

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (DCV)</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below CO₂ Set</td>
<td>No</td>
<td>OFF</td>
<td>OFF</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>HIGH</td>
<td>24v/On</td>
<td>24v/On</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
</tbody>
</table>

*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.
Table 13 — Enthalpy Operation No DCV (CO₂ Sensor) — 1 Speed Fan

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (DCV)</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>NO</td>
<td>OFF</td>
<td>OFF</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>HIGH</td>
<td>24v/On</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>ON</td>
<td>HIGH</td>
<td>24v/On</td>
<td>24v/On</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>YES</td>
<td>OFF</td>
<td>OFF</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>ON</td>
<td>HIGH</td>
<td>24v/On</td>
<td>0v/Off*</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
</tr>
</tbody>
</table>

*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

Table 14 — Enthalpy Operation with DCV (CO₂ Sensor) — 1 Speed Fan

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (DCV)</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below CO₂ Set</td>
<td>No</td>
<td>OFF</td>
<td>OFF</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>HIGH</td>
<td>24v/On</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>ON</td>
<td>HIGH</td>
<td>24v/On</td>
<td>24v/On</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>OFF</td>
<td>OFF</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>ON</td>
<td>HIGH</td>
<td>24v/On</td>
<td>0v/Off*</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
</tr>
</tbody>
</table>

*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2-O after the delay if the call for Y1-I and Y2-I have not been satisfied.

Table 15 — Single Enthalpy and Dual Enthalpy High Limit Curves

<table>
<thead>
<tr>
<th>ENTHALPY CURVE</th>
<th>TEMP. DRY BULB (F)</th>
<th>TEMP. DEWPOINT (F)</th>
<th>ENTHALPY (btu/lb/da)</th>
<th>POINT P1</th>
<th>POINT P2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TEMP. (F)</td>
<td>HUMIDITY (%RH)</td>
<td>TEMP. (F)</td>
<td>HUMIDITY (%RH)</td>
<td></td>
</tr>
<tr>
<td>ES1</td>
<td>80</td>
<td>36.8</td>
<td>66.3</td>
<td>80.1</td>
<td></td>
</tr>
<tr>
<td>ES2</td>
<td>75</td>
<td>39.6</td>
<td>63.3</td>
<td>80.0</td>
<td></td>
</tr>
<tr>
<td>ES3</td>
<td>70</td>
<td>42.3</td>
<td>59.7</td>
<td>81.4</td>
<td></td>
</tr>
<tr>
<td>ES4</td>
<td>65</td>
<td>44.8</td>
<td>55.7</td>
<td>84.2</td>
<td></td>
</tr>
<tr>
<td>ES5</td>
<td>60</td>
<td>46.9</td>
<td>51.3</td>
<td>88.5</td>
<td></td>
</tr>
<tr>
<td>HL</td>
<td>86</td>
<td>38.9</td>
<td>72.4</td>
<td>80.3</td>
<td></td>
</tr>
</tbody>
</table>

**Enthalpy Settings**

When the OA temperature, enthalpy and dew point are below the respective setpoints, the Outdoor Air can be used for economizing. Fig. 54 shows the new single enthalpy boundaries in the W7220. There are 5 boundaries (setpoints ES1 through ES5), which are defined by dry bulb temperature, enthalpy and dew point.

Refer to Table 15 for ENTH CURVE setpoint values.

The W7220 calculates the enthalpy and dew point using the OA temperature and humidity input from the OA enthalpy sensor. When the OA temperature, OA humidity and OA dew point are all below the selected boundary, the economizer sets the economizing mode to YES, economizing is available.

When all of the OA conditions are above the selected boundary, the conditions are not good to economize and the mode is set to NO.

Fig. 54 shows the 5 current boundaries. There is also a high limit boundary for differential enthalpy. The high limit boundary is ES1 when there are no stages of mechanical cooling energized and HL (high limit) when a compressor stage is energized.
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 Checkout tests.

NOTE: For information about menu navigation and use of the keypad see Interface Overview on page 30.

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 W7220 module is mounted and wired, apply power.

Initial Menu Display

On initial start up, Honeywell displays on the first line and economizer W7220 on the second line. After a brief pause, the revision of the software appears on the first line and the second line will be blank.

Power Loss (Outage or Brownout)

All setpoints 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 (see Table 9) 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 30.

Checkout Tests

Use the Checkout menu (see page 35) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

Troubleshooting

Alarms

The economizer module provides alarm messages that display on the 2-line LCD.

NOTE: Upon power up, the module waits 60 minutes before checking for alarms. This allows time for all the configured devices (e.g. sensors, actuator) to become operational. The exception is the SAT sensor which will alarm immediately.

If one or more alarms are present and there has been no keypad activity for at least 5 minutes, the Alarms menu displays and cycles through the active alarms.

You can also navigate to the Alarms menu at any time.

Clearing Alarms

Once the alarm has been identified and the cause has been removed (e.g. replaced faulty sensor) the alarm can be cleared from the display.

To clear an alarm, perform the following:

1. Navigate to the desired alarm.
2. Press the (Enter) button. ERASE? displays.
3. Press the (Enter) button. ALARM ERASED displays.
4. Press the (Menu up/Exit) button to complete the action and return to the previous menu.
NOTE: If the alarm still exists after clearing it, it is redisplayed within 5 seconds.

PREMIERLINK™ (FACTORY OPTION)

The PremierLink™ controller (see Fig. 55) is compatible with Carrier Comfort Network® (CCN) devices. This control is designed to allow users the access and ability to change factory-defined settings, thus expanding the function of the standard unit control board. CCN service access tools include System Pilot™, Touch Pilot™ and Service Tool. (Standard tier display tools Navigator™ and Scrolling Marquee are not suitable for use with latest PremierLink™ controller, Version 2.x.)

The PremierLink™ control is factory-mounted in the 48HC unit’s main control box to the left of the Central Terminal Board (CTB) (see Fig. 56). Factory wiring is completed through harnesses connected to the CTB thermostat. Field connections are made at a 16-pole terminal block (TB1) located on the bottom shelf of the unit control box in front of the PremierLink™ controller. The factory-installed PremierLink™ control includes the supply-air temperature (SAT) sensor. The outdoor air temperature (OAT) sensor is included in the FIOP/accessory EconoMi$er® 2 package. See Fig. 57 and 58 for wiring diagrams.

The PremierLink™ controller requires the use of a Carrier electronic thermostat or a CCN connection for time broadcast to initiate its internal timeclock. This is necessary for broadcast of time of day functions (occupied/unoccupied).

NOTE: The PremierLink™ controller is shipped in Sensor mode. To be used with a thermostat, the PremierLink™ controller must be configured to Thermostat mode. Refer to PremierLink™ Configuration instructions for Operating Mode.
Fig. 57 — PremierLink™ Wiring Schematic
Fig. 58 — PremierLink™ Wiring Schematic with Humidi-MiZer® System
Supply Air Temperature (SAT) Sensor

On the FIOP-equipped 48HC unit, the unit is supplied with a supply-air temperature (SAT) sensor (33ZCSENSAT). This sensor is a tubular probe type, approx 6 in. (152 mm) long. It is a nominal 10k ohm thermistor.

The SAT is factory-wired. The SAT probe is wire-tied to the supply air opening (on the horizontal opening end) in its shipping position. Remove the sensor for installation. Re- position the sensor in the flange of the supply air opening or in the supply air duct (as required by local codes). Drill or punch a 1/2-in. hole in the flange or duct. Use two field-supplied, self-drilling screws to secure the sensor probe in a horizontal orientation. See Fig. 59.

![Fig. 59 — Typical Mounting Location for Supply Air Temperature (SAT) Sensor on Small Rooftop Units](image)

NOTE: Refer to PremierLink™ “Installation, Start-Up and Configuration Instructions” (Part Number 33CSPREMLK) for complete PremierLink™ configuration, operating sequences and troubleshooting information. Have a copy of this manual available at unit start-up.

NOTE: The sensor must be mounted in the discharge airstream downstream of the cooling coil and any heating devices. Be sure the probe tip does not come in contact with any of the unit’s heater surfaces.

Outdoor Air Temperature (OAT) Sensor

The OAT is factory-mounted in the EconoMiSer®2 (FIOP or accessory). It is a nominal 10k ohm thermistor attached to an eyelet mounting ring.

EconoMiSer®2

The PremierLink™ control is used with EconoMiSer®2 (option or accessory) for outdoor air management. The damper position is controlled directly by the PremierLink control; EconoMiSer®2 has no internal logic device.

Outdoor air management functions can be enhanced with field-installation of these accessory control devices:

- Enthalpy control (outdoor air or differential sensors)
- Space CO₂ sensor
- Outdoor air CO₂ sensor

Refer to Table 16 for accessory part numbers.

FIELD CONNECTIONS

Field connections for accessory sensor and input devices are made at the 16-pole terminal block (TB1) located on the control box bottom shelf in front of the PremierLink™ control. See Fig. 57 and 58. Some input devices also require a 24-vac signal source; connect at CTB terminal R at “THERMOSTAT” connection strip for this signal source. See Fig. 61-64 for field connection locations (and for continued connections at the PremierLink™ board inputs).

Table 17 provides a summary of field connections for units equipped with Space Sensor. Table 18 provides a summary of field connections for units equipped with Space Thermostat.

Table 16 — PremierLink™ Sensor Usage

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>OUTDOOR AIR TEMPERATURE SENSOR</th>
<th>RETURN AIR TEMPERATURE SENSOR</th>
<th>OUTDOOR AIR ENTHALPY SENSOR</th>
<th>RETURN AIR ENTHALPY SENSOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential Dry Bulb Temperature with PremierLink™ (PremierLink™ requires 4-20 mA Actuator)</td>
<td>Included — CRTEMPSN001A00</td>
<td>Requires — 33ZCCT5SPT or equivalent</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Single Enthalpy with PremierLink™ (PremierLink™ requires 4-20mA Actuator)</td>
<td>Included — Not Used</td>
<td>—</td>
<td>Requires — 33CSENTHSW</td>
<td>—</td>
</tr>
<tr>
<td>Differential Enthalpy with PremierLink™ (PremierLink™ requires 4-20mA Actuator)</td>
<td>Included — Not Used</td>
<td>—</td>
<td>Requires — 33CSENTHSW or equivalent</td>
<td>Requires — 33CSENSEN or equivalent</td>
</tr>
</tbody>
</table>

NOTE:

CO₂ Sensors (Optional):
- 33ZCSENCO₂ — Room sensor (adjustable). Aspirator box is required for duct mounting of the sensor.
- 33ZCASPCO₂ — Aspirator box used for duct-mounted CO₂ room sensor.
- 33ZCT55CO₂ — Space temperature and CO₂ room sensor with override.
- 33ZCT56CO₂ — Space temperature and CO₂ room sensor with override and setpoint.
### Table 17 — Space Sensor Mode

<table>
<thead>
<tr>
<th>TB1 TERMINAL</th>
<th>FIELD CONNECTION</th>
<th>INPUT SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>T55–SEN/T56–SEN</td>
<td>Analog (10k thermistor)</td>
</tr>
<tr>
<td>2</td>
<td>RMTOCC</td>
<td>Discrete, 24VAC</td>
</tr>
<tr>
<td>3</td>
<td>T55–SEN/T56–SEN</td>
<td>Analog (10k thermistor)</td>
</tr>
<tr>
<td>4</td>
<td>CMPSAFE</td>
<td>Discrete, 24VAC</td>
</tr>
<tr>
<td>5</td>
<td>T56–SET</td>
<td>Analog (10k thermistor)</td>
</tr>
<tr>
<td>6</td>
<td>FSD</td>
<td>Discrete, 24VAC</td>
</tr>
<tr>
<td>7</td>
<td>LOOP–PWR</td>
<td>Analog, 24VAC</td>
</tr>
<tr>
<td>8</td>
<td>SPS</td>
<td>Discrete, 24VAC</td>
</tr>
<tr>
<td>9</td>
<td>IAQ–SEN</td>
<td>Analog, 4-20mA</td>
</tr>
<tr>
<td>10</td>
<td>FILTER</td>
<td>Discrete, 24VAC</td>
</tr>
<tr>
<td>11</td>
<td>IAQ–COM/OAQ–COM/RH–COM</td>
<td>Analog, 4-20mA</td>
</tr>
<tr>
<td>12</td>
<td>CCN + (RED)</td>
<td>Digital, 5VDC</td>
</tr>
<tr>
<td>13</td>
<td>OAQ–SEN/RH–SEN</td>
<td>Analog, 4-20mA</td>
</tr>
<tr>
<td>14</td>
<td>CCN Gnd (WHT)</td>
<td>Digital, 5VDC</td>
</tr>
<tr>
<td>15</td>
<td>AUX OUT(Power Exhaust) (Output)</td>
<td>Discrete 24VAC</td>
</tr>
<tr>
<td>16</td>
<td>CCN–(BLK)</td>
<td>Digital, 5VDC</td>
</tr>
</tbody>
</table>

**Legend**

- **TB5** — Space Temperature Sensor
- **TB6** — Space Temperature Sensor
- **CCN** — Carrier Comfort Network® (communication bus)
- **CMPSAFE** — Compressor Safety
- **FILTER** — Dirty Filter Switch
- **FSD** — Fire Shutdown
- **IAQ** — Indoor Air Quality (CO₂)
- **OAQ** — Outdoor Air Quality (CO₂)
- **RH** — Relative Humidity
- **SFS** — Supply Fan Status

### Table 18 — Thermostat Mode

<table>
<thead>
<tr>
<th>TB1 TERMINAL</th>
<th>FIELD CONNECTION</th>
<th>INPUT SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RAT-SEN</td>
<td>Analog (10k thermistor)</td>
</tr>
<tr>
<td>2</td>
<td>G</td>
<td>Discrete, 24VAC</td>
</tr>
<tr>
<td>3</td>
<td>RAT-SEN</td>
<td>Analog (10k thermistor)</td>
</tr>
<tr>
<td>4</td>
<td>Y1</td>
<td>Discrete, 24VAC</td>
</tr>
<tr>
<td>5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>Y2</td>
<td>Discrete, 24VAC</td>
</tr>
<tr>
<td>7</td>
<td>LOOP–PWR</td>
<td>Analog, 24VAC</td>
</tr>
<tr>
<td>8</td>
<td>W1</td>
<td>Discrete, 24VAC</td>
</tr>
<tr>
<td>9</td>
<td>IAQ–SEN</td>
<td>Analog, 4-20mA</td>
</tr>
<tr>
<td>10</td>
<td>W2</td>
<td>Discrete, 24VAC</td>
</tr>
<tr>
<td>11</td>
<td>IAQ–COM/OAQ–COM/RH–COM</td>
<td>Analog, 4-20mA</td>
</tr>
<tr>
<td>12</td>
<td>CCN + (RED)</td>
<td>Digital, 5VDC</td>
</tr>
<tr>
<td>13</td>
<td>OAQ–SEN/RH–SEN</td>
<td>Analog, 4-20mA</td>
</tr>
<tr>
<td>14</td>
<td>CCN Gnd (WHT)</td>
<td>Digital, 5VDC</td>
</tr>
<tr>
<td>15</td>
<td>AUX OUT(Power Exhaust) (Output)</td>
<td>Discrete 24VAC</td>
</tr>
<tr>
<td>16</td>
<td>CCN–(BLK)</td>
<td>Digital, 5VDC</td>
</tr>
</tbody>
</table>

**Legend**

- **TB1** — Carrier Comfort Network® (communication bus)
- **G** — Thermostat Fan
- **IAQ** — Indoor Air Quality (CO₂)
- **OAQ** — Outdoor Air Quality (CO₂)
- **RAT** — Return Air Temperature
- **RH** — Relative Humidity
- **W1** — Thermostat Heat Stage 1
- **W2** — Thermostat Heat Stage 2
- **Y1** — Thermostat Cool Stage 1
- **Y2** — Thermostat Cool Stage 2
Space Sensors
The PremierLink™ controller is factory-shipped configured for Space Sensor Mode. A Carrier T-55 or T-56 space sensor must be used. The T-55 space temperature sensor provides a signal of space temperature to the PremierLink™ control. T-56 provides the same space temperature signal, and it also allows the occupants to adjust space temperature setpoints from the face of the sensor.

Connect T-55
See Fig. 60 for typical T-55 internal connections. Connect the T-55 SEN terminals to TB1 terminals 1 and 3 (see Fig. 61).

Fig. 60 — T-55 Space Temperature Sensor Wiring

Connect T-56
See Fig. 62 for T-56 internal connections. Install a jumper between SEN and SET terminals as illustrated. Connect T-56 terminals to TB1 terminals 1, 3, and 5 (see Fig. 63).

Fig. 62 — T-56 Internal Connections

Configure the Unit for Thermostat Mode
Connect to the CCN bus using a CCN service tool and navigate to PremierLink™ Configuration screen for Operating Mode. Default setting is Sensor Mode (value 1). Change the value to 0 to reconfigure the controller for Thermostat Mode.

When the PremierLink is configured for Thermostat Mode, these functions are not available: Fire Shutdown (FSD), Remote Occupied (RMTOCC), Compressor Safety (CMPSAFE), Supply Fan Status (SFS), and Filter Pressure Switch (FILTER).
**ECONOMIZER CONTROLS**

**Indoor Air Quality (CO₂) Sensor**

The indoor air quality sensor accessory monitors space carbon dioxide (CO₂) levels. This information is used to monitor IAQ levels. Several types of sensors are available, for wall mounting in the space or in return duct, with and without LCD display, and in combination with space temperature sensors. Sensors use infrared technology to measure the levels of CO₂ present in the space air.

The CO₂ sensors are all factory set for a range of 0 to 2000 ppm and a linear mA output of 4 to 20. Refer to the instructions supplied with the CO₂ sensor for electrical requirements and terminal locations. See Fig. 65 for typical CO₂ sensor wiring schematic.

![Fig. 65 — Indoor/Outdoor Air Quality (CO₂) Sensor (33ZCSENCO2) — Typical Wiring Diagram](image)

To accurately monitor the quality of the air in the conditioned air space, locate the sensor near a return-air grille (if present) so it senses the concentration of CO₂ leaving the space. The sensor should be mounted in a location to avoid direct breath contact.

Do not mount the IAQ sensor in drafty areas such as near supply ducts, open windows, fans, or over heat sources. Allow at least 3 ft (0.9 m) between the sensor and any corner. Avoid mounting the sensor where it is influenced by the supply air; the sensor gives inaccurate readings if the supply air is blown directly onto the sensor or if the supply air does not have a chance to mix with the room air before it is drawn into the return airstream.

**Wiring the Indoor Air Quality Sensor**

For each sensor, use two 2-conductor 18 AWG (American Wire Gage) twisted-pair cables (unshielded) to connect the separate isolated 24 vac power source to the sensor and to connect the sensor to the control board terminals.

To connect the sensor to the control, identify the positive (4 to 20 mA) and ground (SIG COM) terminals on the sensor. See Fig. 65. Connect the 4-20 mA terminal to terminal TB1-9 and connect the SIG COM terminal to terminal TB1-11. See Fig. 66.

**Outdoor Air Quality Sensor (P/N 33ZCSENCO2 Plus Weatherproof Enclosure)**

The outdoor air CO₂ sensor is designed to monitor carbon dioxide (CO₂) levels in the outside ventilation air and interface with the ventilation damper in an HVAC system. The OAQ sensor is packaged with an outdoor cover. See Fig. 67. The outdoor air CO₂ sensor must be located in the economizer outside air hood.

![Fig. 66 — Indoor CO₂ Sensor (33ZCSENCO2) Connections](image)

Refer to “PremierLink™ Installation, Start-Up, and Configuration Instructions” for detailed configuration information.

![Fig. 67 — Outdoor Air Quality Sensor Cover](image)

**Wiring the Outdoor Air CO₂ Sensor**

A dedicated power supply is required for this sensor. A two-wire cable is required to wire the dedicated power supply for the sensor. The two wires should be connected to the power supply and terminals 1 and 2.

To connect the sensor to the control, identify the positive (4 to 20 mA) and ground (SIG COM) terminals on the OAQ sensor. See Fig. 65. Connect the 4 to 20 mA terminal to the TB1-13 terminal of the 48HC unit. Connect the SIG COM terminal to the TB1-11 terminal of the 48HC unit. See Fig. 68.

**OAQ Sensor/RH Sensor**

![Fig. 68 — Outdoor CO₂ Sensor Connections](image)
Space Relative Humidity Sensor or Humidistat Connections
NOTE: The accessory space relative humidity sensor and humidistat are not available for single phase (-3 voltage code) models.

Space Relative Humidity Sensor Connections
The accessory space relative humidity sensor (33ZCSEN-SRH-01) is installed on an interior wall to measure the relative humidity of the air within the occupied space.

The use of a standard 2 x 4-in. electrical box to accommodate the wiring is recommended for installation. The sensor can be mounted directly on the wall, if acceptable by local codes.

![CAUTION]

Failure to follow this caution may result in permanent damage to the sensor.
DO NOT clean or touch the sensing element with chemical solvents as they can permanently damage the sensor.

If the sensor is installed directly on a wall service, install the humidity sensor using 2 screws and 2 hollow wall anchors (field supplied). Do not over tighten screws. See Fig. 69.

![Fig. 69 — Space Relative Humidity Sensor Installation]

The sensor must be mounted vertically on the wall. The Carrier logo should be orientated correctly when the sensor is properly mounted.

Avoid corner locations. Allow at least 4 ft between the sensor and any corner. Airflow near corners tends to be reduced, resulting in erratic sensor readings. The sensor should be vertically mounted approximately 5 ft up from the floor, beside the space temperature sensor.

For wiring distances up to 500 ft, use a 3-conductor, 18 or 20 AWG cable. A CCN communication cable can be used, although the shield is not required. The shield must be removed from the sensor end of the cable if this cable is used. See Fig. 70 for wiring details.

![Fig. 70 — Space Relative Humidity Sensor Connection]

The power for the sensor is provided by the PremierLink™ control on terminal J5-4 (+33 to +35vdc).

Wiring the Sensor
To wire the sensor:
1. At the sensor, remove 4 inches of the jacket from the cable. Strip ¼ inch of insulation from each conductor. Route the cable through the wire clearance opening in the center of the sensor. See Fig. 69.
2. Connect a field-supplied BLACK wire to the sensor screw terminal marked Vin.
3. Connect a field-supplied RED wire into the sensor screw terminal marked Io.
4. Connect the field-supplied RED wire from the sensor to TB1-13.
5. Connect the field-supplied BLACK wire from the sensor to TB1-7.

Smoke Detector/Fire Shutdown (FSD)
This function is available only when PremierLink™ is configured for (Space) Sensor Mode. The unit is factory-wired for PremierLink™ FSD operation when PremierLink™ is factory-installed.

On 48HC units equipped with factory-installed Smoke Detector(s), the smoke detector controller implements the unit shutdown through its NC contact set connected to the unit’s CTB input. The FSD function is initiated via the smoke detector’s Alarm NO contact set. The PremierLink™ communicates the smoke detector’s tripped status to the CCN building control. See PremierLink™ wiring schematics (Fig. 57 and 58).

Filter Status Switch
This function is available only when PremierLink™ is configured for (Space) Sensor Mode.

PremierLink™ control can monitor return filter status in two ways: by monitoring a field-supplied/installed filter pressure switch, or via supply fan runtime hours.

Using Switch Input
Install the dirty filter pressure switch according to switch manufacturer’s instructions, to measure pressure drop across the unit’s return filters. Connect one side of the switch’s NO contact set to CTB’s THERMOSTAT-R terminal. Connect the other side of the NO contact set to TB1-10. Setpoint for Dirty Filter is set at the switch. See Fig. 71.
Filter Switch (NO, close on rising pressure (high drop))

Fig. 71 — PremierLink™ Filter Switch Connection

When the filter switch’s NO contact set closes as filter pressure drop increases (indicating dirt-laden filters), the input signal to PremierLink causes the filter status point to read “DIRTY.”

Using Filter Timer Hours
Refer to PremierLink™ “Installation, Start-Up and Configuration Instructions” for instructions on using the PremierLink™ Configuration screens and on unit alarm sequence.

Supply Fan Status Switch
The PremierLink™ control can monitor supply fan operation through a field-supplied/installed differential pressure switch. This sequence will prevent (or interrupt) operation of unit cooling, heating, and economizer functions until the pressure switch closes indicating proper supply fan operation.

Connect one side of the NO contact set on the timeclock to the unit’s THERMOSTAT-R terminal. Connect the other side of the NO contact set to TB1-8. Setpoint for Supply Fan Status is set at 0.5 psi.

Remote Occupied Switch
The PremierLink™ control permits a remote timeclock to override the control’s on-board occupancy schedule and place the unit into Occupied mode. This function may also provide a “Door Switch” time delay function that will terminate cooling and heating functions after a 2 to 20 minute delay.

Connect one side of the NO contact set on the timeclock to the unit’s THERMOSTAT-R terminal. Connect the other side of the NO contact set to TB1-2 terminal (see Fig. 73).

Refer to PremierLink™ “Installation, Start-Up and Configuration Instructions” for additional information on configuring the PremierLink™ control for Door Switch timer function.

Power Exhaust (Output)
Connect the accessory Power Exhaust contactor coils(s) as shown in Fig. 74.

Fig. 74 — PremierLink™ Power Exhaust Output Connection

NOTE: The Power Exhaust and Humidi-MiZer® options cannot be used with PremierLink™ at the same time as both options require connection at TB1-15 (AUX OUT).

CCN Communication Bus
The PremierLink controller connects to the bus in a daisy chain arrangement. Negative pins on each component must be connected to respective negative pins, and likewise, positive pins on each component must be connected to respective positive pins. The controller signal pins must be wired to the signal ground pins. Wiring connections for CCN must be made at the 3-pin plug.

At any baud (9600, 19200, 38400 baud), the number of controllers is limited to 239 devices maximum. Bus length may not exceed 4000 ft, with no more than 60 total devices on any 1000-ft section. Optically isolated RS-485 repeaters are required every 1000 ft.

NOTE: Carrier device default is 9600 baud.

Communications Bus Wire Specifications
The CCN Communication Bus wiring is field-supplied and field-installed. It consists of shielded 3-conductor cable with drain (ground) wire. The cable selected must be identical to the CCN Communication Bus wire used for the entire network. See Table 19 for recommended cable.

Table 19 — Recommended Cables

<table>
<thead>
<tr>
<th>MANUFACTURER</th>
<th>CABLE PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>2413 or 5463</td>
</tr>
<tr>
<td>American</td>
<td>A22503</td>
</tr>
<tr>
<td>Belden</td>
<td>8772</td>
</tr>
<tr>
<td>Columbia</td>
<td>02525</td>
</tr>
</tbody>
</table>

NOTE: Conductors and drain wire must be at least 20 AWG, stranded, and tinned copper. Individual conductors must be insulated with PVC, PVC/nylon, vinyl, Teflon, or polyethylene. An aluminum/polyester 100% foil shield and an outer jacket of PVC, PVC/nylon, chrome vinyl, or Teflon with a minimum operating temperature range of –20°C to 60°C is required. Do not run communication wire in the same conduit as or next to any AC voltage wiring.

The communication bus shields must be tied together at each system element. If the communication bus is entirely within one building, the resulting continuous shield must be connected to ground at only one single point. If the communication bus cable exits from one building and enters another building, the shields must be connected to the grounds at a lightning suppressor in each building (one point only).
**Connecting CCN Bus**

When connecting the communication bus cable, a color code system for the entire network is recommended to simplify installation and checkout. See Table 20 for the recommended color code.

**Table 20 — Color Code Recommendations**

<table>
<thead>
<tr>
<th>SIGNAL TYPE</th>
<th>CCN BUS WIRE COLOR</th>
<th>CCN PLUG PIN NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Red</td>
<td>1</td>
</tr>
<tr>
<td>Ground</td>
<td>White</td>
<td>2</td>
</tr>
<tr>
<td>–</td>
<td>Black</td>
<td>3</td>
</tr>
</tbody>
</table>

Connect the CCN (+) lead (typically RED) to the unit’s TB1-12 terminal. Connect the CCN (ground) lead (typically WHT) to the unit’s TB1-14 terminal. Connect the CCN (–) lead (typically BLK) to the unit’s TB1-16 terminal. See Fig. 75.

**Fig. 75 — PremierLink™ CCN Bus Connections**

RTU OPEN CONTROL SYSTEM

The RTU Open control is factory-mounted in the 48HC unit’s main control box, to the left of the CTB. See Fig. 76. Factory wiring is completed through harnesses connected to the CTB. Field connections for RTU Open sensors will be made at the Phoenix connectors on the RTU Open board. The factory-installed RTU Open control includes the supply-air temperature (SAT) sensor. The outdoor air temperature (OAT) sensor is included in the FIOP/accessory EconoMi$er®2 package.

The RTU Open controller is an integrated component of the Carrier rooftop unit. Its internal application programming provides optimum performance and energy efficiency. RTU Open enables the unit to run in 100% stand-alone control mode, Carrier’s I-Vu® Open network, or a third-party Building Automation System (BAS). On-board DIP switches allow selection of protocol (and baud rate) among the four most popular protocols in use today: BACnet\(^1\), Modbus\(^2\), Johnson N2 and LonWorks\(^3\). See Fig. 77.

See Fig. 78 and 79 for RTU Open system wiring diagrams. Refer to Table 21, RTU Open Controller Inputs and Outputs, for locations of all connections to the RTU Open board.

---

\(^1\) BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).

\(^2\) Modbus is a registered trademark of Schneider Electric.

\(^3\) LonWorks is a registered trademark of Echelon Corporation.
Fig. 77 — RTU Open Multi-Protocol Control Board
Fig. 78 — RTU Open System Control Wiring Diagram
Fig. 79 — RTU Open System Control Wiring Diagram with Humidi-MiZer® System
<table>
<thead>
<tr>
<th>POINT NAME</th>
<th>BACNET OBJECT NAME</th>
<th>TYPE OF I/O</th>
<th>CONNECTION PIN NUMBER (S)</th>
<th>CHANNEL DESIGNATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEDICATED INPUTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Space Temp / Zone Temp</td>
<td>zone_temp</td>
<td>AI (10K Thermistor)</td>
<td>J20–1 and 2</td>
<td>Analog Input 10</td>
</tr>
<tr>
<td>Supply Air Temperature</td>
<td>sa_temp</td>
<td>AI (10K Thermistor)</td>
<td>J2–1 and 2</td>
<td>Analog Input 6</td>
</tr>
<tr>
<td>Outside Air Temperature</td>
<td>oa_temp</td>
<td>AI (10K Thermistor)</td>
<td>J2–3 and 4</td>
<td>Analog Input 7</td>
</tr>
<tr>
<td>Space Temperature Offset Pot</td>
<td>stpt_adj_offset</td>
<td>AI (100K Potentiometer)</td>
<td>J20–3 and 4</td>
<td>Analog Input 11</td>
</tr>
<tr>
<td>Safety Chain Feedback</td>
<td>safety_status</td>
<td>BI (24 VAC)</td>
<td>J1–9</td>
<td>Binary Input 4</td>
</tr>
<tr>
<td>Compressor Safety Status¹</td>
<td>comp_status</td>
<td>BI (24 VAC)</td>
<td>J1–2</td>
<td>Binary Input 3</td>
</tr>
<tr>
<td>Fire Shutdown Status</td>
<td>firedown_status</td>
<td>BI (24 VAC)</td>
<td>J1–10</td>
<td>Binary Input 5</td>
</tr>
<tr>
<td>Enthalpy Status</td>
<td>enthalpy_status</td>
<td>BI (24 VAC)</td>
<td>J2–6 and 7</td>
<td>Binary Input 8</td>
</tr>
<tr>
<td>Humidistat Input Status</td>
<td>humstat_status</td>
<td>BI (24 VAC)</td>
<td>J5–7 and 8</td>
<td>Binary Input 9</td>
</tr>
<tr>
<td>Zone Temperature</td>
<td>n/a</td>
<td>n/a</td>
<td>J13–1–4</td>
<td>Rnet</td>
</tr>
<tr>
<td><strong>CONFIGURABLE INPUTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indoor Air CO₂</td>
<td>iaq</td>
<td>AI (4–20 mA)</td>
<td>J4–2 and 3 or J4–5 and 6</td>
<td>Analog Input 2</td>
</tr>
<tr>
<td>Outdoor Air CO₂</td>
<td>oaq</td>
<td>AI (4–20 mA)</td>
<td>J4–2 and 3 or J4–5 and 6</td>
<td>Analog Input 1</td>
</tr>
<tr>
<td>Space Relative Humidity</td>
<td>space_rh</td>
<td>AI (4–20 mA)</td>
<td>J4–2 and 3 or J4–5 and 6</td>
<td>Analog Input 10</td>
</tr>
<tr>
<td>Supply Fan Status²</td>
<td>sfan_status</td>
<td>BI (24 VAC)</td>
<td>J5–1 and 2 or J5–3 and 4</td>
<td>Binary Input 3, 5, 8, or 9, except where intrinsic input is used</td>
</tr>
<tr>
<td>Filter Status²</td>
<td>filter_status</td>
<td>BI (24 VAC)</td>
<td>J5–1 and 2 or J5–3 and 4</td>
<td>Binary Input 3, 5, 8, or 9, except where intrinsic input is used</td>
</tr>
<tr>
<td>Door Contact²</td>
<td>door_contact_status</td>
<td>BI (24 VAC)</td>
<td>J5–1 and 2 or J5–3 and 4</td>
<td>Binary Input 3, 5, 8, or 9, except where intrinsic input is used</td>
</tr>
<tr>
<td>Remote Occupancy Input²</td>
<td>occ_contact_status</td>
<td>BI (24 VAC)</td>
<td>J5–1 and 2 or J5–3 and 4</td>
<td>Binary Input 3, 5, 8, or 9, except where intrinsic input is used</td>
</tr>
<tr>
<td>IGC Input²</td>
<td>igcovr_status</td>
<td>BI (24 VAC)</td>
<td>J5–1 and 2 or J5–3 and 4</td>
<td>Binary Input 3, 5, 8, or 9, except where intrinsic input is used</td>
</tr>
<tr>
<td><strong>OUTPUTS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economizer Output</td>
<td>econ_output</td>
<td>AO (4–20mA)</td>
<td>J2–5</td>
<td>Analog Output 1</td>
</tr>
<tr>
<td>Supply Fan VFD</td>
<td>vfd_output</td>
<td>AO (2–10Vdc)</td>
<td>J22–1 and 2</td>
<td>Analog Output 2</td>
</tr>
<tr>
<td>Supply Fan Relay</td>
<td>sfan</td>
<td>BO Relay (24VAC, 1A)</td>
<td>J1–4</td>
<td>Binary Output 1 (G)</td>
</tr>
<tr>
<td>Cool 1 Relay State</td>
<td>comp_1</td>
<td>BO Relay (24VAC, 1A)</td>
<td>J1–8</td>
<td>Binary Output 5 (Y1)</td>
</tr>
<tr>
<td>Cool 2 Relay State</td>
<td>comp_2</td>
<td>BO Relay (24VAC, 1A)</td>
<td>J1–7</td>
<td>Binary Output 4 (Y2)</td>
</tr>
<tr>
<td>Cool 3 Relay State</td>
<td>comp_3</td>
<td>BO Relay (24VAC, 1A)</td>
<td>J11–5 and 6</td>
<td>Binary Output 7 (Y3)</td>
</tr>
<tr>
<td>Heat 1 Relay State</td>
<td>heat_1</td>
<td>BO Relay (24VAC, 1A)</td>
<td>J11–7 and 8</td>
<td>Binary Output 6 (W1)</td>
</tr>
<tr>
<td>Heat 2 Relay State</td>
<td>heat_2</td>
<td>BO Relay (24VAC, 1A)</td>
<td>J11–7 and 8</td>
<td>Binary Output 6 (W2)</td>
</tr>
<tr>
<td>Power Exhaust Relay State</td>
<td>pexh</td>
<td>BO Relay (24VAC, 1A)</td>
<td>J11–2 and 3 (N.O.)</td>
<td>Binary Output 8 (PE)</td>
</tr>
<tr>
<td>Dehumidification Relay</td>
<td>dehum</td>
<td>BO Relay (24VAC, 1A)</td>
<td>J11–7 and 8</td>
<td>Binary Output 6</td>
</tr>
</tbody>
</table>

**LEGEND**

AI — Analog Input
AO — Analog Output
BI — Binary Input
BO — Binary Output

1. Safety Chain Feedback: 24Vac required at this terminal to provide “Run Enable” status. See Input/Output section for additional instructions.
2. These inputs are configurable. If installed, they take the place of the default input on the specific channel. See appropriate Input Configuration Section for wiring and setup instructions.
3. Refer to the input configuration and accessory sections of the RTU Open Multi-Protocol Controller Controls, Start-Up, Operation and Troubleshooting manual for more detail.
4. Parallel pins J5–1 = J2–6, J5–3 = J1–10, J5–5 = J1–2 are used for field installation.
The RTU Open controller requires the use of a Carrier space sensor. A standard thermostat cannot be used with the RTU Open system.

**Supply Air Temperature Sensor**

The FIOP-equipped 48HC unit is supplied with a supply-air temperature (SAT) sensor (33ZCSENSAT). This sensor is a tubular probe type, approx 6 in. (152 mm) in length. It is a nominal 10-k ohm thermistor.

The SAT is factory-wired. The SAT probe is wire-tied to the supply-air opening (on the horizontal opening end) in its shipping position. Remove the sensor for installation. Re-position the sensor in the flange of the supply-air opening or in the supply air duct (as required by local codes). Drill or punch a 1/2-in. hole in the flange or duct. Use two field-supplied, self-drilling screws to secure the sensor probe in a horizontal orientation. See Fig. 59 on page 43.

**Outdoor Air Temperature (OAT) Sensor**

The OAT is factory-mounted in the EconoMi$er ®2 (FIOP or accessory). It is a nominal 10k ohm thermistor attached to an eyelet mounting ring.

**EconoMi$er ®2**

The RTU Open control is used with EconoMi$er ®2 (option or accessory) for outdoor air management. The damper position is controlled directly by the RTU Open control; EconoMi$er ®2 has no internal logic device.

Outdoor air management functions can be enhanced with field-installation of these accessory control devices:

- Enthalpy control (outdoor air or differential sensors)
- Space CO₂ sensor
- Outdoor air CO₂ sensor

**FIELD CONNECTIONS WITH RTU OPEN**

Field connections for accessory sensors and input devices with the RTU Open are made at plugs J1, J2, J4, J5, J11 and J20. All field control wiring that connects to the RTU Open must be routed through the raceway built into the corner post as shown in Fig. 36 on page 19. The raceway provides the UL required clearance between high and low-voltage wiring. Pass the control wires through the hole provided in the corner post, then feed the wires thorough the raceway to the RTU Open. Connect the wires to the removable Phoenix connectors and then reconnect the connectors to the board.

**Space Temperature Sensors**

Two types of SPT sensors are available from Carrier: resistive input non-communicating (T-55, T-56, and T-59) sensors, and Rnet communicating (SPS, SPPL, SPP, and SPPF) sensors. Each type has a variety of options consisting of: timed override button, set point adjustment, LCD screen, and communication tie-in. Space temperature can be also be written from a building network or zoning system. However, it is still recommended that return air duct sensors be installed to allow stand-alone operation for back-up. Part numbers for resistive input non-communicating sensors are as follows:

- T-55 — 33ZCT55SPT, space temperature sensor with override button
- T-56 — 33ZCT56SPT, space temperature sensor with override button and setpoint adjustment
- T-59 — 33ZCT59SPT, space temperature sensor with LCD (liquid crystal display) screen, override button, and setpoint adjustment

Use 20 gauge wire to connect the sensor to the controller. The wire is suitable for distances of up to 500 ft. Use a three-conductor shielded cable for the sensor and setpoint adjustment connections. If the setpoint adjustment (slidebar) is not required, then an unshielded, 18 or 20 gauge, two-conductor, twisted pair cable may be used.

**Connect T-55**

See Fig. 60 on page 45 for typical T-55 internal connections. Connect the T-55 SEN terminals to RTU Open J20-1 and J20-2. See Fig. 80.

```
SEN  ---- J20-1
SEN  ---- J20-2
```

**Fig. 80 — RTU Open T-55 Sensor Connections**

**Connect T-56**

See Fig. 62 on page 45 for T-56 internal connections. Install a jumper between SEN and SET terminals as illustrated. Connect T-56 terminals to RTU Open J20-1, J20-2 and J20-3 as shown in Fig. 81.

```
SEN  ---- J20-1
SEN  ---- J20-2
SET  ---- J20-3
```

**Fig. 81 — RTU Open T-56 Sensor Connections**

**Connect T-59**

The T-59 space sensor requires a separate, isolated power supply of 24 VAC. See Fig. 82 for internal connections at the T-59 sensor. Connect the SEN terminal (BLU) to RTU Open J20-1. Connect the COM terminal (BRN) to J20-2. Connect the SET terminal (STO or BLK) to J20-3.

```
BLK (STO)  J20-3
BRN (COM)  J20-2
BLU (SPT)  J20-1
OPB  COM+  PWR+
OR  SET  SEN
```

**Fig. 82 — Space Temperature Sensor T-59 Typical Wiring**

NOTE: Must use a separate isolated transformer.
Indoor Air Quality (CO₂) Sensor

The indoor air quality sensor accessory monitors space carbon dioxide (CO₂) levels. This information is used to monitor IAQ levels. Several types of sensors are available, for wall mounting in the space or in return duct, with and without LCD display, and in combination with space temperature sensors. Sensors use infrared technology to measure the levels of CO₂ present in the space air.

The CO₂ sensors are all factory set for a range of 0 to 2000 ppm and a linear mA output of 4 to 20. Refer to the instructions supplied with the CO₂ sensor for electrical requirements and terminal locations. See Fig. 65 on page 46 for typical CO₂ sensor wiring schematic.

To accurately monitor the quality of the air in the conditioned air space, locate the sensor near a return-air grille (if present) so it senses the concentration of CO₂ leaving the space. The sensor should be mounted in a location to avoid direct breath contact.

Do not mount the IAQ sensor in drafty areas such as near supply ducts, open windows, fans, or over heat sources. Allow at least 3 ft (0.9 m) between the sensor and any corner. Avoid mounting the sensor where it is influenced by the supply air; the sensor gives inaccurate readings if the supply air is blown directly onto the sensor or if the supply air does not have a chance to mix with the room air before it is drawn into the return airstream.

Wiring the Indoor Air Quality Sensor

For each sensor, use two 2-conductor 18 AWG (American Wire Gage) twisted-pair cables (unshielded) to connect the separate isolated 24 vac power source to the sensor, and to connect the sensor to the control board terminals.

To connect the sensor to the control, identify the positive (4-20 mA) and ground (SIG COM) terminals on the sensor. See Fig. 65 on page 46. Connect the 4-20 mA terminal to RTU Open J4-2 and connect the SIG COM terminal to RTU Open J4-3. See Fig. 83.

Outdoor Air Quality Sensor (P/N 33ZCSENCO2 Plus Weatherproof Enclosure)

The outdoor air CO₂ sensor is designed to monitor carbon dioxide (CO₂) levels in the outside ventilation air and interface with the ventilation damper in an HVAC system. The OAQ sensor is packaged with an outdoor cover. See Fig. 67 on page 46. The outdoor air CO₂ sensor must be located in the economizer outside air hood.

Wiring the Outdoor Air CO₂ Sensor

A dedicated power supply is required for this sensor. A two-wire cable is required to wire the dedicated power supply for the sensor. The two wires should be connected to the power supply and terminals 1 and 2.

To connect the sensor to the control, identify the positive (4-20 mA) and ground (SIG COM) terminals on the OAQ sensor. See Fig. 68 on page 46. Connect the 4-20 mA terminal to RTU Open J4-5. Connect the SIG COM terminal to RTU Open J4-6. See Fig. 84.

Space Relative Humidity Sensor or Humidistat

NOTE: The accessory space relative humidity sensor and humidistat are not available for single phase (-3 voltage code) models.

Humidi-MiZer® Control Wiring

In units equipped with the Humidi-MiZer® option, 2 pink (PNK) wires loose in the control box control the dehumidification function of the unit. These pink wires are meant to be tied to a space humidistat or thermodistat on an electromechanical unit. On RTU Open equipped units these pink wires must be connected to J11–7 and 8 to allow the Open board to operate the dehumidification function for the unit. Disconnect the J11 Phoenix style connector from the board and use the plug screws to secure the pink wires in pins 7 and 8, then reconnect the plug to the board at J11.

Relative Humidity Sensors (Space or Duct Mounted)

The accessory space humidity sensor (33ZCSENSRH-01) or duct humidity sensor (33ZCSENDRH-01) measures the relative humidity of air within the space or return air duct. The RH reading controls the Humidi-MiZer® option of the rooftop unit. For wiring distances up to 500 ft (152 m), use a 3-conductor, 18 or 20 AWG shielded cable. The shield must be removed from the sensor end of the cable and grounded at the unit end. The current loop power for sensor is provided by the RTU Open controller as 24vdc. Refer to the instructions supplied with the RH sensor for the electrical requirements and terminal locations. RTU Open configurations must be changed after adding an RH sensor. See Fig. 85 and 86 for typical RH sensor wiring.

• J4-1 or J4-4 = 24vdc loop power
• J4-2 or J4-5 = 4-20mA signal input

NOTE: The factory default for dehumidification control is normally open humidistat.
Humidistat

The accessory humidistat provides the RTU Open insight to the relative humidity in the space. The humidistat reads the RH level in the space and compares it to its setpoint to operate a dry contact. The humidistat is a dedicated input on the configurable input 9 and tells the RTU Open when the RH level is HIGH or LOW. The normal condition for humidity is LOW. A normally open humidistat is the factory default control for the Humidi-MiZer® option.

To wire in the field:
- J5-8 = 24 VAC source for dry contact
- J5-7 = Signal input

Smoke Detector/Fire Shutdown (FSD)

On 48HC units equipped with factory-installed smoke detector(s), the smoke detector controller implements the unit shutdown through its NC contact set connected to the unit’s CTB input. The FSD function is initiated via the smoke detector’s Alarm NO contact set. The RTU Open controller communicates the smoke detector’s tripped status to the BAS building control. See Fig. 78 on page 51 and Fig. 79 on page 52 (RTU Open System Control wiring schematics).

The Fire Shutdown Switch configuration, MENU→Config→Inputs→input 5, identifies the normally open status of this input when there is no fire alarm.

Connecting Discrete Inputs

Filter Status

The filter status accessory is a field-installed accessory. This accessory detects plugged filters. When installing this accessory, the unit must be configured for filter status by setting MENU→Config→Inputs→input 3, 5, 8 or 9 to Filter Status and normally open (N/O) or normally closed (N/C). Input 8 or 9 is recommended for easy of installation. Refer to Fig. 77 on page page 50 and Fig. 78 on page 51 or Fig. 79 on page 52 for wire terminations at J5.

Fan Status

The fan status accessory is a field-installed accessory. This accessory detects when the indoor fan is blowing air. When installing this accessory, the unit must be configured for fan status by setting MENU→Config→Inputs→input 3, 5, 8 or 9 to Fan Status and normally open (N/O) or normally closed (N/C). Input 8 or 9 is recommended for easy of installation. Refer to Fig. 77 on page 50 and Fig. 78 on page 51 or Fig. 79 on page 52 for wire terminations at J5.

Remote Occupancy

The remote occupancy accessory is a field-installed accessory. This accessory overrides the unoccupied mode and puts the unit in occupied mode. When installing this accessory, the unit must be configured for remote occupancy by setting MENU→Config→Inputs→input 3, 5, 8 or 9 to Remote Occupancy and normally open (N/O) or normally closed (N/C). Also set MENU→Schedules→occupancy source to DI on/off. Input 8 or 9 is recommended for ease of installation. Refer to Fig. 77 on page 50 and Table 21 on page 53 for wire terminations at J5.

Power Exhaust (Output)

The relay used by the RTU Open board to control power exhaust is a dry contact, which means it does not have 24vac. This 24vac must be connected to the relay to allow it to operate the power exhaust relay in the PE accessory. A 24vac source must be provided to J11-2 on the RTU Open control board. This can be provided by the unit’s transformer from various sources. The “R” terminal on the unit’s low voltage terminal board (LVTB) is a logical source. Refer to Fig. 77 on page 50 and Fig. 78 on page 51 or Fig. 79 on page 52 for wire terminations at J11.
COMMUNICATION WIRING — PROTOCOLS

Protocols are the communication languages spoken by control devices. The main purpose of a protocol is to communicate information in the most efficient method possible. Different protocols exist to provide different kinds of information for different applications. In the BAS application, many different protocols are used, depending on manufacturer. Protocols do not change the function of a controller; they simply make the front end user interface different.

The RTU Open can be set to communicate on four different protocols: BACnet (from ASHRAE), Modbus (from Schneider Electric), N2, and LonWorks (from Echelon).

Switch 3 (SW3) on the board is used to set protocol and baud rate. Switches 1 and 2 (SW1 and SW2) are used to set the board’s network address. See Fig. 87 and 88 for protocol switch settings and address switches. The third-party connection to the RTU Open is through plug J19. See Fig. 89 for wiring.

NOTE: Power must be cycled after changing the SW1-3 switch settings.

Refer to the “RTU Open Controller v2 Integration Guide” for detailed information on protocols, third-party wiring, and networking.

### SW3 PROTOCOL SELECTION

<table>
<thead>
<tr>
<th>PROTOCOL</th>
<th>DS8</th>
<th>DS7</th>
<th>DS6</th>
<th>DS5</th>
<th>DS4</th>
<th>DS3</th>
<th>DS2</th>
<th>DS1</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACnet MS/TP (Master)</td>
<td>Unused</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>Select Baud</td>
<td>Select Baud</td>
</tr>
<tr>
<td>Modbus (Slave)</td>
<td>Unused</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>N2 Slave</td>
<td>Unused</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>LonWorks</td>
<td>Unused</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>

**LEGEND**

**DS** — DIP Switch

**NOTE:** BACnet MS/TP SW3 example shown.

**Baud Rate Selection**

<table>
<thead>
<tr>
<th>BAUD RATE</th>
<th>DS2</th>
<th>DS1</th>
</tr>
</thead>
<tbody>
<tr>
<td>9,600</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>19,200</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>38,400</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>76,800</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

**Fig. 87 — RTU Open SW3 Dip Switch Settings**

**Fig. 88 — RTU Open Address Switches**

**Fig. 89 — Network Wiring**
**LOCAL ACCESS**

*Field Assistant*

Field Assistant is a computer program included with the purchase of the Tech Tool Kit (USB-TKIT). This is a field Tech Tool to set-up, service, or download application software to the RTU Open controller and includes a USB Link Cable. The link cable connects a USB port to the J12 local access port. The Field Assistant’s menu structure is similar and functions the same as i-Vu® controls. See Fig. 90.

**RTU OPEN TROUBLESHOOTING**

Communication LEDs indicate if the controller is speaking to the devices on the network. The LEDs should reflect communication traffic based on the baud rate set: the higher the baud rate, the more solid the LEDs will appear. See Table 22.

NOTE: Refer to the 48/50HCTQ RTU Open “Controls, Start-up, Operation, and Troubleshooting Guide” for complete configuration of RTU Open, operating sequences, and troubleshooting information. Refer to “RTU Open Controller v2 Integration Guide” for details on configuration and troubleshooting of connected networks. Have a copy of these manuals available at unit start-up.

---

**Table 22 — RTU Open LEDs**

The LEDs on the RTU Open show the status of certain functions:

<table>
<thead>
<tr>
<th>IF THIS LED IS ON . . .</th>
<th>STATUS IS . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td>RTU Open has power</td>
</tr>
<tr>
<td>Rx</td>
<td>RTU Open is receiving data from the network segment</td>
</tr>
<tr>
<td>Tx</td>
<td>RTU Open is transmitting data over the network segment</td>
</tr>
<tr>
<td>DO#</td>
<td>The digital output is active</td>
</tr>
</tbody>
</table>

The Run and Error LEDs indicate control module and network status:

<table>
<thead>
<tr>
<th>IF RUN LED SHOWS . . .</th>
<th>AND ERROR LED SHOWS . . .</th>
<th>STATUS IS . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 flashes per second</td>
<td>Off</td>
<td>Normal</td>
</tr>
<tr>
<td>2 flashes per second</td>
<td>2 flashes, alternating with Run LED</td>
<td>5 min. auto-restart delay after system error</td>
</tr>
<tr>
<td>2 flashes per second</td>
<td>3 flashes, then off</td>
<td>Control module has just been formatted</td>
</tr>
<tr>
<td>2 flashes per second</td>
<td>4 flashes, then pause</td>
<td>Two or more devices on this network have the same ARC156 network address</td>
</tr>
<tr>
<td>2 flashes per second</td>
<td>On</td>
<td>Exec halted after frequent system errors or control programs halted</td>
</tr>
<tr>
<td>5 flashes per second</td>
<td>On</td>
<td>Exec start-up aborted, boot is running</td>
</tr>
<tr>
<td>5 flashes per second</td>
<td>Off</td>
<td>Firmware transfer in progress, boot is running</td>
</tr>
<tr>
<td>7 flashes per second</td>
<td>7 flashes per second, alternating with Run LED</td>
<td>10 sec. recovery period after brownout</td>
</tr>
<tr>
<td>14 flashes per second</td>
<td>14 flashes per second, alternating with Run LED</td>
<td>Brownout</td>
</tr>
</tbody>
</table>

On

Failure. Try the following solutions:
- Turn RTU Open off, then on.
- Format RTU Open.
- Download memory to RTU Open.
- Replace RTU Open.
OUTDOOR AIR ENTHALPY CONTROL
(P/N 33CSENTHSW)

The enthalpy control (33CSENTHSW) is available as a field-installed accessory to be used with the EconoMi$er®2 damper system. The outdoor air enthalpy sensor is part of the enthalpy control. The separate field-installed accessory return air enthalpy sensor (33CSENTSEN) is required for differential enthalpy control. See Fig. 91.

Locate the enthalpy control in the economizer next to the actuator motor. Locate two GRA leads in the factory harness and connect the gray lead labeled “ESL” to the terminal labeled “LOW”. See Fig. 91. Connect the enthalpy control power input terminals to economizer actuator power leads RED (connect to 24V) and BLK (connect to GND).

The outdoor enthalpy changeover setpoint is set at the enthalpy controller.

Fig. 91 — Enthalpy Switch (33CSENTHSW)

Connections

Differential Enthalpy Control
Differential enthalpy control is provided by sensing and comparing the outside air and return air enthalpy conditions. Install the outdoor air enthalpy control as described above. Add and install a return air enthalpy sensor.

Return Air Enthalpy Sensor
Mount the return-air enthalpy sensor (33SENTSEN) in the return-air section of the economizer. The return air sensor is wired to the enthalpy controller (33CSENTHSW). See Fig. 92.

Fig. 92 — Outside and Return Air Enthalpy Sensor Wiring

Wiring the Return Air Enthalpy Sensor
1. Use a 2-conductor, 18 or 20 AWG, twisted pair cable to connect the return air enthalpy sensor to the enthalpy controller.
2. Connect the field-supplied RED wire to (+) spade connector on the return air enthalpy sensor and the (+) terminal on the enthalpy controller. Connect the BLK wire to (−) spade connector on the return air enthalpy sensor and the (−) terminal on the enthalpy controller.

SMOKE DETECTORS

Smoke detectors are available as factory-installed options on 48HC models. Smoke detectors may be specified for Supply Air only or for Return Air without or with economizer, or in combination of Supply Air and Return Air. Return Air smoke detectors are arranged for vertical return configurations only. All components necessary for operation are factory-provided and mounted. The unit is factory-configured for immediate smoke detector shutdown operation; additional wiring or modifications to unit terminal board may be necessary to complete the unit and smoke detector configuration to meet project requirements.

Units equipped with factory-optional Return Air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 93 for the as-shipped location.

Completing Return Air Smoke Sensor Installation
1. Unscrew the two screws holding the Return Air Smoke Detector assembly. See Fig. 94, Step 1. Save the screws.
2. Turn the assembly 90 degrees and then rotate end to end. Make sure that the elbow fitting is pointing down. See Fig. 94, Step 2.
3. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 94, Step 3.
4. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

Fig. 93 — Return Air Smoke Detector, Shipping Position

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

Step 14 — Adjust Factory-Installed Options

SMOKE DETECTORS
Smoke detector(s) will be connected at the Controls Connections Board, at terminals marked “Smoke Shutdown.” Cut jumper JMP 3 when ready to energize unit.

ECONOMISER IV OCCUPANCY SWITCH
See Fig. 95 for general EconoMi$er IV wiring. External occupancy control is managed through a connection on the Controls Connections Board.

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

**Step 15 — Install Accessories**

Available accessories include:

- Curb
- Thru-base connection kit (must be installed before unit is set on curb)
- LP conversion kit
- Flue discharge deflector
- Manual outside air damper
- Two-position motorized outside air damper
- EconoMi$er™ IV (with control)
- EconoMi$er™2 (without control/for external signal)
- Power Exhaust
- Differential dry-bulb sensor (EconoMi$er IV)
- Outdoor enthalpy sensor

- Differential enthalpy sensor
- CO₂ sensor
- DDC interface (PremierLink™ Controls)
- Louvered hail guard
- Motormaster® head pressure controls
- Phase monitor control

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

**Pre-Start and Start-Up**

This completes the mechanical installation of the unit. Refer to the unit’s Service Manual for detailed Pre-Start and Start-Up instructions. Download the latest versions from HVAC Partners (www.hvacpartners.com).

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**Fig. 94 — Completing Installation of Return Air Smoke Sensor**

**Fig. 95 — EconoMi$er IV Wiring**
I. PRELIMINARY INFORMATION

MODEL NO ____________________________________________
JOB NAME_____________________________________________
SERIAL NO ____________________________________________
ADDRESS _____________________________________________
START-UP DATE________________________________________
TECHNICIAN NAME _____________________________________
ADDITIONAL ACCESSORIES
_____________________________________________________________________________________________________

II. PRE-START-UP

Verify that all packaging materials have been removed from unit (Y/N) _____
Verify installation of outdoor air hood (Y/N) _____
Verify installation of flue exhaust and inlet hood (Y/N) _____
Verify that condensate connection is installed per instructions (Y/N) _____
Verify that all electrical connections and terminals are tight (Y/N) _____
Verify gas pressure to unit gas valve is within specified range (Y/N) _____
Check gas piping for leaks (Y/N) _____
Check that indoor-air filters are clean and in place (Y/N) _____
Check that outdoor air inlet screens are in place (Y/N) _____
Verify that unit is level (Y/N) _____
Check fan wheels and propeller for location in housing/orifice and verify setscrew is tight (Y/N) _____
Verify that fan sheaves are aligned and belts are properly tensioned (Y/N) _____
Verify that scroll compressors are rotating in the correct direction (Y/N) _____
Verify installation of thermostat (Y/N) _____
Verify that crankcase heaters have been energized for at least 24 hours (Y/N) _____

III. START-UP

ELECTRICAL

Supply Voltage L1-L2_____________ L2-L3_____________ L3-L1_____________
Compressor Amps 1 L1   _____________ L2   _____________ L3   _____________
Compressor Amps 2 L1   _____________ L2   _____________ L3   _____________
Supply Fan Amps L1   _____________ L2   _____________ L3   _____________

TEMPERATURES

Outdoor-air Temperature _____________ °F DB (Dry Bulb)
Return-air Temperature _____________ °F DB _____________ °F Wb (Wet Bulb)
Cooling Supply Air Temperature _____________ °F
Gas Heat Supply Air _____________ °F
PRESSURES
Gas Inlet Pressure in. wg ____________ in. wg
Gas Manifold Pressure
STAGE 1 ____________ in. wg
STAGE 2 ____________ in. wg
Refrigerant Suction
CIRCUIT A _____________ PSIG
CIRCUIT B _____________ PSIG
Refrigerant Discharge
CIRCUIT A _____________ PSIG
CIRCUIT B _____________ 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. HUMID-MIZER® START-UP

STEPS
1. Check CTB for jumper 5, 6, 7 (Jumper 5, 6, 7 must be cut and open) (Y/N) ____
2. Open humidistat contacts (Y/N) ____
3. Start unit In cooling (Close Y1) (Y/N) ____
OBSERVE AND RECORD
A. Suction pressure _______________ PSIG
B. Discharge pressure _______________ PSIG
C. Entering air temperature _______________ ° F
D. Liquid line temperature at outlet or reheat coil _______________ ° 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) ____
4. Check unit charge per charging chart (Y/N) ____
   (Jumper 32L Motormaster® temperature sensor during this check. Remove jumper when complete.)
5. Switch unit to high-latent mode (sub-cooler) by closing humidistat with Y1 closed (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. LSV solenoid energized (valve closes) (Y/N) ____
6. Switch unit to dehumid (reheat) by opening Y1 (Y/N) ____
OBSERVE
A. Suction pressure increases to normal cooling level
B. Discharge pressure decreases (35 to 50 psi) (Limited by Motormaster control)
C. Liquid temperature returns to normal cooling level
D. LSV solenoid energized (valve closes)
E. DSV solenoid energized, valve opens
7. With unit in dehumid mode close W1 compressor and outdoor fan stop; LSV and DSV solenoids de-energized (Y/N)
8. Open W1 restore unit to dehumid mode (Y/N) ____
9. Open humidistat input compressor and outdoor fan stop; LSV and DSV solenoids de-energized (Y/N) ____
10. Restore set-points for thermostat and humidistat (Y/N) ____