Installation Instructions

48HC horizontal 17.5 and 20 ton units for installation in the United States contain use of Carrier’s Staged Air Volume (SAV™) 2-speed indoor fan control system. This complies with the U.S. Department of Energy (DOE) efficiency standard of 2018.

48HC units for installation outside the United States may or may not contain use of the SAV 2-speed indoor fan control system as they are not required to comply with the U.S. Department of Energy (DOE) efficiency standard of 2018.

For specific details on operation of the Carrier SAV 2-speed indoor fan system refer to the Variable Frequency Drive (VFD) Factory-Installed Option 2-Speed Motor Control Installation, Setup, and Troubleshooting manual.

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

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/NFPA 70, 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.

FIRE, EXPLOSION HAZARD

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.
Table 1 — Rated Indoor Airflow (cfm) — Table 1 lists the rated indoor airflow used for the AHRI efficiency rating for the units covered in this document.

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>FULL LOAD AIRFLOW (CFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48HC**17</td>
<td>4900</td>
</tr>
<tr>
<td>48HC**20</td>
<td>5700</td>
</tr>
<tr>
<td>48HC**24</td>
<td>6500</td>
</tr>
<tr>
<td>48HC**28</td>
<td>8125</td>
</tr>
</tbody>
</table>

**WARNING**

**ELECTRICAL SHOCK HAZARD**

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

Before performing service or maintenance operations on unit, always turn off main power switch to unit and install lock(s) and lockout tag(s). Unit may have more than one power switch.

**WARNING**

**UNIT OPERATION AND SAFETY HAZARD**

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

Puron (R-410A) refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment.

**WARNING**

**PERSONAL INJURY AND ENVIRONMENTAL HAZARD**

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

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

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

**CAUTION**

**CUT HAZARD**

Failure to follow this caution may result in personal injury. Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing air-conditioning equipment.

**WARNING**

**CARBON-MONOXIDE POISONING HAZARD**

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

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

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

**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.
### 48HC 17-28 Model Number Nomenclature (Example)

#### Model Series - WeatherMaster®
- **HC** = High Efficiency

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

#### Heat Options
- **D** = Low Gas Heat
- **E** = Medium Gas Heat
- **F** = High Gas Heat
- **S** = Low Heat w/ Stainless Steel Exchanger
- **R** = Medium Heat w/ Stainless Steel Exchanger
- **T** = High Heat w/ Stainless Steel Exchanger

#### Refrigeration Systems Options
- **D** = Two stage cooling model with Round Tube/Plate Fin
- **E** = Two stage cooling models with Humidi-Mizer® System
- **G** = Two stage cooling models with MotorMaster® Low Ambient controller

#### Cooling Tons
- 17 = 15 tons
- 20 = 17.5 tons
- 24 = 20 tons
- 28 = 25 tons

#### Sensor Options
- **A** = None
- **B** = RA Smoke Detector
- **C** = SA Smoke Detector
- **D** = RA + SA Smoke Detector
- **E** = CO₂ Sensor
- **F** = RA Smoke Detector and CO₂
- **G** = SA Smoke Detector and CO₂
- **H** = RA + SA Smoke Detector and CO₂
- **J** = Condensate Overflow Switch and RA Smoke Detectors
- **K** = Condensate Overflow Switch and RA and SA Smoke Detectors

#### Indoor Fan Options & Air Flow Configuration
- **1** = Standard Static/Vertical Supply, Return Air Flow
- **2** = Medium Static/Vertical Supply, Return Air Flow
- **3** = High Static/Vertical Supply, Return Air Flow
- **C** = High Static, High Efficiency Motor/Vertical Supply, Return Air Flow
- **5** = Standard Static/Horizontal Supply, Return Air Flow
- **6** = Medium Static/Horizontal Supply, Return Air Flow
- **7** = High Static/Horizontal Supply, Return Air Flow
- **F** = Medium Static, High Efficiency Motor/Horizontal Supply, Return Air Flow
- **G** = High Static, High Efficiency Motor/Horizontal Supply, Return Air Flow

#### 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 Hall Guard
- **N** = Precoat Al/Cu - Al/Cu — Louvered Hall Guard
- **P** = E-coat Al/Cu - Al/Cu — Louvered Hall Guard
- **Q** = E-coat Al/Cu - E-coat Al/Cu — Louvered Hall Guard
- **R** = Cu/Cu - Al/Cu — Louvered Hall Guard
- **S** = Cu/Cu - Cu/Cu — Louvered Hall Guard

#### Packaging
- **0** = Standard

#### Electrical Options
- **A** = None
- **B** = HACR Breaker
- **C** = Non-Fused Disconnect
- **D** = Through-the-base Connection
- **E** = Non-Fused Disconnect and Through-the-base Connection
- **G** = 2-Speed Indoor Fan (VFD) Controller
- **J** = 2-Speed Fan Controller (VFD) and Non-Fused Disconnect

#### Service Options
- **0** = None
- **1** = Unpowered Convenience Outlet
- **2** = Powered Convenience Outlet
- **3** = Hinged Panels
- **4** = Hinged Panels & Unpowered Convenience Outlet
- **5** = Hinged Panels & Powered Convenience Outlet
- **C** = Foil Faced Insulation

#### Intake / Exhaust Options
- **A** = None
- **B** = Temperature Economizer w/ Barometric Relief
- **F** = Enthalpy Economizer w/ Barometric Relief
- **K** = 2-Position Damper
- **Q** = EnergyX® Only
- **R** = EnergyX with Economizer Only
- **T** = EnergyX with Economizer and Frost Protection
- **U** = Temp Ultra Low Leak Economizer w/ Barometric Relief
- **V** = Temp Ultra Low Leak Economizer w/ Power Exhaust - Vertical Air Only
- **W** = Enthalpy Ultra Low Leak Economizer w/ Barometric Relief
- **X** = Enthalpy Ultra Low Leak Economizer w/ Power Exhaust - Vertical Air Only

#### Base Unit Controls
- **0** = Electro-mechanical Controls. Can be used with W7212 EconoMiser® IV (Non-Fault Detection and Diagnostic)
- **1** = PremierLink™ Controller
- **2** = RTU Open Multi-Protocol Controller
- **6** = Electro-mechanical w/ 2-Speed Fan and W7220 Economizer Controller. Can be used with W7220 EconoMiser X (with Fault Detection and Diagnostic)
- **D** = ComfortLink Controls (Standard with EnergyX)

#### Design Revision
- **-** = Factory Design Revision

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

---

Fig. 1 — 48HC 17-28 Model Number Nomenclature (Example)
Fig. 2 — Unit Dimensional Drawing — 17 Size Unit
Fig. 2 — Unit Dimensional Drawing — 17 Size Unit (cont)

* STANDARD UNIT WEIGHT IS WITH LOW GAS HEAT AND WITHOUT PACKAGING. FOR OTHER OPTIONS AND ACCESSORIES, REFER TO THE PRODUCT DATA CATALOG.
Fig. 3 — Unit Dimensional Drawing — 20 and 24 Size Units
Fig. 3 — Unit Dimensional Drawing — 20 and 24 Size Units (cont)

*Standard unit weight is with low gas heat and without packaging.
For other options and accessories, refer to the product data catalog.
Fig. 4 — Unit Dimensional Drawing — 28 Size Unit (cont)

INSTALLATION

Jobsite Survey — Complete the following checks before installation.

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

Step 1 — Plan for Unit Location — Select a location for the unit and its support system (curb or other) that provides for at least 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. 5.

NOTE: Consider also the effect of adjacent units.

Be sure that the unit is installed such that snow will not block the combustion air 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, relief valves, or other sources of contaminated air. For proper unit operation, adequate combustion and ventilation air must be provided in accordance with Section 5.3 (Air for Combustion and Ventilation) of the National Fuel Gas Code, ANSI Z223.1 (American National Standards Institute) and NFPA (National Fire Protection Association) 54 TIA-54--84--1. In Canada, installation must be in accordance with the CAN1--B149 installation codes for gas burning appliances.

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

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 11 — Install External Condensate Trap and Line for required trap dimensions.
ROOF MOUNT — Check building codes for weight distribution requirements. Unit operating weight is shown in Table 2.

Step 2 — Plan for Sequence of Unit Installation — The support method used for this unit will dictate different sequences for the steps of unit installation. For example, on curb-mounted units, some accessories must be installed on the unit before the unit is placed on the curb. Review the following for recommended sequences for installation steps.

CURB-MOUNTED INSTALLATION

- Install curb
- Install field-fabricated ductwork inside curb
- Install accessory thru-base service connection package (affects curb and unit)
- Rig and place unit
- Remove top skid
- Install outside air hood
- Install smoke detector tube
- Install combustion air hood
- Install flue hood
- Install gas piping
- Install condensate line trap and piping
- Make electrical connections
- Install other accessories

PAD-MOUNTED INSTALLATION

- Prepare pad and unit supports
- Rig and place unit
- Remove duct covers and top skid
- Install smoke detector return air sensor tube
- Install field-fabricated ductwork at unit duct openings
- Install outside air hood
- Install combustion air hood
- Install flue hood
- Install gas piping
- Install condensate line trap and piping
- Make electrical connections
- Install other accessories

NOTE: Unit not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.
FRAME-MOUNTED INSTALLATION — Frame-mounted applications generally follow the sequence for a curb installation. Adapt as required to suit specific installation plan.

**Step 3 — Inspect Unit** — Inspect unit for transportation damage. File any claim with transportation agency.

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

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

Locate the carton containing the outside air hood parts; see Fig. 7 and 13. 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. 8-10. 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. 8-10. 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. 6. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

---

### Table 2 — Operating Weights

<table>
<thead>
<tr>
<th>48HC**</th>
<th>UNITS LB (KG)</th>
<th>17</th>
<th>20</th>
<th>24</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Unit</td>
<td>1892 (858)</td>
<td>2102 (954)</td>
<td>2247 (1019)</td>
<td>2292 (1040)</td>
<td></td>
</tr>
<tr>
<td>Economer</td>
<td>246 (112)</td>
<td>246 (112)</td>
<td>246 (112)</td>
<td>246 (112)</td>
<td></td>
</tr>
<tr>
<td>Powered Outlet</td>
<td>35 (16)</td>
<td>35 (16)</td>
<td>35 (16)</td>
<td>35 (16)</td>
<td></td>
</tr>
<tr>
<td>Humidi-MiZer System</td>
<td>110 (50)</td>
<td>120 (54)</td>
<td>120 (54)</td>
<td>120 (54)</td>
<td></td>
</tr>
<tr>
<td>Curb</td>
<td>14-in./356 mm</td>
<td>240 (109)</td>
<td>255 (116)</td>
<td>255 (116)</td>
<td>273 (124)</td>
</tr>
<tr>
<td></td>
<td>24-in./610 mm</td>
<td>340 (154)</td>
<td>355 (161)</td>
<td>355 (161)</td>
<td>355 (161)</td>
</tr>
</tbody>
</table>

**MAXIMUM ALLOWABLE DIFFERENCE IN. (MM)**

<table>
<thead>
<tr>
<th>A-B</th>
<th>B-C</th>
<th>A-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25” (6)</td>
<td>0.5” (12)</td>
<td>0.5” (12)</td>
</tr>
</tbody>
</table>

Install insulation, cant strips, roofing felt, and counter flashing as shown. Ductwork must be attached to curb and not to the unit. Thr-though-the base power connection must be installed before the unit is set on the roof curb. If field-installed thru-the-roof curb gas connections are desired remove knockout in basepan located in the gas section, see Fig. 7 for location. 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, remove knockouts in basepan located in control box area of access panel; see Fig. 2, 3, or 4 for basepan knockout locations for location. Attach the service connections to the basepan.

---

**Fig. 6 — Unit Leveling Tolerances**

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

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

ALTERNATE UNIT SUPPORT (IN LIEU OF CURB OR SLAB MOUNT) — A non-combustible sleeper rail can be used in the unit curb support area. If sleeper rails cannot be used, support the long sides of the unit with a minimum of 3 equally spaced 4-in. x 4-in. (102 mm x 102 mm) pads on each side. Locate pads so that they support the rails. Make sure to avoid the fork openings.
Fig. 8 — Roof Curb Details — 17 Size Unit
Fig. 9 — Roof Curb Details — 20 and 24 Size Units
Fig. 10 — Roof Curb Details — 28 Size Unit
Step 5 — Field Fabricate Ductwork — Cabinet return-air static pressure (a negative condition) shall not exceed 0.5 in. wg (87 Pa) with economizer or without economizer.

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

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

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

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

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

A minimum clearance is not required around ductwork.

**CAUTION**

PROPERTY DAMAGE HAZARD

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

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

---

Step 6 — Rig and Place Unit — Keep unit upright and do not drop. Spreader bars are not required if top crating is left on unit. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 2 (on page 11) and Fig. 11 for additional information.

Lifting holes are provided in base rails as shown in Fig. 8-10. Refer to rigging instructions on unit.

**CAUTION**

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

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

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

---

**NOTES:**

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

**Table 2**

<table>
<thead>
<tr>
<th>UNIT</th>
<th>MAX WEIGHT</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb</td>
<td>in.</td>
</tr>
<tr>
<td>48HC**17</td>
<td>2339</td>
<td>127.8</td>
</tr>
<tr>
<td>48HC**20</td>
<td>2549</td>
<td>141.5</td>
</tr>
<tr>
<td>48HC**24</td>
<td>2699</td>
<td>141.5</td>
</tr>
<tr>
<td>48HC**28</td>
<td>2748</td>
<td>157.8</td>
</tr>
</tbody>
</table>

---

**Fig. 11 — Rigging Details**
POSITIONING ON CURB — Position unit on roof curb so that the following clearances are maintained: 1/4 in. (6 mm) clearance between the roof curb and the base rail inside the right and left, 1/2 in. (12 mm) clearance between the roof curb and the base rail inside the front and back. This will result in the distance between the roof curb and the base rail inside on the condenser end of the unit being approximately equal to Details A and B in Fig. 8-10.

Do not attempt to slide unit on curb after unit is set. Doing so will result in damage to the roof curb seal.

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

Flue vent discharge must have a minimum horizontal clearance of 48 in. (1220 mm) from electric and gas meters, gas regulators, and gas relief equipment. Minimum distance between unit and other electrically live parts is 48 inches (1220 mm).

Flue gas can deteriorate building materials. Orient unit such that flue gas will not affect building materials. Locate mechanical draft system flue assembly at least 48 in. (1220 mm) from an adjacent building or combustible material.

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

Step 7 — Horizontal Duct Connection — Refer to Fig. 2-4 for locations and sizes of the horizontal duct connections. Note that there are two different return air duct connection locations – one for unit without an economizer (on back side of unit) and a different one for unit equipped with an economizer (on left end, under the economizer hood). The supply air duct connection is on the back side. See Fig. 12 for top view depicting typical horizontal duct arrangements.

---

<table>
<thead>
<tr>
<th>Location</th>
<th>SUPPLY</th>
<th>RETURN WITHOUT ECONOMIZER</th>
<th>RETURN WITH ECONOMIZER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height - in. (mm)</td>
<td>15 1/8 (402)</td>
<td>49 1/2 (1253)</td>
<td>18 1/8 (467)</td>
</tr>
<tr>
<td>Width - in. (mm)</td>
<td>29 1/4 (756)</td>
<td>23 1/2 (593)</td>
<td>61 1/8 (1564)</td>
</tr>
</tbody>
</table>

---

Fig. 12 — Horizontal Duct Opening Dimensions

Field-supplied (3/4 in.) flanges should be attached to horizontal duct openings (see Fig. 12) 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.

Step 8 — Install Outside Air Hood — Factory Option — The outside air hood for factory-option economizer and two-position damper is shipped in knock-down form and requires field assembly. The panel for the hood top is shipped on the end of the unit (see Fig. 13). The remaining parts for the hood assembly (including side panels, filters and tracks) are shipped in a carton that is secured to the rear of the blower assembly. Access the carton location through rear panel (see Fig. 14).

---

Fig. 13 — Hood Top — Shipping Position

Fig. 14 — Hood Package — Shipping Location

To remove the hood parts package:
1. Remove the back blower access panel.
2. Locate and cut the strap, being careful to not damage any wiring.
3. Carefully lift the hood package carton through the back blower access opening.

See Fig. 15 for identification of the various parts of the hood assembly.

To assemble the outside air hood:
1. Remove hood top panel from shipping position on unit end.
2. Install four angles to the upper end panel using the screws provided.
3. Apply seal strip to mating flanges on the side plates of the hood (see Fig. 15).
4. Secure side plates to panel using the screws provided.
5. Apply seal strip to mating flange of the hood (see Fig. 15).
6. Secure top flange using screws provided in kit.
7. Install outdoor air screens by sliding them into the channel formed by the four angles installed in Step 2. Make sure that the screens extend across the entire length of the hood.
8. Install side filter supports using the screws provided.
9. Install side drip angles using the screws provided.
10. Run a continuous length of seal strip across the hood covering the engagement holes in the lower hood.
11. Install top diverter using the screws provided.
12. On units with barometric relief, remove screws at bottom of relief damper. **Do not discard damper door.**

**Fig. 16 — Hood Assembly — Completed**

**Step 9 — Install Flue Hood and Combustion Air Hood** — The flue hood is shipped screwed to the fan deck inside the burner compartment. Remove the burner access panel and then remove the flue hood from its shipping location. Using the screws provided, install flue hood and screen in location shown in Fig. 17.

The combustion air hood is attached to the back of the burner access panel. Remove the two screws securing the hood to the back of the burner access panel. Using the two screws, re-attach the hood to the front of the burner access panel as shown in Fig. 17.

**Fig. 17 — Flue Hood and Combustion Air Hood Details**

**Step 10 — Install Gas Piping** — Installation of the gas piping must be in accordance with local building codes and with applicable national codes. In U.S.A., refer to NFPA 54/ANSI Z223.1 National Fuel Gas Code (NFGC). In Canada, installation must be in accordance with the CAN/CSA B149.1 and CAN/CSA B149.2 installation codes for gas burning appliances.

This unit is factory equipped for use with Natural Gas 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 5 in. wg (1246 Pa) or greater than 13 in. wg (3240 Pa) while the unit is operating. For liquefied petroleum applications, the gas pressure must not be less than 11 in. wg (2740 Pa) or greater than 13 in. wg (3240 Pa) at the unit connection.

**GAS SUPPLY LINE** — The gas supply pipe enters the unit adjacent to the burner access panel on the front side of the unit, through the grommeted hole. The gas connection to the unit is made to the 3/4-in. FPT gas inlet port on the unit gas valve.

Table 3 lists typical 3/4 inch NPT (National Pipe Thread) field supplied pipe fittings required for Thru-Base gas supply, starting from the unit gas valve (see Fig. 18).

Pipe gas supply into 90 degree elbow item 15 (see Table 3) through the hole in the unit basepan.

For typical 3/4 in. NPT field supplied fittings required for NON Thru-Base gas supply starting from the unit gas valve, omit items 14 and 15 from Table 3 and pipe gas supply into TEE. See Fig. 19.
Table 3 — Typical 3/4-in. NPT Field Supplied Piping Parts

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>CPN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>CA15RA201</td>
<td>90 Deg Street Elbow</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>CA03CA226</td>
<td>5 in. Long Nipple</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>CA65RA201</td>
<td>Ground-Joint Union</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>CA03CA218</td>
<td>3 in. Long Nipple</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>CA06RA201</td>
<td>90 Deg Elbow</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>CA06CA250</td>
<td>12 in. Long Nipple</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>CA06RA201</td>
<td>90 Deg Elbow</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>CA03CA218</td>
<td>3 in. Long Nipple</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>CA20RA201</td>
<td>TEE</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>CA01CN222</td>
<td>4 in. Long Nipple (Sediment Trap)</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>CA38RA201</td>
<td>Cap</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>CA03CA220</td>
<td>3 1/2 in. Long Nipple</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>GB30</td>
<td>NIBCO Ball Valve</td>
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<tr>
<td>14</td>
<td>1</td>
<td>CA01CA238</td>
<td>8 in. Long Nipple</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>CA05RA201</td>
<td>90 Deg Elbow</td>
</tr>
</tbody>
</table>

Table 4 — 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>48HC**</td>
<td>17, 20, 24, 28</td>
<td>5.0 in. wg (1246 Pa)</td>
<td>13.0 in. wg (3240 Pa)</td>
</tr>
</tbody>
</table>

Fig. 18 — Gas Supply Line Piping with Thru-Base

Fig. 19 — Gas Supply Line Piping

Fig. 20 — Gas Piping Guide

A CAUTION

EQUIPMENT DAMAGE HAZARD

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

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 smaller than the size specified. 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 two ways: horizontally from outside the unit (across the roof), or through unit basepan. Observe clearance to gas line components per Fig. 20.
cal piping arrangements for gas piping that has been routed through the sidewall of the base pan.

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

1. Avoid low spots in long runs of pipe. Grade all pipe 1/4-inch in every 15 ft (7 mm in every 5 m) to prevent traps. Grade all horizontal runs downward to risers. Use risers to connect to heating section and to meter.

2. Protect all segments of piping system against physical and thermal damage. Support all piping with appropriate straps, hangers, etc. Use a minimum of one hanger every 6 ft (1.8 m). For pipe sizes larger than 1/2-in., follow recommendations of national codes.

3. Apply joint compound (pipe dope) sparingly and only to male threads of joint when making pipe connections. Use only pipe dope that is resistant to action of liquefied petroleum gases as specified by local and/or national codes. If using PTFE (Teflon*) tape, ensure the material is Double Density type and is labeled for use on gas lines. Apply tape per manufacturer’s instructions.

4. Pressure-test all gas piping in accordance with local and national plumbing and gas codes before connecting piping to unit.

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

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

WARNING

FIRE OR EXPLOSION HAZARD

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

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

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

Step 11 — Install External Condensate Trap and Line — The unit has one 3/4-in. condensate drain connection on the end of the condensate pan (see Fig. 22). See Fig. 2-4, item “E”, in the view labeled “BACK (HORIZONTAL DISCHARGE)” for the location of the condensate drain connection.

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

* Teflon is a registered trademark of DuPont.
**Fig. 23 — Condensate Drain Piping Details**

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

**Step 12 — Make Electrical Connections**

**WARNING**

**ELECTRICAL SHOCK HAZARD**

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

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

**WARNING**

**FIRE HAZARD**

Failure to follow this warning could result in intermittent operation or unsatisfactory performance.

*Do not connect aluminum wire between disconnect switch and air conditioning unit. Use only copper wire.* (See Fig. 25.)

**NOTE:** Field-supplied wiring shall conform with the limitations of minimum 63°F (3°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 or HACR, connect the source leads to the terminal block with unit field power leads. See Fig. 24.

**Fig. 24 — Location of TB1**

Field power wires are connected to the unit at line-side pressure lugs on the terminal block (see wiring diagram label for control box component arrangement) or at factory-installed option non-fused disconnect switch or HACR breaker. Use copper conductors only.

**NOTE:** Make field power connections directly to line connection pressure lugs only.

**Fig. 25 — Disconnect Switch and Unit**

**UNITS WITHOUT FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR** — When installing units, provide a disconnect switch of adequate size per NEC (National Electrical Code). 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.
To field install the NFD shaft and handle:
1. Open the control box panel.
2. Make sure the NFD shipped from the factory is at OFF position (the arrow on the black handle knob or on the silver metal collar is at OFF).
3. Insert the shaft with the cross pin on the top of the shaft in the horizontal position.
4. Measure the tip of the shaft to the outside surface of the corner post to be 0.88 inches.
5. Tighten the locking screw to secure the shaft to the NFD.
6. Turn the handle to the OFF position with red arrow pointing at OFF.
7. Install the handle on to the corner post vertically with the red arrow pointing up.
8. Secure the handle to the corner post with (2) screws and lock washers supplied.

Fig. 26 — Handle and Shaft Assembly for NFD

To field install the HACR shaft and handle:
1. Open the control box panel.
2. Make sure the HACR shipped from the factory is at OFF position (the white arrow pointing at OFF).
3. Insert the shaft all the way with the cross pin on the top of the shaft in the horizontal position.
4. Measure the tip of the shaft to the outside surface of the corner post to be 0.88 inches.
5. Tighten the locking screw to secure the shaft to the HACR.
6. Turn the handle to the OFF position with red arrow pointing at OFF.
7. Install the handle on to the corner post vertically with the red arrow pointing up.
8. Secure the handle to the corner post with (2) screws and lock washers supplied.

Fig. 27 — Handle and Shaft Assembly for HACR

ALL UNITS — All field wiring must comply with NEC and all local requirements.

Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 28 for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is 2/0 AWG per pole.
Provide a ground-fault and short-circuit 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 protection device unless required by local codes.

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 below to determine the percent of voltage imbalance.

\[
\text{% Voltage imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}
\]

Example: Supply voltage is 230-3-60.

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

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

Determine maximum deviation from average voltage.

(AB) 227 – 224 = 3 v

(BC) 231 – 227 = 4 v

(AC) 227 – 226 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

\[
\text{% Voltage Imbalance} = 100 \times \frac{4}{227} = 1.76\%
\]

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

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

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

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

CONVENIENCE OUTLETS

ELECTRICAL OPERATION HAZARD

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

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

Two types of convenience outlets are offered on 48HC models: non-powered and unit-powered. Both types provide a 125-volt GFCI (ground-fault circuit-interrupter) duplex receptacle rated at 15-A behind a hinged waterproof access cover, located on the panel beneath the control box. See Fig. 29.
Installing Weatherproof Cover — A weatherproof while-in-use cover for the factory-installed convenience outlets is now required by UL standards. This cover cannot be factory-mounted due 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.

DISCONNECT ALL POWER TO UNIT AND CONVENIENCE OUTLET. LOCK-OUT AND TAG-OUT ALL POWER.

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

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

Mount the weatherproof cover to the backing plate as shown in Fig. 30. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover. Check for full closing and latching.

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

Unit-powered type — A unit-mounted transformer is factory-installed to stepdown the main power supply voltage to the unit to 115-v at the duplex receptacle. This option also includes a manual switch with fuse, located in a utility box and mounted on a bracket behind the convenience outlet; access is through the unit’s control box access panel. See Fig. 29.

The primary leads to the convenience outlet transformer are not factory-connected. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect switch; this will provide service power to the unit when the unit disconnect switch is open. See Fig. 31.
receptacle does not trip as required. Press the RESET button to
for proper grounding wires and power line phasing if the GFCI
the face of the receptacle to trip and open the receptacle. Check
outlet power is also checked and de-energization is confirmed.
Treat all units as electrically energized until the convenience
disconnects be opened to de-energize all power to the unit.
mounted convenience outlet circuits will often require that two
clear the tripped condition.
with field-installed accessories.
maximum over-current protection device required on the unit
factory. See unit nameplates for the proper fuse, HACR or
nameplate and label on factory-installed HACR for the amp
exhaust), the HACR may no longer be of the proper amp rating
stalled accessories are added or changed in the field (i.e., power
trical options of the unit as shipped from the factory. If field-in-
tion is based on the size, voltage, indoor motor and other elec-
HACR  — The amp rating of the HACR factory-installed op-
for use of convenience outlets.
Observe National Electrical Code Article 210, Branch Circuits,
UNITS WITHOUT THRU-BASE CONNECTIONS
mation.
access to both top and bottom of the base pan is available. See
equipped with the non-unit powered convenience outlet option.
provided for a 115 volt line which is used when the unit is
ate size for the size of the fitting required. A 7/8-in. knock out is
brought through the multi knock out by removing the appropri-
bossed area is provided with three knock outs. High voltage is
accessed through the control box access panel. An em-
accomplish this.
through the gas access panel. A knock out must be removed to
section behind the gas entrance post. Access is gained
through the base.
All units are equipped with the ability to bring utilities
FACTORY OPTION THRU-BASE CONNECTIONS —
All units are equipped with the ability to bring utilities
through the base.
Gas is brought up through an embossed area located in the
gas section behind the gas entrance post. Access is gained
through the gas access panel. A knock out must be removed to
accomplish this.
The electrical entrance is located in the control box area and
can be accessed through the control box access panel. An em-
bossed area is provided with three knock outs. High voltage is
brought through the multi knock out by removing the appropriate
size for the size of the fitting required. A 7/8-in. knock out is
provided for low voltage. An additional 7/8-in. knock out is pro-
vided for a 115 volt line which is used when the unit is
equipped with the non-unit powered convenience outlet option.
All required fittings are field supplied. Install fittings when
access to both top and bottom of the base pan is available. See
electrical and gas connections for routing and connection informa-
UNITS WITHOUT THRU-BASE CONNECTIONS
1. Install liquid tight conduit between disconnect and
control box.
2. Pull correctly rated high voltage wires through the
conduit.
3. Install power lines to terminal connections as shown in
Fig. 28.
FIELD CONTROL WIRING — The 48HC unit requires an
external temperature control device. This device can be a ther-
ostat (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 controller is available as
a factory-installed option only).
THERMOSTAT — Install a Carrier-approved accessory 2-
stage thermostat according to installation instructions included
with the accessory. Locate the thermostat accessory on a solid
wall in the conditioned space to sense average temperature in
accordance with the thermostat installation instructions.
If the thermostat contains a logic circuit requiring 24-v pow-
er, use a thermostat cable or equivalent single leads of different
colors with minimum of seven leads. If the thermostat does not
require a 24-v source (no “C” connection required), use a ther-
ostat 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 (Amери-
can Wire Gage) insulated wire (35°C minimum). For 50 to
75 ft (15 to 23 m), use no. 16 AWG insulated wire (35°C mini-
ummum). For over 75 ft (23 m), use no. 14 AWG insulated wire
(35°C minimum). All wire sizes larger than no. 18 AWG can-
not be directly connected to the thermostat and will require a
junction box and splice at the thermostat.
UNIT WITHOUT THRU-BASE CONNECTION KIT —
Correctly rated low voltage wire can be routed through the rub-
er grommet located on the corner post adjacent to the control
box access panel. Route wire through the grommet and then
route the wire behind the corner post utilizing the factory pro-
vided wire ties secured to the control box. This will ensure sep-
oration of the field low voltage wire and the high voltage
route the low voltage wire through the junction box.
UNIT WITHOUT THRU-BASE CONNECTION KIT —
Correctly rated low voltage wire can be routed through the rub-
er grommet located on the corner post adjacent to the control
box access panel. Route wire through the grommet and then
route the wire behind the corner post utilizing the factory pro-
vided wire ties secured to the control box. This will ensure sep-
oration of the field low voltage wire and the high voltage
route the low voltage wire through the junction box.

![Fig. 32 — Convenience Utilization Notice](image1)

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.

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.

HACR — The amp rating of the HACR factory-installed op-
tion is based on the size, voltage, indoor motor and other elec-
trical options of the unit as shipped from the factory. If field-in-
stalled accessories are added or changed in the field (i.e., power
exhaust), 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. See unit nameplates for the proper fuse, HACR or
maximum over-current protection device required on the unit
with field-installed accessories.

![Fig. 33 — HACR Caution Label](image2)

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

Le voltage nominal du disjoncteur
CACR est de 240V/480V en étoile-triangle,
et 600V en étoile. Ne pas brancher sur
une alimentation électrique de 600V en
triangle. Cela causera de graves
dommages à l’équipement.
Fig. 34 — Typical Low-Voltage Control Connections

NOTE: Typical multi-function marking. Follow manufacturer's configuration instructions to select Y2.

--- Field Wiring

⚠️ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may cause a short circuit. Carefully check the connection of control conductor for indoor fan control at terminal G. Connecting the indoor fan lead to terminal C will cause a short circuit condition which can cause component damage inside the unit or at thermostat.

Fig. 35 — Field Control Wiring Raceway

HEAT ANTICIPATOR SETTINGS — Set heat anticipator settings at 0.14 amp for the first stage and 0.14 amp for second-stage heating.

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

Humidi-MiZer System Control Connections

HUMIDI-MIZER® — SPACE RH CONTROLLER

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

The Humidi-MiZer dehumidification system requires a field-supplied and installed space relative humidity control device. This device may be a separate humidistat control (contact closes on rise in space RH above control setpoint) or a combination thermostat-humidistat control device such as Carrier’s Edge® Pro Thermostat with isolated contact set for dehumidification control. The humidistat is normally used in applications where a temperature control is already provided (units with PremierLink™ control).

To connect the Carrier humidistat (HL38MG029):

1. Route the humidistat 2-conductor cable (field-supplied) through hole provided in the unit corner post.
2. Feed wires through the raceway built into the corner post (see Fig. 35) 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. Use wire nuts to connect humidistat cable to two PINK leads in the low-voltage wiring as shown in Fig. 38.

To connect the Thermidistat device (33CS2PPRH-01):
1. Route the Thermidistat multi-conductor thermostat cable (field-supplied) through hole provided in the unit corner post.
2. Feed wires through the raceway built into the corner post (see Fig. 35) 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. 39). 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.
Fig. 38 — Typical Humidi-MiZer® Adaptive Dehumidification System Humidistat Wiring

Edge Programable Thermostat

- Rc
- Rh
- W1
- G
- Y2
- C
- O/W2/B
- Y1
- OAT
- RRS
- SRTN
- HUM
- D1
- D2
- V+
- Vg

Humidi-MiZer™ FIOP

Unit CTB THERMOSTAT

- X*
- C
- G
- W2
- W1
- Y2
- Y1
- R

*Connection not required.

Fig. 39 — Typical Rooftop Unit with Humidi-MiZer Adaptive Dehumidification System with Edge Pro Thermodistat Device
EconoMi$er® X (Factory-Installed Option)

PRODUCT DESCRIPTION — The EconoMi$er X system is an expandable economizer control system, which includes a W7220 economizer module (controller) with an LCD and keypad (See Fig. 40). The W7220 can be configured with optional sensors.

Fig. 40 — 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 EconoMi$er 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 EconoMi$er 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 connected to 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

---

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

IMPORTANT: All inputs and outputs must be Class 2 wiring.

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).

4 Binary Inputs — 1-wire 24 Vac + common GND.
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. 41 and Tables 5 and 6 to locate the wiring terminals for the Economizer module.

NOTE: The four terminal blocks are removable. You can 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>20k NTC and COM</td>
<td>Mixed Air Temperature Sensor (Polarity Insensitive Connection)</td>
</tr>
<tr>
<td>OAT</td>
<td>20k NTC and COM</td>
<td>Outdoor 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>
</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>Shut Down (SD) or HEAT (W) Conventional only and Heat Pump Changeover (O-B) in Heat Pump mode.</td>
</tr>
<tr>
<td>OCC</td>
<td>24 vac IN</td>
<td>Occupied/Unoccupied Input</td>
</tr>
<tr>
<td>E-GND</td>
<td>24 vac OUT</td>
<td>Programmable: Exhaust Fan 2 output or ERV or System alarm output</td>
</tr>
<tr>
<td>EXH1</td>
<td>24 vac OUT</td>
<td>Shut Down (SD) or HEAT (W) Conventional only and Heat Pump Changeover (O-B) in Heat Pump mode.</td>
</tr>
</tbody>
</table>

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. 42 and Table 7 to locate the wiring terminals for each S-Bus sensor.

Use Fig. 42 and Table 7 to locate the wiring terminals for each enthalpy control sensor.
Table 7 — HH57AC081 Sensor Wiring Terminations

<table>
<thead>
<tr>
<th>TERMINAL</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. 42 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 ON OFF</td>
</tr>
<tr>
<td>RA</td>
<td>ON OFF OFF</td>
</tr>
<tr>
<td>OA</td>
<td>OFF OFF OFF</td>
</tr>
</tbody>
</table>

NOTE: When a 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. 43 for CO₂ sensor wiring.

![CO₂ Sensor Wiring Diagram](image)

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

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 AND if you have 2 speed fan DCV MIN (high and low speed) and DCV MAX (high and low speed will appear).

Fig. 44 — W7220 Controller Navigation Buttons

Press the (Menu Up/Exit) button to exit a menu’s item and return to the list of menusTo 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.
7. Press the (Enter) button to accept the displayed value and store it in nonvolatile RAM.
8. “CHANGE STORED” displays.
9. Press the (Enter) button to return to the current menu parameter.
10. 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 AND if you have 2 speed fan DCV MIN (high and low speed) and DCV MAX (high and low speed 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 setup and configured for the installed system.

**IMPORTANT:** During setup, the economizer module is live at all times.

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.

<table>
<thead>
<tr>
<th>Table 9 — Menu Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MENU</strong></td>
</tr>
<tr>
<td>ECONO AVAIL</td>
</tr>
<tr>
<td>ECONOMIZING</td>
</tr>
<tr>
<td>OCCUPIED</td>
</tr>
<tr>
<td>HEAT PUMP</td>
</tr>
<tr>
<td>COOL Y1—IN</td>
</tr>
<tr>
<td>COOL Y1—OUT</td>
</tr>
<tr>
<td>COOL Y2—IN</td>
</tr>
<tr>
<td>COOL Y2—OUT</td>
</tr>
<tr>
<td>MA TEMP</td>
</tr>
<tr>
<td>DA TEMP</td>
</tr>
<tr>
<td>OA TEMP</td>
</tr>
<tr>
<td>OA HUM</td>
</tr>
<tr>
<td>RA TEMP</td>
</tr>
<tr>
<td>RA HUM</td>
</tr>
<tr>
<td>IN CO2</td>
</tr>
<tr>
<td>DCV STATUS</td>
</tr>
<tr>
<td>DAMPER OUT</td>
</tr>
<tr>
<td>ACT POS</td>
</tr>
<tr>
<td>MENU</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>STATUS (CONT)</td>
</tr>
<tr>
<td>ACT COUNT</td>
</tr>
<tr>
<td>ACTUATOR</td>
</tr>
<tr>
<td>EXH1 OUT</td>
</tr>
<tr>
<td>EXH2 OUT</td>
</tr>
<tr>
<td>ERV</td>
</tr>
<tr>
<td>MECH COOL ON or HEAT STAGES ON</td>
</tr>
<tr>
<td>FAN SPEED</td>
</tr>
<tr>
<td>W (HEAT ON)</td>
</tr>
<tr>
<td>SETPOINTS</td>
</tr>
<tr>
<td>MAT SET</td>
</tr>
<tr>
<td>LOW T LOCK</td>
</tr>
<tr>
<td>DRYBLB SET</td>
</tr>
<tr>
<td>ENTH CURVE</td>
</tr>
<tr>
<td>DCV SET</td>
</tr>
<tr>
<td>MIN POS</td>
</tr>
<tr>
<td>VENTMAX</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>VENTMIN</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>ERV OAT SP</td>
</tr>
<tr>
<td>EXH1 SET</td>
</tr>
<tr>
<td>EXH2 SET</td>
</tr>
<tr>
<td>MENU</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>SYSTEM SETUP</td>
</tr>
<tr>
<td>INSTALL</td>
</tr>
<tr>
<td>UNITS DEG</td>
</tr>
<tr>
<td>EQUIPMENT</td>
</tr>
<tr>
<td>AUX2 IN</td>
</tr>
<tr>
<td>FAN SPEED</td>
</tr>
<tr>
<td>FAN CFM</td>
</tr>
<tr>
<td>AUX1 OUT</td>
</tr>
<tr>
<td>OCC</td>
</tr>
<tr>
<td>FACTORY DEFAULT</td>
</tr>
<tr>
<td>MALO SET</td>
</tr>
<tr>
<td>FREEZE POS</td>
</tr>
<tr>
<td>CO2 ZERO</td>
</tr>
<tr>
<td>CO2 SPAN</td>
</tr>
<tr>
<td>STG3 DLY</td>
</tr>
<tr>
<td>SD DMPR POS</td>
</tr>
<tr>
<td>DA LO ALM</td>
</tr>
<tr>
<td>DA HI ALM</td>
</tr>
<tr>
<td>DCVCAL ENA</td>
</tr>
</tbody>
</table>

**ADVANCED SETUP**
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>ADVANCED SETUP (CONT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAT T CAL</td>
<td>0.0°F ±2.5°F</td>
<td>SUPPLY AIR TEMPERATURE CALIBRATION</td>
<td>Allows for the operator to adjust for an out of calibration temperature sensor.</td>
<td></td>
</tr>
<tr>
<td>OAS T CAL</td>
<td>0.0°F ±2.5°F</td>
<td>OUTSIDE AIR TEMPERATURE CALIBRATION</td>
<td>Allows for the operator to adjust for an out of calibration temperature sensor.</td>
<td></td>
</tr>
<tr>
<td>OA H CAL</td>
<td>0% RH ±10% RH</td>
<td>RETURN AIR HUMIDITY CALIBRATION</td>
<td>Allows for operator to adjust for an out of calibration humidity sensor.</td>
<td></td>
</tr>
<tr>
<td>RA T CAL</td>
<td>0.0°F ±2.5°F</td>
<td>RETURN AIR TEMPERATURE CALIBRATION</td>
<td>Allows for the operator to adjust for an out of calibration temperature sensor.</td>
<td></td>
</tr>
<tr>
<td>RA H CAL</td>
<td>0% RH ±10% RH</td>
<td>DISCHARGE AIR TEMPERATURE CALIBRATION</td>
<td>Allows for the operator to adjust for an out of calibration temperature sensor.</td>
<td></td>
</tr>
<tr>
<td>DA T CAL</td>
<td>0.0°F ±2.5°F</td>
<td>TIME DELAY ON 2nd STAGE ECONOMIZING</td>
<td>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>
<td></td>
</tr>
<tr>
<td>2SP FAN DELAY</td>
<td>5 Minutes 0 to 20 minutes in 1 minute increments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHECKOUT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<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. See Table 10.</td>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
<tr>
<td>DAMPER CLOSE</td>
<td>N/A</td>
<td>N/A</td>
<td>Positions damper to the fully closed position.</td>
<td></td>
</tr>
<tr>
<td>CONNECT Y1-O</td>
<td>N/A</td>
<td>N/A</td>
<td>Closes the Y1-O relay (Y1-O)</td>
<td></td>
</tr>
<tr>
<td>CONNECT Y2-O</td>
<td>N/A</td>
<td>N/A</td>
<td>Closes the Y2-O relay (Y2-O)</td>
<td></td>
</tr>
<tr>
<td>CONNECT AUX1-O</td>
<td>N/A</td>
<td>N/A</td>
<td>Energizes the AUX output. If Aux setting is: • NONE — no 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</td>
<td></td>
</tr>
<tr>
<td>CONNECT EXH1</td>
<td>N/A</td>
<td>N/A</td>
<td>Closes the power exhaust fan 2 relay (EXH1)</td>
<td></td>
</tr>
<tr>
<td>ALARMS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAT SENS ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>SUPPLY AIR TEMPERATURE SENSOR ERROR</td>
<td>Mixed air sensor has failed or become disconnected - check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td>CO2 SENS ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>CO2 SENSOR ERROR</td>
<td>CO2 sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td>OA SYLK T ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>OUTSIDE AIR S-BUS SENSOR ERROR</td>
<td>Outdoor air enthalpy sensor has failed or become disconnected - check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td>OA SYLK H ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>RETURN AIR S-BUS SENSOR ERROR</td>
<td>Return air enthalpy sensor has failed or become disconnected - check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td>RA SYLK T ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>DISCHARGE AIR S-BUS SENSOR ERROR</td>
<td>Discharge air sensor has failed or become disconnected - check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td>RA SYLK H ERR</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DA SYLK T ERR</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OA SENS T ERR</td>
<td>N/A</td>
<td>N/A</td>
<td>OUTSIDE AIR TEMPERATURE SENSOR ERROR</td>
<td>Outdoor air temperature sensor has failed or become disconnected - check wiring then replace if the alarm continues.</td>
</tr>
<tr>
<td>ACT ERROR</td>
<td>N/A</td>
<td>N/A</td>
<td>ACTUATOR ERROR</td>
<td>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.</td>
</tr>
<tr>
<td>FREEZE ALARM</td>
<td>N/A</td>
<td>N/A</td>
<td>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.</td>
<td></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>ALARMS</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>

#### LEGEND

- **CLO** — Compressor Lockout
- **ERV** — Energy Recovery Ventilator
- **LCD** — Liquid Crystal Display
- **MA** — Mixed Air
- **MAT** — Mixed Air Temperature
- **N/A** — Not Applicable
- **OA** — Outdoor Air
- **OAT** — Outdoor Air Temperature
- **OCC** — Occupied
- **RA** — Return Air
- **RAT** — Return Air Temperature
- **RTU** — Rooftop Unit
- **SYS** — System

#### NOTES:

1. 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.
2. When values are displayed, pressing and holding the `▲` or `▼` button causes the display to automatically increment.
3. 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.

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. For dry bulb operation with a 2 speed indoor fan, with or without DCV, see Tables 15 and 16. For enthalpy operation with a 2 speed indoor fan, with or without DCV, see Tables 17 and 18.

4. **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.

5. **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.

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

7. **SYSTEM SETUP parameters must be configured as noted for 2-Speed unit operation:**
   - EQUIPMENT = CONV
   - AUX2 IN = W
   - FAN SPEED = 2SPEED
**Table 10 — Damper Minimum Position Settings and Readings on Checkout Menu**

<table>
<thead>
<tr>
<th>DEMAND CONTROLLED VENTILATION (CO₂ SENSOR)</th>
<th>FAN SPEED</th>
<th>SETPOINTS</th>
<th>CHECKOUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>1</td>
<td>MIN POS</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>MIN POS H</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIN POS L</td>
<td>VMAX–LS</td>
</tr>
<tr>
<td>YES</td>
<td>1</td>
<td>VENT MIN</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VENT MAX</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>VENT MIN H</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VENT MAX H</td>
<td>VMAX–LS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VENT MIN L</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VENT MAX L</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></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>
</tr>
<tr>
<td></td>
<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>
</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></td>
<td>ON</td>
<td>OFF</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS to Full Open</td>
<td>Closed to Full-Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON</td>
<td>ON</td>
<td>HIGH</td>
<td>24v/On</td>
<td>0v/Off</td>
<td>MIN POS to Full Open</td>
<td>Closed to Full-Open</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>OFF/UNO</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></td>
<td>ON</td>
<td>OFF</td>
<td>HIGH</td>
<td>24v/On</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<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>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF</td>
<td>OFF</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON</td>
<td>ON</td>
<td>HIGH</td>
<td>24v/On</td>
<td>0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
<tr>
<td>Above CO₂ Set</td>
<td>OFF/UNO</td>
<td>OFF</td>
<td>OFF</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN to VENTMAX</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>HIGH</td>
<td>24v/On</td>
<td>0v/Off</td>
<td>VENTMIN to VENTMAX</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON</td>
<td>ON</td>
<td>HIGH</td>
<td>24v/On</td>
<td>24v/On</td>
<td>VENTMIN to VENTMAX</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF</td>
<td>OFF</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON</td>
<td>OFF</td>
<td>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ON</td>
<td>ON</td>
<td>HIGH</td>
<td>24v/On</td>
<td>0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</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>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>HIGH</td>
<td>24v/On</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<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>
<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>HIGH</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>HIGH</td>
<td>24v/On</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<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>
<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.

| Above CO₂ Set                       | Yes                            | OFF  | OFF  | HIGH      | 0v/Off| 0v/Off| VENTMIN  | Closed    |
| ON                                  | OFF                            | HIGH | 24v/On| 0v/Off    | 0v/Off| VENTMIN| Closed   |
| ON                                  | ON                             | HIGH | 24v/On| 24v/On    | VENTMIN| Closed |

### Table 15 — Dry Bulb Operation No DCV (CO₂ Sensor) — 2 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>LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>LOW</td>
<td>24v/On</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>LOW</td>
<td>24v/On</td>
<td>24v/On</td>
<td>MIN POS</td>
<td>Closed</td>
<td></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 16 — Dry Bulb Operation With DCV (CO₂ Sensor) — 2 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><strong>Below CO₂ Set</strong></td>
<td></td>
<td></td>
<td></td>
<td>LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td>No</td>
<td>OFF OFF LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON OFF LOW</td>
<td>24v/On 0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON ON HIGH</td>
<td>24v/On 24v/On</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Yes</strong></td>
<td>OFF OFF LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON OFF LOW</td>
<td>0v/Off 0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON ON HIGH</td>
<td>24v/On 0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></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 17 — Enthalpy Operation No DCV (CO₂ Sensor) — 2 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><strong>NO CO₂ SENSOR</strong></td>
<td></td>
<td></td>
<td></td>
<td>LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td>NO</td>
<td>OFF OFF LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON OFF LOW</td>
<td>24v/On 0v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON ON HIGH</td>
<td>24v/On 24v/On</td>
<td>MIN POS</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>YES</strong></td>
<td>OFF OFF LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>MIN POS to Full Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON OFF LOW</td>
<td>0v/Off 0v/Off</td>
<td>MIN POS to Full Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON ON HIGH</td>
<td>24v/On 0v/Off</td>
<td>MIN POS to Full Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></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 18 — Enthalpy Operation With DCV (CO₂ Sensor) — 2 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><strong>Below CO₂ Set</strong></td>
<td></td>
<td></td>
<td></td>
<td>LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td>No</td>
<td>OFF OFF LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON OFF LOW</td>
<td>24v/On 0v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON ON HIGH</td>
<td>24v/On 24v/On</td>
<td>VENTMIN</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Yes</strong></td>
<td>OFF OFF LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON OFF LOW</td>
<td>0v/Off 0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON ON HIGH</td>
<td>24v/On 0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Above CO₂ Set</strong></td>
<td></td>
<td></td>
<td></td>
<td>HIGH</td>
<td>24v/On</td>
<td>24v/On</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td>No</td>
<td>OFF OFF LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN to VENTMAX</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON OFF LOW</td>
<td>24v/On 0v/Off</td>
<td>VENTMIN to VENTMAX</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON ON HIGH</td>
<td>24v/On 24v/On</td>
<td>VENTMIN to VENTMAX</td>
<td>Closed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Yes</strong></td>
<td>OFF OFF LOW</td>
<td>0v/Off</td>
<td>0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON OFF LOW</td>
<td>0v/Off 0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON ON HIGH</td>
<td>24v/On 0v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
<td></td>
<td></td>
<td></td>
<td></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.
ENTHALPY SETTINGS — When the OA temperature, enthalpy and dew point are below the respective setpoints, the Outdoor Air can be used for economizing. Fig. 45 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 19 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. 45 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.

Table 19 provides the values for each boundary limit.

Two-Speed Fan Operation — The W7220 controller has the capability to work with a system using a 2-speed supply fan. The W7220 does not control the supply directly but uses the following input status to determine the speed of the supply fan and controls the OA damper to the required position, see Table 20.

Table 20 — Fan Speed

<table>
<thead>
<tr>
<th>STATE</th>
<th>FAN SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCC</td>
<td>Low</td>
</tr>
<tr>
<td>Y1</td>
<td>Low</td>
</tr>
<tr>
<td>Y2</td>
<td>High</td>
</tr>
<tr>
<td>W</td>
<td>High</td>
</tr>
</tbody>
</table>

The W (heating mode) is not controlled by the W7220 but it requires the status to know where to position the OA damper for minimum position for the fan speed.

The 2 speed fan delay is available when the system is programmed for 2 speed fan (in the System Setup menu item). The 2 speed fan delay is defaulted to 5 minutes and can be changed in the Advanced Setup menu item. When the unit has a call for Y1 In and in the free cooling mode and there is a call for Y2 In, the 2-speed fan delay starts and the OA damper will modulate 100% open, the supply fan should be set to high speed by the unit controller.

After the delay one of two actions will happen:
- The Y2 In call will be satisfied with the damper 100% open and fan on high speed and the call will turn off OR
- If the call for additional cooling in the space has not been satisfied then the first stage of mechanical cooling will be enabled through Y1 Out or Y2 Out.

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.
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 (on page 34) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

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

To perform a Checkout test:
1. Scroll to the desired test in the Checkout menu using the ▲ and ▼ buttons.
2. Press the ▼ button to select the item.
3. RUN? appears.
4. Press the ▼ button to start the test.
5. The unit pauses and then displays IN PROGRESS.
6. When the test is complete, DONE appears.
7. When all desired parameters have been tested, press the (Menu Up) button to end the test.

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

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 ▼ button.
3. ERASE? displays.
4. Press the ▼ button.
5. ALARM ERASED displays.
6. Press the (Menu up/Exit) button to complete the action and return to the previous menu.

NOTE: If the alarm still exists after you clear it, it is redisplayed within 5 seconds.

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 your specific job requirements.

Staged Air Volume (SAV) with Variable Frequency Drive (Factory Option) — For details on operating 48HC 2 stage cooling units equipped with the factory-installed Staged Air Volume option, refer to the Variable Frequency Drive (VFD) Installation, Setup and Troubleshooting Supplement.

EconoMi$er® X — Ultra Low Leak Economizer (Factory Option) — For details on operating 48HC 2 stage cooling units equipped with the EconoMi$er X Installation, Setup and Troubleshooting Supplement factory-installed EconoMi$er X option, refer to Factory-Installed Economizers for TC/TCQ/HC/Q/L/C/KC/Q Rooftop Units, 3 to 27.5 Nominal Tons.

ComfortLink Controls (Factory Option) — For details on operating 48HC units equipped with the factory-installed ComfortLink controls option, refer to Controls, Start-Up, Operation and Troubleshooting for 48/50HC 04-28 Single Package Rooftop Unit with ComfortLink Controls.
Fig. 47 — ComfortLink with Humid-MiZer® Power Diagram and Component Arrangement 48/50HC 17-28 Units
Fig. 48 — ComfortLink (without Humid-MiZer) Power Diagram and Component Arrangement 48/50HC 17-28 Units
The PremierLink controller (see Fig. 49) 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 controller is factory-mounted in the 48HC unit’s main control box to the right of the Central Terminal Board (CTB) (see Fig. 50). Factory wiring is completed through harnesses connected to the CTB thermostat. Field connections are made at a 16-pole terminal block (TB3) located at the top of the unit control box in front of the PremierLink controller. The factory-installed PremierLink controller includes the supply-air temperature (SAT) sensor. The outdoor air temperature (OAT) sensor is included in the FIOP/accessory EconoMi$er 2 package.

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: 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. 50 — 48HC Control Box Component Locations
Fig. 51 — PremierLink Wiring Schematic
Fig. 52 — PremierLink™ Wiring Schematic with Humidi-MiZer® System Option
Supply Air Temperature (SAT) Sensor — On FIOF-equipped 48HC units, the unit is supplied with a supply-air temperature (SAT) sensor (33ZCSENSAT). This sensor is a tubular probe type, approx 6-inches (152 mm) in length. It is a nominal 10k ohm thermistor.

The SAT is factory-wired. The SAT probe is mounted in the fan deck (see Fig. 53). It can be removed or remounted per 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. Insure that the sensor wires do not contact the hot surface of the heat exchanger.

Fig. 53 — Mounting Location for Supply Air Temperature (SAT) Sensor on 48HC Units

NOTE: Refer PremierLink Controller Installation, Start-up, and Configuration Instructions for complete PremierLink controller configuration, operating sequences and troubleshooting information. Have a copy of this manual available at unit set-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 EconoMi$er2 (FIOF or accessory). It is a nominal 10k ohm thermistor attached to an eylet mounting ring.

ECONOMISER2 — The PremierLink controller is used with EconoMi$er2 (option or accessory) for outdoor air management. The damper position is controlled directly by the PremierLink control; EconoMi$er2 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 21 for accessory part numbers.

Field Connections — Field connections for accessory sensor and input devices are made at the 16-pole terminal block (TB3, see Fig. 51 and 52) located on the control box top shelf in front of the PremierLink control. Some input devices also require a 24-vac signal source; connect at CTB terminal R at “THERMOSTAT” connection strip for this signal source. See connections figures on following pages for field connection locations (and for continued connections at the PremierLink controller board inputs).

Table 22 provides a summary of field connections for units equipped with Space Sensor. Table 23 provides a summary of field connections for units equipped with Space Thermostat.

<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>Required — 33ZCT5SSPT 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 — 33CSENTHWSW or equivalent</td>
<td>Requires — 33CSENTSEN or equivalent</td>
</tr>
</tbody>
</table>

NOTES:
- 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 22 — Space Sensor Mode

<table>
<thead>
<tr>
<th>TB3 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, 24VDC</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**

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
T55 — Space Temperature Sensor
T56 — Space Temperature Sensor

### Table 23 — Thermostat Mode

<table>
<thead>
<tr>
<th>TB3 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, 24VDC</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>
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</tr>
<tr>
<td>15</td>
<td>AUX OUT (Power Exhaust) (Output)</td>
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</tr>
<tr>
<td>16</td>
<td>CCN — (BLK)</td>
<td>Digital, 5VDC</td>
</tr>
</tbody>
</table>

**LEGEND**

CCN — 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. T-55 space temperature sensor provides a signal of space temperature to the PremierLink controller. T-56 provides same space temperature signal plus it allows for adjustment of space temperature setpoints from the face of the sensor by the occupants.

**Fig. 54 — T-55 Space Temperature Sensor Wiring**

Connect T-55 — See Fig. 54 for typical T-55 internal connections. Connect the T-55 SEN terminals to TB3 terminals 1 and 3 (see Fig. 55).

**Fig. 55 — PremierLink™ Controller T-55 Sensor**

Connect T-56 — See Fig. 56 for T-56 internal connections. Install a jumper between SEN and SET terminals as illustrated. Connect T-56 terminals to TB3 terminals 1, 3 and 5 (see Fig. 57).

**CONNECT THERMOSTAT** — A 7-wire thermostat connection requires a 24-v power source and a common connection. Use the R and C terminals on the CTB’s THERMOSTAT connection strip for these. Connect the thermostat’s Y1, Y2, W1, W2 and G terminals to PremierLink TB3 as shown in Fig. 58.

If the 48HC unit is equipped with factory-installed smoke detector(s), disconnect the factory BLU lead at TB3-6 (Y2) before connecting the thermostat. Identify the BLU lead originating at CTB-DDC-1; disconnect at TB3-6 and tape off. Confirm that the second BLU lead at TB3-6 remains connected to PremierLink J4-8.
If the 48HC unit has an economizer system and free-cooling operation is required, a sensor representing Return Air Temperature must also be connected (field-supplied and installed). This sensor may be a T-55 Space Sensor (see Fig. 54) installed in the space or in the return duct, or it may be sensor P/N 33ZCSENSAT, installed in the return duct. Connect this sensor to TB3-1 and TB3-3 per Fig. 55.

**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 controller 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. 59 for typical CO₂ sensor wiring schematic.

**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. 59 for typical CO₂ sensor wiring schematic.
ventilation damper in an HVAC system. The OAQ sensor is packaged with an outdoor cover. See Fig. 61. The outdoor air CO₂ sensor must be located in the economizer outside air hood.

**Fig. 61 — Outdoor Air Quality Sensor Cover**

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. 59. Connect the 4 to 20 mA terminal to the TB3-13 terminal of the 48HC. Connect the SIG COM terminal to the TB3-11 terminal of the 48HC. See Fig. 62.

**Fig. 62 — Outdoor CO₂ Sensor Connections**

**SPACE RELATIVE HUMIDITY SENSOR OR HUMIDISTAT CONNECTIONS**

Space Relative Humidity Sensor connections — The accessory space relative humidity sensor (33ZCSNSRH-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 inch electrical box to accommodate the wiring is recommended for installation. The sensor can be mounted directly on the wall, if acceptable by local codes.

**Fig. 63 — 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. Airtight 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 feet, 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. 64 for wiring details.
The power for the sensor is provided by the PremierLink controller on terminal J5-4 (+33 to +35vdc).

To wire the sensor:
1. At the sensor, remove 4 inches of the jacket from the cable. Strip 1/4 inch of insulation from each conductor. Route the cable through the wire clearance opening in the center of the sensor. See Fig. 63.
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 TB3-13.
5. Connect the field-supplied BLACK wire from the sensor to TB3-7.

Humidistat Connections — A humidistat can not be directly connected to the PremierLink controller. Follow the instructions on pages 24 and 25 to connect a humidistat or a thermostat as an electromechanical device.

SMOKE DETECTOR/FIRE SHUTDOWN (FSD) — This function is available only when the PremierLink controller is configured for (Space) Sensor Mode. The unit is factory-wired for PremierLink FSD operation when the PremierLink controller 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 controller communicates the smoke detector’s tripped status to the CCN building control. See Fig. 51 and Fig. 52, typical PremierLink controller wiring diagrams.

FILTER STATUS SWITCH — This function is available only when the PremierLink controller is configured for (Space) Sensor Mode.

PremierLink controller can monitor return filter status in two ways: By monitoring a field-supplied/installed filter pressure switch or via supply fan run-time 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 TB3-13. Setpoint for Dirty Filter is set at the switch. See Fig. 65.

SUPPLY FAN STATUS SWITCH — The PremierLink controller 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 contacts are closed indicating proper supply fan operation.

Install the differential pressure switch in the supply fan section according to switch manufacturer’s instructions. Arrange the switch contact to be open on no flow and to close as pressure rises indicating fan operation.

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 TB3-8. Setpoint for Supply Fan Status is set at the switch. See Fig. 66.

REMOTE OCCUPIED SWITCH — The PremierLink controller 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 CTB’s THERMOSTAT-R terminal. Connect the other side of the timeclock contact to the unit’s TB3-2 terminal. See Fig. 67.
Refer to the PremierLink Controller Installation, Start-up, and Configuration Instructions for additional information on configuring the PremierLink controller for Door Switch timer function.

POWER EXHAUST (OUTPUT) — Connect the accessory Power Exhaust contactor coil(s) per Fig. 68.

![Diagram of Power Exhaust Connection](image)

**Fig. 68 — PremierLink Controller 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 TB3-15 (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 (1219 m), with no more than 60 total devices on any 1000-ft section. Optically isolated RS-485 repeaters are required every 1000 ft (305 m).

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 24 for recommended cable.

**Table 24 — 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 (–4°F) to 60°C (140°F) 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

NOTE: When connecting the communication bus cable, a color code system for the entire network is recommended to simplify installation and checkout. See Table 25 for the recommended color code.

**Table 25 — 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 TB3-12 terminal. Connect the CCN (ground) lead (typically WHT) to the unit’s TB3-14 terminal. Connect the CCN (–) lead (typically BLK) to the unit’s TB3-16 terminal. See Fig. 69.

**CCN Bus**

- (RED) ——— 12 ———[Diagram of CCN Bus Connections](image)
- (WHT) ——— 14 ———
- (BLK) ——— 16 ———

**Fig. 69 — PremierLink Controller CCN Bus Connections**
RTU Open Controller System — The RTU Open controller is factory-mounted in the 48HC unit’s main control box, to the right of the CTB. See Fig. 50. Factory wiring is completed through harnesses connected to the CTB. Field-connections for RTU Open controller sensors will be made at the Phoenix connectors on the RTU Open board. The factory-installed RTU Open controller includes the supply-air temperature (SAT) sensor. The outdoor air temperature (OAT) sensor is included in the FIOP/accessory EconoMi$er2 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 you to select your protocol (and baud rate) of choice among the four most popular protocols in use today: BACnet*, Modbus†, Johnson N2 and LonWorks**. (See Fig. 70.)

Refer to Table 26, RTU Open Controller Inputs and Outputs for locations of all connections to the RTU Open controller board.

![Fig. 70 — RTU Open Multi-Protocol Controller Board](image)

---

* BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).
† Modbus is a registered trademark of Schneider Electric.
** LonWorks is a registered trademark of Echelon Corporation.
Fig. 72 — RTU Open System Control Wiring Diagram with Humi-MiZer® System Option
Table 26 — RTU Open Controller Inputs and Outputs

<table>
<thead>
<tr>
<th>POINT NAME</th>
<th>BACNET OBJECT NAME</th>
<th>TYPE OF I/O</th>
<th>CONNECTION PIN NUMBER(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEDICATED INPUTS</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, 2</td>
</tr>
<tr>
<td>Supply Air Temperature</td>
<td>sa_temp</td>
<td>AI (10K Thermistor)</td>
<td>J2—1, 2</td>
</tr>
<tr>
<td>Outside Air Temperature</td>
<td>oa_temp</td>
<td>AI (10K Thermistor)</td>
<td>J2—3, 4</td>
</tr>
<tr>
<td>Space Temperature Offset Pot</td>
<td>stpt_adj_offset</td>
<td>AI (100K Potentiometer)</td>
<td>J20—3, 4</td>
</tr>
<tr>
<td>Safety Chain Feedback</td>
<td>safety_status</td>
<td>DI (24 VAC)</td>
<td>J1—9</td>
</tr>
<tr>
<td>Compressor Safety Status</td>
<td>comp_status</td>
<td>DI (24 VAC)</td>
<td>J1—2</td>
</tr>
<tr>
<td>Fire Shutdown Status</td>
<td>firedown_status</td>
<td>DI (24 VAC)</td>
<td>J1—10</td>
</tr>
<tr>
<td>Enthalpy Status</td>
<td>enthalpy_status</td>
<td>DI (24 VAC)</td>
<td>J2—6</td>
</tr>
<tr>
<td>Humidistat Input Status</td>
<td>humstat_status</td>
<td>DI (24 VAC)</td>
<td>J5—7</td>
</tr>
<tr>
<td>CONFIGURABLE INPUTS</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 or J4—5</td>
</tr>
<tr>
<td>Outdoor Air CO₂</td>
<td>oaq</td>
<td>AI (4-20 mA)</td>
<td></td>
</tr>
<tr>
<td>Space Relative Humidity</td>
<td>space_rh</td>
<td>AI (4-20 mA)</td>
<td></td>
</tr>
<tr>
<td>Supply Fan Status*</td>
<td>sfan_status</td>
<td>DI (24 VAC)</td>
<td>J5—1 or J5—3 or J5—5 or J5—7</td>
</tr>
<tr>
<td>Door Contact Input*</td>
<td>door_contact_status</td>
<td>DI (24 VAC)</td>
<td></td>
</tr>
<tr>
<td>Occupancy Contact*</td>
<td>occ_contact_status</td>
<td>DI (24 VAC)</td>
<td></td>
</tr>
<tr>
<td>OUTPUTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economizer Output</td>
<td>econ_output</td>
<td>AO (4-0mA)</td>
<td>J2—5</td>
</tr>
<tr>
<td>Supply Fan Relay State</td>
<td>sfan</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J1—4</td>
</tr>
<tr>
<td>Compressor 1 Relay State</td>
<td>comp_1</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J1—8</td>
</tr>
<tr>
<td>Compressor 2 Relay State</td>
<td>comp_2</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J1—7</td>
</tr>
<tr>
<td>Heat Stage 1 Relay State</td>
<td>heat_1</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J1—6</td>
</tr>
<tr>
<td>Heat Stage 2 Relay State</td>
<td>heat_2</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J1—5</td>
</tr>
<tr>
<td>Power Exhaust Relay State</td>
<td>pexh</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J11—3</td>
</tr>
<tr>
<td>Dehumidification Relay State</td>
<td>dehum</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J11—7, 8</td>
</tr>
</tbody>
</table>

**LEGEND**

AI — Analog Input  
AO — Analog Output  
DI — Discrete Input  
DO — Discrete Output

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 (SAT) SENSOR — On 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-inches (152 mm) in length. 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. 53.

OUTDOOR AIR TEMPERATURE (OAT) SENSOR — The OAT is factory-mounted in the EconoMi$er2 (FIOP or accessory). It is a nominal 10k ohm thermistor attached to an eyelet mounting ring.

ECONOMISER®2 — The RTU Open controller is used with EconoMi$er2 (factory-installed option or field-installed accessory) for outdoor air management. The damper position is controlled directly by the RTU Open controller; EconoMi$er2 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** — Field connections for accessory sensors and input devices are made the RTU Open controller, at plugs J1, J2, J4, J5, J11 and J20. All field control wiring that connects to the RTU Open controller must be routed through the raceway built into the corner post as shown in Fig. 35. 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 controller. Connect to the wires to the removable Phoenix connectors and then reconnect the connectors to the board.

SPACE TEMPERATURE (SPT) SENSORS — There are two types of SPT sensors available from Carrier, resistive input non-communicating (T55, T56, and T59) and Rnet communicating (SPS, SPPL, SPP, and SPPF) sensors. Each type has a variety of options consisting of: timed override button, set point adjustment, a LCD screen, and communication tie in. Space temperature can be also be written to from a building network or zoning system. However, it is still recommended that return air duct sensor be installed to allow stand-alone

**Table 26 — RTU Open Controller Inputs and Outputs**

<table>
<thead>
<tr>
<th>POINT NAME</th>
<th>BACNET OBJECT NAME</th>
<th>TYPE OF I/O</th>
<th>CONNECTION PIN NUMBER(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space Temp / Zone Temp</td>
<td>zone_temp</td>
<td>AI (10K Thermistor)</td>
<td>J20—1, 2</td>
</tr>
<tr>
<td>Supply Air Temperature</td>
<td>sa_temp</td>
<td>AI (10K Thermistor)</td>
<td>J2—1, 2</td>
</tr>
<tr>
<td>Outside Air Temperature</td>
<td>oa_temp</td>
<td>AI (10K Thermistor)</td>
<td>J2—3, 4</td>
</tr>
<tr>
<td>Space Temperature Offset Pot</td>
<td>stpt_adj_offset</td>
<td>AI (100K Potentiometer)</td>
<td>J20—3, 4</td>
</tr>
<tr>
<td>Safety Chain Feedback</td>
<td>safety_status</td>
<td>DI (24 VAC)</td>
<td>J1—9</td>
</tr>
<tr>
<td>Compressor Safety Status</td>
<td>comp_status</td>
<td>DI (24 VAC)</td>
<td>J1—2</td>
</tr>
<tr>
<td>Fire Shutdown Status</td>
<td>firedown_status</td>
<td>DI (24 VAC)</td>
<td>J1—10</td>
</tr>
<tr>
<td>Enthalpy Status</td>
<td>enthalpy_status</td>
<td>DI (24 VAC)</td>
<td>J2—6</td>
</tr>
<tr>
<td>Humidistat Input Status</td>
<td>humstat_status</td>
<td>DI (24 VAC)</td>
<td>J5—7</td>
</tr>
<tr>
<td>CONFIGURABLE INPUTS</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 or J4—5</td>
</tr>
<tr>
<td>Outdoor Air CO₂</td>
<td>oaq</td>
<td>AI (4-20 mA)</td>
<td></td>
</tr>
<tr>
<td>Space Relative Humidity</td>
<td>space_rh</td>
<td>AI (4-20 mA)</td>
<td></td>
</tr>
<tr>
<td>Supply Fan Status*</td>
<td>sfan_status</td>
<td>DI (24 VAC)</td>
<td>J5—1 or J5—3 or J5—5 or J5—7</td>
</tr>
<tr>
<td>Door Contact Input*</td>
<td>door_contact_status</td>
<td>DI (24 VAC)</td>
<td></td>
</tr>
<tr>
<td>Occupancy Contact*</td>
<td>occ_contact_status</td>
<td>DI (24 VAC)</td>
<td></td>
</tr>
<tr>
<td>OUTPUTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economizer Output</td>
<td>econ_output</td>
<td>AO (4-0mA)</td>
<td>J2—5</td>
</tr>
<tr>
<td>Supply Fan Relay State</td>
<td>sfan</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J1—4</td>
</tr>
<tr>
<td>Compressor 1 Relay State</td>
<td>comp_1</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J1—8</td>
</tr>
<tr>
<td>Compressor 2 Relay State</td>
<td>comp_2</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J1—7</td>
</tr>
<tr>
<td>Heat Stage 1 Relay State</td>
<td>heat_1</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J1—6</td>
</tr>
<tr>
<td>Heat Stage 2 Relay State</td>
<td>heat_2</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J1—5</td>
</tr>
<tr>
<td>Power Exhaust Relay State</td>
<td>pexh</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J11—3</td>
</tr>
<tr>
<td>Dehumidification Relay State</td>
<td>dehum</td>
<td>DO Relay (24VAC, 1A)</td>
<td>J11—7, 8</td>
</tr>
</tbody>
</table>
operation for back-up. Refer to the configuration section for
details on controller configurations associated with space sen-

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

Use 20 gauge wire to connect the sensor to the controller.
The wire is suitable for distances of up to 500 ft (152 m). Use a
three-conductor shielded cable for the sensor and setpoint ad-
justment connections. If the setpoint adjustment (slider) is
not required, then an unshielded, 18 or 20 gauge, two-conduc-
tor, twisted pair cable may be used.

Connect T-55 — See Fig. 54 for typical T-55 internal connec-
tions. Connect the T-55 SEN terminals to the RTU Open con-
troller at J20-1 and J20-2. See Fig. 73.

\[\text{Fig. 73 — RTU Open Controller T-55 Sensor}
\text{Connections}\]

Connect T-56 — See Fig. 56 for T-56 internal connections. In-
stall a jumper between SEN and SET terminals as illustrated.
Connect T-56 terminals to the RTU Open controller at J20—1,
J20—2 and J20—3 per Fig. 74.

\[\text{Fig. 74 — RTU Open Controller T-56 Sensor}
\text{Connections}\]

Connect T-59 — The T-59 space sensor requires a separate,
isolated power supply of 24 VAC. See Fig. 75 for internal con-
nections at the T-59. Connect the SEN terminal (BLU) to the
RTU Open controller at J20—1. Connect the COM terminal
(BRN) to J20—2. Connect the SET terminal (STO or BLK) to
J20—3.

\[\text{Wiring the Indoor Air Quality}
\text{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 con-
trol 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. 59. Connect the 4-20 mA terminal to the RTU Open con-
troller at J4-2 and connect the SIG COM terminal to the RTU
Open controller at J4-3. See Fig. 76.
Fig. 76 — RTU Open Controller/Indoor CO₂ Sensor (33ZCSENCO2) Connections

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. 61. 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 to 20 mA) and ground (SIG COM) terminals on the OAQ sensor. See Fig. 59. Connect the 4 to 20 mA terminal to the RTU Open controller at J4—5. Connect the SIG COM terminal to the RTU Open controller at J4—6. See Fig. 77.

OAQ Sensor

Fig. 77 — RTU Open Controller/Outdoor CO₂ Sensor (33ZCSENCO2) Connections

SPACE RELATIVE HUMIDITY SENSOR OR HUMIDISTAT

Humidi-MiZer System Control Wiring — In units equipped with the Humidi-MiZer option there are two pink (PNK) wires loose in the control box used to control the dehumidification function of the unit. These pink wires are meant to be tied to a space humidistat or thermostat on an electromechanical unit. On RTU Open controller 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, reconnect the plug to the board at J11.

Relative Humidity Sensors (Space or Duct Mounted) — The accessory space humidity sensor (33ZCSENRH-01) or duct humidity sensor (33ZCSENDRH-01) is used to measure the relative humidity of air within the space or return air duct. The RH reading is used to control 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 controller configurations must be changed after adding an RH sensor. See Fig. 78 and 79 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.

Fig. 78 — Space Relative Humidity Sensor Typical Wiring
Humidistat — The accessory humidistat provides the RTU Open controller 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 controller 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 system 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. 71 and 72, the RTU Open Controller 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 ease of installation. Refer to Fig. 70 and Fig. 71 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 ease of installation. Refer to Fig. 70 and Fig. 71 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. 70 and Table 26 for wire terminations at J5.

Power Exhaust (output) — The relay used by the RTU Open controller 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 controller 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 source. Refer to Fig. 70 and Table 26 for wire terminations at J11.

Communication Wiring — Protocols

GENERAL — 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; just make the front end user different.

The RTU Open controller can be set to communicate on four different protocols: BACnet, Modbus, N2, and LonWorks. 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. 80 and 81 for protocol switch settings and address switches. The third party connection to the RTU Open controller is through plug J19. See Fig. 82 for wiring.

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

Refer to the RTU Open Controller Integration Guide or more 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>OFF</td>
<td>Select Baud</td>
<td>Select Baud</td>
</tr>
<tr>
<td>N2 (Slave)</td>
<td>Unused</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</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>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

NOTE: DS = Dip Switch
BACnet MS/TP SW3 example shown

Baud Rate Selections

<table>
<thead>
<tr>
<th>BAUD RATE</th>
<th>DS2</th>
<th>DS1</th>
</tr>
</thead>
<tbody>
<tr>
<td>9600</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. 80 — RTU Open Controller SW3 Dip Switch Settings

LOCAL ACCESS

BACview® Handheld — The BACview® is a keypad/display interface used to connect to the RTU Open to access the control information, read sensor values, and test the RTU, see Fig. 83. This is an accessory interface that does not come with the RTU Open controller and can only be used at the unit. Connect the BACview® to the RTU Open J12 local access port. There are two password protected levels in the display (User and Admin). The user password is defaulted to 0000 but can be changed. The Admin password is 1111 and cannot be changed. There is a 10 minute auto logout if a screen is idle. See RTU Open Multi-Protocol Controller Controls, Start-Up, Operation and Troubleshooting manual, Appendix A, for navigation and screen content.

Virtual BACview — Virtual BACview is a freeware computer program that functions as the BACview® Handheld. The USB Link interface (USB-L) is required to connect a computer to the RTU Open board. The link cable connects a USB port to the J12 local access port. This program functions and operates identical to the handheld.

RTU OPEN CONTROLLER TROUBLESHOOTING

Communication LEDs — The 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 27.

NOTE: Refer to the RTU Open Multi-Protocol Controller Controls, Start-Up, Operation and Troubleshooting manual for complete configuration of the RTU Open controller, operating sequences and troubleshooting information. Refer to the RTU Open Controller Integration Guide for details on configuration and troubleshooting of connected networks. Have a copy of these manuals available at unit start-up.
The outdoor air enthalpy control (P/N 33CSENTHSW) is available as a field-installed accessory to be used with the EconoMi$er2 damper system. The outdoor air enthalpy sensor is part of the enthalpy control. The separate field-installed accessory return air enthalpy sensor (33CSENT-SEN) is required for differential enthalpy control. See Fig. 84. 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. 84. 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.

The LEDs on the RTU Open Control Board (see Fig. 70) 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>The RTU Open controller has power</td>
</tr>
<tr>
<td>Rx</td>
<td>The RTU Open controller is receiving data from the network segment</td>
</tr>
<tr>
<td>Tx</td>
<td>The RTU Open controller 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>Five minute 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>Ten second recovery period after brownout</td>
</tr>
<tr>
<td>14 flashes per second</td>
<td>14 flashes per second, alternating with Run LED</td>
<td>Bownout</td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>Failure. Try the following solutions:</td>
</tr>
</tbody>
</table>

- Turn the RTU Open controller off, then on.
- Format the RTU Open controller.
- Download memory to the RTU Open controller.
- Replace the RTU Open controller.
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 (see Fig. 85).

Fig. 85 — Outside and Return Air Enthalpy Sensor Wiring

To wire the return air enthalpy sensor, perform the following:

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. 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.

RETURN AIR SENSOR TUBE INSTALLATION — The return air sampling tube is shipped in the unit’s supply fan section, attached to the blower housing (see Fig. 86. Its operating location is in the return air section of the unit (see Fig. 87, unit without economizer, or Fig. 88, unit with economizer), inserted into the return air sensor module housing which protrudes through the back of the control box.

To install the return air sensor sampling tube:

1. Remove the tube from its shipping location.
2. Open the unit end to access the return air sensor (located on right-hand partition)
3. Orient the tube’s sampling holes into the return air flow direction. For vertical application, position the sampling holes on the bottom of the tube, facing into the bottom return duct opening. For horizontal application, position the sampling holes on the side of the tube, facing the unit’s end panel.
4. Insert the sampling tube into the return air sensor module until the tube snaps into position.
5. Replace end panel or outside air hood.

SMOKE DETECTOR TEST MAGNET — Locate the magnet; it is shipped in the control box area.

ADDITIONAL APPLICATION DATA — Refer to the Factory-Installed Smoke Detectors for Small and Medium Rooftop Units 2-25 Tons application data for discussions on additional control features of these smoke detectors including multiple unit coordination.
Step 13 — Adjust Factory-Installed Options

ECONOMISER IV OCCUPANCY SWITCH — Refer to Fig. 89 for general EconoMiSer IV wiring. External occupancy control is managed through a connection on the Central Terminal 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 on CTB. Remove or cut jumper JMP 2 to complete the installation.

Step 14 — Install Accessories — Available accessories include:

- Roof Curb
- Thru-base connection kit (must be installed before unit is set on curb)
- LP conversion kit
- Manual outside air damper
- High Altitude Gas kits
- Low Ambient Controls
- Thermostat / Sensors
- Two-Position motorized outside air damper
- EconoMiSer IV (with control and integrated barometric relief)
- EconoMiSer2 (without control for external signal and integrated barometric relief)
- Power Exhaust
- Differential dry-bulb sensor (EconoMiSer IV)
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- CO₂ sensor
- DDC interface (PremierLink controller)
- Louvered hail guard
- Phase monitor control
- Winter Start kit

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

Step 15 — Check Belt Tension — Measure the belt span length as shown in Fig. 90. Calculate the required deflection by multiplying the belt span length by 1/64. For example, if the belt span length is 32 inches: 32 x 1/64 = 1/2 inch deflection.

BELT FORCE — DEFLECTION METHOD — Check the belt tension with a spring-force belt force deflection gauge (available from drive belt manufacturer).

1. Place a straightedge along the belt between the two pulleys. Measure the distance between the motor shaft and the blower shaft.
2. Set the tension gauge to the desired tension (see Table 1 in Fig. 90). Place the large O-ring at that point.
3. Press the tension checker downward on the belt until the large O-ring is at the bottom of the straightedge.
4. Adjust the belt tension as needed.

Adjust belt tension by loosing the motor mounting plate front bolts and rear bolt (see Fig. 91) and slide the plate towards the fan (to reduce tension) or away from the fan (to increase tension). Ensure the blower shaft and motor shaft are parallel to each other (pulleys aligned). Tighten all bolts securely when finished.
BELT TENSION METHOD — Requires belt tension gauge that measures tension in belt in units of lbs force.

Pre-Start and Start-Up — This completes the mechanical installation of the unit. Refer to the unit’s Service and Maintenance manual for detailed Pre-Start and Start-Up instructions.

---

Table 1

<table>
<thead>
<tr>
<th>BELT CROSS SECTION</th>
<th>SMALLEST SHEAVE DIAMETER</th>
<th>SMALLEST SHEAVE DIAMETER</th>
<th>BELT DEFLECTION FORCE (LBS)</th>
<th>BELT DEFLECTION FORCE (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A, AX</td>
<td>A, AX</td>
<td>UNNOTCHED BELTS</td>
<td>NOTCHED BELTS</td>
</tr>
<tr>
<td></td>
<td>3.0-3.6</td>
<td>3.7</td>
<td>5.5</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>3.8-4.8</td>
<td>4.5</td>
<td>6.8</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>5.0-7.0</td>
<td>5.4</td>
<td>8.0</td>
<td>5.7</td>
</tr>
<tr>
<td></td>
<td>B, BX</td>
<td>B, BX</td>
<td>UNNOTCHED BELTS</td>
<td>NOTCHED BELTS</td>
</tr>
<tr>
<td></td>
<td>3.4-4.2</td>
<td>—</td>
<td>—</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>4.4-5.6</td>
<td>5.3</td>
<td>7.9</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td>5.8-8.6</td>
<td>6.3</td>
<td>9.4</td>
<td>8.5</td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>BELT CONDITION</th>
<th>TENSION FORCE IN BELT (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>100</td>
</tr>
<tr>
<td>Used</td>
<td>80</td>
</tr>
</tbody>
</table>
START-UP CHECKLIST
(Remove and use for job file)

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

I. PRELIMINARY INFORMATION

MODEL NO.: ____________________________________________ SERIAL NO.: ____________________________________________

DATE: ____________________________________________ TECHNICIAN: ____________________________________________

II. PRE-START-UP (insert checkmark in box as each item is completed)

☐ Verify that jobsite voltage agrees with voltage listed on rating plate
☐ Verify that all packaging materials have been removed from unit
☐ Remove all shipping hold down bolts and brackets per installation instructions
☐ Verify that condensate connection is installed per installation instructions
☐ Verify flue hood is installed
☐ Check refrigerant piping for indications of leaks; investigate and repair if necessary
☐ Check gas piping for leaks
☐ Check all electrical connections and terminals for tightness
☐ Check that return (indoor) air filters are clean and in place
☐ Check that outdoor air inlet screens are in place
☐ Verify that unit installation is level
☐ Check fan wheels and propeller for location in housing/orifice and setscrew tightness
☐ Check to ensure that electrical wiring is not in contact with refrigerant lines or sharp metal edges
☐ Check pulley alignment and belt tension per installation instructions

III. START-UP (REFER TO UNIT SERVICE/MAINTENANCE MANUAL FOR START–UP INSTRUCTIONS)

ELECTRICAL

<table>
<thead>
<tr>
<th>SUPPLY VOLTAGE</th>
<th>L1-L2</th>
<th>L2-L3</th>
<th>L3-L1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIRCUIT 1 COMPRESSOR AMPS</td>
<td>L1</td>
<td>L2</td>
<td>L3</td>
</tr>
<tr>
<td>CIRCUIT 2 COMPRESSOR AMPS</td>
<td>L1</td>
<td>L2</td>
<td>L3</td>
</tr>
<tr>
<td>INDOOR FAN AMPS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OUTDOOR FAN AMPS</td>
<td>NO. 1</td>
<td>NO. 2</td>
<td>NO. 3</td>
</tr>
<tr>
<td></td>
<td>NO. 4</td>
<td>NO. 5</td>
<td>NO. 6</td>
</tr>
</tbody>
</table>

TEMPERATURES

<table>
<thead>
<tr>
<th>OUTDOOR-AIR TEMPERATURE</th>
<th>DB</th>
<th>WB</th>
</tr>
</thead>
<tbody>
<tr>
<td>RETURN-AIR TEMPERATURE</td>
<td>DB</td>
<td>WB</td>
</tr>
<tr>
<td>COOLING SUPPLY AIR</td>
<td>DB</td>
<td>WB</td>
</tr>
<tr>
<td>GAS HEAT SUPPLY AIRS</td>
<td>DB</td>
<td>WB</td>
</tr>
</tbody>
</table>

PRESSURES (Heating Mode)

<table>
<thead>
<tr>
<th>GAS INLET PRESSURE</th>
<th>IN. WG</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAS MANIFOLD PRESSURE</td>
<td>IN. WG (LOW FIRE)</td>
</tr>
</tbody>
</table>
PRESSURES

REFRIGERANT SUCTION, CIRCUIT 1  _________ PSIG  _________ °F
REFRIGERANT SUCTION, CIRCUIT 2  _________ PSIG  _________ °F
REFRIGERANT DISCHARGE, CIRCUIT 1  _________ PSIG  _________ °F
REFRIGERANT DISCHARGE, CIRCUIT 2  _________ PSIG  _________ °F

☐ VERIFY THAT 3-PHASE FAN MOTOR AND BLOWER ARE ROTATING IN CORRECT DIRECTION
☐ VERIFY THAT 3-PHASE SCROLL COMPRESSOR IS ROTATING IN THE CORRECT DIRECTION
☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS

GENERAL

☐ SET ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO MATCH JOB REQUIREMENTS (IF EQUIPPED)