Installation Instructions

NOTE: Read the entire instruction manual before starting the installation.

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50TCQ 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.

50TCQ 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.
SAFETY CONSIDERATIONS

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

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

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

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

GENERAL

See Fig. 1 and 2 for unit options and dimensions.

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>50TCQD14</td>
<td>4500</td>
</tr>
</tbody>
</table>
### Unit/Series/Model
50TCQ - Packaged Rooftop Heat Pump

### Refrigeration Systems Options
D = Two Stage Cooling Models

### Cooling Tons
14 - 12.5 ton

### Sensor Options
- A = None
- B = RA Smoke Detector
- C = SA Smoke Detector
- D = RA + SA Smoke Detector
- E = CO₂
- F = RA Smoke Detector and CO₂
- G = SA Smoke Detector and CO₂
- H = RA + SA Smoke Detector and CO₂
- J = Condensate Overflow Switch (electro-mechanical controls only)
- K = Condensate Overflow Switch and RA Smoke Detectors
- L = Condensate Overflow Switch and RA and SA Smoke Detectors

### Indoor Fan Options
- 1 = Standard Static Option – Belt Drive
- 2 = Medium Static Option – Belt Drive
- 3 = High Static Option – Belt Drive
- C = High Static Option with High Efficiency Motor

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

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

### Design Revision
- = Factory Design Revision

### Factory Assigned
- 0 = Standard
- 1 = LTL
- 3 = CA Seismic Complaint
- 4 = LTL and CA Seismic Compliant

### Electrical Options
- A = None
- C = Non-Fused Disconnect
- D = Thru-The-Base Connections
- F = Non-Fused Disconnect and Thru-The-Base Connections
- G = 2-Speed Indoor Fan (VFD) Controller
- J = 2-Speed Indoor Fan (VFD) Controller and Non-Fused Disconnect
- K = 2-Speed Indoor Fan (VFD) Controller and Thru-The-Base Connections
- M = 2-Speed Indoor Fan (VFD) Controller with Non-Fused Disconnect and Thru-The-Base Connections
- *PremierLink controller can not be used with Staged Air Volume (SAV) 2-speed indoor fan motor. It is recommended with models using Staged Air Volume (SAV) 2-speed indoor fan motor control that the EconoMiser X system be used because it contains two ventilation set points, one for each fan speed.

### Service Options
- 0 = None
- 1 = Unpowered Convenience Outlet
- 2 = Powered Convenience Outlet
- 3 = Hinged Panels
- 4 = Hinged Panels and Unpowered Convenience Outlet
- 5 = Hinged Panels and Powered Convenience Outlet

### Intake / Exhaust Options
- A = None
- B = Temperature Economizer with Barometric Relief
- F = Enthalpy Economizer with Barometric Relief
- K = 2-Position Damper
- U = Temperature Ultra Low Leak Economizer with Barometric Relief
- W = Enthalpy Ultra Low Leak Economizer with Barometric Relief

### Base Unit Controls
- 0 = Electro-mechanical Controls can be used with W7212 EconoMi$er® IV (Non-Fault Detection and Diagnostic)
- 1 = PremierLink™ Controller*
- 2 = RTU Open Multi-Protocol Controller
- 6 = Electro-mechanical with W7220 Economizer controller Controls. Can be used with W7220 EconoMi$er X (with Fault Detection and Diagnostic)

---

**Fig. 1 — Model Number Nomenclature**
NOTE: Unit not designed to have overhead obstruction. Contact Application Engineering for guidance on any application planning overhead obstruction or for vertical clearances.

**Fig. 3 — Service Clearance Dimensional Drawing**

### Refrigeration System Components

Each heat pump refrigeration system includes a compressor, accumulator, reversing valve, dual-function outdoor coil with vapor header check valve, cooling liquid line with a filter drier and a check valve, dual-function indoor coil with a vapor header check valve, and heating liquid line with a check valve and a strainer. Size 14 units have two compressor-circuits. See Fig. 4 for typical unit piping schematic (4-row indoor coil with two compressor-circuits is shown).

Dual-function outdoor and indoor coils are designed to provide parallel coil circuits during evaporator-function operation and converging coil circuits during the condenser-function operation.

### Reversing Valve and Check Valve Position

See Fig. 4 and Tables 2-4.

**Troubleshooting Refrigerant Pressure Problems and Check Valves**

Refer to Fig. 4 and Tables 2 and 3.

**Refrigerant System Pressure Access Ports**

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

The brass fittings are two-piece High Flow valves, with a receptacle base brazed to the tubing and an integral spring-closed check valve core screwed into the base. See Fig. 5. This check valve is permanently assembled into this core body and cannot be serviced separately. Replace the entire core body if necessary. Service tools are available from RCD that allow the replacement of the check valve core without having to recover the entire system refrigerant charge. Apply compressor refrigerant oil to the check valve core’s bottom O-ring. Install the fitting body and torque to 96 ± 10 in.-lb (10.9 ± 1 Nm). Do not exceed 106 in.-lb (11.9 Nm) when tightening.

### Service Clearance Dimensions

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>DIMENSION</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>48-in. (1219 mm)</td>
<td>Unit disconnect is mounted on panel</td>
</tr>
<tr>
<td></td>
<td>18-in. (457 mm)</td>
<td>No disconnect, convenience outlet option</td>
</tr>
<tr>
<td></td>
<td>18-in. (457 mm)</td>
<td>Recommended service clearance</td>
</tr>
<tr>
<td></td>
<td>12-in. (305 mm)</td>
<td>Minimum clearance</td>
</tr>
<tr>
<td>B</td>
<td>42-in. (1067 mm)</td>
<td>Surface behind servicer is grounded (e.g., metal, masonry wall)</td>
</tr>
<tr>
<td></td>
<td>36-in. (914 mm)</td>
<td>Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass)</td>
</tr>
<tr>
<td></td>
<td>Special</td>
<td>Check sources of flue products within 10 ft of unit fresh air intake hood</td>
</tr>
<tr>
<td>C</td>
<td>36-in. (914 mm)</td>
<td>Side condensate drain is used</td>
</tr>
<tr>
<td></td>
<td>18-in. (457 mm)</td>
<td>Minimum clearance</td>
</tr>
<tr>
<td>D</td>
<td>42-in. (1067 mm)</td>
<td>Surface behind servicer is grounded (e.g., metal, masonry wall, another unit)</td>
</tr>
<tr>
<td></td>
<td>36-in. (914 mm)</td>
<td>Surface behind servicer is electrically non-conductive (e.g., wood, fiberglass)</td>
</tr>
</tbody>
</table>
Table 2 — Cooling Mode (each circuit)

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>STATUS/POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reversing Valve</td>
<td>Energized</td>
</tr>
<tr>
<td>Check Valve A</td>
<td>Closed</td>
</tr>
<tr>
<td>Check Valve B</td>
<td>Open</td>
</tr>
<tr>
<td>Check Valve C</td>
<td>Closed</td>
</tr>
<tr>
<td>Check Valve D</td>
<td>Open</td>
</tr>
</tbody>
</table>

Table 3 — Heating Mode (each circuit)

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>STATUS/POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reversing Valve</td>
<td>De-energized</td>
</tr>
<tr>
<td>Check Valve A</td>
<td>Open</td>
</tr>
<tr>
<td>Check Valve B</td>
<td>Closed</td>
</tr>
<tr>
<td>Check Valve C</td>
<td>Open</td>
</tr>
<tr>
<td>Check Valve D</td>
<td>Closed</td>
</tr>
</tbody>
</table>

Table 4 — Defrost Mode

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>STATUS/POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defrost Thermostat</td>
<td>Closed</td>
</tr>
<tr>
<td>Outdoor Fan(s)</td>
<td>Off</td>
</tr>
<tr>
<td>Reversing Valve</td>
<td>Energized</td>
</tr>
<tr>
<td>Check Valve A</td>
<td>Closed</td>
</tr>
<tr>
<td>Check Valve B</td>
<td>Open</td>
</tr>
<tr>
<td>Check Valve C</td>
<td>Closed</td>
</tr>
<tr>
<td>Check Valve D</td>
<td>Open</td>
</tr>
</tbody>
</table>

Fig. 4 — Typical Unit Piping Schematic
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. 3.

NOTE: Consider also the effect of adjacent units.
Unit may be installed directly on wood flooring or on Class A, B, or C roof-covering material when roof curb is used.
Do not install unit in an indoor location. Do not locate air inlets near exhaust vents, relief valves, or other sources of contaminated air.

Although unit is weatherproof, avoid locations that permit water from higher level runoff and overhangs to fall onto the unit. Select a unit mounting system that provides adequate height to allow for removal and disposal of frost and ice that will form during the heating-defrost mode as well as allow installation of condensate trap per requirements. Refer to Step 9 — Install External Condensate Trap and Line on page 14 – for required trap dimensions.

ROOF MOUNT
Check building codes for weight distribution requirements. Unit operating weight is shown in Table 5.

Table 5 — Operating Weights

<table>
<thead>
<tr>
<th></th>
<th>50TCQD14</th>
<th>UNITS LB (KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Unit</td>
<td>1370 (623)</td>
<td></td>
</tr>
<tr>
<td>Economizer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical</td>
<td>100 (45)</td>
<td></td>
</tr>
<tr>
<td>Horizontal</td>
<td>115 (52)</td>
<td></td>
</tr>
<tr>
<td>Powered Outlet</td>
<td>32 (15)</td>
<td></td>
</tr>
<tr>
<td>Curb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14-in. (356 mm)</td>
<td>180 (82)</td>
<td></td>
</tr>
<tr>
<td>24-in. (610 mm)</td>
<td>235 (107)</td>
<td></td>
</tr>
</tbody>
</table>

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

Review the following for recommended sequences for installation steps.

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

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

1. CoreMax is a registered trademark of Fastest, Inc.
FRAME-MOUNTED INSTALLATION

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

**Step 3 — Inspect Unit**

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

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

**Step 4 — Provide Unit Support**

**ROOF CURB MOUNT**

Accessory roof curb details and dimensions are shown in Fig. 7. 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. 7. 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 show in Fig. 6. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

**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.

---

**Fig. 6 — Unit Leveling Tolerances**

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

MAXIMUM ALLOWABLE DIFFERENCE IN. (MM)
Step 5 — Field Fabricate Ductwork
Cabinet return-air static pressure (a negative condition) shall not exceed 0.35 in. wg (87 Pa) with economizer or 0.45 in. wg (112 Pa) without economizer.

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

FOR UNITS WITH ACCESSORY ELECTRIC HEATERS
All installations require a minimum clearance to combustible surfaces of 1-in. (25 mm) from duct for first 12-in. (305 mm) away from unit.

\[\text{UNIT DAMAGE HAZARD}\]
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
When the unit is ready to be rigged and no longer will be lifted by a fork truck, the wood protector under the basepan must be removed. Remove 4 screws from each base rail. Wood protector will drop to the ground. See instructions on the unit base rails.

Keep unit upright and do not drop. Spreader bars are required. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 5 and Fig. 9 for additional information.

\[\text{UNIT DAMAGE HAZARD}\]
Failure to follow this caution may result in equipment damage.
All panels must be in place when rigging. Unit is not designed for handling by fork truck when packaging is removed.
If using top crate as spreader bar, once unit is set, carefully lower wooden crate off building roof top to ground. Ensure that no people or obstructions are below prior to lowering the crate.

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

POSITIONING ON CURB
For full perimeter curbs CRRFCURB074A00 and 075A00, the clearance between the roof curb and the front and rear base rails should be \(\frac{1}{4}\)-in. (6.4 mm). The clearance between the curb and the end base rails should be \(\frac{1}{2}\)-in. (13 mm). For retrofit applications with curbs CRRFCURB003A01 and 4A01, the unit should be positioned as shown in Fig. 8. Maintain the 15\(\frac{1}{2}\)-in. (394 mm) and 8\(\frac{3}{8}\)-in. (220 mm) clearances and allow the 22\(\frac{5}{16}\)-in. (567 mm) dimension to float, if necessary.

\[\text{Fig. 8 — Retrofit Installation Dimensions}\]

<table>
<thead>
<tr>
<th>UNIT</th>
<th>MAX WEIGHT</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LB</td>
<td>KG</td>
</tr>
<tr>
<td>50TCQD14</td>
<td>2015</td>
<td>916</td>
</tr>
</tbody>
</table>

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.

\[\text{Fig. 9 — Rigging Details}\]
If the alternative condensate drain location through the bottom of the unit is used in conjunction with a retrofit curb, the hole in the curb must be moved 12 1/2-in. (320 mm) towards the end of the unit.

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

Remove all shipping materials and top skid. Remove extra center post from the condenser end of the unit so that the condenser end of the unit matches Fig. 21-23. Recycle or dispose of all shipping materials.

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

Unit is shipped in the vertical duct configuration. Unit without factory-installed economizer or return-air smoke detector option may be field-converted to horizontal ducted configuration using accessory CRDUCTCV001A00. To convert to horizontal configuration, remove screws from side duct opening covers (see Fig. 10) and remove covers.

Discard the supply duct cover. Install accessory CRDUCTCV001A00 to cover the vertical supply duct opening. Use the return duct cover removed from the end panel to cover the vertical return duct opening.

Use the screws to install the covers on vertical duct openings with the insulation-side down. The panels must be inserted into the notches on the basepan to properly seal. The notches are covered by the tape used to secure the insulation to the basepan and are not easily seen. See Fig. 11 for position of the notches in the basepan. Seals around duct openings must be tight. Secure with screws as shown in Fig. 12. Cover seams with foil duct tape.

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

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

**Step 8 — Install Outside Air Hood**

**ECONOMIZER HOOD REMOVAL AND SETUP (FACTORY OPTION)**

1. The hood is shipped in knock-down form and located in the return air compartment. It is attached to the economizer using two plastic tie-wraps.
2. To gain access to the hood, remove the filter access panel. (See Fig. 13.)
3. Locate and cut the (2) plastic tie-wraps, being careful not to damage any wiring. (See Fig. 14.)
4. Carefully lift the hood assembly through the filter access opening and assemble per the steps outlined in Economizer Hood and Two-Position Hood on page 13.
1. The hood is shipped in knock-down form and assembled to a metal support tray using plastic stretch wrap. Located in the return air compartment, the assembly’s metal tray is attached to the basepan and also attached to the damper using two plastic tie-wraps.
2. To gain access to the hood, remove the filter access panel. (See Fig. 13.)
3. Locate the (2) screws holding the metal tray to the basepan and remove. In order to remove the screws, it may be necessary to remove the panel underneath the two-position damper. Remove the two screws. Locate and cut the (2) plastic tie-wraps securing the assembly to the damper. (See Fig. 15.) Be careful to not damage any wiring or cut tie-wraps securing any wiring.
4. Carefully lift the hood assembly (with metal tray) through the filter access opening and assemble per the steps outlined in Economizer Hood and Two-Position Hood.
5. If removed, reattach the panel under the damper.

ECONOMIZER HOOD AND TWO-POSITION HOOD

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

1. The indoor coil access panel will be used as the top of the hood. If the panel is still attached to the unit, remove the screws along the sides and bottom of the panel. See Fig. 16.
2. Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Be careful not to lift the panel too far as it might fall out. Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 17.
3. Remove the shipping tape holding the economizer barometric relief damper in place.
4. Insert the hood divider between the hood sides. See Fig. 17 and 18. Secure hood divider with 3 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.
5. Attach the post that separates the filters with the screws provided.
6. Open the filter clips which are located underneath the hood top. Insert the aluminum filters into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filters into place. See Fig. 18.
7. Install the two rain deflectors on the edge of the hood top as shown in Fig. 16.
8. Caulk the ends of the joint between the unit top panel and the hood top as shown in Fig. 16.
9. Replace the filter access panel.
Step 9 — Install External Condensate Trap and Line

The unit has one 3/4-in. condensate drain connection on the end of the condensate pan and an alternate connection on the bottom. See Fig. 19. Unit airflow configuration does not determine which drain connection to use. Either drain connection can be used with vertical or horizontal applications.

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

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

The piping for the condensate drain and external trap can be completed after the unit is in place. See Fig. 20.

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

Fig. 19 — Condensate Drain Pan (Side View)

Fig. 20 — Condensate Drain Piping Details

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

**WARNING**

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

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

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

**FIELD POWER SUPPLY**

For those units without through-the-curb power, conduit must be used to route the main power from the condenser end of the unit to either the factory option disconnect, the bottom of the control box or the single point box accessory. A 1-in. conduit is provided behind the access panel located under the control box. For those units that require conduit larger than 1-in., it must be field supplied. Figures 21-23 show the various wire routings.

If the field disconnect is larger than 100A, it must be attached to the unit using accessory CRDISBKT001A00 (see Fig. 25). Follow the instructions provided with this accessory. For smaller field disconnects, be sure to use 1/2-in. screws to mount the disconnect directly to the end panel (see Fig. 24). In either case, set the disconnect vertical location on the unit so that a 90 degree fitting can be used to connect the conduit to the disconnect.
All units except 208/230-v units are factory wired for the voltage shown on the nameplate. If the 208/230-v unit is to be connected to a 208-v power supply, the control transformer must be rewired by moving the black wire with the 1/4-in. female spade connector from the 230-v connection and moving it to the 200-v 1/4-in. male terminal on the primary side of the transformer. Refer to unit label diagram for additional information.

Field power wires are connected to the unit at line-side pressure lugs at the main terminal block (TB1) or at factory-installed option non-fused disconnect switch. Max wire size is #2 AWG (copper only). (See Fig. 27.)

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

**WARNING**

FIRE HAZARD

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

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

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

Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 27 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is #2/0 AWG per pole.

Provide a ground-fault and short-circuit 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.

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.

% Voltage Imbalance:
\[ \text{Average Voltage} = \frac{\text{AB} + \text{BC} + \text{AC}}{3} \]
\[ \text{AB} = 224 \text{ v} \]
\[ \text{BC} = 231 \text{ v} \]
\[ \text{AC} = 226 \text{ v} \]

\[ \text{Average Voltage} = \frac{224 + 231 + 226}{3} = \frac{681}{3} = 227 \]

Determine maximum deviation from average voltage.
(AB) 227-224 = 3 v
(BC) 231-227 = 4 v
(AC) 227-226 = 1 v
Maximum deviation is 4 v.
Determine percent of voltage imbalance.
\[ \% \text{ Voltage Imbalance} = 100 \times \frac{4}{227} = 1.78\% \]
This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

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

CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.
Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.
Fig. 28 — Typical 50TCQ Control Wiring Diagram
Fig. 29 — Typical 50TCQ Power Wiring Diagram (208/230-v, 3 Phase, 60 Hz Unit Shown)
UNITS WITHOUT FACTORY-INSTALLED NON-FUSED DISCONNECT

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.

UNITS WITH FACTORY-INSTALLED NON-FUSED DISCONNECT

The factory-installed option disconnect switch is located in a weatherproof enclosure located under the main control box. The manual switch handle is accessible through an opening in the access panel. Discard the factory test leads (see Fig. 27). The factory disconnect is an 80A disconnect.

To field install the NFD shaft and handle:

1. Remove the unit front panel (see Fig. 2).
2. Remove (3) hex screws on the NFD enclosure - (2) on the face of the cover and (1) on the bottom.
3. Remove the front cover of the NFD enclosure.
4. Make sure the NFD shipped from the factory is at OFF position (the arrow on the black handle knob is at OFF). See Fig. 30.
5. Insert the shaft with the cross pin on the top of the shaft in the horizontal position. See Fig. 31.
6. Measure the tip of the shaft to the top surface of the pointer to be 3.75 to 3.88-in. (95 to 99 mm) for 80A and 100A NFD and 3.43 to 3.56-in. (87 to 90 mm) for 200A NFD.
7. Tighten the locking screw to secure the shaft to the NFD.
8. Turn the handle to the OFF position with red arrow pointing at OFF.
9. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
10. Secure the handle to the painted cover with (2) screws and lock washers supplied.
11. Engaging the shaft into the handle socket, re-install (3) hex screws on the NFD enclosure.
12. Re-install the unit front panel.

CONVENIENCE OUTLETS

Two types of convenience outlets are offered on 50TCQD models: non-powered and unit-powered. Both types provide a 125-v GFCI (ground-fault circuit-interrupter) duplex receptacle rated at 15-A behind a hinged waterproof access cover, located on the panel beneath the control box. See Fig. 32.

Non-powered type

This type requires the field installation of a general-purpose 125-v 15-A circuit powered from a source elsewhere in the building. Observe national and local codes when selecting wire size 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 panel beneath the control box. See Fig. 32.

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

WARNING

ELECTRICAL OPERATION HAZARD

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

Units with convenience outlet circuits may use multiple disconnects. Check convenience outlet for power status before opening unit for service. Locate its disconnect switch, if appropriate, and open it. Lock-out and tag-out this switch, if necessary.
when the unit disconnect or HACR switch is open. See Fig. 33. On a unit without a unit-mounted disconnect, connect the source leads to the main terminal block (TB1).

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

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

**Duty Cycle**

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

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.

Fuse on power type: The factory fuse is a Bussman “Fusetron”\(^1\) T-15, non-renewable screw-in (Edison base) type plug fuse.

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1. Bussman and Fusetron are trademarks of Cooper Technologies Company.
FACTORY-OPTION THRU-BASE CONNECTIONS

This service connection kit consists of a 1/2-in. electrical bulkhead connector and a 11/2-in. electrical bulkhead connector, all factory-installed to the basepan cover plate. Remove the cover plate from the shipping bracket and attach to basepan with 8 screws provided. The 1/2-in. bulkhead connector enables the low-voltage control wires to pass through the basepan. The 11/2-in. electrical bulkhead connector allows the high-voltage power wires to pass through the basepan. See Fig. 35.

Check tightness of connector lock nuts before connecting electrical conduits.

Field-supplied and field-installed liquidtight conduit connectors and conduit may be attached to the connectors on the basepan. Pull correctly rated high voltage and low voltage wires through appropriate conduits. Connect the power conduit to the internal disconnect (if unit is so equipped) or to the external disconnect (through unit side panel). Remove one of the two knockouts located on the bottom left side of the unit control box. Use this hole for the control conduit.

UNITS WITHOUT THRU-BASE CONNECTIONS

1. Install power wiring conduit through side panel openings. Install conduit between disconnect and control box.
2. Install power lines to terminal connections as shown in Fig. 27.

FIELD CONTROL WIRING

The 50TCQD unit requires an external temperature control device. This device can be a thermostat (field-supplied) or a PremierLink™ controller (available as a factory-installed option or as a 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 Cooling/Heating thermostat according to installation instructions included with the accessory. The 50TCQ models do not require a thermostat with an O function to control the reversing valve operation. If using an electronic thermostat, configure it for "non-heat pump" operation. Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions.

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

For wire runs up to 50 ft. (15 m), use no. 18 AWG (American Wire Gage) insulated wire (35°C [95°F] minimum). For 50 to 75 ft. (15 to 23 m), use no. 16 AWG insulated wire (35°C [95°F] minimum). For over 75 ft. (23 m), use no. 14 AWG insulated wire (35°C [95°F] minimum). All wire sizes larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and splice at the thermostat.

Central Terminal Board

<table>
<thead>
<tr>
<th>Typical Thermostat Connections</th>
<th>Central Terminal Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>W2</td>
<td>W2</td>
</tr>
<tr>
<td>W1</td>
<td>W1</td>
</tr>
<tr>
<td>O/B/Y2 (Note 1)</td>
<td>Y2</td>
</tr>
<tr>
<td>Y1</td>
<td>R</td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
</tbody>
</table>

Note 1: Typical multi-function marking. Follow manufacturer's configuration instructions to select Y2. Do not configure for O output.

Note 2: W2 connection not required on units without electric heating.

--- Field Wiring

**Fig. 36 — Typical Low-Voltage Control Connections**

**Central Terminal Board**

The Central Terminal Board (CTB) is a pass through connection point. The CTB provides the capability to add factory-installed options and field-installed accessories to the units by cutting jumper wires without having to change or reroute wires through the structure of the unit. The CTB does not provide any microprocessor control; it is simply a basic multifunction wiring terminal configuration.
Commercial Defrost Control

The Commercial Defrost Control Board (DFB) coordinates thermostat demands for supply fan control, 1 or 2 stage cooling, 2 stage heating, emergency heating and defrost control with unit operating sequences. The DFB also provides an indoor fan off delay feature (user selectable). See Fig. 37 for board arrangement.

![Fig. 37 — Defrost Control Board Arrangement](image)

Table 6 — 50TCQ Defrost Board I/O and Jumper Configurations

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

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

The defrost control mode is a time/temperature sequence. There are two time components: The continuous run period and the test/defrost cycle period. The temperature component is provided by Defrost Thermostat 1 and 2 (DFT1 and DFT2) mounted on the outdoor coil.

The continuous run period is a fixed time period between the end of the last defrost cycle (or start of the current Heating cycle) during which no defrost will be permitted. This period can be set at 30, 60, 90 or 120 minutes by changing the positions of DIP switches SW1 and SW2 (see Fig. 39 and Table 7). The default run period is 60 minutes for size 14 units.

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

HEAT ANTICIPATOR SETTINGS

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

Electric Heaters

50TCQ units may be equipped with field-installed accessory electric heaters. The heaters are modular in design, with heater frames holding open coil resistance wires strung through ceramic insulators, line-break limit switches and a control contactor. One or two heater modules may be used in a unit. Heater modules are installed in the compartment below the indoor (supply) fan outlet. Access is through the indoor access panel. Heater modules slide into the compartment on tracks along the bottom of the heater opening. See Fig. 41.
SINGLE POINT BOXES

When heaters are installed, power wiring to both heaters and the rest of the unit is connected via the single point box accessory, which will be installed directly under the unit control box, just to the left of the partition separating the indoor section (with electric heaters) from the outdoor section. The single point box has a hinged access cover. See Fig. 42. The single point box also includes pigtailed to complete the wiring between the single point box and the unit’s main control box terminals. Refer to the accessory heater and single point box installation instructions for details on tap connections.

HEATER AND SUPPLEMENTARY FUSES

When the unit MOCP device value exceeds 60-A, unit-mounted supplementary fuses are required for each heater circuit. These fuses are included in accessory single point boxes, with power distribution and fuse blocks.

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

---

**WARNING**

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage. Not all available heater modules and single point boxes may be used in every unit. Use only those heater modules that are UL listed for use in a specific size unit. Refer to the label on the unit cabinet for the list of approved heaters and single point boxes.

---

HEATER LOW-VOLTAGE CONTROL CONNECTIONS

One or two heaters can be installed in the unit. Use the wiring procedure listed below for each heater as determined by the number of stages in the heater.

**Single Stage Heaters**

Single-stage heaters will have an orange and a brown control wire. Connect these to the orange and brown wires located on TB4.

**Two Stage Heaters**

Two-stage heaters will have orange, purple, red and brown wires. The orange and the purple are the control wires and the red and brown wires feed the safety circuit. Connect both the orange and the purple wires to the orange wire locations of TB4. Connect the red and brown wires to red and brown wires on TB4. If more than one heater is installed, repeat the wiring procedure for the second heater. The 3 locations across the top of TB4 do allow a switch to be installed in series with some of the heaters in order to add additional heater control.
The EconoMiSer X system is an expandable economizer control system, which includes a W7220 economizer module (controller) with an LCD and keypad (See Fig. 44). The W7220 can be configured with optional sensors.

**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, check-out tests, and alarm and error conditions with a 2-line 16 character LCD display and four button keypad.

**Electrical**

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

**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 change over 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°F to 150°F (–40°C 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°F to 150°F (–40°C 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 (see page 28 for wiring details).
24 vac power supply
20 to 30 vac 50/60Hz; 100 VA Class 2 transformer.

OUTPUTS

Actuator Signal
2 to 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°F to 150°F (–40°C 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°F to 150°F (–40°C to 65°C)

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

Relative Humidity
5% to 95% RH non-condensing

ECONOMIZER MODULE WIRING DETAILS
Use Fig. 45 and Tables 8 and 9 to locate the wiring terminals for the Economizer module.
NOTE: The four terminal blocks are removable. Slide out each terminal block, wire it, and then slide it back into place.
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. 46 and Table 10 to locate the wiring terminals for each S-Bus sensor.

Use Fig. 46 and Table 11 to set the DIP switches for the desired use of the sensor.

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. 47 for CO2 sensor wiring.

INTERFACE OVERVIEW
This section describes how to use the EconoMi$er® user interface for:
• Keypad and menu navigation
• Settings and parameter changes
• Menu structure and selection

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

Keypad
Use the four navigation buttons (see Fig. 48) to scroll through the menus and menu items, select menu items, and to change parameter and configuration settings.
To use the keypad when working with menus:
- Press the ▲ (Up arrow) button to move to the previous menu.
- Press the ▼ (Down arrow) button to move to the next menu.
- Press the ▶ (Enter) button to display the first item in the currently displayed menu.
Press the ◄ (Menu Up/Exit) button to exit a menu’s item and return to the list of menus.

**Fig. 48 — W7220 Controller Navigation Buttons**

To use the keypad when working with Setpoints, System and Advanced Settings, Checkout tests and Alarms:

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

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

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

**Menu Structure**

Table 12 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

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

**SETUP AND CONFIGURATION**

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

**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 12 — W7220 Menu Structure*

<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT†</th>
<th>EXPANDED PARAMETER NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Notes</td>
</tr>
<tr>
<td></td>
<td>ECON AVAIL</td>
<td>NO</td>
<td>YES/NO</td>
<td>FIRST STAGE COOLING DEMAND (Y1–IN)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>YES = economizing available; the system can use outside air for free cooling when required.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ECONOMIZING</td>
<td>NO</td>
<td>YES/NO</td>
<td>FIRST STAGE COOLING RELAY OUTPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>YES = outside air being used for first stage cooling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OCCUPIED</td>
<td>NO</td>
<td>YES/NO</td>
<td>OCCUPIED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>YES = OCC signal received from space thermostat or unitary controller</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>YES = 24 vac on terminal OCC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NO = 0 vac on terminal OCC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HEAT PUMP</td>
<td>N/A**</td>
<td>COOL/HEAT</td>
<td>HEAT PUMP MODE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays COOL or HEAT when system is set to heat pump (Non-conventional)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COOL Y1—IN</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>FIRST STAGE COOLING DEMAND (Y1–IN)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y1–I signal from space thermostat or unitary controller for cooling stage 1. ON = 24 vac on terminal Y1–I</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OFF = 0 vac on terminal Y1–I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COOL Y1—OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>FIRST STAGE COOLING RELAY OUTPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cool stage 1 Relay Output to stage 1 mechanical cooling (Y1–OUT terminal)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COOL Y2—IN</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>SECOND STAGE COOLING DEMAND (Y2–IN)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y2–I signal from space thermostat or unitary controller for second stage cooling. ON = 24 vac on terminal Y2–I</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OFF = 0 vac on terminal Y2–I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COOL Y2—OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>SECOND STAGE COOLING RELAY OUTPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cool Stage 2 Relay Output to mechanical cooling (Y2–OUT terminal)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MA TEMP</td>
<td>_ _ °F (_ _ °C)</td>
<td>–40°F to 150°F (–40°C to 66°C)</td>
<td>SUPPLY AIR TEMPERATURE, Cooling Mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays value of measured mixed air from MAT sensor. Displays _ _ °F if not connected, short or out of range.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DA TEMP</td>
<td>_ _ °F (_ _ °C)</td>
<td>–40°F to 150°F (–40°C to 66°C)</td>
<td>DISCHARGE AIR TEMPERATURE, after Heating section</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays when Discharge Air Sylk Bus sensor is connected and displays measured discharge temperature. Displays _ _ °F if sensor sends invalid value, if not connected, short or out of range.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OA TEMP</td>
<td>_ _ °F (_ _ °C)</td>
<td>–40°F to 140°F (–40°C to 60°C)</td>
<td>OUTSIDE AIR TEMPERATURE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays measured value of outdoor air temperature. Displays _ _ °F if sensor sends invalid value, short or out of range.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OA HUM</td>
<td>_ _ %</td>
<td>0 to 100%</td>
<td>OUTSIDE AIR RELATIVE HUMIDITY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays measured value of outdoor humidity from OA Sylk Bus sensor. Displays _ _% if not connected, short, or out of range.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RA TEMP</td>
<td>_ _ °F (_ _ °C)</td>
<td>0°F to 140°F (–18°C to 60°C)</td>
<td>RETURN AIR TEMPERATURE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays measured value of return air temperature from RAT Sylk Bus sensor. Displays _ _ °F if sensor sends invalid value, if not connected, short or out of range.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RA HUM</td>
<td>_ _ %</td>
<td>0 to 100%</td>
<td>RETURN AIR RELATIVE HUMIDITY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays measured value of return air humidity from RA Sylk Bus sensor. Displays _ _% if sensor sends invalid value, if not connected, short or out of range.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IN CO2</td>
<td>_ _ ppm</td>
<td>0 to 2000 ppm</td>
<td>SPACE/RETURN AIR CO₂</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays value of measured CO₂ from CO₂ sensor. Invalid if not connected, short or out of range. May be adjusted in Advanced menu by Zero offset and Span.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DCV STATUS</td>
<td>N/A</td>
<td>ON/OFF</td>
<td>DEMAND CONTROLLED VENTILATION STATUS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays ON if above set point and OFF if below set point, and ONLY if a CO₂ sensor is connected.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DAMPER OUT</td>
<td>2.0v</td>
<td>2.0 to 10.0v</td>
<td>Displays voltage output to the damper actuator.***</td>
</tr>
<tr>
<td></td>
<td>ACT POS</td>
<td>N/A</td>
<td>0 to 100%</td>
<td>Displays actual position of actuator</td>
</tr>
<tr>
<td></td>
<td>ACT COUNT</td>
<td>N/A</td>
<td>1 to 65,535</td>
<td>Displays number of times actuator has cycled. 1 cycle equals 180 degrees of actuator movement in any direction.</td>
</tr>
<tr>
<td></td>
<td>ACTUATOR</td>
<td>N/A</td>
<td>OK/Alarm (on Alarm menu)</td>
<td>Displays ERROR if voltage or torque is below actuator range.</td>
</tr>
<tr>
<td></td>
<td>EXH1 OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>EXHAUST STAGE 1 RELAY OUTPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Displays ON when damper position reaches programmed percentage set point. Output of EXH1 terminal: ON = relay closed OFF = relay open</td>
<td></td>
</tr>
</tbody>
</table>
### Table 12 — W7220 Menu Structure* (cont)

<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT†</th>
<th>EXPANDED PARAMETER NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXH2 OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>EXHAUST STAGE 2 RELAY OUTPUT</td>
<td>Output of AUX1 O terminal Displays ON when damper position reaches programmed percentage set point. ON = 24 vac output OFF = No output Displays only if AUX1 O = EXH2</td>
</tr>
<tr>
<td>STATUS (cont)</td>
<td>ERV</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>ENERGY RECOVERY VENTILATOR Output of AUX1 O terminal; displays only if AUX1 O = ERV ON = 24 vac output OFF = No Output</td>
</tr>
<tr>
<td>MECH COOL ON</td>
<td>0</td>
<td>0, 1, or 2</td>
<td>Displays stage of mechanical cooling that is active. Displays the stage of heat pump heating that is active.</td>
<td></td>
</tr>
<tr>
<td>HEAT STAGES ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAN SPEED</td>
<td>N/A</td>
<td>LOW or HIGH</td>
<td>SUPPLY FAN SPEED Displays speed setting of fan on a 2-speed fan unit.</td>
<td></td>
</tr>
<tr>
<td>W (HEAT IN)</td>
<td>N/A</td>
<td>ON/OFF</td>
<td>HEAT DEMAND STATUS Displays status of heat demand on a 2-speed fan unit.</td>
<td></td>
</tr>
<tr>
<td>SETPOINTS</td>
<td>MAT SET</td>
<td>53°F (12°C)</td>
<td>38°F to 70°F (3°C to 21°C); increment by 1 degree</td>
<td>SUPPLY AIR SETPOINT The economizer will modulate the OA damper to maintain the mixed air temperature at the set point</td>
</tr>
<tr>
<td></td>
<td>LOW T LOCK</td>
<td>32°F (0°C)</td>
<td>–45°F to 80°F (–43°C to 27°C); increment by 1 degree</td>
<td>COMPRESSOR LOW TEMPERATURE LOCKOUT Set point determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout. At or below the set point, the Y1-O and Y2-O will not be energized on the controller.</td>
</tr>
<tr>
<td></td>
<td>DRYBLB SET</td>
<td>63°F (17°C)</td>
<td>48°F to 80°F (9°C to 27°C); increment by 1 degree</td>
<td>OA DRY BULB TEMPERATURE CHANGEOVER SETPOINT Dry bulb set point will only appear if using dry bulb changeover. Set point determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.; at 63°F unit will economize at 62°F and below and not economize at 64°F and above. There is a 2°F deadband</td>
</tr>
<tr>
<td></td>
<td>ENTH CURVE</td>
<td>ES3</td>
<td>ES1, ES2, ES3, ES4, or ES5</td>
<td>ENTHALPY CHANGEOVER CURVE ES curve will only appear if using enthalpy changeover. Enthalpy boundary “curves” for economizing using single enthalpy. See page 36 for description of enthalpy curves.</td>
</tr>
<tr>
<td></td>
<td>DCV SET</td>
<td>1100ppm</td>
<td>500 to 2000 ppm; increment by 100</td>
<td>DEMAND CONTROLLED VENTILATION Displays only if CO2 sensor is connected. Set point for Demand Controlled Ventilation of space. Above the set point, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the set point.</td>
</tr>
<tr>
<td></td>
<td>MIN POS</td>
<td>2.8 V</td>
<td>2 to 10 vdc</td>
<td>VENTILATION MINIMUM POSITION Displays ONLY if a CO2 sensor is NOT connected.</td>
</tr>
<tr>
<td></td>
<td>VENTMAX</td>
<td>2.8 V</td>
<td>100 to 9990 cfm; increment by 10</td>
<td>If OA, MA, RA, and CO2 sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 CFM.</td>
</tr>
<tr>
<td></td>
<td>VENTMIN</td>
<td>2.25 V</td>
<td>2 to 10 vdc</td>
<td>DVC MINIMUM DAMPER POSITION Displays only if a CO2 sensor is connected. Used for Vbz (ventilation max cfm) set point. VENTMAX is the same setting as MIN POS would be if unit did not have CO2 sensor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>With 2-speed fan units, VENTMAX L (low speed fan) and VENTMAX H (high speed fan) settings are required. Default for VENTMAX L is 3.2V and VENTMAX H is 2.8V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ERV OAT SP††</td>
<td>32°F (0°C)</td>
<td>0°F to 50°F (–18°C to 10°C); increment by 1 degree</td>
<td>ENERGY RECOVERY VENTILATOR UNIT OUTDOOR AIR TEMPERATURE SETPOINT Only when AUX1 O = ERV</td>
</tr>
<tr>
<td></td>
<td>EXH1 SET</td>
<td>50%</td>
<td>0 to 100%; increment by 1</td>
<td>EXHAUST FAN STAGE 1 SETPOINT Set point for OA damper position when exhaust fan 1 is powered by the economizer.</td>
</tr>
<tr>
<td></td>
<td>EXH2 SET</td>
<td>75%</td>
<td>0 to 100%; increment by 1</td>
<td>EXHAUST FAN STAGE 2 SETPOINT Set point for OA damper position when exhaust fan 2 is powered by the economizer. Only used when AUX1 O is set to EHX2.</td>
</tr>
</tbody>
</table>
### Table 12 — W7220 Menu Structure* (cont)

<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT†</th>
<th>EXPANDED PARAMETER NAME</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INSTALL</td>
<td>01/01/10</td>
<td>N/A</td>
<td>Display order = MM/DD/YY</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Setting order = DD, MM, then YY.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UNITS DEG</td>
<td>°F or °C</td>
<td></td>
<td>Sets economizer controller in degrees Fahrenheit or Celsius</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EQUIPMENT</td>
<td>CONV or HP</td>
<td></td>
<td>CONV = conventional; HP O/B = Enable Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AUX2 IN</td>
<td>W</td>
<td></td>
<td>In CONV mode: SD = Enables configuration of shutdown (default); W = Informs controller that system is in heating mode. In HP O/B mode: HP(O) = energize heat pump on Cool (default); HP(B) = energize heat pump on heat.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FAN SPEED</td>
<td>2 speed</td>
<td>1 speed/2 speed</td>
<td>Sets the economizer controller for operation of 1 speed or 2 speed supply fan. The controller does not control the fan, but positions the OA and RA dampers to heating or cooling mode.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FAN CFM</td>
<td>5000 cfm</td>
<td>100 to 15000 cfm; increment by 100</td>
<td>UNIT DESIGN AIRFLOW (CFM) Enter only if using DCVCAL ENA = AUTO This is the capacity of the RTU. The value is found on the nameplate label for the specific unit.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AUX1 OUT</td>
<td>NONE or ERV/EXH2/SYS</td>
<td></td>
<td>Select OUTPUT for AUX1 O relay • NONE = not configured (output is not used) • ERV = Energy Recovery Ventilator†† • EXH2 = second damper position 24 vac out for second exhaust fan • SYS = use output as an alarm signal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OCC</td>
<td>INPUT or ALWAYS</td>
<td></td>
<td>OCCUPIED MODE BY EXTERNAL SIGNAL When using a setback thermostat with occupancy out (24 vac), the 24 vac is input “INPUT” to the OCC terminal. If no occupancy output from the thermostat, then change program to “ALWAYS” OR add a jumper from terminal R to OCC terminal.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FACTORY DEFAULT</td>
<td>NO or YES</td>
<td></td>
<td>Resets all set points to factory defaults when set to YES. LCD will briefly flash YES and change to NO but all parameters will change to the factory default values.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MA LO SET</td>
<td>45°F (7°C)</td>
<td>35°F to 65°F (2°C to 18°C); increment by 1 degree</td>
<td>SUPPLY AIR TEMPERATURE LOW LIMIT Temperature to activate Freeze Protection (close damper or modulate to MIN POS if temp falls below set value).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FREEZE POS</td>
<td>CLO or MIN</td>
<td></td>
<td>FREEZE PROTECTION DAMPER POSITION Damper position when freeze protection is active (closed or MIN POS).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CO2 ZERO</td>
<td>0 ppm</td>
<td>0 to 500 ppm; increment by 10</td>
<td>CO2 ppm level to match CO2 sensor start level.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CO2 SPAN</td>
<td>2000 ppm</td>
<td>1000 to 3000 ppm; increment by 50</td>
<td>CO2 ppm span to match CO2 sensor; e.g.: 500-1500 sensor output would be 500 CO2 zero and 1000 CO2 span.</td>
<td></td>
</tr>
<tr>
<td>ADVANCED SETUP</td>
<td>STG3 DLY</td>
<td>2.0h</td>
<td>0 min, 5 min, 15 min, then 15 min intervals. Up to 4 hrs or OFF</td>
<td>COOLING STAGE 3 DELAY Delay after stage 2 cool has been active. Turns on second stage of cooling when economizer is first stage call and mechanical cooling is second stage call. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD DMPR POS</td>
<td>CLO or OPN</td>
<td></td>
<td>Indicates shutdown signal from space thermostat or unitary controller. When controller receives 24 vac input on the SD terminal in conventional mode, the OA damper will open if programmed for OPN and OA damper will close if programmed for CLO. All other controls, e.g., fans, etc. will shut off.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DA LO ALM</td>
<td>45°F (7°C)</td>
<td>NONE or 35°F to 65°F (2°C to 18°C); increment by 5°F</td>
<td>Used for alarm for when the DA air temperature is too low. Set lower range of alarm, below this temperature the alarm will show on the display.</td>
<td></td>
</tr>
</tbody>
</table>
### ADVANCED SETUP (cont)

- **DA HI ALM**: 80°F (27°C)
  - **NONE**: 70°F to 180°F (21°C to 82°C); increment by 5°F
  - **Used for alarm when the DA air temperature is too high. Sets upper range of alarm; above this temperature, the alarm will show on the display.**

- **DCVCAL ENA**: MAN (manual)
  - **AUTO**: Turns on the DCV automatic control of the dampers. Resets ventilation based on the RA, OA, and MA sensor conditions. Requires all (RA, OA, MA, CO₂) sensors. This operation is not operable with a 2-speed fan unit.

- **MAT T CAL**: 0.0°F ± 2.5°F
  - **SUPPLY AIR TEMPERATURE CALIBRATION**: Allows for the operator to adjust for an out of calibration temperature sensor.

- **OAS T CAL**: 0.0°F ± 2.5°F
  - **OUTSIDE AIR TEMPERATURE CALIBRATION**: Allows for the operator to adjust for an out of calibration temperature sensor.

- **OA H CAL**: 0% RH ±10% RH
  - **RETURN AIR HUMIDITY CALIBRATION**: Allows for operator to adjust for an out of calibration humidity sensor.

- **RA T CAL**: 0.0°F ± 2.5°F
  - **RETURN AIR TEMPERATURE CALIBRATION**: Allows for the operator to adjust for an out of calibration temperature sensor.

- **RA H CAL**: 0% RH ±10% RH
  - **RETURN HUMIDITY CALIBRATION**: Allows for operator to adjust for an out of calibration humidity sensor.

- **DA T CAL**: 0.0°F ± 2.5°F
  - **DISCHARGE AIR TEMPERATURE CALIBRATION**: Allows for the operator to adjust for an out of calibration temperature sensor.

- **2SP FAN DELAY**: 5 Minutes
  - **TIME DELAY ON 2nd STAGE ECONOMIZING**: When in economizing mode, this is the delay for the high speed fan to try to satisfy the call for second stage cooling before the first stage mechanical cooling is enabled.

### CHECKOUT***

- **DAMPER MINIMUM POSITION**: N/A
  - **N/A**: The checkout for the damper minimum position is based on the system. See Table 13.

- **DAMPER OPEN**: N/A
  - **N/A**: Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure to pause in the mode to allow exhaust contacts to energize due to the delay in the system.

- **DAMPER CLOSE**: N/A
  - **N/A**: Positions damper to the fully closed position.

- **CONNECT Y1–O**: N/A
  - **N/A**: Closes the Y1-O relay (Y1-O) when using SYLK bus sensors, “SYLK” will appear on the screen, and when using 20k OA temperature sensors, “SENS T” will appear on the screen.

- **CONNECT Y2–O**: N/A
  - **N/A**: Closes the Y2-O relay (Y2-O) when using SYLK bus sensors, “SYLK” will appear on the screen, and when using 20k OA temperature sensors, “SENS T” will appear on the screen.

- **CONNECT AUX1–O**: N/A
  - **N/A**: 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

### ALARMS

Alarms display only when they are active. The menu title “ALARMS(#)” includes the number of active alarms in parenthesis ( ). When using SYLK bus sensors, “SYLK” will appear on the screen, and when using 20k OA temperature sensors, “SENS T” will appear on the screen.

- **MA T SENS ERR**: N/A
  - **N/A**: Mixed air sensor has failed or become disconnected - check wiring; then replace sensor if the alarm continues.

- **CO2 SENS ERR**: N/A
  - **N/A**: CO₂ SENSOR ERROR
    - CO₂ sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues.

- **OA SYLK T ERR**: N/A
  - **N/A**: OUTSIDE AIR S-BUS SENSOR ERROR
    - Outdoor air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.

- **RA SYLK H ERR**: N/A
  - **N/A**: Return air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.

- **DA SYLK T ERR**: N/A
  - **N/A**: DISCHARGE AIR S-BUS SENSOR ERROR
    - Discharge air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.

- **OA SENS T ERR**: N/A
  - **N/A**: OUTSIDE AIR TEMPERATURE SENSOR ERROR
    - Outdoor air temperature sensor has failed or become disconnected - check wiring, then replace if the alarm continues.

- **ACT ERROR**: N/A
  - **N/A**: ACTUATOR ERROR
    - Actuator has failed or become disconnected - check for stall, over voltage, under voltage and actuator count. Replace actuator if damper is movable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu.

---

### Table 12 — W7220 Menu Structure* (cont)

<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT†</th>
<th>EXPANDED PARAMETER NAME</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADVANCED SETUP (cont)</td>
<td>DA HI ALM</td>
<td>80°F (27°C)</td>
<td>NONE</td>
<td>70°F to 180°F (21°C to 82°C); increment by 5°F</td>
<td>Used for alarm when the DA air temperature is too high. Sets upper range of alarm; above this temperature, the alarm will show on the display.</td>
</tr>
<tr>
<td></td>
<td>DCVCAL ENA</td>
<td>MAN</td>
<td>MAN (manual)</td>
<td>AUTO</td>
<td>Turns on the DCV automatic control of the dampers. Resets ventilation based on the RA, OA, and MA sensor conditions. Requires all (RA, OA, MA, CO₂) sensors. This operation is not operable with a 2-speed fan unit.</td>
</tr>
<tr>
<td></td>
<td>MAT T CAL</td>
<td>0.0°F</td>
<td>± 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>
</tr>
<tr>
<td></td>
<td>OAS T CAL</td>
<td>0.0°F</td>
<td>± 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>
</tr>
<tr>
<td></td>
<td>OA H CAL</td>
<td>0% RH</td>
<td>±10% RH</td>
<td>RETURN AIR HUMIDITY CALIBRATION</td>
<td>Allows for operator to adjust for an out of calibration humidity sensor.</td>
</tr>
<tr>
<td></td>
<td>RA T CAL</td>
<td>0.0°F</td>
<td>± 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>
</tr>
<tr>
<td></td>
<td>RA H CAL</td>
<td>0% RH</td>
<td>±10% RH</td>
<td>RETURN HUMIDITY CALIBRATION</td>
<td>Allows for operator to adjust for an out of calibration humidity sensor.</td>
</tr>
<tr>
<td></td>
<td>DA T CAL</td>
<td>0.0°F</td>
<td>± 2.5°F</td>
<td>DISCHARGE AIR TEMPERATURE CALIBRATION</td>
<td>Allows for the operator to adjust for an out of calibration temperature sensor.</td>
</tr>
<tr>
<td></td>
<td>2SP FAN DELAY</td>
<td>5 Minutes</td>
<td>0 to 20 minutes in 1 minute increments</td>
<td>TIME DELAY ON 2nd STAGE ECONOMIZING</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>
</tr>
<tr>
<td>CHECKOUT***</td>
<td>DAMPER MINIMUM POSITION</td>
<td>N/A</td>
<td>N/A</td>
<td>The checkout for the damper minimum position is based on the system. See Table 13.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DAMPER OPEN</td>
<td>N/A</td>
<td>N/A</td>
<td>Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure to pause in the mode to allow exhaust contacts to energize due to the delay in the system.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DAMPER CLOSE</td>
<td>N/A</td>
<td>N/A</td>
<td>Positions damper to the fully closed position</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONNECT Y1–O</td>
<td>N/A</td>
<td>N/A</td>
<td>Closes the Y1-O relay (Y1-O) when using SYLK bus sensors, “SYLK” will appear on the screen, and when using 20k OA temperature sensors, “SENS T” will appear on the screen.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONNECT Y2–O</td>
<td>N/A</td>
<td>N/A</td>
<td>Closes the Y2-O relay (Y2-O) when using SYLK bus sensors, “SYLK” will appear on the screen, and when using 20k OA temperature sensors, “SENS T” will appear on the screen.</td>
<td></td>
</tr>
</tbody>
</table>
| | CONNECT AUX1–O | N/A | N/A | 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 |
| | CONNECT EXH1 | N/A | N/A | Closes the power exhaust fan 1 relay (EXH1) when using SYLK bus sensors, “SYLK” will appear on the screen, and when using 20k OA temperature sensors, “SENS T” will appear on the screen. |
| ALARMS | MA T SENS ERR | N/A | N/A | SUPPLY AIR TEMPERATURE SENSOR ERROR |
| | CO2 SENS ERR | N/A | N/A | CO₂ SENSOR ERROR |
| | OA SYLK T ERR | N/A | N/A | OUTSIDE AIR S-BUS SENSOR ERROR |
| | RA SYLK T ERR | N/A | N/A | RETURN AIR S-BUS SENSOR ERROR |
| | OA SYLK H ERR | N/A | N/A | Outdoor air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues. |
| | RA SYLK H ERR | N/A | N/A | Return air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues. |
| | DA SYLK T ERR | N/A | N/A | DISCHARGE AIR S-BUS SENSOR ERROR |
| | DA SYLK H ERR | N/A | N/A | Discharge air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues. |
| | OA SENS T ERR | N/A | N/A | OUTSIDE AIR TEMPERATURE SENSOR ERROR |
| | ACT ERROR | N/A | N/A | ACTUATOR ERROR |

† Requires all (RA, OA, MA, CO₂) sensors. This operation is not operable with a 2-speed fan unit.

†† 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.
Table 12 — W7220 Menu Structure* (cont)

<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT†</th>
<th>EXPANDED PARAMETER NAME</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALARMS (cont)</td>
<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 Set point on Advanced menu. When conditions are back in normal range, the alarm will go away.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SHUTDOWN ACTIVE</td>
<td>N/A</td>
<td>N/A</td>
<td>AUX2 IN is programmed for SHUTDOWN and 24 V has been applied to AUX2 IN terminal.</td>
<td></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, this alarm will display when the W7220 is completing a calibration on the dampers. Wait until the calibration is completed and the alarm will go away. Must have OA, MA and RA sensors for DCV calibration; set up is in the Advanced setup menu.</td>
<td></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>
<td></td>
</tr>
<tr>
<td></td>
<td>SYS ALARM</td>
<td>N/A</td>
<td>N/A</td>
<td>When AUX1-O is set to SYS and there is any alarm (e.g., failed sensors, etc.), the AUX1-O terminal has 24 vac out.</td>
<td></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>
<td></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>
<td></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>
<td></td>
</tr>
</tbody>
</table>

**Table 12 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration. For example, if you do not have a DCV (CO₂) sensor, then none of the DCV parameters appear.**

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

** N/A = Not Applicable.

†† 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 set point in the set point menu.***

For damper minimum position settings and checkout menu readings, see Table 13. For dry bulb operation with or without DCV, see Tables 14 and 15. For enthalpy operation with or without DCV, see Tables 16 and 17.

Table 13 — Damper Minimum Position Settings and Readings on Checkout Menu

<table>
<thead>
<tr>
<th>FAN SPEED</th>
<th>DEMAND CONTROLLED VENTILATION (CO₂ SENSOR)</th>
<th>SETPOINTS</th>
<th>CHECKOUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NO</td>
<td>MIN POS</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>YES</td>
<td>VENT MIN</td>
<td>VMAX–HS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VENT MAX</td>
<td>VMAX–HS</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 — Dry Bulb Operation without DCV (CO₂ Sensor) — 1 Speed Fan |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| DEMAND CONTROLLED VENTILATION (DCV) | OUTSIDE AIR GOOD TO ECONOMIZE | Y1-I | Y2-I | FAN SPEED | Y1-O | Y2-O | OCCUPIED | UNOCCUPIED |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| NONE | Off | Off | High | 0-v/Off | 0-v/Off | MIN POS | Closed |
| | On | Off | High | 24-v/On | 0-v/Off | MIN POS | Closed |
| | On | On | High | 24-v/On | 24-v/On | MIN POS | Closed |
| | Yes | Off | Off | High | 0-v/Off | 0-v/Off | MIN POS to Full-Open | Closed to Full-Open |
| | | On | Off | High | 0-v/Off | 0-v/Off | MIN POS | Closed |
| | | On | On | High | 24-v/On | 0-v/Off* | MIN POS to Full-Open | Closed to Full-Open |

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

| Table 15 — Dry Bulb Operation with DCV (CO₂ Sensor) — 1 Speed Fan |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| DEMAND CONTROLLED VENTILATION (DCV) | OUTSIDE AIR GOOD TO ECONOMIZE | Y1-I | Y2-I | FAN SPEED | Y1-O | Y2-O | OCCUPIED | UNOCCUPIED |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Below CO₂ set | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN | Closed |
| | On | Off | High | 24-v/On | 0-v/Off | VENTMIN | Closed |
| | On | On | High | 24-v/On | 24-v/On | VENTMIN | Closed |
| | Yes | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN to Full-Open | Closed to Full-Open |
| | | On | Off | High | 0-v/Off | 0-v/Off | VENTMIN to Full-Open | Closed to Full-Open |
| | | On | On | High | 24-v/On | 0-v/Off* | VENTMIN to Full-Open | Closed to Full-Open |
| Above CO₂ set | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN to VENTMAX | Closed |
| | On | Off | High | 24-v/On | 0-v/Off | VENTMIN to VENTMAX | Closed |
| | On | On | High | 24-v/On | 24-v/On | VENTMIN to VENTMAX | Closed |
| | Yes | Off | Off | High | 0-v/Off | 0-v/Off | VENTMIN to Full-Open | Closed to Full-Open |
| | | On | Off | High | 0-v/Off | 0-v/Off | VENTMIN to Full-Open | Closed to Full-Open |
| | | On | On | High | 24-v/On | 0-v/Off* | VENTMIN to Full-Open | Closed to Full-Open |

*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 — Enthalpy Operation without DCV (CO₂ Sensor) — 1 Speed Fan |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| DEMAND CONTROLLED VENTILATION (DCV) | OUTSIDE AIR GOOD TO ECONOMIZE | Y1-I | Y2-I | FAN SPEED | Y1-O | Y2-O | OCCUPIED | UNOCCUPIED |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| NONE | Off | Off | High | 0-v/Off | 0-v/Off | MIN POS | Closed |
| | On | Off | High | 24-v/On | 0-v/Off | MIN POS | Closed |
| | On | On | High | 24-v/On | 24-v/On | MIN POS | Closed |
| | Yes | Off | Off | High | 0-v/Off | 0-v/Off | MIN POS to Full-Open | Closed to Full-Open |
| | | On | Off | High | 0-v/Off | 0-v/Off | MIN POS to Full-Open | Closed to Full-Open |
| | | On | On | High | 24-v/On | 0-v/Off* | MIN POS to Full-Open | Closed to Full-Open |

*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 set points, the Outdoor Air can be used for economizing. Figure 49 shows the new single enthalpy boundaries in the W7220. There are 5 boundaries (set points ES1 through ES5), which are defined by dry bulb temperature, enthalpy and dew point.

Refer to Table 18 for ENTH CURVE set point values.

The W7220 calculates the enthalpy and dew point using the OA temperature and humidity input from the OA enthalpy sensor.

---

**Table 17 — 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>UNOCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Below CO₂ set</td>
<td>Off</td>
<td>Off</td>
<td>High</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>High</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>On</td>
<td>High</td>
<td>24-v/On</td>
<td>24-v/On</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Off</td>
<td>Off</td>
<td>High</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>High</td>
<td>24-v/On</td>
<td>0-v/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>24-v/On</td>
<td>0-v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
<tr>
<td></td>
<td>Above CO₂ set</td>
<td>Off</td>
<td>Off</td>
<td>High</td>
<td>0-v/Off</td>
<td>0-v/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>24-v/On</td>
<td>0-v/Off</td>
<td>VENTMIN L to VENTMAX</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>On</td>
<td>High</td>
<td>24-v/On</td>
<td>24-v/On</td>
<td>VENTMIN H to VENTMAX</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Off</td>
<td>Off</td>
<td>High</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN L to VENTMAX</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>High</td>
<td>24-v/On</td>
<td>0-v/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>24-v/On</td>
<td>0-v/Off</td>
<td>VENTMIN to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
</tbody>
</table>

*With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.

†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.

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.

Figure 49 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.

---

**Fig. 49 — Single Enthalpy Curve Boundaries**
4. When all desired parameters have been tested, press the button to complete the test or at any time during the operation of the system as a test.

To perform a Checkout test:

1. Scroll to the desired test in the Checkout menu using the keypad, see Interface Overview on page 28.

NOTE: For information about menu navigation and use of the keypad see Interface Overview on page 28.

**Power Loss (Outage or Brownout)**

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

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

**Status**

Use the Status menu (see Table 12) 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 28.

**Checkout Tests**

Use the Checkout menu (see page 33) 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 28.

To perform a Checkout test:

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

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**TROUBLESHOOTING**

**Alarms**

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

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

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

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

**Clearing Alarms**

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

To clear an alarm, perform the following:

1. Navigate to the desired alarm.
2. Press the (Enter) button. ERASE? displays.
3. Press the (Enter) button. ALARM ERASED displays.
4. Press the (Menu up/Exit) button to complete the action and return to the previous menu.

If the alarm still exists after clearing it, it is redisplayed within 5 seconds.

**PremierLink™ (Factory Option)**

For details on operating 50TCQ units equipped with the factory-installed PremierLink controller option, refer to the PremierLink Retrofit Rooftop Controller Version 3.x Installation, Start-Up, and Configuration Instructions manual.

**RTU-Open Controller System (Factory-Installed Option)**

For details on operating 50TCQ units equipped with the factory-installed RTU Open controller, refer to the “Factory-Installed RTU Open Multi-Protocol Controller Control, Start-Up, Operation and Troubleshooting” manual.

**Smoke Detectors**

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

Units equipped with factory-optinal return air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 50 for the as-shipped location.
COMPLETING INSTALLATION OF RETURN AIR SMOKE SENSOR

1. Unscrew the two screws holding the Return Air Smoke Detector assembly. See Fig. 51, Step 1. Save the screws.
2. Turn the assembly 90 degrees and then rotate end to end. Make sure that the elbow fitting is pointing down. See Fig. 51, Step 2.
3. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 51, Step 3.
4. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

ADDITIONAL APPLICATION DATA

Refer to the Application Data sheet titled, Factory Installed Smoke Detectors for Small and Medium Rooftop Units 2 to 25 Tons for discussions on additional control features of these smoke detectors including multiple unit coordination.
Step 11 — Adjust Factory-Installed Options

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

ECONOMISER IV OCCUPANCY SWITCH
Refer to Fig. 52 for general EconoMi$er 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 12 — Install Accessories
Available accessories include:

- Roof curb
- Thru-base connection kit (must be installed before unit is set on curb)
- Manual outside air damper
- Two-position motorized outside air damper
- EconoMi$er IV (with control and integrated barometric relief)
- EconoMi$er2 (without control/for external signal and integrated barometric relief)
- Barometric relief
- Power exhaust
- Differential dry-bulb sensor (EconoMi$er IV)
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- Time Guard II compressor anti-cycle control
- Outdoor coil protector grille
- Head pressure control
- Programmable setback thermostat
- Electro-mechanical thermostat and subbase
- Electric heaters
- Single point kits
- Thermostat / sensors
- CO₂ sensor
- DDC interface (PremierLink™ controller)
- Louvered hail guard
- Phase monitor control

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

Step 13 — Check Belt Tension

Measure the belt span length as shown in Fig. 53. Calculate the required deflection by multiplying the belt span length by 1/64. For example, if the belt span length is 32 inches:

\[ 32 \times \frac{1}{64} = \frac{1}{2}\text{-in. deflection}. \]

BELT FORCE — DEFLECTION METHOD
Check the belt tension with a spring-force belt force deflection gage (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 gage to the desired tension (see Table 1 in Fig. 53). 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. 54) 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.

Fig. 52 — EconoMi$er® IV Wiring
BELT TENSION METHOD
Requires belt tension gage that measures tension in belt in units of lbs force.

---

Table 1

<table>
<thead>
<tr>
<th>BELT CROSS SECTION</th>
<th>SMALLEST SHEAVE DIAMETER</th>
<th>BELT DEFLECTION FORCE (LBS)</th>
<th>UNNOTCHED BELTS</th>
<th>NOTCHED BELTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>USED</td>
<td>NEW</td>
</tr>
<tr>
<td>A, AX</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>B, BX</td>
<td>3.4-4.2</td>
<td>—</td>
<td>—</td>
<td>—</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>

---

Fig. 53 — V-Belt Force Label

Fig. 54 — Belt Drive Motor Mounting

TORQUE ALL SHEAVE SET SCREWS TO 110±10 IN. LBS.

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BELT SPAN
DEFLECTION
BELT SPAN
BLOW PULLEY
MOTOR
V-BELT
MOTOR MOUNTING PLATE
MOUNTING BOLTS (4)
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. ____________________________________________
JOB NAME_____________________________________________
SERIAL NO. ____________________________________________
ADDRESS _____________________________________________
START-UP DATE________________________________________
TECHNICIAN NAME _____________________________________
ADDITIONAL ACCESSORIES

II. PRE-START-UP
Verify that all packaging materials have been removed from unit (Y/N) _____
Verify installation of outdoor air hood (Y/N) ______
Verify that condensate connection is installed per instructions (Y/N) ______
Verify that all electrical connections and terminals are tight (Y/N) _____
Check that indoor-air filters are clean and in place (Y/N) ______
Check that outdoor-air inlet screens are in place (Y/N) ______
Verify that unit is level (Y/N) ______
Check fan wheels and propeller for location in housing/orifice and verify setscrew is tight (Y/N) ______
Verify that fan sheaves are aligned and belts are properly tensioned (Y/N) ______
Verify that scroll compressors are rotating in the correct direction (Y/N) ______
Verify installation of thermostat (Y/N) ______

III. START-UP
ELECTRICAL
Supply Voltage L1-L2_____________ L2-L3_____________ L3-L1_____________
Compressor Amps 1 L1   _____________ L2   _____________ L3   _____________
Compressor Amps 2 L1   _____________ L2   _____________ L3   _____________
Supply Fan Amps L1   _____________ L2   _____________ L3   _____________

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

PRESSURES
Refrigerant Suction CIRCUIT A _____________ PSIG
CIRCUIT B _____________ PSIG
Refrigerant Discharge CIRCUIT A _____________ PSIG
CIRCUIT B _____________ PSIG

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

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.
GENERAL
Economizer minimum vent and changeover settings to job requirements (if equipped) (Y/N) _____
Verify smoke detector unit shutdown by utilizing magnet test (Y/N) _____

IV. HUMIDI-MIZER® START-UP
NOTE: Units equipped with either SystemVu™ or RTU Open controls have Service Test menus or modes that can assist with the Humidi-Mizer System Start-Up function and provide the means to make the observations listed for this start-up.

STEPS
1. Check CTB for jumper 5, 6, 7 (Jumper 5, 6, 7 must be cut and open) (Y/N) _____
2. Open humidistat contacts (Y/N) _____
3. Start unit In cooling (Close Y1) (Y/N) _____

OBSERVE AND RECORD
A. Suction pressure _______________ PSIG
B. Discharge pressure _______________ PSIG
C. Entering air temperature _______________ ° F
D. Liquid line temperature at outlet or reheat coil _______________ ° F
E. Confirm correct rotation for compressor (Y/N) _____
F. Check for correct ramp-up of outdoor fan motor as condenser coil warms (Y/N) _____
4. Check unit charge per charging chart (Y/N) _____
   (Jumper 32L Motormaster® temperature sensor during this check. Remove jumper when complete.)
5. Switch unit to high-latent mode (sub-cooler) by closing humidistat with Y1 closed (Y/N) _____

OBSERVE
A. Reduction in suction pressure (5 to 7 psi expected) (Y/N) _____
B. Discharge pressure unchanged (Y/N) _____
C. Liquid temperature drops to 50°F to 55°F range (Y/N) _____
D. LSV solenoid energized (valve closes) (Y/N) _____
6. Switch unit to dehumid (reheat) by opening Y1 (Y/N) _____

OBSERVE
A. Suction pressure increases to normal cooling level
B. Discharge pressure decreases (35 to 50 psi) (Limited by Motormaster control)
C. Liquid temperature returns to normal cooling level
D. LSV solenoid energized (valve closes)
E. DSV solenoid energized, valve opens
7. With unit in dehumid mode close W1 compressor and outdoor fan stop; LSV and DSV solenoids de-energized (Y/N) _____
8. Open W1 restore unit to dehumid mode (Y/N) _____
9. Open humidistat input compressor and outdoor fan stop; LSV and DSV solenoids de-energized (Y/N) _____
10. Restore set-points for thermostat and humidistat (Y/N) _____

REPEAT PROCESS FOR 2 COMPRESSOR SYSTEMS.