# Installation Instructions

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SAFETY CONSIDERATIONS

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

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

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

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

### WARNING

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

### WARNING

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

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

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### WARNING

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

Relieve pressure and recover all refrigerant before system repair or final unit disposal. Wear safety glasses and gloves when handling refrigerants. Keep torches and other ignition sources away from refrigerants and oils.

### CAUTION

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing air conditioning equipment.

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IMPORTANT: 50HC 11 and 12 size 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. 50HC 11 and 12 size 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 control system refer to the Variable Frequency Drive (VFD) Factory-Installed Option 2-Speed Motor Control Installation, Setup and Troubleshooting manual.

### MODEL NUMBER NOMENCLATURE AND DIMENSIONS

See Fig. 1 for 50HC model number nomenclature. See Fig. 2 and 3 for unit dimensional drawings.

### Rated Indoor Airflow

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

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>RATED INDOOR AIRFLOW (CFM)</th>
</tr>
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<tbody>
<tr>
<td>50HC*A/B/F07</td>
<td>2400</td>
</tr>
<tr>
<td>50HC*D/E/G07</td>
<td>2400</td>
</tr>
<tr>
<td>50HC*D/E/G08</td>
<td>3000</td>
</tr>
<tr>
<td>50HC*D/E/G09</td>
<td>3000</td>
</tr>
<tr>
<td>50HC*D/E11</td>
<td>3000</td>
</tr>
<tr>
<td>50HC*D/E/G12</td>
<td>3000</td>
</tr>
</tbody>
</table>
Fig. 1 — 50HC 07-12 Model Number Nomenclature (Example)

Unit Heat Type
50 - Electric Heat
Packaged Rooftop

Model Series - WeatherMaster®
HC - High Efficiency

Heat Options
- None (Field Installed Accessory)
A - Low Electric Heat
B - Medium Electric Heat
C - High Electric Heat

Refrig. Systems Options
A - Single stage cooling models
B - Single stage cooling models
with Humidi-MiZer®
D - Two stage cooling models
E - Two stage cooling models with
MotorMaster Low Ambient Controller
F - Two stage cooling models with
MotorMaster Low Ambient Controller

Cooling Tons
07 - 6 ton
08 - 7.5 ton
09 - 8.5 ton
11 - 10 ton (12.0 EER)
12 - 10 ton (11.7 EER)

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
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

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

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

Factory Assigned
0 - Standard
1 - LTL

Electrical Options
A - None
B - HACR Breaker
C - Non-Fused Disconnect
D - Thru-The-Base Connections
E - HACR and Thru-The-Base Connections
F - Non-Fused Disconnect and
Thru-The-Base Connections
G - 2-Speed Indoor Fan (VFD) Controller
H - 2-Speed Fan Controller (VFD) and HACR
J - 2-Speed Fan Controller (VFD) and
Non-Fused Disconnect
K - 2-Speed Fan Controller (VFD) and
Thru-The-Base Connections
L - 2-Speed Fan Controller (VFD) with
HACR and Thru-The-Base Connections
M - 2-Speed Fan Controller (VFD) with
Non-Fused Disconnect and
Thru-The-Base Connections

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
C - Foil Faced Insulation
D - Foil Faced Insulation with
Unpowered Convenience Outlet
E - Foil Faced Insulation with
Powered Convenience Outlet
F - Foil Faced Insulation and Hinged Panels
G - Foil Faced Insulation and Hinged Panels
with Unpowered Convenience Outlet
H - Foil Faced Insulation and Hinged Panels
with Powered Convenience Outlet

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

Base Unit Controls
0 - Electro-mechanical Controls can be used with W7212 EconoMi$er IV (Non-Fault Detection and Diagnostic)
1 - PremierLink™ Controller
2 - RTU Open Multi-Protocol Controller
6 - Electro-mechanical with 2-Speed fan and W7220 EconoMi$er X
(control with Fault Detection and Diagnostic)
D - ComfortLink Controls
(Not available on 2-stage cooling 07 size models)

Design Revision
A - Factory Design Revision
Fig. 2 — Unit Dimensional Drawing — Sizes 07-09 (cont)
INSTALLATION

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

Step 1 — Plan for Unit Location
Select a location for the unit and its support system (curb or other) that provides for 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. 4.

NOTE: Consider also the effect of adjacent units.

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

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

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

Select a unit mounting system that provides adequate height to allow installation of condensate trap per requirements. Refer to Step 9 — Install External Condensate Trap and Line — for required trap dimensions.

ROOF MOUNT

Check building codes for weight distribution requirements. Unit operating weight is shown in Table 2.
Table 2 — Operating Weights

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<th>UNIT WEIGHT LB (KG)</th>
<th>UNIT WEIGHT KG (KG)</th>
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<tr>
<td></td>
<td>07</td>
<td>08</td>
<td>09</td>
</tr>
<tr>
<td>Base Unit</td>
<td>715 (324)</td>
<td>860 (390)</td>
<td>860 (390)</td>
</tr>
<tr>
<td>Economizer</td>
<td>75 (34)</td>
<td>75 (34)</td>
<td>75 (34)</td>
</tr>
<tr>
<td>Vertical</td>
<td>122 (55)</td>
<td>122 (55)</td>
<td>122 (55)</td>
</tr>
<tr>
<td>Horizontal</td>
<td>35 (16)</td>
<td>35 (16)</td>
<td>35 (16)</td>
</tr>
<tr>
<td>Powered Outlet</td>
<td>80 (36)</td>
<td>80 (36)</td>
<td>80 (36)</td>
</tr>
<tr>
<td>Humidi-Mizer® System*</td>
<td>14 in. (356 mm)</td>
<td>143 (65)</td>
<td>143 (65)</td>
</tr>
<tr>
<td></td>
<td>24 in. (610 mm)</td>
<td>245 (111)</td>
<td>245 (111)</td>
</tr>
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*Not available for size 11 units.

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. See the following 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 (see 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

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

Step 3 — Inspect Unit

Inspect unit for transportation damage. File any claim with transportation agency.
Confirm before installation of unit that voltage, amperage and circuit protection requirements listed on unit data plate agree with power supply provided.
On units with hinged panel option, check to be sure all latches are snug and in closed position.
Locate the carton containing the outside air hood parts; refer to Fig. 12 on page 13. Do not remove carton until unit has been rigged and located in final position.

Step 4 — Provide Unit Support

ROOF CURB MOUNT
Accessory roof curb details and dimensions are shown in Fig. 6 on page 10. Assemble and install accessory roof curb in accordance with instructions shipped with the curb.
NOTE: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 6 on page 10. Improperly applied gasket can also result in air leaks and poor unit performance.
Curb should be level. This is necessary for unit drain to function properly. Unit leveling tolerances are necessary for unit drain to function properly. Unit leveling tolerances are shown in Fig. 5. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

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.

Fig. 5 — Unit Leveling Tolerances

Install insulation, cant strips, roofing felt, and counter flashing as shown. Ductwork must be attached to curb and not to the unit. The accessory thru-the-base power package must be installed before the unit is set on the roof curb.
If electric and control wiring is to be routed through the basepan, attach the accessory thru-the-base service connections to the basepan in accordance with the accessory installation instructions.

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.
Fig. 6 — Roof Curb Details — Sizes 07-12

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

**RESOURCES:**
- ROOFING MATERIAL (FIELD SUPPLIED)
- CANT STRIP (FIELD SUPPLIED)
- ROOFING FELT (FIELD SUPPLIED)
- COUNTER FLASHING (FIELD SUPPLIED)
- UNIT GASKET (SUPPLIED WITH CURB)
- RIGID INSULATION (FIELD SUPPLIED)
- DUCT (FIELD SUPPLIED)
- NAIL (FIELD SUPPLIED)

**CERTIFIED DRAWING**

**Fig. 6 — Roof Curb Details — Sizes 07-12**
ALTERNATE UNIT SUPPORT (IN LIEU OF CURB OR SLAB MOUNT)

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

Step 5 — Field Fabricate Ductwork

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

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

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

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

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

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

Step 6 — Rig and Place Unit

Keep unit upright and do not drop. Spreader bars are required. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 2 and Fig. 7 for additional information.

Lifting holes are provided in base rails as shown in Fig. 7. Refer to rigging instructions on unit.

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

When using the standard side drain connection, ensure the red plug in the alternate bottom connection is tight. Do this before setting the unit in place. The red drain pan can be tightened with a 1/2-in. square socket drive extension. For further details see Step 9 — Install External Condensate Trap and Line on page 14.

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

UNITS WITH ACCESSORY OR OPTIONAL ELECTRIC HEATERS

Horizontal applications require a minimum clearance to combustible surfaces of 1 in. (25 mm) from duct for first 12 in. (305 mm) away from unit. Vertical applications do not require a minimum clearance.

Minimum clearance is not required around ductwork.

Outlet grilles must not lie directly below unit discharge.

NOTE: A 90-degree elbow must be provided in the ductwork to comply with UL (Underwriters Laboratories) code for use with electric heat.

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage. All panels must be in place when rigging. Unit is not designed for handling by fork truck when packaging is removed.

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

POSITIONING ON CURB

Position unit on roof curb so that the following clearances are maintained: 1/4 in. (6.4 mm) clearance between the roof curb and the base rail inside the front and back, 0.0 in. clearance between the roof curb and the base rail inside on the duct end of the unit. This will result in the distance between the roof curb and the base rail inside on the condenser end of the unit being approximately 3 5/16 in. (84 mm).

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

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.

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

CAUTION

PROPERTY DAMAGE HAZARD

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

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

CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage. All panels must be in place when rigging. Unit is not designed for handling by fork truck when packaging is removed.

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

CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage. All panels must be in place when rigging. Unit is not designed for handling by fork truck when packaging is removed.

CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage. All panels must be in place when rigging. Unit is not designed for handling by fork truck when packaging is removed.
**Fig. 7 — Rigging Details**

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

Unit is shipped in the vertical duct configuration. Unit without factory-installed economizer or return air smoke detector option may be field-converted to horizontal ducted configuration. To convert to horizontal configuration, remove screws from side duct opening covers (see Fig. 8) and remove covers. Use the screws to install the covers on vertical duct openings with the insulation side down. The panels must be inserted into the notches on the basepan to properly seal. The notches are covered by the tape used to secure the insulation to the basepan and are not easily seen. See Fig. 9 for position of the notches in the basepan. Seals around duct openings must be tight. Secure with screws as shown in Fig. 10. 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.

---

**Table: Unit Dimensions**

<table>
<thead>
<tr>
<th>UNIT</th>
<th>MAX WEIGHT LB (KG)</th>
<th>DIMENSIONS IN. (MM)</th>
<th>A</th>
<th>B</th>
<th>C</th>
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<tr>
<td>50HC*(A,B,D,E)*07</td>
<td>1130 (514)</td>
<td>88.0 (2235)</td>
<td>43.0 (1090)</td>
<td>41.5 (1055)</td>
<td></td>
</tr>
<tr>
<td>50HC*(D,E)*08</td>
<td>1340 (609)</td>
<td>88.0 (2235)</td>
<td>43.0 (1090)</td>
<td>49.5 (1255)</td>
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<td>50HC*(D,E)*09</td>
<td>1340 (609)</td>
<td>88.0 (2235)</td>
<td>43.0 (1090)</td>
<td>49.5 (1255)</td>
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<tr>
<td>50HC*(D,E)11,12</td>
<td>1580 (718)</td>
<td>88.0 (2235)</td>
<td>31.5 (775)</td>
<td>49.5 (1255)</td>
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</table>

**NOTES:**
1. **SPREADER BARS REQUIRED** — Top damage will occur if spreader bars are not used.
2. Dimensions in ( ) are in millimeters.
3. 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.

---

**Fig. 8 — Horizontal Conversion Panels**

**Fig. 9 — Location of Notches**

**Fig. 10 — Rigging Details**
Step 8 — Install Outside Air Hood

ECONOMIZER AND TWO POSITION DAMPER HOOD PACKAGE REMOVAL AND SETUP — FACTORY OPTION

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

1. To gain access to the hood, remove the filter access panel. (See Fig. 11.)
2. Locate the (2) screws holding the metal tray to the basepan and remove. Locate and cut the (2) plastic tie-wraps securing the assembly to the damper. (See Fig. 12.) Be careful to not damage any wiring or cut tie-wraps securing any wiring.

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. Remove the screws along the sides and bottom of the indoor coil access panel. See Fig. 13.
2. Swing out indoor coil access panel and insert the hood sides under the panel (hood top). Use the screws provided to attach the hood sides to the hood top. Use screws provided to attach the hood sides to the unit. See Fig. 14.
3. Remove the shipping tape holding the economizer barometric relief damper in place (economizer only).

4. Insert the hood divider between the hood sides. See Fig. 14 and 15. Secure hood divider with 2 screws on each hood side. The hood divider is also used as the bottom filter rack for the aluminum filter.

5. Open the filter clips which are located underneath the hood top. Insert the aluminum filter into the bottom filter rack (hood divider). Push the filter into position past the open filter clips. Close the filter clips to lock the filter into place. See Fig. 15.

6. Caulk the ends of the joint between the unit top panel and the hood top.

7. 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. 16. 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.

**Fig. 16 — Condensate Drain Pan (Side View)**

The piping for the condensate drain and external trap can be completed after the unit is in place. See Fig. 17.

**Fig. 17 — Condensate Drain Piping Details**

**IMPORTANT:** 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**

**ELECTRICAL SHOCK HAZARD**

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

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

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

**FIELD POWER SUPPLY**

If equipped with optional Powered Convenience Outlet: The power source leads to the convenience outlet’s transformer primary are not factory connected. Installer must connect these leads according to required operation of the convenience outlet. If an always-energized convenience outlet operation is desired, connect the source leads to the line side of the unit-mounted disconnect. (Check with local codes to ensure this method is acceptable in your area.) If a de-energize via unit disconnect switch operation of the convenience outlet is desired, connect the source leads to the load side of the unit disconnect. On a unit without a unit-mounted disconnect, connect the source leads to compressor contactor C and indoor fan contactor (IFC) pressure lugs with unit field power leads. Field power wires will be connected at the line-side pressure lugs on the power terminal block or at factory-installed option non-fused disconnect or HACR.

Field power wires are connected to the unit at line-side pressure lugs on compressor contactor C and indoor fan contactor IFC (see wiring diagram label for control box component arrangement), or at factory-installed option non-fused disconnect switch or HACR or electric heat single point box. Max wire size is #4ga AWG (copper only) per pole on contactors, #4ga AWG (copper only) or 1/0 AWG (copper only) per pole on optional disconnect (max wire size depends on the disconnect size supplied with unit), 1/0 AWG (copper only) on optional HACR and 4/0 AWG (copper only) per pole on terminal or fuse block on units with single point box. See Fig. 18 and unit label diagram for field power wiring connections.

**NOTE:** TEST LEADS — Unit may be equipped with short leads (pigtails) on the field line connection points on contactor C or optional disconnect switch or HACR. 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.

![Fig. 18 — Power Wiring Connections](image-url)
UNITS WITH FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR

The factory-installed optional non-fused disconnect (NFD) or HACR switch is located in a weatherproof enclosure located under the main control box. The manual switch handle and shaft are shipped in the disconnect or HACR enclosure. Assemble the shaft and handle to the switch at this point. Discard the factory test leads (see Fig. 18).

![Diagram of Disconnect Switch and Unit](image)

**Field-Install the NFD Shaft and Handle**

1. Remove the unit front panel (see Fig. 2 on page 4 or Fig. 3 on page 6).
2. Remove (3) hex screws on the NFD enclosure — (2) on the face of the cover and (1) on the left side cover. See Fig. 20.
3. Remove the front cover of the NFD enclosure.
4. Make sure the NFD shipped from the factory is at OFF position (the arrow on the black handle knob is at OFF).
5. Insert the shaft with the cross pin on the top of the shaft in the horizontal position. See Fig. 21.
6. Measure from the tip of the shaft to the top surface of the black pointer; the measurement should be 3.75 to 3.88 in. (95 to 99 mm).
7. Tighten the locking screw to secure the shaft to the NFD.
8. Turn the handle to the OFF position with red arrow pointing at OFF.
9. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
10. Secure the handle to the painted cover with (2) screws and lock washers supplied.
11. Engaging the shaft into the handle socket, re-install (3) hex screws on the NFD enclosure.
12. Re-install the unit front panel.

**Field-Install the HACR Shaft and Handle**

1. Remove unit front panel (see Fig. 2 on page 4 or Fig. 3 on page 6).
2. Remove (3) hex screws on the HACR enclosure — (2) on the face of the cover and (1) on the left side cover. See Fig. 22.
3. Remove the front cover of the HACR enclosure.
4. Make sure the HACR shipped from the factory is at OFF position (the white arrow pointing at OFF).
5. Insert the shaft all the way with the cross pin on the top of the shaft in the horizontal position. See Fig. 23.
6. Tighten the locking screw to secure the shaft to the HACR.
7. Turn the handle to the OFF position with red arrow pointing at OFF.
8. Install the handle on to the painted cover horizontally with the red arrow pointing to the left.
9. Secure the handle to the painted cover with (2) screws and lock washers supplied.
10. Engaging the shaft into the handle socket, re-install (3) hex screws on the HACR enclosure.
11. Re-install the unit front panel.

**WARNING**

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

Do not connect aluminum wire between disconnect switch and air conditioning unit. Use only copper wire. See Fig. 19.

**ELECTRIC DISCONNECT SWITCH**

COPPER WIRE ONLY

ALUMINUM WIRE

**Fig. 19 — Disconnect Switch and Unit**

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

**Fig. 20 — NFD Enclosure Location**

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

**Fig. 22 — HACR Enclosure Location**

**Fig. 23 — HACR Handle and Shaft Assembly**
UNITS WITHOUT FACTORY-INSTALLED NON-FUSED DISCONNECT OR HACR

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

ALL UNITS

All field wiring must comply with NEC and all local codes. Size wire based on MCA (Minimum Circuit Amps) on the unit informative plate. See Fig. 18 and the unit label diagram for power wiring connections to the unit power terminal blocks and equipment ground. Maximum wire size is #2ga AWG (copper only) per pole on contactors, #2ga AWG (copper only) per pole on optional disconnect or HACR, and 4/0 AWG (copper only) per pole on terminal or fuse block on units with single point box. See Fig. 18 and unit label diagram for field power wiring connections.

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

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

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

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

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

Example: Supply voltage is 230-3-60

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

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

Determine maximum deviation from average voltage.

<table>
<thead>
<tr>
<th>( AB )</th>
<th>( BC )</th>
<th>( AC )</th>
</tr>
</thead>
<tbody>
<tr>
<td>224</td>
<td>231</td>
<td>226</td>
</tr>
</tbody>
</table>

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%.

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

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
</table>

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.

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

Two types of convenience outlets are offered as factory-installed options on 50HC models: non-unit-powered and unit-powered. Both types provide a 125-volt GFCI (ground fault circuit interrupter) duplex receptacle rated at 15A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 24.

A 20 amp non-powered convenience outlet is available as a field-installed accessory.

**Non-Unit-Powered Type**

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

**Unit-Powered Type**

A unit-mounted transformer is factory-installed to step-down the main power supply voltage to the unit to 115v at the duplex receptacle. This option also includes a manual switch with fuse, located in a utility box and mounted on a bracket behind the convenience outlet; access is through the unit’s control box access panel. See Fig. 24.

The primary leads to the convenience outlet transformer are not factory-connected. Selection of primary power source is a customer option. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect or HACR breaker switch; this will provide service power to the unit when the unit disconnect switch or HACR switch is open. Other connection methods will result in the convenience outlet circuit being de-energized when the unit disconnect or HACR switch is open. See Fig. 25.

**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.**

**Fused On Power Type**

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

**Installing Weatherproof Cover**

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

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

---

1. Bussman and Fusetron are trademarks of Cooper Technologies Company.
1. Remove the blank cover plate at the convenience outlet; discard the blank cover.
2. Loosen the two screws at the GFCI duplex outlet, until approximately 1/2 in. (13 mm) under screw heads are exposed. Press the gasket over the screw heads.
3. Slip the backing plate over the screw heads at the keyhole slots and align with the gasket; tighten the two screws until snug (do not over-tighten).
4. Mount the weatherproof cover to the backing plate as shown in Fig. 27.
5. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover.
6. Check for full closing and latching.

**Fig. 27 — Weatherproof Cover Installation**

**Using Unit-Mounted Convenience Outlets**

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

**HACR AMP RATING**

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

**CAUTION**

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

**ATTENTION**


**Fig. 28 — HACR Caution Label**

**FACTORY-OPTION THRU-BASE CONNECTIONS**

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

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

Check tightness of connector lock nuts before connecting electrical conduits

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

**UNITS WITHOUT THRU-BASE CONNECTIONS**

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. 18.

**FIELD CONTROL WIRING**

The 50HC unit requires an external temperature control device. This device can be a thermostat (field-supplied) or a PremierLink™ controller (available as factory-installed option or as field-installed accessory, for use on a Carrier Comfort Network® (CCN) 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

Select a Carrier-approved accessory thermostat. When electric heat is installed in the 50HC unit, the thermostat must be capable of energizing the G terminal (to energize the Indoor Fan Contactor) whenever there is a space call for heat (energizing the W1 terminal). The accessory thermostats listed on the unit price pages can provide this signal but they are not configured to enable this signal as shipped.

Install the accessory thermostat according to installation instructions included with the accessory.

Locate the thermostat accessory on a solid wall in the conditioned space to sense average temperature in accordance with the thermostat installation instructions.

If the thermostat contains a logic circuit requiring 24-v 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 minimum). For 50 to 75 ft. (15 to 23 m), use no. 16 AWG insulated wire (35°C minimum). For over 75 ft. (23 m), use no. 14 AWG insulated wire (35°C 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.

See Fig. 30 for typical low-voltage control connections.

Fig. 30 — 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 multi-function wiring terminal configuration.

Unit without Thru-Base Connection Kit

Pass the thermostat control wires through the hole provided in the end panel (see item “D” in the view labeled “LEFT” in Fig. 2 and Fig. 3) then feed the wires through the raceway built into the corner post to the control box. Pull the wires over to the terminal strip on the upper-left corner of the Central Terminal Board (CTB) See Fig. 31.

Fig. 31 — Field Control Wiring Raceway

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

Heat Anticipator Settings

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

ELECTRIC HEATERS

The 50HC units may be equipped with factory or field-installed electric heaters. The heaters are modular in design, with heater frames holding open coil resistance wires strung through ceramic insulators, limit switches and one or two control contactors. 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. 32-34.

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

Unit heaters are marked with Heater Model Numbers, but heaters are ordered as and shipped in cartons marked with a corresponding heater Sales Package part number. See Table 3 for correlation between Heater Model Number and Sales Package part number.

NOTE: The value in position 9 of the part number differs between the sales package part number (value is 1) and a bare heater model number (value is 0).
Table 3 — Heater Model Number

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<th>R</th>
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**Single Point Boxes and Supplementary Fuses**

When the unit MOCP device value exceeds 60-A, unit-mounted supplementary fuses are required for each heater circuit. These fuses are included in accessory single point boxes, with power distribution and fuse blocks. The single point box will be installed directly under the unit control box, just to the left of the partition separating the indoor section (with electric heaters) from the outdoor section. The single point box has a hinged access cover. See Fig. 35. The single point box also includes a set of power taps and 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 on field-installed electric heat accessory. All fuses on 50HC 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.)

**Single Point Boxes without Fuses**

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

**Low-Voltage Control Connections**

Pull the low-voltage control leads from the heater module(s) — VIO and BRN (two of each if two modules are installed; identify for Module #1) — to the 4-pole terminal board TB4 located on the heater bulkhead to the left of Heater #1. Connect the VIO lead from Heater #1 to terminal TB4-1. Except for CRHEATER128B00-129B00, for 2 stage heating, connect the VIO lead from Heater #2 to terminal TB4-2. For 1 stage heating with 2 heater modules connect the VIO lead from both Heater #1 and #2 to terminal TB4-1. Connect both BRN leads to terminal TB4-3. See Fig. 36.
Fig. 36 — Optional or Accessory Electric Heater Control Connections (Except CRHEATER128B00-129B00)

CRHEATER128B00-129B00 Only

Connect the ORN lead from Heater Relay 1 (HR1) to terminal TB4-1. For 2 stage heating, connect the VIO lead from Heater Relay 3 (HR3) to terminal TB4-2. For 1 stage heating with CRHEATER128B00 or CRHEATER129B00, connect the ORN lead from HR1 and the VIO lead from HR3 to terminal TB4-1. Connect the BRN lead from HR1 to TB4-3. See Fig. 37.

Fig. 37 — Optional or Accessory Electric Heater Control Connections for CRHEATER128B00-129B00 Only

Humidi-Mizer® Control Connections

Humidi-Mizer® Space RH Controller

NOTE: The Humidi-Mizer® system is a factory-installed option which is only available for units equipped with belt-drive motors.

The Humidi-Mizer® dehumidification system requires a field-supplied and field-installed space relative humidity control device. This device may be a separate humidistat control (contact closes on rise in space RH above control setpoint) or a combination thermostat-humidistat control device such as Carrier’s Edge® Pro Thermostat™ with isolated contact set for dehumidification control. See Fig. 38 and Fig. 39. The humidistat is normally used in applications where a temperature control is already provided (units with PremierLink™ control).

Fig. 38 — Accessory Field-Installed Humidistat

To connect the Carrier humidistat (HL38MG029):

1. Route the humidistat 2-conductor cable (field-supplied) through the hole provided in the unit corner post.
2. Feed wires through the raceway built into the corner post (see Fig. 31 on page 20) to the 24-v barrier located on the left side of the control box. The raceway provides the UL-required clearance between high-voltage and low-voltage wiring.
3. Use wire nuts to connect humidistat cable to the leads in the low-voltage wiring (as shown in Fig. 40), connecting PNK to PNK and PNK/BLK to PNK/BLK.

Fig. 39 — Edge® Pro Thermostat

For simplicity, not all control wiring internal to the electric heaters is shown.

LS: Primary Limit Switch

LS: Field Connections for Field-Installed Electric Heat
To connect the Thermidistat device (33CS2PPRH-01):

1. Route the Thermidistat multi-conductor thermostat cable (field-supplied) through the hole provided in the unit corner post.
2. Feed wires through the raceway built into the corner post (see Fig. 31 on page 20) to the 24-v barrier located on the left side of the control box. The raceway provides the UL-required clearance between high-voltage and low-voltage wiring.
3. The Thermidistat has dry contacts at terminals D1 and D2 for dehumidification operation (see Fig. 41). The dry contacts must be wired between CTB terminal R and the PNK/BLK lead to the LTLO (low temperature cooling lockout) switch with field-supplied wire nuts. Refer to the installation instructions included with the Carrier Edge® Pro Thermidistat device for more information.

**TYPICAL CONTROL AND POWER WIRING DIAGRAMS**

See Fig. 42-49.
Fig. 41 — Typical Rooftop Unit with Humidi-MiZer® Adaptive Dehumidification System with Edge® Pro Thermidistat Device

*Connection not required.
Fig. 42 — Electro-Mechanical Control Wiring Diagram
Fig. 43 — Electro-Mechanical Control Wiring Diagram with Humidi-MiZer® System
Fig. 44 — Typical ComfortLink Control Wiring Diagram (50HC'08/09 shown)
Fig. 45 — Typical 50HC ComfortLink Control Power Wiring Diagram with Humidi-MiZer® System (208/230V, 460V-3 Ph-60 Hz shown)
Fig. 46 — Typical PremierLink™ Control Wiring Diagram
Fig. 47 — Typical PremierLink™ Control Wiring Diagram with Humidi-MiZer® System Option
Fig. 48 — Typical RTU Open Controller Wiring Diagram
Fig. 49 — Typical RTU Open Controller Wiring Diagram with Humidi-MiZer® System Option
EconoMiSer® X (Factory Option)

The EconoMiSer X system is an expandable economizer control system, which includes a W7220 economizer module (controller) with an LCD and keypad (See Fig. 50). The W7220 can be configured with optional sensors.

Fig. 50 — W7220 Economizer Module

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

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

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

System Components

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

Economizer Module

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

S-Bus Enthalpy Control Sensors

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

CO₂ Sensor (optional)

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

Specifications

W7220 Economizer Module

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

User Interface

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

Electrical

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

Inputs

Sensors

NOTE: A Mixed Air (MA) analog sensor is required on all W7220 units; either an Outdoor Air (OA) sensor for dry bulb change over 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 to 150°F (–40 to 65°C)

Temperature accuracy –0°F/+2°F

Temperature and Humidity, C7400S1000 (optional)

S-Bus; 2-wire (18 to 22 AWG)

Temperature: range –40 to 150°F (–40 to 65°C)

Temperature accuracy –0°F/+2°F

Humidity: range 0 to 100% RH with 5% accuracy.

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

4 Binary Inputs — 1-wire 24 Vac + common GND

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

Outputs

Actuator Signal

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

Exhaust fan, Y1, Y2 and AUX1 O

All Relay Outputs (at 30 Vac):

Running: 1.5A maximum

Inrush: 7.5A maximum

Environmental

Operating Temperature

–40 to 150°F (–40 to 65°C).

Exception of display operation down to –4°F (–20°C) with full recovery at –4°F (–20°C) from exposure to –40°F (–40°C)

Storage Temperature

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

Relative Humidity  
5% to 95% RH non-condensing

**Economizer Module Wiring Details**

Use Fig. 51 and Tables 4 and 5 to locate the wiring terminals for the Economizer module.

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

---

**Table 4 — Economizer Module - Left Hand Terminal Blocks**

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

<table>
<thead>
<tr>
<th>LABEL</th>
<th>TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAQ 2-10</td>
<td>2-10 vdc</td>
<td>Air Quality Sensor Input (e.g. CO₂ sensor)</td>
</tr>
<tr>
<td>IAQ COM</td>
<td>COM</td>
<td>Air Quality Sensor Common</td>
</tr>
<tr>
<td>IAQ 24V</td>
<td>24 vac</td>
<td>Air Quality Sensor 24 vac Source</td>
</tr>
<tr>
<td>ACT 2-10</td>
<td>2-10 vdc</td>
<td>Damper Actuator Output (2-10 vdc)</td>
</tr>
<tr>
<td>ACT COM</td>
<td>COM</td>
<td>Damper Actuator Output Common</td>
</tr>
<tr>
<td>ACT 24V</td>
<td>24 vac</td>
<td>Damper Actuator 24 vac Source</td>
</tr>
<tr>
<td>NA</td>
<td></td>
<td>The bottom pin is not used.</td>
</tr>
</tbody>
</table>

* Sylk is a trademark of Honeywell International Inc.

**Table 5 — Economizer Module - Right Hand Terminal Blocks**

<table>
<thead>
<tr>
<th>LABEL</th>
<th>TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Right Terminal Blocks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUX2 I</td>
<td>24 vac IN</td>
<td>Shut Down (SD) or HEAT (W) Conventional only and Heat Pump Changeover (O-B) in Heat Pump mode.</td>
</tr>
<tr>
<td>OCC</td>
<td>24 vac IN</td>
<td>Occupied/Unoccupied Input</td>
</tr>
<tr>
<td>E-GND</td>
<td>E-GND</td>
<td>Earth Ground — System Required</td>
</tr>
<tr>
<td>EXH1</td>
<td>24 vac OUT</td>
<td>Exhaust Fan 1 Output</td>
</tr>
<tr>
<td>AUX1 O</td>
<td>24 vac OUT</td>
<td>Programmable: Exhaust fan 2 output or ERV or System alarm output</td>
</tr>
</tbody>
</table>

| Bottom Right Terminal Blocks  |
| Y2-I | 24 vac IN | Y2 in - Cooling Stage 2 Input from space thermostat |
| Y2-O | 24 vac OUT | Y2 out - Cooling Stage 2 Output to stage 2 mechanical cooling |
| Y1-I | 24 vac IN | Y1 in - Cooling Stage 1 Input from space thermostat |
| Y1-O | 24 vac OUT | Y1 out - Cooling Stage 1 Output to stage 2 mechanical cooling |
| C    | COM       | 24 vac Common                                    |
| R    | 24 vac    | 24 vac Power (hot)                              |

---

**Fig. 51 — W7220 Economizer Module Terminal Connection Labels**
**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. 52 and Table 6 to locate the wiring terminals for each S-Bus sensor.

Use Fig. 52 and Table 7 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. 53 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. 54) 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.

**TERMINAL TYPE DESCRIPTION**

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

**Table 7 — Enthalpy Control Sensor DIP Switch Settings**

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

**LEGEND**

DA — Discharge Air
OA — Return Air
RA — Outside Air

NOTE: Terminals are polarity insensitive.

**Fig. 54 — W7220 Controller**
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.

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

Menu Structure

Table 8 illustrates the complete hierarchy of menus and parameters for the EconoMiSer® X system.

The Menus in display order are:

• STATUS
• SETPOINTS
• SYSTEM SETUP
• ADVANCED SETUP
• CHECKOUT
• ALARMS

IMPORTANT: Table 8 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration.

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

NOTE: Some parameters in the menus use the letters MA or MAT, indicating a mixed air temperature sensor location before the cooling coil. This unit application has the control sensor located after the cooling coil, in the fan section, where it is designated as (Cooling) Supply Air Temperature or SAT sensor.
<table>
<thead>
<tr>
<th>MENU</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON AVAL</td>
<td>NO</td>
<td>YES/NO</td>
<td></td>
<td>ECONOMIZING AVAILABLE; YES = economizing available; the system can use outside air for free cooling when required</td>
</tr>
<tr>
<td>ECONOMIZING</td>
<td>NO</td>
<td>YES/NO</td>
<td></td>
<td>ECONOMIZING ACTIVE; YES = Outside air being used for 1 stage cooling; NO = Economizing not active</td>
</tr>
<tr>
<td>OCCUPIED</td>
<td>NO</td>
<td>YES/NO</td>
<td></td>
<td>OCCUPIED; YES = OCC signal received from space thermostat or unitary controller; NO = 0 Vac on terminal OCC</td>
</tr>
<tr>
<td>HEAT PUMP</td>
<td>N/A**</td>
<td>COOL, HEAT</td>
<td>HEAT PUMP MODE</td>
<td>Displays COOL or HEAT when system is set to heat pump (Non-conventional)</td>
</tr>
<tr>
<td>COOL Y1—IN</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>FIRST STAGE COOLING DEMAND</td>
<td>Y1–I signal from space thermostat or unitary controller for cooling stage 1. ON = 24 Vac on terminal Y1–I</td>
</tr>
<tr>
<td>COOL Y1—OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>FIRST STAGE COOLING RELAY OUTPUT</td>
<td>Cool stage 1 Relay Output to stage 1 mechanical cooling (Y1—OUT terminal)</td>
</tr>
<tr>
<td>COOL Y2—IN</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>SECOND STAGE COOLING DEMAND</td>
<td>Y2–I signal from space thermostat or unitary controller for second stage cooling. ON = 24 Vac on terminal Y2–I</td>
</tr>
<tr>
<td>COOL Y2—OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>SECOND STAGE COOLING RELAY OUTPUT</td>
<td>Cool Stage 2 Relay Output to mechanical cooling (Y2—OUT terminal)</td>
</tr>
<tr>
<td>MA TEMP</td>
<td>—— — _°F</td>
<td>0 to 150°F (-18 to 60°C)</td>
<td>SUPPLY AIR TEMPERATURE</td>
<td>Displays value of measured mixed/cooled air from SAT sensor in fan section. Displays _ _ _ if not connected, short or out-of-range. See Note 2.</td>
</tr>
<tr>
<td>DA TEMP</td>
<td>—— — _°F</td>
<td>0 to 150°F (-18 to 60°C)</td>
<td>DISCHARGE AIR TEMPERATURE</td>
<td>Displays when Discharge Air sensor is connected and displays measured discharge temperature. Displays _ _ _ °F if sensor sends invalid value, if not connected, short or out-of-range.</td>
</tr>
<tr>
<td>OA TEMP</td>
<td>_ _ _ °F</td>
<td>-40 to 140°F (-40 to 60°C)</td>
<td>OUTSIDE AIR TEMP</td>
<td>Displays measured value of outdoor air temperature. Displays _ _ _ °F if sensor sends invalid value, if not connected, short or out-of-range.</td>
</tr>
<tr>
<td>OA HUM</td>
<td>_ _ %</td>
<td>0 to 100%</td>
<td>OUTSIDE AIR RELATIVE HUMIDITY</td>
<td>Displays measured value of outdoor humidity from OA enthalpy sensor.</td>
</tr>
<tr>
<td>RA TEMP</td>
<td>_ _ _ °F</td>
<td>0 to 140°F (-18 to 60°C)</td>
<td>RETURN AIR TEMPERATURE</td>
<td>Displays measured value of return air temperature from RAT sensor. Displays _ _ _ °F if sensor sends invalid value, if not connected, short or out-of-range.</td>
</tr>
<tr>
<td>RA HUM</td>
<td>_ _ %</td>
<td>0 to 100%</td>
<td>RETURN AIR RELATIVE HUMIDITY</td>
<td>Displays measured value of return air humidity from RA sensor. Displays _ _ _ % if sensor sends invalid value, if not connected, short or out-of-range.</td>
</tr>
<tr>
<td>IN CO2</td>
<td>_ _ ppm</td>
<td>0 to 2000 ppm</td>
<td>SPACE/RETURN AIR CO₂</td>
<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>
</tr>
<tr>
<td>DCCV STATUS</td>
<td>N/A</td>
<td>ON/OFF</td>
<td>DEMAND CONTROLLED VENTILATION STATUS</td>
<td>Displays ON if IN CO₂ value above setpoint DCV SET and OFF if below setpoint DCV SET.</td>
</tr>
<tr>
<td>DAMPER OUT</td>
<td>2.0V</td>
<td>2.0 TO 10.0V</td>
<td>Displays output voltage or position to the damper actuator.***</td>
<td></td>
</tr>
<tr>
<td>ACT POS</td>
<td>N/A</td>
<td>0 to 100%</td>
<td>Displays actual position of outdoor air damper actuator</td>
<td></td>
</tr>
<tr>
<td>ACT COUNT</td>
<td>N/A</td>
<td>1 to 65535</td>
<td>Displays number of times actuator has cycled. 1 cycle equals accrued 180 deg. of actuator movement in any direction.</td>
<td></td>
</tr>
<tr>
<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>
<td></td>
</tr>
<tr>
<td>EXH1 OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>EXHAUST STAGE 1 RELAY OUTPUT</td>
<td>Output of EXH1 terminal. Displays ON when damper position reaches programmed percentage setpoint. ON = 24 Vac Output; OFF = No Output.</td>
</tr>
<tr>
<td>MENU</td>
<td>PARAMETER</td>
<td>PARAMETER DEFAULT VALUE</td>
<td>PARAMETER RANGE AND INCREMENT</td>
<td>NOTES</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>-------------------------</td>
<td>------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>EXH2 OUT</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>EXHAUST STAGE 2 RELAY OUTPUT Output of AUX1 O terminal Displays ON when damper position reaches programmed percentage setpoint ON = 24 Vac Output, OFF = No Output; displays only if AUX1 O = EXH2</td>
<td></td>
</tr>
<tr>
<td>ERV</td>
<td>OFF</td>
<td>ON/OFF</td>
<td>ENERGY RECOVERY UNIT RELAY OUTPUT Output of AUX1 O terminal. ON = 24 Vac Output, OFF = No Output; displays only if AUX1 O = ERV</td>
<td></td>
</tr>
<tr>
<td>MECH COOL ON or HEAT STAGES 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>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 ON)</td>
<td>N/A</td>
<td>ON/OFF</td>
<td>HEAT DEMAND STATUS Displays status of heat demand on a 2-speed fan unit.</td>
<td></td>
</tr>
<tr>
<td>MAT SET</td>
<td>53°F (12°C)</td>
<td>38 to 70°F (3 to 21°C); increment by 1</td>
<td>SUPPLY AIR SETPOINT Setpoint determines where the economizer will modulate the OA damper to maintain the mixed air temperature. See Note 2.</td>
<td></td>
</tr>
<tr>
<td>LOW T LOCK</td>
<td>32°F (0°C)</td>
<td>-45 to 80°F (-43 to 27°C); increment by 1</td>
<td>COMPRESSOR LOW TEMPERATURE LOCKOUT Setpoint determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout. At or below the setpoint the Y1-O and Y2-O will not be energized on the controller.</td>
<td></td>
</tr>
<tr>
<td>DRYBLB SET</td>
<td>63°F (17°C)</td>
<td>48 to 80°F (9 to 27°C); increment by 1</td>
<td>OA DRY BULB TEMPERATURE CHANGEOVER SETPOINT Setpoint determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.: at 63°F (17°C), unit will economize at 62°F (16.7°C) and below and not economize at 64°F (17.8°C) and above. There is a 2°F (1.1°C) deadband. See Note 3</td>
<td></td>
</tr>
<tr>
<td>ENTH CURVE</td>
<td>ES3</td>
<td>ES1, ES2, ES3, ES4, or ES5</td>
<td>ENTHALPY CHANGEOVER CURVE (Requires enthalpy sensor option) Enthalpy boundary “curves” for economizing using single enthalpy. See page 45 for description of enthalpy curves.</td>
<td></td>
</tr>
<tr>
<td>DCV SET</td>
<td>1100ppm</td>
<td>500 to 2000 ppm; increment by 100</td>
<td>DEMAND CONTROLLED VENTILATION SETPOINT Displays only if CO2 sensor is connected. Setpoint for Demand Controlled Ventilation of space. Above the setpoint, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the setpoint.</td>
<td></td>
</tr>
<tr>
<td>MIN POS</td>
<td>2.6 V</td>
<td>2 to 10 Vdc</td>
<td>VENTILATION MINIMUM POSITION Displays only if a CO2 sensor is NOT connected. With 2-speed fan units MIN POS L (low speed fan) and MIN POS H (high speed fan) settings are required. Default for MIN POS L is 3.2V and MIN POS H is 2.8V</td>
<td></td>
</tr>
<tr>
<td>VENTMAX</td>
<td>2.8 V</td>
<td>2 to 10 Vdc</td>
<td>DCV MAXIMUM DAMPER POSITION Displays only if a CO2 sensor is connected. Used for Vbz (ventilation max cfm) setpoint. VENTMAX is the same setting as MIN POS would be without the CO2 sensor.</td>
<td></td>
</tr>
<tr>
<td>VENTMIN</td>
<td>2.25 V</td>
<td>2 to 10 Vdc</td>
<td>DCV MINIMUM DAMPER POSITION Displays only if a CO2 sensor is connected. Used for Va (ventilation min cfm) setpoint. This is the ventilation requirement for less than maximum occupancy of the space.</td>
<td></td>
</tr>
<tr>
<td>ERV OAT SP††</td>
<td>32°F (0°C)</td>
<td>0 to 50°F; (-18 to 10°C); increment by 1</td>
<td>ENERGY RECOVERY VENTILATOR UNIT OUTDOOR AIR TEMPERATURE SETPOINT Only when AUX1 O = ERV</td>
<td></td>
</tr>
<tr>
<td>EXH1 SET</td>
<td>50%</td>
<td>0 to 100%; increment by 1</td>
<td>EXHAUST FAN STAGE 1 SETPOINT Setpoint for OA damper position when exhaust fan 1 is powered by the economizer. With 2-speed fan units Exh1 L (low speed fan) and Exh1 H (high speed fan) settings are required. Default for Exh1 L is 65% and Exh1 H is 50%</td>
<td></td>
</tr>
<tr>
<td>EXH2 SET</td>
<td>75%</td>
<td>0 to 100%; increment by 1</td>
<td>EXHAUST FAN STAGE 2 SETPOINT Setpoint for OA damper position when exhaust fan 2 is powered by the economizer. Only used when AUX1 O is set to EH2. With 2-speed fan units Exh2 L (low speed fan) and Exh2 H (high speed fan) settings are required. Default for Exh2 L is 80% and Exh2 H is 75%</td>
<td></td>
</tr>
<tr>
<td>MENU</td>
<td>PARAMETER</td>
<td>PARAMETER DEFAULT VALUE</td>
<td>PARAMETER RANGE AND INCREMENT</td>
<td>NOTES</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>-------------------------</td>
<td>-------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>SYSTEM SETUP</td>
<td>INSTALL</td>
<td>01/01/10</td>
<td>N/A</td>
<td>Display order = MM/DD/YY Setting order = DD, MM, then YY.</td>
</tr>
<tr>
<td></td>
<td>UNITS DEG</td>
<td>°F</td>
<td>°F or °C</td>
<td>Sets economizer controller in degrees Fahrenheit or Celsius</td>
</tr>
<tr>
<td></td>
<td>EQUIPMENT</td>
<td>CONV</td>
<td>Conventional or HP</td>
<td>CONV = conventional; HP O/B = Enable Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller. See Note 4.</td>
</tr>
<tr>
<td></td>
<td>AUX2 IN</td>
<td>N/A</td>
<td>Shutdown (SD) Heat (W1) HP (O) HP (B)</td>
<td>In CONV mode: SD = enables configuration of shutdown (default); W = informs controller that system is in heating mode. NOTE: If using 2-speed fan mode, you must program CONV mode for W. Shutdown is not available in 2-speed fan mode. See Note 4. In HP O/B mode: HP(O) = energize heat pump on Cool (default); HP(B) = energize heat pump on heat.</td>
</tr>
<tr>
<td>SYSTEM SETUP</td>
<td>FAN SPEED</td>
<td>1 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 the heating or cooling mode. See page 35 for modes and position. NOTE: 2-speed fan option also needs Heat (W1) programmed in AUX2 In. See Note 4.</td>
</tr>
<tr>
<td></td>
<td>FAN CFM</td>
<td>5000cfm</td>
<td>100 to 15000 cfm; increment by 100</td>
<td>UNIT DESIGN AIRFLOW (CFM) Enter only if using DCVAL ENA = AUTO The value is found on the nameplate label for the specific unit.</td>
</tr>
<tr>
<td></td>
<td>AUX1 OUT</td>
<td>NONE</td>
<td>NONE ERV EXH2 SYS</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>
</tr>
<tr>
<td></td>
<td>OCC</td>
<td>INPUT</td>
<td>INPUT or ALWAYS 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. See Note 1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FACTORY DEFAULT</td>
<td>NO</td>
<td>NO or YES Resets all set points to factory defaults when set to YES. LCD will briefly flash YES and change to NO but all parameters will change to the factory default values. NOTE: RECHECK AUX2 IN and FANTYPE for required 2-speed values.</td>
<td></td>
</tr>
<tr>
<td>ADVANCED SETUP</td>
<td>MA LO SET</td>
<td>45°F (7°C)</td>
<td>35 to 55°F (2 to 18°C); incremented by 1°</td>
<td>SUPPLY AIR TEMPERATURE LOW LIMIT Temperature to achieve Freeze Protection (close damper and alarm if temperature falls below setup value).</td>
</tr>
<tr>
<td></td>
<td>FREEZE POS</td>
<td>CLO</td>
<td>CLO or MIN FREEZE PROTECTION DAMPER POSITION Damper position when freeze protection is active CLO = closed MIN = MIN POS or VENTMAX</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CO2 ZERO</td>
<td>0ppm</td>
<td>0 to 500 ppm; Increment by 10</td>
<td>CO2 ppm level to match CO2 sensor start level.</td>
</tr>
<tr>
<td></td>
<td>CO2 SPAN</td>
<td>2000ppm</td>
<td>1000 to 3000 ppm; Increment by 10</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>
</tr>
<tr>
<td></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>
</tr>
<tr>
<td></td>
<td>SD DMPR POS</td>
<td>CLO</td>
<td>CLO or OPN</td>
<td>Indicates shutdown signal from space thermostat or unitary controller. When controller receives 24 Vac input on the SD terminal in conventional mode, the OA damper will open if programmed for CLO and OA damper will close if programmed for CLO. All other controls, e.g., Y1-O, Y2-O, EXH1, etc. will shut off. NOTE: Function NOT AVAILABLE with 2-speed mode</td>
</tr>
<tr>
<td></td>
<td>DA LO ALM</td>
<td>45°F (7°C)</td>
<td>35 to 65°F (2 to 18°C); incremented by 5 deg.</td>
<td>Used for alarm when the DA air temperature is too low. Set lower range of alarm, below this temperature the alarm will show on the display.</td>
</tr>
<tr>
<td></td>
<td>DA HI ALM</td>
<td>80°F (27°C)</td>
<td>70 to 180°F (21 to 82°C); incremented by 5 deg.</td>
<td>Used for alarm when the DA air temperature is too high. Set high 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) 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 sensors (RA, OA, MA, and CO2). NOTE: This operation is not available with a 2-speed fan unit.</td>
</tr>
<tr>
<td>MENU</td>
<td>PARAMETER</td>
<td>PARAMETER DEFAULT VALUE</td>
<td>PARAMETER RANGE AND INCREMENT</td>
<td>NOTES</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------</td>
<td>--------------------------</td>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>MAT T CAL</td>
<td>0.0°F (or °C) ±2.5°F</td>
<td>SUPPLY AIR TEMPERATURE CALIBRATION</td>
<td>Allows the operator to adjust for an out of calibration supply air temperature (SAT) sensor.</td>
</tr>
<tr>
<td></td>
<td>OAS T CAL</td>
<td>0.0°F (or °C) ±2.5°F</td>
<td>OUTSIDE AIR TEMPERATURE CALIBRATION</td>
<td>Allows the operator to adjust for an out of calibration outside air temperature (OAT) sensor.</td>
</tr>
<tr>
<td></td>
<td>OAH CAL</td>
<td>0% RH ±10% RH</td>
<td>OUTSIDE AIR HUMIDITY CALIBRATION</td>
<td>Allows for operator to adjust for an out of calibration outside air enthalpy sensor.</td>
</tr>
<tr>
<td></td>
<td>RAT CAL</td>
<td>0.0°F (or °C) ±2.5°F</td>
<td>RETURN AIR TEMPERATURE CALIBRATION</td>
<td>Allows the operator to adjust for an out of calibration return air temperature (RA) sensor</td>
</tr>
<tr>
<td></td>
<td>RAH CAL</td>
<td>0% RH ±10% RH</td>
<td>RETURN AIR HUMIDITY CALIBRATION</td>
<td>Allows the operator to adjust for an out of calibration return air enthalpy sensor.</td>
</tr>
<tr>
<td></td>
<td>DAT CAL</td>
<td>0.0°F (or °C) ±2.5°F</td>
<td>DISCHARGE AIR TEMPERATURE CALIBRATION</td>
<td>Allows the operator to adjust for an out of calibration discharge air temperature (DAT) sensor.</td>
</tr>
<tr>
<td></td>
<td>2SP FAN DELAY</td>
<td>5 Minutes 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></td>
<td>DAMPER MINIMUM POSITION</td>
<td>N/A N/A</td>
<td>The checkout for the damper minimum position is based on the system. See Table 9.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DAMPER OPEN</td>
<td>N/A N/A</td>
<td>Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure you pause in the mode to allow exhaust contacts to energize due to the delay in the system.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DAMPER CLOSE</td>
<td>N/A 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 N/A</td>
<td>Closes the Y1-O relay (Y1-O). See Caution on page 46.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONNECT Y2–O</td>
<td>N/A N/A</td>
<td>Closes the Y2-O relay (Y2-O). See Caution on page 46.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONNECT AUX1–O</td>
<td>N/A N/A</td>
<td>Energizes the AUX output. If Aux setting is: • NONE — not action taken • ERV — 24 Vac out. Turns on or signals an ERV that the conditions are not good for economizing but are good for ERV operation.†† • SYS — 24 Vac out. Issues a system alarm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONNECT EXH1</td>
<td>N/A N/A</td>
<td>Closes the power exhaust fan 1 relay (EXH1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAT SENS ERR</td>
<td>N/A N/A</td>
<td>SUPPLY AIR TEMPERATURE SENSOR ERROR</td>
<td>Supply air sensor has failed or become disconnected — check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>CO2 SENS ERR</td>
<td>N/A N/A</td>
<td>CO2 SENSOR ERROR</td>
<td>CO2 sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>OA SYLK T ERR</td>
<td>N/A N/A</td>
<td>OUTSIDE AIR S-BUS SENSOR ERROR</td>
<td>Outdoor air enthalpy sensor has failed or become disconnected — check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>OA SYLK H ERR</td>
<td>N/A N/A</td>
<td>OUTSIDE AIR S-BUS SENSOR ERROR</td>
<td>Outdoor air enthalpy sensor has failed or become disconnected — check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>RA SYLK T ERR</td>
<td>N/A N/A</td>
<td>RETURN AIR S-BUS SENSOR ERROR</td>
<td>Return air enthalpy sensor has failed or become disconnected — check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>RA SYLK H ERR</td>
<td>N/A N/A</td>
<td>RETURN AIR S-BUS SENSOR ERROR</td>
<td>Return air enthalpy sensor has failed or become disconnected — check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>DA SYLK T ERR</td>
<td>N/A N/A</td>
<td>DISCHARGE AIR S-BUS SENSOR ERROR</td>
<td>Discharge air sensor has failed or become disconnected — check wiring then replace sensor if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>OA SENS T ERR</td>
<td>N/A N/A</td>
<td>OUTSIDE AIR TEMPERATURE SENSOR ERROR</td>
<td>Outdoor air temperature sensor has failed or become disconnected — check wiring then replace if the alarm continues.</td>
</tr>
<tr>
<td></td>
<td>ACT ERROR</td>
<td>N/A N/A</td>
<td>ACTUATOR ERROR</td>
<td>Actuator has failed or become disconnected — check for stall, over voltage, under voltage and actuator count. Replace actuator if damper is movable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu.</td>
</tr>
<tr>
<td></td>
<td>FREEZE ALARM</td>
<td>N/A N/A</td>
<td>Check if outdoor temperature is below the LOW Temp Lockout on setpoint menu. Check if Mixed air temperature on STATUS menu is below the Lo Setpoint on Advanced setup menu. When conditions are back in normal range the alarm will go away.</td>
<td></td>
</tr>
</tbody>
</table>

### Table 8 — Menu Structure* (cont)

**ADVANCED SETUP (CONT)**

**CHECKOUT†††** Check information for checkout only when they are active. The menu title "ALARMS(#)") includes the number of active alarms in parenthesis (). When using S-bus sensors, “SYLK” will appear on the screen, and when using 20k OA temperature sensors, “SENS T” will appear on the screen.

ALARMS

- **DA SYLK T ERR**: Discharge air sensor has failed or become disconnected — check wiring then replace sensor if the alarm continues.
- **OA SENS T ERR**: Outdoor air temperature sensor has failed or become disconnected — check wiring then replace if the alarm continues.
- **ACT ERROR**: Actuator has failed or become disconnected — check for stall, over voltage, under voltage, and actuator count. Replace actuator if damper is movable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu.
- **FREEZE ALARM**: Check if outdoor temperature is below the LOW Temp Lockout on setpoint menu. Check if Mixed air temperature on STATUS menu is below the Lo Setpoint on Advanced setup menu. When conditions are back in normal range the alarm will go away.
Table 8 — Menu Structure* (cont)

<table>
<thead>
<tr>
<th>ALARMS (CONT)</th>
<th>PARAMETER</th>
<th>PARAMETER DEFAULT VALUE</th>
<th>PARAMETER RANGE AND INCREMENT</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<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>DMP CAL. RUNNING</td>
<td>N/A</td>
<td>N/A</td>
<td>DAMPER CALIBRATION ROUTINE RUNNING</td>
<td></td>
</tr>
<tr>
<td>DA SENS ALM</td>
<td>N/A</td>
<td>N/A</td>
<td>DISCHARGE AIR TEMPERATURE SENSOR ALARM</td>
<td></td>
</tr>
<tr>
<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>ACT UNDER V</td>
<td>N/A</td>
<td>N/A</td>
<td>ACTUATOR VOLTAGE LOW</td>
<td></td>
</tr>
<tr>
<td>ACT OVER V</td>
<td>N/A</td>
<td>N/A</td>
<td>ACTUATOR VOLTAGE HIGH</td>
<td></td>
</tr>
<tr>
<td>ACT STALLED</td>
<td>N/A</td>
<td>N/A</td>
<td>ACTUATOR STALLED</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
1. STATUS → OCCUPIED — The factory-standard Occupancy signal originates with a thermostat or other controller call for indoor fan operation at CTB terminal G. This signal passes through the Central Terminal Board’s OCCUPIED jumper JMP1 to the ECONO connector and to the W7220’s OCC input terminal. An external timeclock or relay is required to implement an Occupancy schedule on the economizer damper position.
2. STATUS → MA TEMP, SETPOINTS → MAT SET — The W7220 menu parameters and labels include designations MA, MAT and Mixed Air for the economizer cooling control sensor. On these rooftop units, the economizer control sensor is located downstream of the evaporator/indoor coil in the supply fan section where this sensor is designated as Supply Air Temperature (SAT) sensor.
3. SETPOINTS → DRYBLB SET — This point is not displayed if a Return Air (differential) temperature sensor or an Outdoor Air enthalpy sensor is connected.
4. SYSTEM SETUP parameters must be configured as noted for 2-Speed unit operation:
   EQUIPMENT = CONV
   AUX2 IN = W
   FAN SPEED = 2SPEED

LEGEND
- CLO — Compressor Lockout
- ERV — Energy Recovery Ventilator
- LCD — Liquid Crystal Display
- MA — Mixed Air
- MAT — Mixed Air Temperature
- N/A — Not Applicable
- OA — Outdoor Air
- OAT — Outdoor Air Temperature
- OCC — Occupied
- RA — Return Air
- RAT — Return Air Temperature
- RTU — Rooftop Unit
- SYS — System
For damper minimum position settings and checkout menu readings, see Table 9.

### Table 9 — 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>1</td>
<td>NO</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>NO</td>
<td>MIN POS H</td>
<td>VMAX – HS</td>
</tr>
<tr>
<td>2</td>
<td>NO</td>
<td>MIN POS L</td>
<td>VMAX – LS</td>
</tr>
<tr>
<td>1</td>
<td>YES</td>
<td>VENT MIN</td>
<td>VMIN – HS</td>
</tr>
<tr>
<td>1</td>
<td>YES</td>
<td>VENT MAX</td>
<td>VMAX – HS</td>
</tr>
<tr>
<td>2</td>
<td>YES</td>
<td>VENT MIN H</td>
<td>VMIN – HS</td>
</tr>
<tr>
<td>2</td>
<td>YES</td>
<td>VENT MAX H</td>
<td>VMAX – LS</td>
</tr>
<tr>
<td>2</td>
<td>YES</td>
<td>VENT MIN L</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>YES</td>
<td>VENT MAX L</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### SEQUENCE OF OPERATION

See Tables 10-17 for dry bulb and enthalpy sequence of operation.

### Table 10 — Dry Bulb Operation, No Demand Controlled Ventilation (DCV) (CO₂ Sensor) — 1 Speed Fan

<table>
<thead>
<tr>
<th>DCV</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE?</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>No</td>
<td>Off</td>
<td>Off</td>
<td>High</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>High</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>On</td>
<td>High</td>
<td>24-v/On</td>
<td>24-v/On</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td>Yes</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>High</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>High</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>MIN POS to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>On</td>
<td>High</td>
<td>24-v/On</td>
<td>24-v/On</td>
<td>MIN POS to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
</tbody>
</table>

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

### Table 11 — Dry Bulb Operation, With Demand Controlled Ventilation (DCV) (CO₂ Sensor) — 1 Speed Fan

<table>
<thead>
<tr>
<th>DCV</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE?</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below CO₂ Set</td>
<td>No</td>
<td>Off</td>
<td>Off</td>
<td>High</td>
<td>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>Yes</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>High</td>
<td>0-v/Off</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>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>Above CO₂ Set</td>
<td>No</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 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 to VENTMAX</td>
<td>Closed</td>
</tr>
<tr>
<td>Yes</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>High</td>
<td>0-v/Off</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>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>24-v/On</td>
<td>VENTMIN to VENTMAX</td>
<td>Closed</td>
</tr>
</tbody>
</table>

*With stage 3 delay (STG3 DLY) in Advanced setup menu, second stage of mechanical cooling Y2-O can be turned on after the delay if the calls for Y1-I and Y2-I have not been satisfied.
Table 12 — Enthalpy Operation, No Demand Controlled Ventilation (DCV) (CO₂ Sensor) — 1 Speed Fan

<table>
<thead>
<tr>
<th>DCV</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE?</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>No</td>
<td>Off</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>Low</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>On</td>
<td>High</td>
<td>24-v/On</td>
<td>24-v/On</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td>Yes</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>High</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>High</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>On</td>
<td>High</td>
<td>24-v/On</td>
<td>24-v/On</td>
<td>MIN POS</td>
<td>Closed</td>
</tr>
</tbody>
</table>

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

Table 13 — Enthalpy Operation, With Demand Controlled Ventilation (DCV) (CO₂ Sensor) — 1 Speed Fan

<table>
<thead>
<tr>
<th>DCV</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE?</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Set</td>
<td>No</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>Above Set</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 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>
</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, second stage of mechanical cooling Y2-O can be turned on after the delay if the calls for Y1-I and Y2-I have not been satisfied.

Table 14 — Dry Bulb Operation, No Demand Controlled Ventilation (DCV) (CO₂ Sensor) — 2 Speed Fan

<table>
<thead>
<tr>
<th>DCV</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE?</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>No</td>
<td>Off</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>MIN POS L</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>Low</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>MIN POS L</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>MIN POS H</td>
<td>Closed</td>
</tr>
<tr>
<td>Yes</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>MIN POS L</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>Low</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>MIN POS L</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>On</td>
<td>High</td>
<td>DELAY* 24-v/On</td>
<td>0-v/Off†</td>
<td>MIN POS H 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, second stage of mechanical cooling Y2-O can be turned on after the delay if the calls for Y1-I and Y2-I have not been satisfied.
### Table 15 — Dry Bulb Operation, With Demand Controlled Ventilation (DCV) (CO₂ Sensor) — 2 Speed Fan

<table>
<thead>
<tr>
<th>DCV</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE?</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Set</td>
<td>No</td>
<td>Off</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN L</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>Low</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>VENTMIN L</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</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Off</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN L</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN L 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 H to Full-Open</td>
<td>Closed to Full-Open</td>
</tr>
<tr>
<td>Above Set</td>
<td>No</td>
<td>Off</td>
<td>Off</td>
<td>Low</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>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>Low</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>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN L 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>DELAY*</td>
<td>0-v/Off</td>
<td>VENTMIN H 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, second stage of mechanical cooling Y2-O can be turned on after the delay if the calls for Y1-I and Y2-I have not been satisfied.

### Table 16 — Enthalpy Operation, No Demand Controlled Ventilation (DCV) (CO₂ Sensor) — 2 Speed Fan

<table>
<thead>
<tr>
<th>DCV</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE?</th>
<th>Y1-I</th>
<th>Y2-I</th>
<th>FAN SPEED</th>
<th>Y1-O</th>
<th>Y2-O</th>
<th>OCCUPIED</th>
<th>UNOCCUPIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Set</td>
<td>No</td>
<td>Off</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>MIN POS L</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>Low</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>MIN POS L</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>MIN POS H</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Off</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>MIN POS L</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>MIN POS L 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>DELAY*</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>VENTMIN H 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.

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### Table 17 — Enthalpy Operation, With Demand Controlled Ventilation (DCV) (CO₂ Sensor) — 2 Speed Fan

<table>
<thead>
<tr>
<th>DCV</th>
<th>OUTSIDE AIR GOOD TO ECONOMIZE?</th>
<th>Y1-I</th>
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<th>FAN SPEED</th>
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<tr>
<td>Below Set</td>
<td>No</td>
<td>Off</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN L</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>Low</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>VENTMIN L</td>
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<td></td>
<td>On</td>
<td>On</td>
<td>High</td>
<td>24-v/On</td>
<td>24-v/On</td>
<td>VENTMIN H</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Off</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN L</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
<td>0-v/Off</td>
<td>VENTMIN L 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>DELAY*</td>
<td>24-v/On</td>
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</tr>
<tr>
<td>Above Set</td>
<td>No</td>
<td>Off</td>
<td>Off</td>
<td>Low</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>On</td>
<td>High</td>
<td>24-v/On</td>
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<td>Closed</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Off</td>
<td>Off</td>
<td>Low</td>
<td>0-v/Off</td>
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<td>0-v/Off</td>
<td>VENTMIN L 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>DELAY*</td>
<td>24-v/On</td>
<td>0-v/Off</td>
<td>VENTMIN H 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, second stage of mechanical cooling Y2-O can be turned on after the delay if the calls for Y1-I and Y2-I have not been satisfied.
ENTHALPY SETTINGS

When the OA temperature, enthalpy and dew point are below the respective setpoints, the outdoor air can be used for economizing. Figure 55 shows the new single enthalpy boundaries in the W7220. There are 5 boundaries (setpoints ES1 through ES5), which are defined by dry bulb temperature, enthalpy and dew point.

Refer to Table 18 for ENTH CURVE setpoint values.

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

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

Fig. 55 shows the 5 current boundaries. There is also a high limit boundary for differential enthalpy. The high limit boundary is ES1 when there are no stages of mechanical cooling energized and HL (high limit) when a compressor stage is energized.

Table 18 provides the values for each boundary limit.
TWO-SPEED FAN OPERATION

The W7220 controller has the capability to work with a system using a 2-speed supply fan. The W7220 does not control the supply directly but uses the input status to determine the speed of the supply fan (see Table 19) and controls the OA damper to the required position.

Table 19 — W7220 Control, 2-Speed Supply Fan

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

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

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

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

CHECKOUT

Inspect all wiring connections at the economizer module’s terminals, and verify compliance with the installation wiring diagrams.

For checkout, review the Status of each configured parameter and perform the Checkout tests.

NOTE: See “Interface Overview” on page 35 for information about menu navigation and use of the keypad.

Power Up

After the W7220 module is mounted and wired, apply power.

Initial Menu Display

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

Power Loss (Outage or Brownout)

All setpoints and advanced settings are restored after any power loss or interruption. All settings are stored in non-volatile flash memory.

Status

Use the Status menu (see Table 8) to check the parameter values for the various devices and sensors configured.

NOTE: See “Interface Overview” on page 35 for information about menu navigation and use of the keypad.

Checkout Tests

Use the Checkout menu (see Table 8) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

NOTE: See “Interface Overview” on page 35 for information about menu navigation and use of the keypad.

### TROUBLESHOOTING

#### Alarms

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

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

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

#### Clearing Alarms

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

To clear an alarm, perform the following:

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

NOTE: If the alarm still exists after clearing it, it is redisplayed within 5 seconds.
Smoke Detectors

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

Units equipped with factory-optional Return Air smoke detectors require a relocation of the sensor module at unit installation. See Fig. 56 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. 57, 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. 57, Step 2.
3. Screw the sensor and detector plate into its operating position using screws from Step 1. See Fig. 57, Step 3.
4. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.

Fig. 56 — Return Air Smoke Detector, Shipping Position

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.

Fig. 57 — Completing Installation of Return Air Smoke Sensor
**Staged Air Volume (SAV™) with Variable Frequency Drive (Factory-Installed Option)**

For details on operating 50HC 2 stage cooling units equipped with the factory-installed Staged Air Volume option, refer to the Variable Frequency Drive (VFD) Installation, Start-Up and Service Instructions.

**ComfortLink Control (Factory-Installed Option)**

For details on operating 50HC units equipped with the factory-installed ComfortLink option, refer to Controls, Start-Up, Operation and Troubleshooting for 48/50HC 04-28 Single Package Rooftop Unit with ComfortLink Controls.

**PremierLink™ Controller (Factory Option)**

For details on operating 50HC 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**

For details on operating 50HC units equipped with the factory-installed RTU Open controller option, refer to the Factory-Installed Option RTU Open Multi-Protocol Controller Controls, Start-Up, Operation and Troubleshooting manual.

**Controller Options**

**LOW AMBIENT CONTROL (FACTORY OPTION)**

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

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

**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. 58 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.

**Fig. 58 — EconoMi$er IV Wiring**

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*Controller Options*

LOW AMBIENT CONTROL (FACTORY OPTION)

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

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

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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)
- Power Exhaust
- Differential dry-bulb sensor (EconoMi$er IV)
- Outdoor enthalpy sensor
- Differential enthalpy sensor
- Electric Heaters
- Single Point kits
- Low Ambient Controls
- Thermostat / Sensors
- CO₂ sensor
- DDC interface (PremierLink™ controller)
- Louvered hail guard
- Phase monitor control
- Winter Start kit
Refer to separate installation instructions for information on installing these accessories.

Step 13 — Check Belt Tension
Measure the belt span length as shown in Fig. 59. Calculate the required deflection by multiplying the belt span length by 1/64. For example, if the belt span length is 32 inches: 32 x 1/64 = 1/2 inch deflection.

BELT FORCE — DEFLECTION METHOD
Check the belt tension with a spring-force belt force deflection gauge (available from drive belt manufacturer).
1. Place a straightedge along the belt between the two pulleys. Measure the distance between the motor shaft and the blower shaft.
2. Set the tension gauge to the desired tension (see Table 1 in Fig. 59). 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 loosening the motor mounting plate front bolts and rear bolt (see Fig. 60) and slide the plate towards the fan (to reduce tension) or away from the fan (to increase tension). Ensure the blower shaft and motor shaft are parallel to each other (pulleys aligned). Tighten all bolts securely when finished.

BELT TENSION METHOD
Requires belt tension gauge that measures tension in belt in units of lbs force.

UltraTech Compressor (50HC07 Units Only)
50HC07 (6 ton) units use a two-stage single UltraTech* compressor. The UltraTech compressor’s molded plug should be used at all times. The maximum power is 5A.

The compressor will modulate from part load to full load when the voltage supplied to the molded plug is 18 to 28vdc or 18 to 28 vac rectified to vdc. The compressor will modulate from full load to part load when the current in the circuit drops below 0.9 MA. See Table 20 for additional details. For service information, see 50HC04-14 Service and Maintenance Instructions.

* UltraTech is a trademark of Emerson Climate Technologies, Inc.
Pre-Start and Start-Up

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

<table>
<thead>
<tr>
<th>STAGE</th>
<th>CAPACITY</th>
<th>METERING</th>
<th>LIQUID LINE SOLENOID</th>
<th>COMPRESSOR UNLOADER</th>
<th>FOR ULTRA TECH COMPRESSOR TROUBLESHOOTING (COMPRESSOR CURRENT)</th>
<th>FOR LIQUID LINE SOLENOID VALVE TROUBLESHOOTING (TOP EVAPORATOR COIL TEMPERATURE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1</td>
<td>Part Load (66%)</td>
<td>TXV</td>
<td>Closed (De-energized)</td>
<td>De-energized</td>
<td>Approx. 80% or less</td>
<td>Top section of the evaporator coil will not be cold (U-bend tubes)</td>
</tr>
<tr>
<td>Y1+Y2</td>
<td>Full Load (100%)</td>
<td>TXV+Fixed</td>
<td>Open (Energized)</td>
<td>Energized</td>
<td>100%</td>
<td>Top section of the evaporator coil will be cold (U-bend tubes)</td>
</tr>
</tbody>
</table>
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) _____

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

IV. HUMIDI-MIZER® SYSTEM START-UP
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) _____
5. Switch unit to high-latent mode (sub-cooler) by closing humidistat with Y1 closed (Y/N) _____

OBSERVE
A. Reduction in suction pressure (5 to 7 psi expected) (Y/N) _____
B. Discharge pressure unchanged (Y/N) _____
C. Liquid temperature drops to 50 to 55°F range (Y/N) _____
D. Liquid solenoid valve (LSV) 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)
C. Liquid temperature returns to normal cooling level
D. LSV solenoid energized (valve closes)
E. Discharge solenoid valve (DSV) energized, valve opens
7. With unit in dehumid mode close W1 compressor and outdoor fan stop; LSV and DSV solenoids are 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.